HOLLY SPRINGS, NC

2014 JORDAN LAKE ALLOCATION REQUEST

FINAL

NOVEMBER 2014

THE TOWN OF
Holly
Springs

November 12, 2014

Tom Fransen
Water Planning Section Chief
Division of Water Resources
NC Department of Environment and Natural Resources
1611 Mail Service Center
Raleigh, NC 27699-1611

RE: Jordan Lake Allocation Application
TOHS Project #14-006

Dear Mr. Fransen:

This draft Jordan Lake Allocation Application being submitted by the Town of Holly Springs represents a request for storage allocation required to meet the Town's projected needs for additional water supply capacity through 2045. This Application constitutes a request for water supply consistent with the Triangle Regional Water Supply Plan (TRWSP) that has been developed by the Jordan Lake Partnership (JLP), a collection of thirteen local governments and water systems that was created to collaboratively plan for the future of water supply in the Triangle Region, including the future use of Jordan Lake.

The JLP's TRWSP was compiled with the intention of meeting the needs of all JLP members while minimizing the impacts on other water users (including downstream systems), the environment, and rate payers. Additionally, it has been a goal of the JLP to present a set of coordinated allocation requests for Jordan Lake water supply storage that neither over-allocates the storage pool nor results in needless competition among individual water systems.

All Jordan Lake Allocation requests submitted by the Jordan Lake Partnership member entities have been made transparent to other partners, and should match the designated allocation requests that are presented in the JLPs TRWSP.

Accordingly, the Town of Holly Springs is requesting a 2% Level II allocation. This request is consistent with continuing Holly Springs' existing 2% Level II allocation and is an integral part of the Holly Springs overall regional water supply plan. We believe that this request supports reasonably predicted growth, and demonstrates a unique commitment to responsibility for public health, as Holly Springs is home to the Novartis Vaccines manufacturing and processing facility – the only pandemic flu vaccine manufacturing plant in the United States.

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In addition to manufacturing the flu vaccine, the Novartis plant is one of three facilities that have been asked by the US Biomedical and Advanced Research and Development Authority to submit plans to produce an anti-Ebola drug, ZMapp. Securing a consistent and sufficient water supply to meet the needs of the community – including this facility – is critical to public health.

The Town of Holly Springs is fully committed to meeting all financial obligations resulting from the fulfillment of this allocation request.

Thank you for your consideration of this request. Please let me know if you have questions.

Sincerely,

Kendra D. Parrish, PE, CFM
Director of Engineering

Cc: Project file paper/electronic/correspondence 41164

KDP/cdm/jcb

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INTRODUCTION

The Jordan Lake Partnership (JLP) has been working collaboratively since 2009 to plan for the future of the Triangle Region's water supply. They have developed a draft Triangle Regional Water Supply Plan (TRWSP) to meet the 50-year water needs of the thirteen partners listed below:

- ***Town of Apex***
- ***Town of Cary***
- ***Chatham County (North water system)***
- ***City of Durham***
- ***Town of Hillsborough***
- ***Town of Holly Springs***
- ***Town of Morrisville***
- ***Orange Water and Sewer Authority (OWASA)***
- ***Orange County***
- ***Town of Pittsboro***
- ***City of Raleigh and Merger Partners***
- ***City of Sanford***
- ***Wake County (Research Triangle Park - South)***

The draft Triangle Regional Water Supply Plan has been provided to DWR by the JLP as an accompanying document to this Jordan Lake Allocation request. The TRWSP details the planning process used to develop the regional water supply plan, and the preferred regional alternative includes projected requests for Jordan Lake water supply allocation by several of the JLP members. This introduction briefly presents the preferred regional alternative, thus providing the regional context of the Town of Holly Springs' allocation request.

As part of the regional water supply planning process, JLP members collaborated to develop demand projections, identify water source options, develop and evaluate alternatives, and present a mutually-supported plan for meeting the future water supply needs of the Triangle Region. In doing so, JLP members supported each other through a careful peer review of each other's demand projections; through shared information about conservation and water use efficiency efforts; through inter-utility infrastructure planning efforts (including a regional distribution system interconnection study, a hydraulic model, and a feasibility study for a new intake and water treatment plant on the western side of Jordan Lake); and by expanding the pool of potential water supply source options.

The 2060 future water service areas of the JLP members are shown in Figure 1.

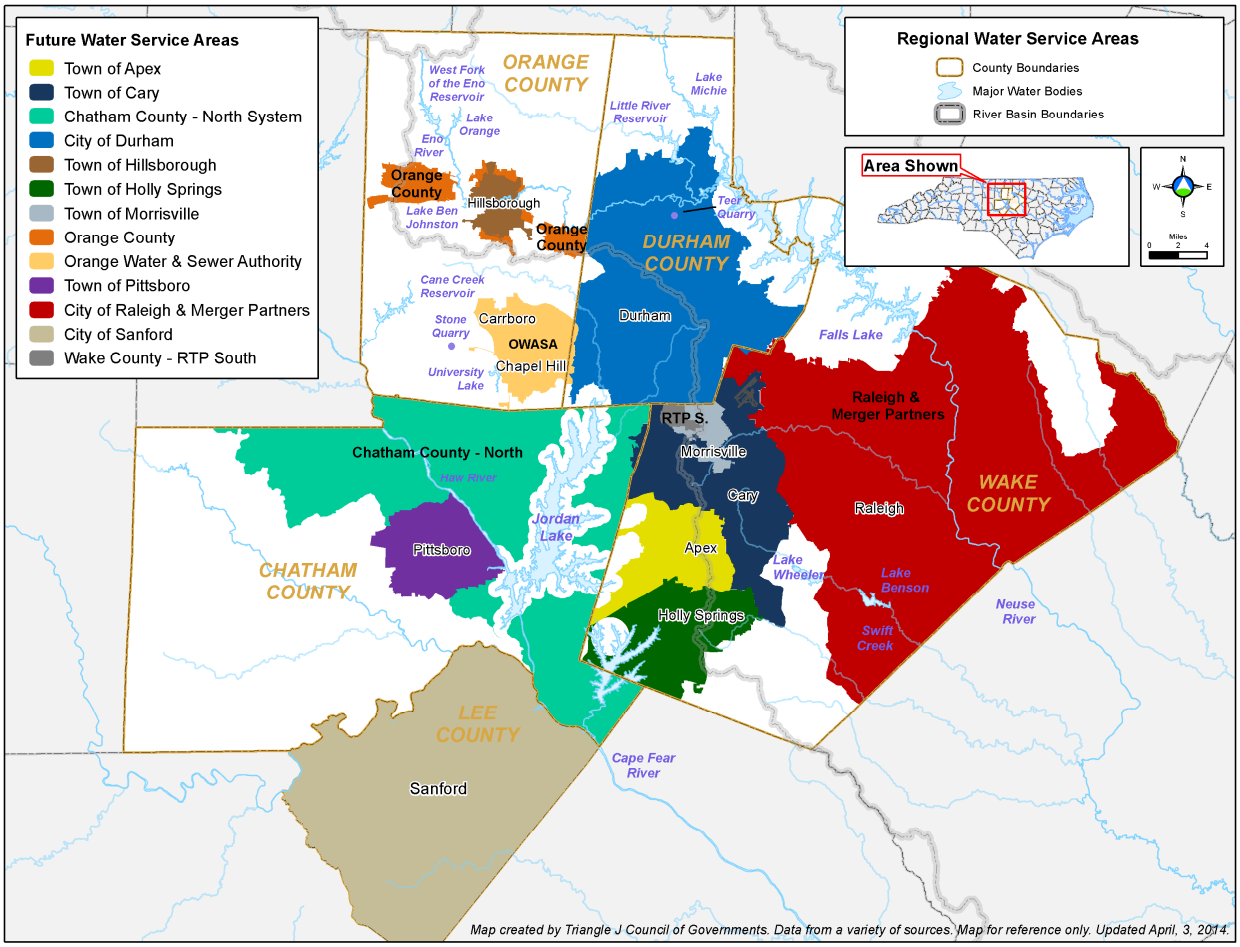


Figure 1 – Future (2060) Water Service Areas of the Jordan Lake Partners

Developing the Regional Water Supply Plan

The TRWSP has two basic components: 1) identification of regional water need through 2060, and 2) a plan for meeting those needs. The *Triangle Regional Water Supply Plan: Volume I – Water Needs Assessment* (May 2, 2012) presented the demand projections and initial estimates of water supply needs for all of the JLP members. The *Triangle Regional Water Supply Plan: Volume II – Regional Water Supply Alternatives Analysis* (Draft, April 18, 2014) presented the methodology used to create and evaluate regional water supply alternatives and the details of the preferred alternative and regional water supply plan. These documents should be consulted for more information. The following information summarizes the regional needs, recommended regional water supply alternative, and proposed Jordan Lake allocations requests.

Water Demand Projections and Projected Need

Figure 2 illustrates the total regional water demand projections as compared to the current available water supply (horizontal line) of 199 MGD for the thirteen JLP members. Each of the partners developed its own initial projections, which were then reviewed and scrutinized by the

other partners, and subsequently revised. The revised, peer-reviewed demand projections were approximately 10-15% lower than the initial projections, as shown by the red shaded boxes in the figure below, and represent a historic consensus among local water system professionals about the present status and long-term needs of the Triangle Region's water supply resources.

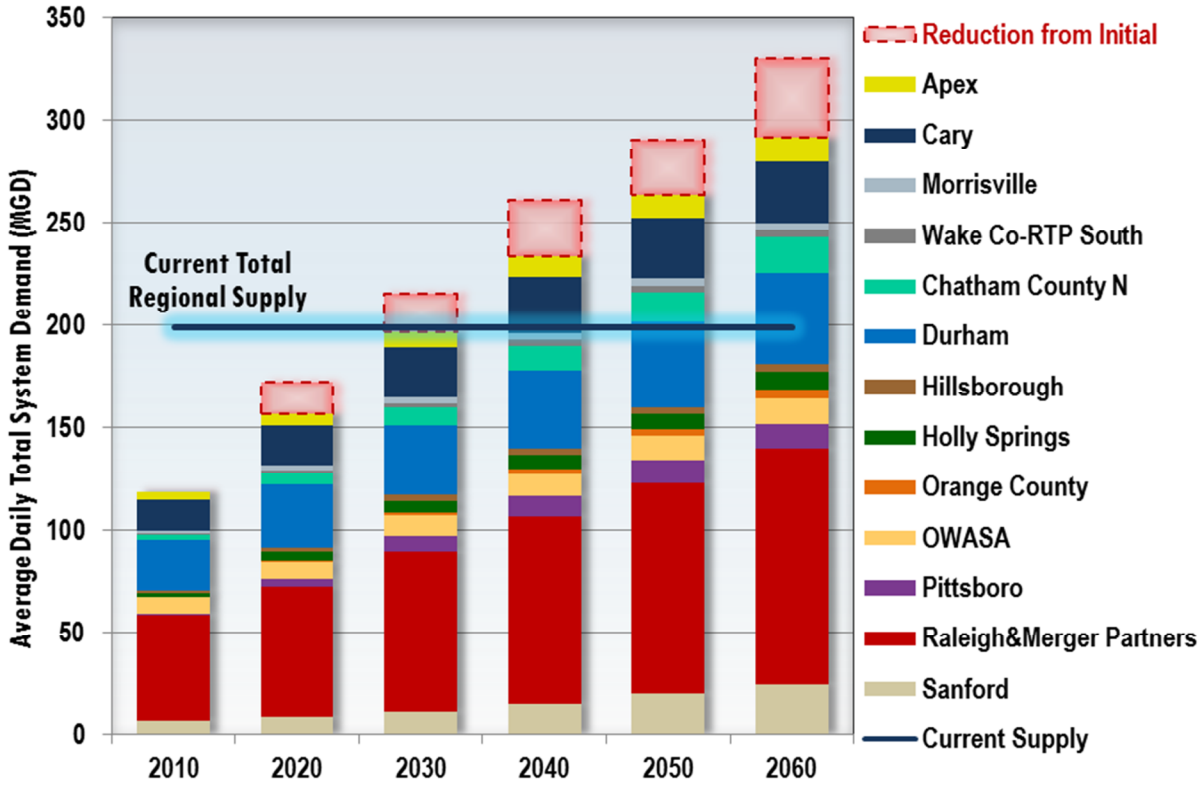


Figure 2 – Regional Demand Projections, Current Supply, and Reductions due to Peer Review

Each water system's need is presented as the average day demand minus the operational yield of its existing water supply sources (including existing Level I Jordan Lake allocations). Based on demand projections and existing supply, the need for each partner was computed for the 2010 -2060 planning period at five year intervals as shown in Table 1. The italicized columns for 2045 and 2060 highlight the key planning years for the Round 4 Jordan Lake Allocation process and the 50-year TRWSP, respectively.

Table 1 – Projected Water Supply Need (MGD) by Partner

Partner	2010	2015	2020	2025	2030	2035	2040	*2045*	2050	2055	*2060*
Apex *	0.0	0.0	0.0	0.0	0.0	0.3	1.4	*2.1*	2.5	2.8	*3.1*
Cary *	0.0	0.0	0.0	0.0	0.8	2.5	3.9	*5.1*	6.3	6.3	*6.3*
Morrisville *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	*0.1*
Wake Co. (RTP S.) *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chatham County N *	0.0	0.0	0.0	0.8	2.3	4.1	5.9	*7.0*	8.2	10.1	*12.1*
Durham *	0.0	0.0	0.0	0.0	0.0	0.0	0.2	*2.1*	4.0	5.2	*6.5*
Hillsborough	0.0	0.0	0.0	0.0	0.1	0.3	0.4	*0.6*	0.8	0.9	*1.1*
Holly Springs *	0.0	0.0	0.0	0.0	0.0	0.0	0.1	*0.6*	1.1	1.6	*2.1*
Orange County *	0.0	0.1	0.5	0.9	1.3	1.8	2.2	*2.6*	3.0	3.3	*3.7*
OWASA *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pittsboro	0.0	0.0	1.3	3.6	5.8	6.9	8.1	*8.4*	8.8	9.3	*9.8*
Raleigh & Merger	0.0	0.0	0.0	0.0	0.9	7.5	14.0	*19.7*	25.4	31.6	*37.7*
Sanford	0.0	0.0	0.0	0.0	0.0	1.3	3.2	*5.8*	8.4	10.6	*12.8*
Total	0.0	0.1	1.8	5.3	11.2	24.7	39.4	*54.0*	68.4	81.8	*95.2*

**** "Need" assumes that existing Level I Jordan Lake allocations are fully utilized***

Recommended Regional Alternative

The JLP evaluated a multitude of regional water supply alternatives that could meet the Region's needs as presented in Table 1. The *Triangle Regional Water Supply Plan: Volume II – Regional Alternatives Analysis* presents the methodology and analyses used to create and evaluate those alternatives. A preferred regional alternative for meeting the future needs of all partners through 2060 emerged from this effort and is referred to hereinafter as the "JLP Recommended Alternative."

Table 2 presents new water supply sources that would be brought online as part of the JLP Recommended Alternative. The Projected New Supply column lists the estimated yield of supply sources in addition to existing yields currently available. These sources may include either new supply sources or the expansion of existing sources.

The City of Raleigh's preferred source options remain uncertain with regard to timing and order of implementation, but include four priority sources, any of which could provide approximately 13.7 MGD of additional yield. These include 1) a new Little River Reservoir in eastern Wake County, 2) a reallocation of Falls Lake storage to increase the available water supply pool, 3) a direct withdrawal from the Neuse River upstream of Raleigh's Neuse River Wastewater Treatment Plant, and 4) a quarry reservoir adjacent to the Neuse River near Richland Creek. Under the JLP Recommended Alternative, Raleigh would meet its future demands from a combination of these Neuse Basin sources and would not require a Jordan Lake allocation.

Table 2 – JLP Recommended Alternative Sources to be Constructed

Partner	Source Name	Basin	Type	Year Online	Projected New Supply [MGD]
Multiple	Jordan Lake – Round 4	Haw	Storage Allocation	2015	28.2
Multiple	Jordan Lake – Future Rounds	Haw	Storage Allocation	2025 – 2045	8.2
Sanford	Cape Fear River Withdrawal	Cape Fear	River Withdrawal	2025, 2045	12.8
Pittsboro	Haw River Withdrawal	Haw	River Withdrawal	2015, 2020	4.0
Hillsborough	W. Fork Eno Reservoir Expansion	Neuse	Reservoir Expansion	2015	1.2
OWASA	Stone Quarry Expansion	Haw	Quarry Reservoir	2035	2.1
Orange County	Town of Mebane Purchase	Haw	Purchase	2015-2020	2 (0.5 – 2.5)
Raleigh	Neuse Basin Option 1	Neuse	TBD	2025	13.7 (9-15)
Raleigh	Neuse Basin Option 2	Neuse	TBD	2035-2045	13.7 (9-15)
Raleigh	Neuse Basin Option 3	Neuse	TBD	2050-2055	13.7 (9-15)
TOTAL	All New Sources				96.2-100

In total, the JLP Recommended Alternative provides approximately 100 MGD of additional supply by 2060, which would meet the Region's projected cumulative need of 95.2 MGD. The timing and sequence of bringing the new sources online would reduce the risk of a supply deficit for any partner during the planning period.

Jordan Lake Allocations Proposed in JLP Recommended Alternative

The JLP Recommended Alternative includes new or expanded Jordan Lake Allocations for multiple partners, both in this current Round 4 and in future allocation cycles, to meet needs through 2060. Currently, 63% of Jordan Lake's water supply pool has been allocated, and a 1% storage allocation is assumed to yield approximately 1 MGD of average day supply. All existing allocations are currently held by Jordan Lake Partnership members, and the JLP Recommended Alternative proposes that all of these either be maintained or increased.

Table 3 presents current allocations, the proposed Round 4 allocation requests, and future proposed allocation requests through 2060. Round 4 requests would meet water supply needs through 2045; future allocations would meet 2060 needs. Table 3 indicates the total allocation amounts for each partner, who are expected to distinguish between Level I and Level II requests in their respective Round 4 allocation applications.

Table 3 includes all thirteen JLP members, even though Raleigh and Sanford are not expected to request Jordan Lake Allocations. The Towns of Apex and Cary currently hold a combined allocation that meets the needs of both communities. The Town of Cary also has finalized long-term agreements to serve the Town of Morrisville and the Wake County – RTP South service areas and is expected to make a joint allocation request. Table 3, therefore, includes the combined amount of the proposed allocation request, but it also shows the individual partners' amounts.

Table 3 – JLP Recommended Alternative proposed Jordan Lake Allocations by Partner (MGD).

Partner	Current	Round 4 Requests	Future Rounds (2060 Need)
Apex	8.5	10.6	11.6
Cary	23.5 (32.0)	28.6 (46.2)	29.8 (48.5)
Morrisville	3.5	3.5	3.6
Wake County (RTP South)	3.5	3.5	3.5
Chatham County - N	6	13	18.2
Durham	10	16.5	16.5
OWASA	5	5	5
Orange County	1	1.5	2
Holly Springs	2	2	2.2
Hillsborough	0	1	1
Pittsboro	0	6	6
Raleigh & Merger Partners	0	0	0
Sanford	0	0	0
TOTAL JLP	63	91.2	99.4

Moving toward implementation

The JLP Recommended Alternative is the result of more than four years of collaborative planning by the Partnership. The water supply needs of the thirteen partners have been vetted through multiple rounds of peer review and represent the most complete long-term picture of the Region's demands compiled to date. A thorough regional water supply alternatives analysis determined that the JLP Recommended Alternative would be most acceptable in terms of implementability, environmental and community impacts, customer costs, and overall acceptance by local governments and the general public.

The JLP efforts constituted the successful collaboration – including an unprecedented level of mutual trust and respect – among local entities planning, coordinating, and moving toward implementation of a water supply plan that will meet the long-term needs of the entire Triangle Region. Individual partners will continue to operate their own systems, but the success of this regional water supply plan will depend on each partner being able to implement its respective additional water supply sources as recommended.

The partners investigated the various impacts of the JLP Recommended Alternative – including effects on the environment, downstream water users, and the general public – and found these impacts to be acceptable and preferable to those of the other options. Hydrologic effects of the JLP Recommended Alternative were modeled with the recently updated Cape Fear-Neuse Basin OASIS model. Preliminary results indicate the proposed alternative will meet long term

demands without creating downstream shortages; is considered to be the most implementable from a regulatory and political perspective; and provides for coordinated allocation requests among JLP members.

The remainder of this document presents the allocation request for the Town of Holly Springs.

SECTION I. WATER DEMAND FORECAST

The Town of Holly Springs (alternately referred to in this application as Holly Springs or The Town) is located in southwest Wake County. The Town and its growth area are bordered to the east by the Town of Fuquay-Varina, to the north by the Towns of Apex and Cary, to the west by Apex and the county line, and to the south by Fuquay Varina, Chatham and Harnett Counties. The Town currently incorporates approximately 12 square miles (7,660 acres), based on GIS data provided by the Wake County GIS Department, and has approximately 56 square miles (36,000 acres) included in its planning area. A map of the Town's planning area is shown in Figure I.1.

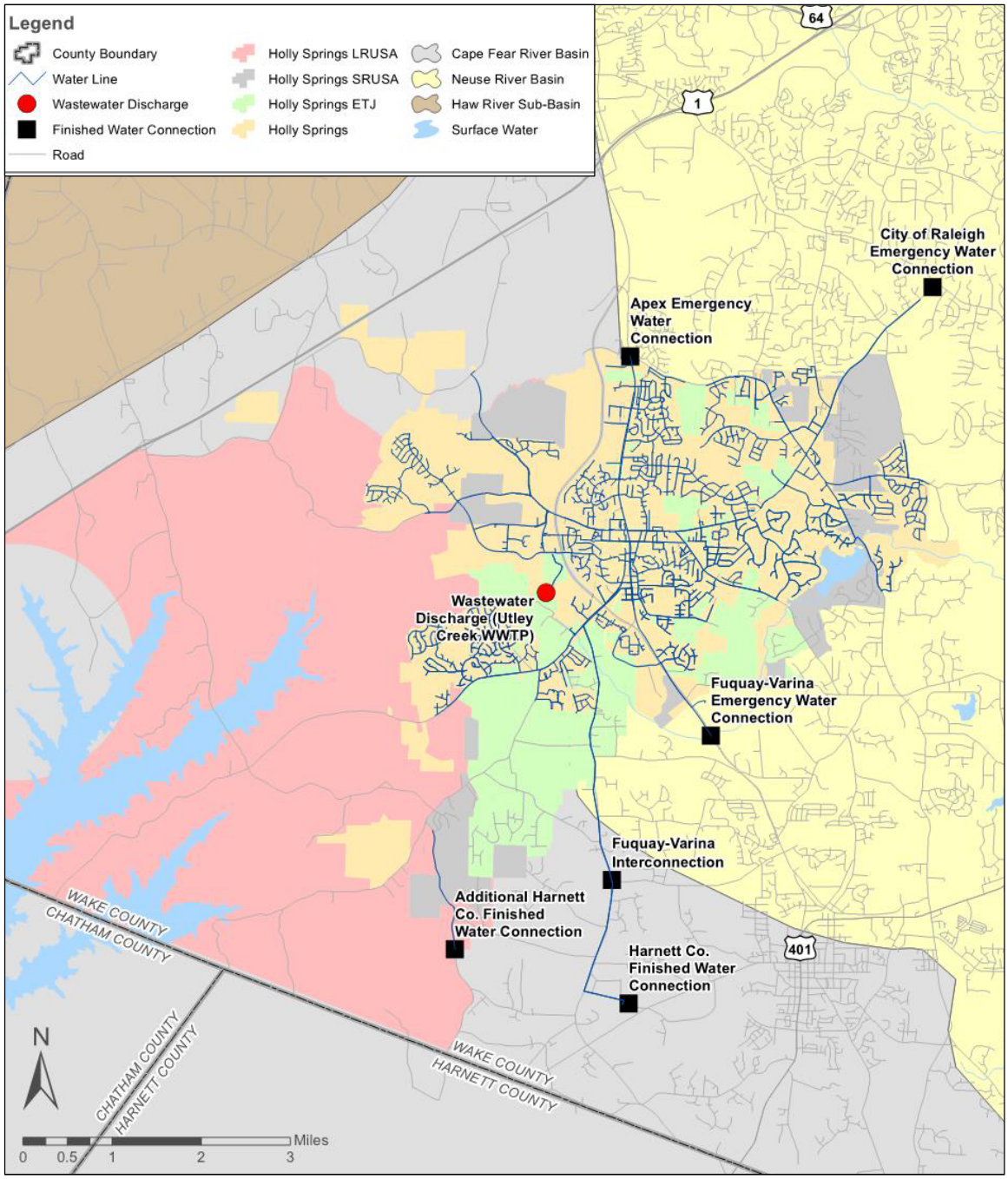
Holly Springs currently uses approximately 1.8 million gallons of potable water on an average daily basis delivered from Harnett County. The Town purchases capacity from Harnett County, which draws water from the Cape Fear River. The contract with Harnett County allows the Town to draw a maximum of 10 million gallons per day (MGD) of finished water. Residential customers currently account for approximately 74% of the town's water usage, with commercial, industrial and institutional customers accounting for 17%, 7% and 2%, respectively, of the town's water usage.

In addition to this primary finished water supply source, the Town has a formal agreement for emergency supply with the City of Raleigh to provide up to 1.2 million gallons per day through the year 2017, although no water has been purchased from Raleigh since July 2008. The Town currently holds a 2% Level II allocation for water from Jordan Lake, but does not currently receive water from this source. The Town also has emergency water system interconnections with the Towns of Apex and Fuquay-Varina.

Recognizing the value of its water, the Town has implemented multiple strategies, which will be detailed later in this document, to offset potable demands. These include – among other things – a reclaimed water program, a water loss reduction program, a conservation water rate structure, and a water shortage response plan.

The Town of Holly Springs is unique in the region in that it is home to the Novartis facility, which is critical to national public health. Novartis is one of the Town's biggest users of water. The Holly Springs Novartis facility was built as a joint partnership between Novartis and the US Department of Health and Human Services Biomedical and Advanced Research and Development Authority (BARDA) to invest in innovation to better protect the public in the event of a pandemic or other health security. In June 2014, the facility was licensed by the US Food and Drug Administration to produce cell-culture influenza vaccines. The Holly Springs facility produces seasonal as well as pre-pandemic flu vaccine, and it is capable of increasing production in the event of a flu pandemic. In addition to manufacturing the flu vaccine, the Holly Springs Novartis plant is one of three facilities that have recently been asked by the BARDA to submit plans to produce an anti-Ebola drug, ZMapp. Redundancy in the Town of Holly Springs' water supply is of critical importance to uninterrupted operation of the Novartis facility.

Figure I.1 – Map of Service Area



In 2011, the Town completed a detailed demand projection study to evaluate future water needs. This study is used as the basis for all demand projections for Holly Springs. Nearly all techniques and approaches for projecting future water demands are based on the premise that an analysis of historic trends can serve as the basis for predicting future trends, including the most commonly used methods, per capita demand forecasting and disaggregated demand forecasting. In the 2011 study, both methods were used in projecting future demand for

planning purposes and for the purposes of this application. Since the results of both methods were very similar, disaggregated demand forecasting was utilized for the final projections for each sector, as this would allow the Town more flexibility in modifying the projections as account growth and distribution is tracked annually. However, the basis for the population projections is also described below for comparison purposes.

Population Projections

Historical population estimates from 1970 through 2004 were retrieved from the North Carolina Office of State Planning, estimates from 2005 through 2009 were retrieved from the Town Planning and Zoning Department, and 2010 population estimates originated from the 2010 Census. Future population forecasts through 2030 were retrieved from the 2009 Western Wake Regional Wastewater Management Facilities Engineering Report (ER) and were based upon historical trends in Holly Springs from 2000 to 2004. Note that these projections assumed, for the purposes of the ER document, that 50 percent of an unresolved area between Apex and Holly Springs would be served by Apex and 50 percent would be served by Holly Springs. This service area has now been resolved.

The previously mentioned historical population estimates and projections through 2030 were graphed and demonstrated a linear relationship of growth over time. This same linear relationship was used to project population forward through 2060. In order to determine if the projections were reasonable, the resulting population density was compared to that of neighboring cities. The projected population density was found to be reasonable, in comparison to neighboring cities, and the population projection itself, as seen in Table I.1 below, was determined to be as reasonable and accurate as possible, given the uncertainties surrounding future projections.

Table I.1 - Population Projections for Service Area

2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
24,700	35,700	46,700	54,300	61,900	68,400	74,800	81,900	89,000	96,200	103,300

Usage Rates

To project future usage rates for the 2011 study, historical water demands were evaluated, using billing records of monthly water usage for fiscal years 2002 through 2010. Annual usage and per capita water usage are shown below in Table I.2.

Table I.2 – Annual Water Usage and Per Capita Estimates

Fiscal Year	Annual Usage (million gallons)	Population	Per Capita Usage (gallons/person/day)	Avg. Daily Use (million gallons/day)
2002	306.1	11,375	73.7	0.84
2003	268.6	12,375	59.5	0.74
2004	320.1	13,362	65.6	0.88
2005	342.7	15,425	60.9	0.94
2006	450.6	18,214	67.8	1.23
2007	495.1	19,804	68.5	1.36
2008	546.9	20,892	71.7	1.50
2009	510.6	21,482	65.1	1.40
2010	609.6	24,661	67.7	1.67

The per capita usage over the most recent 5 years of the study was approximately 68 gallons per person per day. Quite simply, this number was then applied to the population projections as a first estimate of the future water demand.

Sector Projections

As noted, however, it was determined during the 2011 study that sector projections or a "dis-aggregated" demand forecast would be most appropriate for Holly Springs. The remainder of this section discusses the process for building this demand forecast and the results for the planning horizon evaluated in this application.

User Sectors

The Town bills water across various categories of accounts. For the purposes of this application and for consistency with the North Carolina Local Water Supply Plan reporting documentation, the water use account categories used by the Town for their billing reports were reorganized into four major water use sectors, as summarized in Table I.3.

Table I.3. – Water Account Types Re-Distributed into Sectors and Subsectors

Use Sector	Use Sub-sector	Description
Residential	Residential	Meters serving single-family and multi-family dwellings
	Irrigation Meter	Dedicated meters measuring use of potable water for irrigation
	Builder	Meters serving the construction community, which are predominantly converted to residential use.
Commercial	Commercial	Meters serving commercial businesses
Industrial	Industrial	Meters serving manufacturing, processing and/or assembly facilities
	Novartis	Large industrial facility, manufactures influenza vaccine
Institutional	Office and institutional	Meters serving offices and public good institutions, such as schools, hospitals, etc.
Non-Revenue	Distribution System Process	Meters measuring water used to flush and clean water distribution lines

The JLP, in accordance with current water supply industry practice, no longer uses the term "Unaccounted-for Water". In general, non-revenue water falls into unbilled water use for system management, maintenance and operations purposes, and all other non-revenue water use. 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 water" and is most easily calculated as a function of total consumed or total finished water entering the distribution. "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, but primarily should represent loss through leakage. The JLP members have been working towards completing water audits, and better measuring flows to be able more 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 components allows a more complete representation of non-revenue water uses that is still flexible enough to be used by multiple JLP members. While the definitions of the sectors are largely similar, differences in system operation lead to differences in the specific components within the sectors. Furthermore, each partner used slightly different methodologies to compute the actual demand in each of these subsectors. Thus, the single percentage factor in the "Population & Demand Projections" tab of the JLA4 Excel Workbook (DWR, 2012) is not

sufficient to represent these sectors, and the projections are instead entered as the projected values in units of million gallons per day (MGD).

Account Distribution and Growth

In order to project future demands by sector, two assumptions were made. First, the rate of growth of total accounts through the planning horizon had to be assumed. Although a significant reduction in accounts creation occurred between the peak of the economic boom (1,039 new accounts in 2006) and fiscal year 2010 (236 new accounts), signs of an economic recovery were also taken into account. Therefore, for projection of future demand by sector, it was assumed that total accounts will continue to grow at an average of 400 accounts per year throughout the planning horizon. This estimate is less than the average growth of total account experienced over the five-year period of record in the 2011 study, (594 new accounts per year), which accounts for the economic downturn, yet is above the accounts added in the final two years covered in the study (277 accounts added in 2009 and 236 total accounts added in 2010). Table I.4 shows the effect of the account growth and assumed distribution of accounts over time. The ultimate goal is an approximately 80%/20% split between residential and non-residential accounts.

Table I.4. – Future Water Account Distribution Scenario

Account Type	Proposed Account Growth Scenario					
	2010	2015	2020	2025	2030	2060
Residential	7,966	9,351	10,535	11,520	13,120	22,720
Commercial	412	756	1,195	1,728	1,968	3,408
Industrial	14	150	338	576	656	1,136*
Institutional	5	136	317	547	623	1,079
TOTAL	8,400	10,400	12,400	14,400	16,400	28,300

*Large projected number of industrial accounts by 2060 is based on historical average industrial demand that did not include largest user, Novartis. Actual number of accounts in the future may be smaller due to planned addition of large-demand industrial users rather than numerous small-demand users.

Usage Rates

To project future usage rates with as reasonable degree of certainty as possible, historical water demands were evaluated, using billing records of monthly water usage for fiscal years 2002 through 2010. The resulting historical annual water usage by user sector and average day demand (ADD) are shown in Table I.5.

Table I.5 – Annual Water Usage by User Sector (million gallons)

Account Type	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Residential	281.60	242.20	292.40	309.00	415.10	451.50	458.60	462.80	499.00
Total Commercial	19.90	21.80	22.10	28.10	30.60	41.00	85.60	45.60	54.70
Total Industrial	2.80	2.50	2.40	2.40	2.10	1.60	1.80	1.40	54.60*
Total Institutional	1.80	2.10	3.20	3.10	2.80	1.00	0.90	0.80	1.30
TOTAL	306.10	268.60	320.10	342.60	450.60	495.10	546.90	510.60	609.60
Average ADD (MGD)	0.84	0.74	0.88	0.94	1.23	1.36	1.50	1.40	1.67

*Large increase in industrial water usage for 2010 was due to opening of Novartis facility

In order to project future demand for each sector, an assumption of how much water will be used for each account type was derived. A calculation was made to determine an average of the three highest daily water usage values over the last five-year period of record for each account type, as seen in Table I.6.

Table I.6 – Three Year Highest Average Daily Water Usage by Use Sector

Water Use Sector	Average Water Use (gal/acct/day)	3-yr Highest Average Water Use (gal/acct/day)
Residential	167.0	177.0
Commercial	237.0	371.0
Industrial	572.0	649.0
Institutional	451.0	511.0

The projected account distributions in Table I.4 were applied to the assumed change in accounts (400 new accounts per year, as described under the subsection, “Sector Projections”) for the planning horizon at the assumed average daily water usages in Table I.6 to produce the disaggregated water demand forecasts through 2060 as seen in Table I.7.

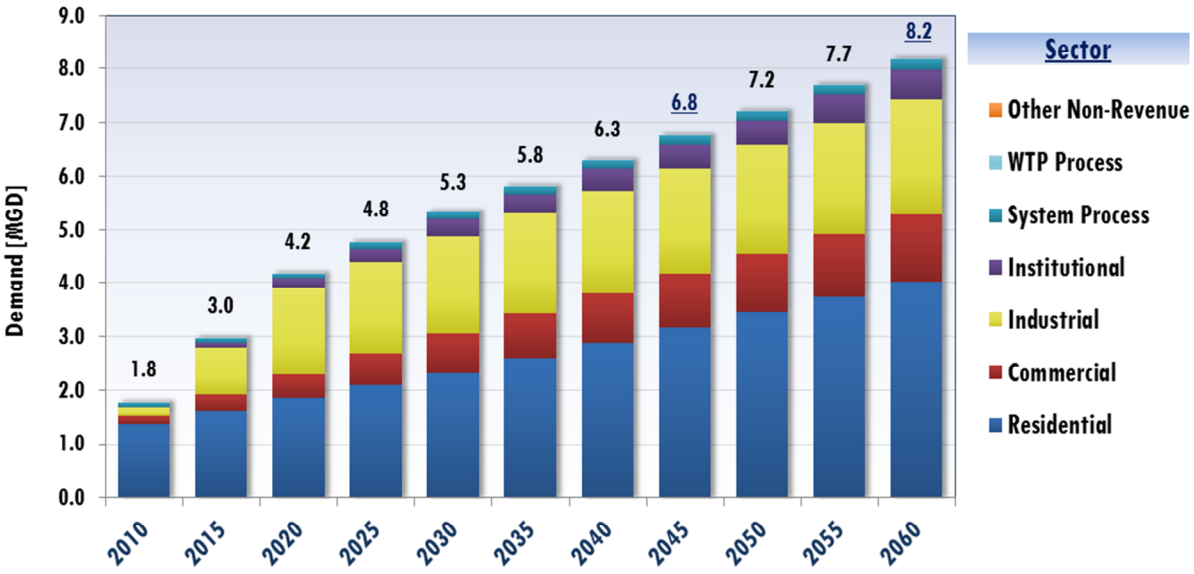
Table I.7 – Water Demand Projections by Sector

Sector	Subsector	2010	2020	2030	2040	*2045*	2050	2060
Residential	Residential	1.37	1.86	2.32	2.89	*3.17*	3.45	4.02
Commercial	Commercial	0.15	0.44	0.73	0.91	*1.00*	1.09	1.27
Industrial	Industrial	0.15	1.62	1.83	1.93	*1.98*	2.03	2.14
Institutional	Institutional	0.00	0.16	0.32	0.40	*0.44*	0.47	0.55
Non-Revenue	Other Non-Revenue	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00
System Process	System Process	0.10	0.10	0.13	0.16	*0.17*	0.18	0.19
	WTP Process	0.00	0.00	0.00	0.00	*0.00*	0.00	0.00
TOTAL		1.77	4.18	5.33	6.29	*6.76*	7.22	8.17

Since the Town does not operate its own plant, but purchases water, WTP process water is not figured into the demands. However, flushing water is accounted for and has been included. In addition, it should be noted that all non-revenue water is tracked by the Town and included in the Institutional category for the purposes of this projection.

Figure I.2 presents the Town's demand projections for each sector.

Figure I.2 – Demand Projections by Sector



It is important to note that, as is mentioned in Section II, Holly Springs is one of only four utilities in North Carolina with a reclaimed water program. There are currently nearly 300 accounts using reclaimed water, using a total of approximately 220,000 gallons a day, which is

equivalent to approximately 12 percent of total daily potable water use. The use of reclaimed water for irrigation purposes is especially beneficial during the summer months. The hot, dry weather causes a spike in irrigation, but the use of reclaimed water for irrigation serves to reduce that peak demand and conserve the Town's potable water supply. While this reclaimed water use is already factored into water demand projections, the reclaimed water program will be expanded in 2014, making reclaimed water available to more users. It is anticipated that this increased availability, and therefore increased use, of reclaimed water would further reduce peak water usage.

Bulk Water Sales

Holly Springs has a currently active water sales contract with the neighboring town of Fuquay-Varina. This maximum 1 MGD contract utilizes a small, surplus amount of the water Holly Springs purchases from Harnett County. Although the contract went into effect as of 2013, no water has yet been transferred to Fuquay-Varina under this contract. The non-recurring contract will expire in 2017. Details regarding this contract are listed in Table I.8.

Table I.8 – Sales to Other Systems

Purchaser	PWSID	Contract Amount (MGD)	Begin Year	End Year	Regular or Emergency	Pipe Size (in.)
Fuquay-Varina	03-92-055	1.0	2013	2017	Regular	16

SECTION II. CONSERVATION AND DEMAND MANAGEMENT

The Town of Holly Springs is committed to using its water efficiently and reducing potable water use through a multi-pronged approach. The approach includes water loss reduction measures, a reuse water system, an increasing-block water rate structure, and a water conservation program.

Following a 2006 study, the Town took aggressive measures to reduce unaccounted-for water by metering all known non-revenue water uses and enhancing its water loss detection program.

In 2009, the Town of Holly Springs installed a reuse water system to reduce its potable water demand, while at the same time reducing its wastewater discharge volume. Through the reuse system, the town offsets approximately 12% of its average day potable water demands and provides process and cooling water for industrial use and outdoor irrigation water for commercial, residential and golf course use. The system serves nearly 300 customers, with plans to expand in the future.

In 2011, Holly Springs instituted a water conservation program that includes regulations and fines for wasting water and a voluntary alternate-day watering schedule. In times of water shortage, water restrictions become mandatory.

Finally, the Town has an increasing-block rate water billing structure designed to encourage water conservation. The Town also requires separate water irrigation meters and potable water for irrigation is billed at the highest rate. Reuse water for irrigation is dramatically less expensive, encouraging reuse water for outdoor use. In the future, Holly Springs intends to expand its reuse water system to make it available to more customers and continue to reduce its water loss.

The following sections summarize these strategies.

Reclaimed Water Program

In 2009, the Town recognized an opportunity to recycle water from the Utley Creek Water Reclamation Facility (wastewater treatment plant) to reduce total demand on the potable water system. The system, which is one of only four in the State of North Carolina, significantly reduces the Town's impact on drinking water supplies as well as its discharge of treated wastewater into nearby waterways. Construction of a Reclaimed Water System for Holly Springs began in 2009 and was completed in the fall of 2010. The $2M project was funded by development fees and a federal grant and included the following:

- A reclaimed water pumping station;
- An overhead 500,000-gallon storage tank at the corner of Irving Parkway and New Hill Road; and

- Distribution piping from the treatment plant to the storage tank, which feeds irrigation lines in the public medians of Green Oaks Parkway, the golf course and its associated community, and various business and commercial users in the Holly Springs Business Park.

Currently, the system provides approximately 220,000 gallons of clean, treated wastewater per day to nearly 300 customers, which is equivalent to over 12 percent of the average daily potable demand in the Town. A network of underground pipes delivers the water for residential, multifamily and commercial (golf courses) irrigation uses as well as some industrial uses including cooling water at a Novartis facility and process water at the wastewater treatment plant.

Reclaimed water is currently only available west of G.B. Alford Highway. In 2014, however, lines will be extended eastward under the highway to a park and commercial area. Eventually, per a Reclaimed Master Plan, reclaimed water will be available to all parts of Holly Springs. The current permit capacity for the system is 1.5 MGD. The Town's water demand forecasts consider the offset in demand projected to be provided by the reuse system.

Water Loss Reduction Program

In 2006, the Town completed a water demand forecasting study. Within this study, the Town was estimated to have approximately 19 percent unaccounted-for-water. In response to this report and other local drivers, the Town enhanced their existing leak detection programs and implemented new programs to reduce the amount of "unaccounted-for-water". For example, the Town aggressively identified all known sources of non-revenue water throughout the Town and installed meters to measure the amount of non-revenue water. Based on these strategies, the Town has been able to reduce its "unaccounted-for-water" to approximately 5 percent, as reported in the most recent State Local Water Supply Plan Update. The Town continues to implement these strategies to manage overall potable water demand. The demand forecasts provided in the Town's Local Water Supply Plan includes consideration of this reduction in "unaccounted-for-water."

Conservation Rate Structure

The Town has implemented multiple measures within its water rate structure to incentivize conservation in its customer base. First, the Town has implemented an inclining block rate structure to discourage overuse of potable water. As water usage increases through a series of tiers or blocks, the rate charged per gallon of water increases. Table II.1 summarizes the Town's current water rates.

Table II.1 – Conservation Rate Structure Tiered Rates

Location	Monthly Access Fee	0-2,000	2,001-5000	5,001-9,000	9,001-14,000	14,001 & Over
In-Town	$11.50	$3.65	$4.70	$5.75	$6.80	$7.50
Out of Town	$23.00	$7.30	$9.40	$11.50	$13.60	$15.00

Secondly, the Town requires installation of irrigation meters so that irrigation water is metered and priced separately from potable water. Irrigation water is priced higher than potable water to discourage overwatering of lawns and landscaping. The Town currently has approximately 1,400 customers with irrigation meters. Each customer is charged $7.50 per thousand gallons, as well as an $11.50 monthly access fee.

Lastly, the Town has a separate set of rates for reuse water. As noted previously, nearly 300 customers in the Town use reuse water for residential irrigation, golf course irrigation and industrial uses. Reuse water for irrigation and other uses is priced lower than potable water to provide a financial incentive for its use. Table II.2 summarizes the current reuse water rates.

Table II.2 – Current Reuse Water Rates

Apply to	Monthly Access Fee	Cost Per 1,000 Gallons
Residential/Commercial	$5.75	$3.75
Bulk/Industrial	$5.75	$2.50

Water Shortage Response Planning and Demand Side Management

In 2011, the Town developed and approved a water shortage response plan that included year-round voluntary water conservation measures as well as specific demand reduction measures in case of water shortage.

Year Round Permanent and Seasonal Water Conservation

Through the passage of this plan, the Town made it unlawful for persons to intentionally or unintentionally waste water, particularly by overwatering grass and landscaping such that runoff is generated and flows onto the street. Customers violating this provision are subject to a fine or termination of their water service.

In addition, the Town established a water conservation season annually from May 1 through September 30 when every Town customer is encouraged (through public outreach/education) to comply on a voluntary basis with an alternate day watering schedule for irrigation systems.

Water Shortage Alert, Warning, and Emergency Crisis Stages

The Town is obligated under its contract with Harnett County, the Town's primary water supplier, to implement at least the same level of restrictions that Harnett County implements. In the event that Harnett County begins to experience a water shortage, the Town has established a series of progressive stages for response to the severity of water shortage.

- At the Alert Stage (Stage 1), mandatory alternate day irrigation restrictions are enacted (covering 6 days per week) and restrictions are placed on the filling of new pools and ponds.

- At the Warning Stage (Stage 2), alternate day watering is restricted to only 4 days per week. In addition, outdoor water use such as vehicle, driveway and house washing is prohibited unless performed as part of a commercial business. Lastly, industrial, commercial, and manufacturing enterprises are requested to reduce consumption by any degree feasible with a goal of 20 percent reduction.

- At the Emergency Stage (Stage 3), irrigation using potable water, re-filling of swimming pools, and other outdoor uses of potable water are strictly prohibited. In addition, restaurants are required to use single-serve utensils and should only provide water upon request. Lastly, industrial, commercial, and manufacturing enterprises are requested to reduce consumption by any degree feasible with a goal of 40 percent reduction.

- At the Crisis Stage (Stage 4), nearly all non-essential uses of potable water are prohibited. Also, industrial, manufacturing, and commercial enterprises must reduce consumption to any degree feasible with goal of 50 percent reduction.

The town manager of Holly Springs has the authority to implement and enforce any of the treated water use restrictions and to make them applicable during various times of the day needed to protect the public health, safety and welfare.

Although Holly Springs has adopted Harnett County's water shortage alert, warning, and emergency crisis stages as required by its contract with the County, the Town has implemented conservation measures beyond those required by the County including year round water conservation, a conservation rate structure, reclaimed water program, and a water loss reduction program.

SECTION III. CURRENT WATER SUPPLY

Available Supply

Holly Springs does not currently have a surface or groundwater source for potable water, instead relying solely on purchased water. The Town currently has a purchase agreement which includes a share of plant capacity with neighboring Harnett County, which uses the Cape Fear River as its source, to purchase 10 MGD of potable water for regular use.

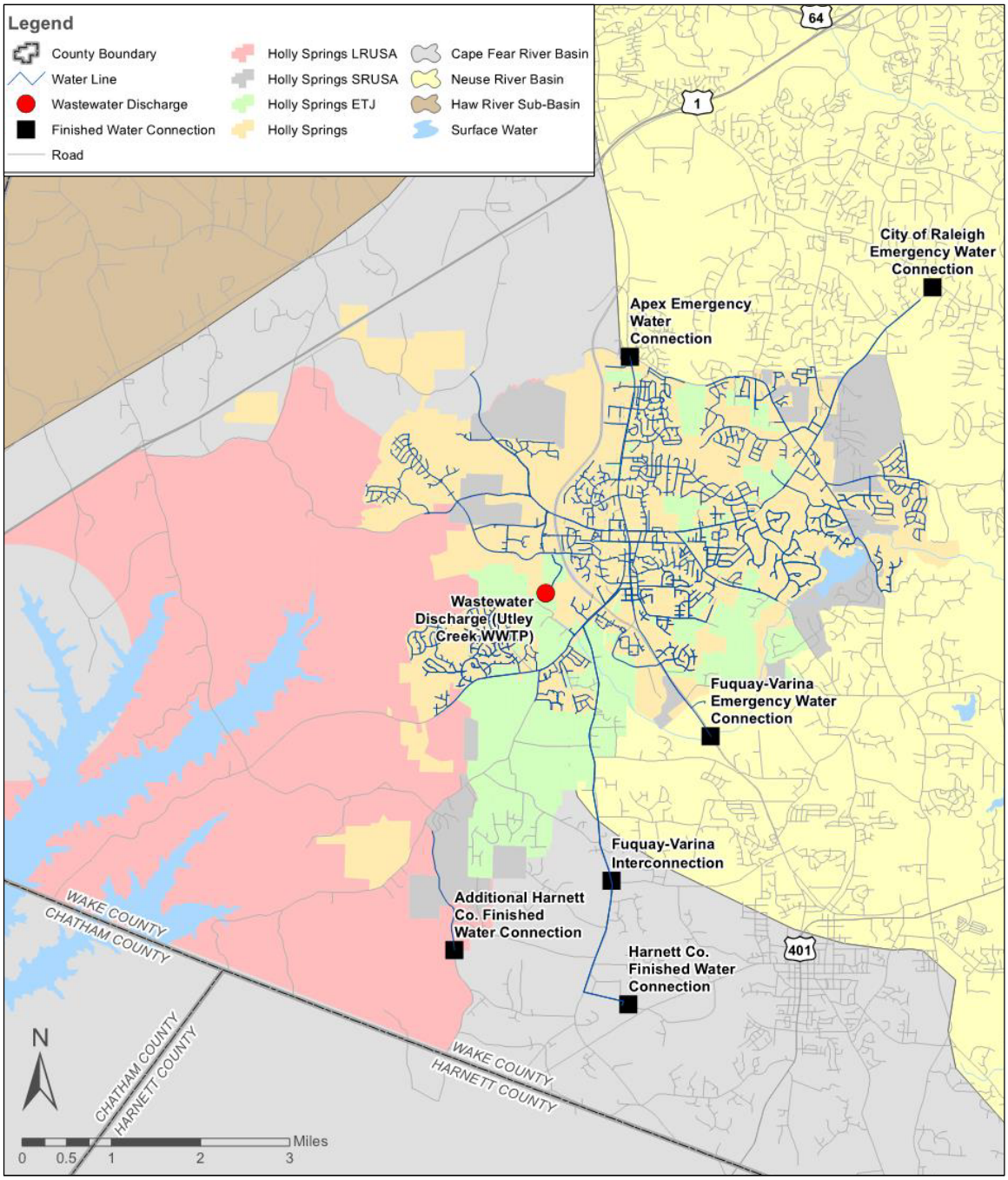
Holly Springs' contract with Harnett County is for a maximum of 10 MGD and currently runs through 2040, but is likely to be extended. Given that this is a maximum-day contract, Holly Springs cannot allow its average water demand to approach 10 MGD without exceeding this contract limit on peak days. Holly Springs' current peaking factor (maximum day use relative to average day use) is 2.0.

Given this reality, the Harnett County contract should not be considered to provide 10 MGD of supply on the average day. However, adjusting the theoretical average day "yield" of this connection downward by the current maximum day peaking factor is probably inappropriate as future demand projections are based on average day supply, and it is likely that this factor will come down in the future as Holly Springs' customer base grows and as reclaimed water is made available to more customers, lowering the peak maximum day usage in summer months. A seasonality (that is, maximum month relative to year average) based factor may be more appropriate for adjusting the "yield" value of the contract downward because at an average yearly demand of 10 MGD, many whole months would have daily demand much higher than 10 MGD.

For each year of Holly Springs' purchase records from 2002 to 2010, the highest month demand divided by the average year demand was calculated at a factor of 1.37, on average. Dividing the 10 MGD by this factor would suggest a reasonable "yield" of 7.3 MGD from the Harnett County contract. For planning purposes, and therefore the purposes of this application, Holly Springs has chosen a conservative factor of 1.5 to "pro-rate" the Harnett County contract that will account for seasonality and most peak day usage. Accordingly, the average-day "yield" value of the Harnett County contract is 6.67 MGD. This factor was recommended by the Jordan Lake Partners' modeling consultant to facilitate consistency with the other Partners' demand representations in the model and to prevent a situation in which Holly Springs' peak demands exceed the available supply.

A map of the Town's water supply sources and treatment plants is shown in Figure III.1.

Figure III.1 – Map of Water Supply Sources and Treatment Plants



Purchased Water

Holly Springs uses approximately 1.8 million gallons of potable water daily through a contractual arrangement with the Harnett County Department of Public Utilities (HCDPU), which draws water from the Cape Fear River. The contract allows the Town to draw a maximum of 10 million gallons per day (MGD). Table III.1 summarizes the Town's purchase contracts.

Table III.1 – Purchase Contracts

Supplier	PWSID	Contract Amount (MGD)	Begin Year	End Year	Regular or Emergency	Pipe Size (in.)	Equiv. Supply (MGD)
Harnett County	03-43-045	10.0	0	2040	Regular	36.0	6.7
City of Raleigh	03-92-010	1.2	0	2017	Emergency	16	1.2
TOTAL							7.9

Summary

In addition to the water purchase contracts in Table III.1 above, the Town currently holds a 2% Level II Jordan Lake allocation. No water has been purchased from Raleigh for emergency supply since July 2008.

SECTION IV. FUTURE WATER SUPPLY NEEDS

The Demand Projections presented in Section II have been peer-reviewed by the Jordan Lake Partnership and represent the best available estimate of the future demand for Holly Springs for average day demand over the planning horizon.

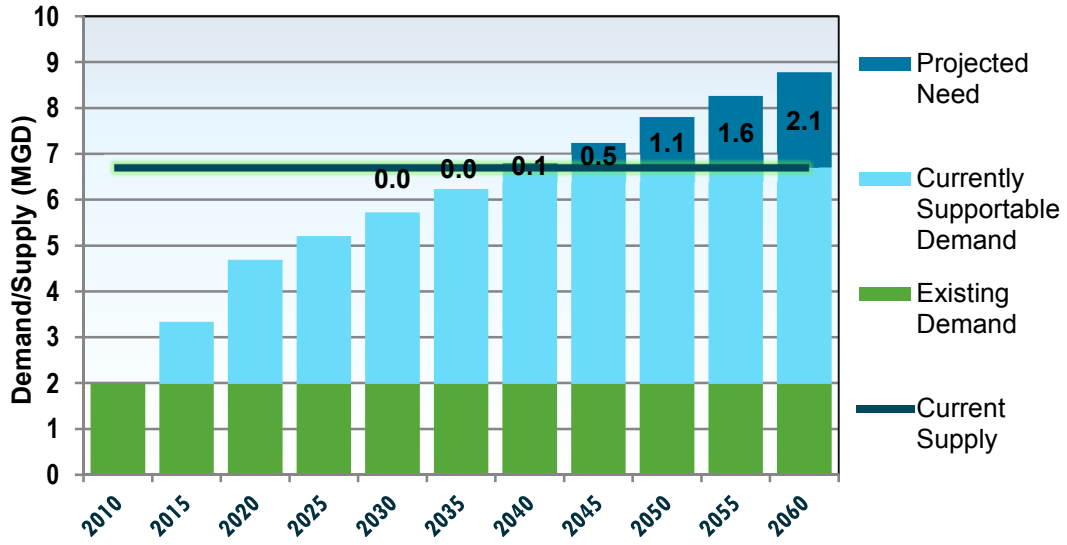
This section summarizes the projected future water supply needs, which are defined here as the difference between available raw water supply and future projected demand. For this analysis, only the available raw water supply capacity of existing sources is counted.

Table IV.1 and Figure IV.1 illustrate the projected demand in five-year increments and contrasts them to the available supply utilizing current available sources. Need is calculated by subtracting current source water supply availability (i.e. yield) from projected average day water demand. By 2030, demand as percent of supply reaches a critical stage, and by 2040, a water deficit results, and the need for additional water is abundantly clear. Furthermore, finished water supply will have to be increased in excess of the need shown in the table to ensure a factor of safety, meet peak demands, and partially account for uncertainty in the long-range demand projections.

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

	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Demand	2.0	3.3	4.7	5.2	5.7	6.2	6.8	7.2	7.8	8.3	8.8
Supply	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Demand % of Supply	*30%*	*50%*	*70%*	*78%*	*85%*	*93%*	***101%***	***108%***	***116%***	***123%***	***131%***
Need	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**0.5**	**1.1**	**1.6**	**2.1**

Figure IV.1 – Projected Demand and Need relative to Current Supply



SECTION V. ALTERNATIVE WATER SUPPLY OPTIONS

Source Options

Table V.1 summarizes the available source options for Holly Springs, which are limited to currently available existing sources: a Jordan Lake allocation; purchased water from Harnett County, which treats water drawn from the Cape Fear River; and purchased water from the City of Raleigh, which treats water drawn from Falls Lake, Lake Benson, and Lake Wheeler in the Neuse River basin.

Table V.1 – Source Options - Descriptions

Source	Type	Basin	WQ Classification	Year Online (earliest)	Available Supply (MGD)
Jordan Lake Allocation	Jordan Lake	Haw (2-1)	WS IV B NSW CA	2015	2.0
Jordan Lake Allocation - Future Round	Jordan Lake	Haw (2-1)	WS IV B NSW CA	2035	0.2
Harnett County	Purchase	Cape Fear (2-2)	WS IV CA	2015	2.0
Harnett County - increase	Purchase	Cape Fear (2-2)	WS IV CA	2015	0.2
City of Raleigh	Purchase	Neuse (10-1)	WS-III/IV NSW CA	2015	1.2

Supply Alternatives Summary

Table V.2 summarizes Holly Springs' water supply alternatives.

Table V.2 – Alternatives Description Table

Alternative	Alternative Description
Alternative 1	This alternative is the preferred alternative and was developed in collaboration with, and is supported by, the Jordan Lake Partnership. This option includes maintaining the current 10 MGD (maximum day) purchase contract with Harnett County as well retaining the existing 2% Jordan Lake Allocation and converting it to Level I in the future. The 2% Jordan Lake Allocation would be needed beginning in 2040 to meet projected demands as well as providing redundancy in the Town's water supply. An additional 0.2% allocation would be needed in 2060.
Alternative 2	This option includes increasing the current 10 MGD (maximum day) purchase contract with Harnett County by 2 MGD (average day). A renegotiation of the Harnett County purchase contract to increase would need to take place prior to 2035 to meet projected demands.
Alternative 3	This option includes maintaining the current 10 MGD maximum day purchase contract with Harnett County as well increasing the current 1.2 MGD emergency-only purchase contract with the City of Raleigh to a 2.2 MGD contract to access a 2.2% Jordan Lake allocation.
Alternative 4	This option includes construction a new water treatment plant for the Town of Holly Springs. Although no allocation from Jordan Lake would be requested, the Town would need to withdraw 8.8 MGD (average day) by 2060 from the Cape Fear River downstream of the lake.

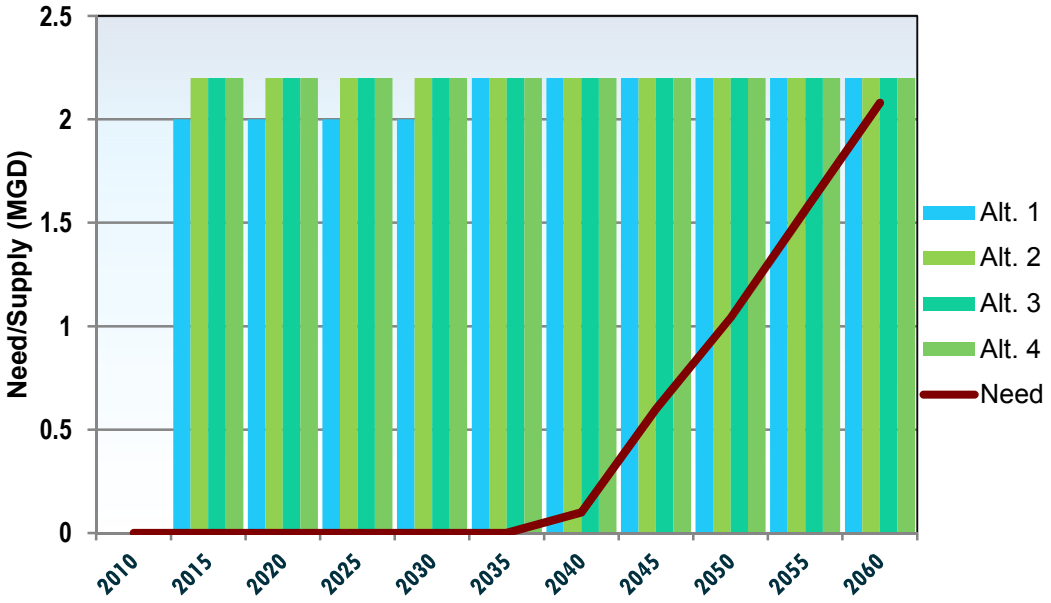
Table V.3 summarizes the source composition associated with each of the water supply alternatives described in Table V.2.

Table V.3 – Source Composition of Supply Alternatives (MGD)

Need and Source Options	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total Projected Need (2045)	*0.6*	*0.6*	*0.6*	*0.6*
Total Projected Need (2060)	*2.1*	*2.1*	*2.1*	*2.1*
Sources:				
Jordan Lake Allocation - Rd 4	2.0	0.0	0.0	0.0
Jordan Lake Allocation - Future Round	0.2	0.0	0.0	0.0
Cape Fear River Allocation	0.0	0.0	0.0	8.8
Harnett County	0.0	2.2	0.0	0.0
City of Raleigh	0.0	0.0	2.2	0.0

Total Supply (MGD)	**2.2**	**2.2**	**2.2**	**8.8**

Figure V.2 – Alternatives - Timeline of Need Versus New Water Supply



Alternatives Analysis

Each of the water supply alternatives considered by Holly Springs was evaluated for a series of factors consistent with the Jordan Lake partners. Table V.4 summarizes the results of this evaluation while the sections below provide a narrative of the evaluation.

Table V.4 – Water Supply Alternative Ratings

Classification	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Rd. 4 Allocation Request (% of storage)	2.2	0.0	0.0	0.0
Total Supply (MGD)	2.2	2.2	2.2	8.8
Environmental Impacts	Baseline	Same	Same	More
Water Quality Classification	0	0	0	0
Timeliness	Baseline	Same	Less Timely	Less Timely
Interbasin Transfer (MGD)	No	No	Yes	No
Regional Partnerships	Yes, JLP	None (purchase)	None (purchase)	None
Technical Complexity	Not Complex	Not Complex	Not Complex	Very Complex
Institutional Complexity	Not Complex	Very Complex	Very Complex	Very Complex
Political Complexity	Not Complex	Complex	Very Complex	Very Complex
Public Benefits	Few to Many	Few	Few	Few
Consistency with local plans	Consistent	Consistent	Consistent	Not Consistent
Total Cost ($ millions)	$4.09-6.09	$4-6 million+	$8.52 million	$27 million

Alternative 1 – Preferred Alternative

Alternative 1 consists of maintaining the Town's current water purchase contract with Harnett County for 10 MGD and supplementing that water with a Jordan Lake allocation. The allocation would remain a Level II allocation until needed in the future, at which time it would be converted to a Level I allocation. The allocation would be accessed through the US Army Corps of Engineers releasing the water to Harnett County's downstream intake, where Harnett County would treat the additional supply and sell it to Holly Springs.

Jordan Lake Allocation Request

This alternative includes retaining the Town's current 2% (2 MGD) Level II Jordan Lake allocation and converting it to a Level I allocation in the future. In addition, by 2045 either an additional 0.2% (0.2 MGD) Level I allocation or an increase of the requested 2% Level I allocation to a 2.2% (2.2 MGD) Level I allocation would be required to meet future demands.

Available Supply

This alternative would bring online sufficient water supply to meet the need for the entire forecast period. The Round 4 allocation would meet the need up to 2045, and the future round allocation (additional 0.2% allocation or increase of existing allocation to 2.2%), to be brought online by 2035, would bring online enough water supply to meet the water need through 2060.

Environmental Impacts

Little to no environmental impact is anticipated for this alternative. Harnett County already has an intake on the Cape Fear River, a treatment plant, and a transmission main to convey finished water to Holly Springs. Improvements to the pumping and distribution facilities will already be constructed as part of the current agreement for 10 MGD of supply.

Water Quality Classification

The water currently purchased from Harnett County is withdrawn from the Cape Fear River, which is classified WS-IV CA. Jordan Lake is classified WS IV B NSW CA.

Timeliness

The timeliness of this alternative is rated as Good, as the infrastructure and facilities already exist and are currently in use.

Interbasin Transfer

There are no interbasin transfer (IBT) impacts expected for this alternative. Holly Springs serves customers in the Neuse basin (10-1) and Cape Fear (10-2) IBT subbasins. However, the majority of customers and future growth is within the Cape Fear (10-2) subbasin, and use in the Neuse

basin will not exceed the IBT threshold. An analysis of the Town's transfers between the Neuse and Cape Fear IBT basins is described in Tables V.5 and V.6 for average day and maximum day values. According to the analysis, the Town will not exceed the IBT threshold of 2 mgd. It is possible that the Town could exceed the threshold in 2060 if it obtained all of its Jordan Lake allocation from its connection with Apex; however, the preferred alternative is to access the Jordan Lake allocation through Harnett County.

Table V.5 – Interbasin Transfers of Water – Average Day

Year	Withdrawal From Source (MGD)	Consumptive Loss		Wastewater Discharge		Total Return to Source Basin (MGD)	Total Surface Water Transfer (MGD)
		Source Basin (MGD)	Receiving Basin (MGD)	Source Basin (MGD)	Receiving Basin (MGD)		
	(Column A)	(Column B)	(Column C)	(Column D)	(Column E)	(F) = (B)+(D)	(G) = (A)-(F)
2012	1.83	0.175	0.205	1.329	0	1.504	0.326
2020	4.18	0.592	0.327	3.036	0	3.628	0.552
2030	5.33	0.762	0.41	3.871	0	4.633	0.697
2040	6.29	0.879	0.505	4.568	0	5.447	0.843
2050	7.22	0.991	0.598	5.243	0	6.234	0.986
2060	8.17	1.105	0.692	5.933	0	7.039	1.131

Table V.6 – Interbasin Transfer of Water – Maximum Day

Year	Withdrawal From Source (MGD)	Consumptive Loss		Wastewater Discharge		Total Return to Source Basin (MGD)	Total Surface Water Transfer (MGD)
		Source Basin (MGD)	Receiving Basin (MGD)	Source Basin (MGD)	Receiving Basin (MGD)		
	(Column A)	(Column B)	(Column C)	(Column D)	(Column E)	(F) = (B)+(D)	(G) = (A)-(F)
2012	2.377	0.227	0.266	1.726	0	1.953	0.424
2020	5.429	0.769	0.425	3.942	0	4.712	0.717
2030	6.922	0.990	0.533	5.027	0	6.017	0.905
2040	8.169	1.141	0.656	5.932	0	7.074	1.095
2050	9.377	1.287	0.776	6.810	0	8.096	1.280
2060	10.610	1.435	0.899	7.706	0	9.141	1.469

Regional Partnerships

This alternative was developed in coordination with the Jordan Lake Partnership and is supported by other JLP members.

Technical Complexity

The Technical Complexity is rated as Not Complex for this alternative. Harnett County already possesses the infrastructure necessary to accept and treat the additional water from the allocation.

Institutional Complexity

The Institutional Complexity is rated as Not Complex for this alternative, as Holly Springs already has an agreement with Harnett County for 10 MGD of water supply.

Political Complexity

The Political Complexity is rated as Not Complex for this alternative as little to no change to existing conditions is anticipated.

Public Benefits

This alternative would benefit the public by providing redundancy in Holly Springs' water supply. Maintaining the Town's Jordan Lake allocation would provide an additional source of water in case of a chemical spill or other emergency in the Cape Fear River or with a failure of the transmission main from Harnett County. Redundancy increases the ability of the Town to provide water to its customers including the Novartis Vaccines manufacturing and processing facility – the only pandemic flu vaccine manufacturing plant in the United States.

The Holly Springs Novartis facility was built as a joint partnership between Novartis and the US Department of Health and Human Services Biomedical and Advanced Research and Development Authority (BARDA) to invest in innovation to better protect the public in the event of a pandemic or other health security. In June 2014, the facility was licensed by the US Food and Drug Administration to produce cell-culture influenza vaccines. The Holly Springs facility produces seasonal as well as pre-pandemic flu vaccine, and it is capable of increasing production in the event of a flu pandemic. In addition to manufacturing the flu vaccine, the Holly Springs Novartis plant is one of three facilities that have recently been asked by the BARDA to submit plans to produce an anti-Ebola drug, ZMapp.

Redundancy in the Town of Holly Springs' water supply is of critical importance to uninterrupted operation of the Novartis facility, which is vitally important to public health nationwide.

Consistency with Local Plans

This alternative is consistent with local comprehensive land use plans, growth management plans, and capital improvement plans. No additional infrastructure or facilities would be required.

Cost

Holly Springs has an agreement in place with Harnett County for 10 MGD of water supply. It is difficult to predict the cost Harnett County would assess Holly Springs for an additional 2.2 MGD of water that would be accessed in 2045. Based on current costs, the capital cost is estimated to be $4-6 million; however, this cost will need to be negotiated with Harnett County in the future.

This alternative will also require payment to DENR of $91,041 to convert the Town's Level II Jordan Lake allocation to a Level I allocation in the future.

The cost for the additional 2.2% plus the Level I allocation is estimated to be $4.09-6.09 million.

Alternative 2 – Increase Purchase from Harnett County

Alternative 2 consists of increasing the current 10 MGD purchase contract with Harnett County to a 12 MGD contract. A renegotiation of the Harnett County purchase contract to increase to 12.2 MGD would need to take place prior to 2035.

Jordan Lake Allocation Request

This alternative relies solely on Harnett County for water supply; therefore, no Jordan Lake Allocation would be required. This alternative is contingent on Harnett County's agreement to allocate as much as 2.2 MGD of its supply to Holly Springs, increasing Holly Springs' purchase amount from 10 MGD to 12.2 MGD by 2060.

Available Supply

This alternative would bring online sufficient water supply to meet the need for the entire forecast period if Harnett County allows Holly Springs to increase the purchase amount to 12.2 MGD. If Harnett County does not agree to allow Holly Springs to purchase the full 2.2 MGD of additional supply, then this alternative would not meet the Town's demands through 2060.

Environmental Impacts

Little to no environmental impact is anticipated to obtain the additional water supply from Harnett County, because infrastructure is already in place to convey the water to Holly Springs' system.

Water Quality Classification

The source water currently purchased from Harnett County is classified WS-IV CA.

Timeliness

The timeliness of this alternative is rated as Good, as the infrastructure and facilities already exist and are currently in use. This rating could be lowered in the future if Harnett County determines that it does not have an adequate supply to allow Holly Springs to increase its purchase amount.

Interbasin Transfer

There is no IBT impact expected for this alternative.

Regional Partnerships

This alternative does not involve a regional partnership other than the coordination between Holly Springs and Harnett County for the purchase of water.

Technical Complexity

The Technical Complexity is rated as Not Complex for this alternative. Harnett County already possesses the infrastructure necessary to accept and treat the additional water from the allocation.

Institutional Complexity

The Institutional Complexity is rated as Very Complex for this alternative. If Harnett County determines that it does not have adequate capacity for its customers plus an increase in purchase amount by Holly Springs, an increase in the amount withdrawn from the Cape Fear River could become necessary. At a minimum, Harnett would have to reallocate a portion of its withdrawal to Holly Springs.

Political Complexity

The Political Complexity is rated as Complex for this alternative. If Harnett County determines that it does not have adequate capacity for its customers plus an increase in purchase amount by Holly Springs, the Town would not be able to meet its demands in the future.

Public Benefits

This alternative will generate very few secondary public benefits. The Town of Holly Springs would rely on Harnett County and the single transmission main for its entire water supply. The Town could maintain the emergency connections with Raleigh and Apex, but these would not provide as much water as a second continuous supply source.

Consistency with Local Plans

This alternative is consistent with local comprehensive land use plans, growth management plans, and capital improvement plans. No additional infrastructure or facilities would be required.

Cost

Holly Springs has an agreement in place with Harnett County for 10 MGD of water supply. It is difficult to predict the cost Harnett County would assess Holly Springs for an additional 2.2 MGD of water that would be accessed in 2045. Based on current costs, the capital cost is estimated to be $4-6 million; however, this cost will need to be negotiated with Harnett County in the future.

It is assumed that this alternative will not require payment to DENR to convert the Town's Level II Jordan Lake allocation to a Level I allocation since the Town would obtain all of its supply through Harnett County.

The cost for the additional 2.2 MGD plus the Level I allocation is estimated to be $4-6 million plus additional charges Harnett County would require for expanding its intake or reallocating some of its supply to Holly Springs.

Alternative 3 – Increase Purchase from City of Raleigh

Alternative 3 consists of maintaining the Town's current water purchase contract with Harnett County for 10 MGD as well increasing the current 1.2 MGD emergency-only purchase contract with the City of Raleigh to a 2.2 MGD contract.

Jordan Lake Allocation Request

This alternative relies solely on Harnett County and the City of Raleigh for water supply; therefore, no Jordan Lake Allocation would be required. This alternative is contingent on the City of Raleigh's agreement to allocate 2.2 MGD of its supply to Holly Springs. This alternative would likely require the City of Raleigh to request an allocation from Jordan Lake, as it would increase the City's total demands. The current contract allows Holly Springs to obtain water on an emergency basis; however, this alternative would require the contract to be converted to a continuous use contract.

Available Supply

This alternative would bring online sufficient water supply to meet the need for the entire forecast period if the City of Raleigh allows Holly Springs to increase the purchase amount to 2.2 MGD. If the City does not agree to allow Holly Springs to purchase the full 2.2 MGD of additional supply, then this alternative would not meet the Town's demands through 2060.

Environmental Impacts

Little to no environmental impact is anticipated to obtain the additional water supply from the City of Raleigh, because infrastructure is already in place to convey the water to Holly Springs' system. This alternative would involve more environmental impacts if it is determined that the existing transmission main is unable to convey the 2.2 MGD needed in the future.

Water Quality Classification

Raleigh's water sources are classified as WS-III/IV NSW CA.

Timeliness

The timeliness of this alternative is rated as Good, as the infrastructure and facilities already exist and are currently in use. This rating could be lowered in the future if the City of Raleigh determines that it does not have an adequate supply to allow Holly Springs to increase its purchase amount.

Interbasin Transfer

This alternative would cause an IBT of water from the Neuse River IBT subbasin to the Cape Fear River subbasin, because the majority of Holly Springs' future growth area is located in the Cape Fear subbasin.

Regional Partnerships

This alternative does not involve a regional partnership other than the coordination between Holly Springs and the City of Raleigh for the purchase of water.

Technical Complexity

The Technical Complexity is rated as Not Complex for this alternative. A transmission main is already in place to convey water from Raleigh's service area to Holly Springs' service area. However, it may need to be upsized in the future to convey the additional water supply to Holly Springs.

Institutional Complexity

The Institutional Complexity is rated as Very Complex for this alternative. This alternative would likely require the City of Raleigh to request an allocation from Jordan Lake, as it would increase the City's total demands. This alternative would also require an IBT certificate in the future. The City is a partner in the Jordan Lake Partnership. The contract with the City of Raleigh is based on emergency use. The current contract expires in 2017. Because the City is also a member in the Jordan Lake Partnership, it seems unlikely that Raleigh would have surplus water to allocate to Holly Springs in the future. Raleigh recently sold part of the transmission main that conveys water from Raleigh to Holly Springs to Cary, so this alternative involves the additional complexity of requiring agreements with both Raleigh and Cary. This complexity would be increased further if it is determined that the existing transmission main is undersized for the 2.2 MGD Holly Springs demand.

Political Complexity

The Political Complexity is rated as Very Complex for this alternative. This alternative would likely require the City of Raleigh to request an allocation from Jordan Lake, as it would increase

the City's total demands. This alternative would also require an IBT certificate in the future. Because Cary owns part of the transmission main through which Raleigh conveys water to Holly Springs, this alternative involves the political complexity of requiring coordination among elected officials in three municipalities.

Public Benefits

This alternative would benefit the public by providing redundancy in Holly Springs' water supply, as long as Raleigh is able to provide the required demand. Redundancy increases the ability of the Town to provide water to its customers including the Novartis Vaccines manufacturing and processing facility – the only pandemic flu vaccine manufacturing plant in the United States.

The Holly Springs Novartis facility was built as a joint partnership between Novartis and the US Department of Health and Human Services Biomedical and Advanced Research and Development Authority (BARDA) to invest in innovation to better protect the public in the event of a pandemic or other health security. In June 2014, the facility was licensed by the US Food and Drug Administration to produce cell-culture influenza vaccines. The Holly Springs facility produces seasonal as well as pre-pandemic flu vaccine, and it is capable of increasing production in the event of a flu pandemic. In addition to manufacturing the flu vaccine, the Holly Springs Novartis plant is one of three facilities that have recently been asked by the BARDA to submit plans to produce an anti-Ebola drug, ZMapp.

Redundancy in the Town of Holly Springs' water supply is of critical importance to uninterrupted operation of the Novartis facility, which is vitally important to public health nationwide.

Consistency with Local Plans

This alternative is not consistent with local comprehensive land use plans, growth management plans, and capital improvement plans. It would result in an IBT of water, because the majority of Holly Springs' growth area is within the Cape Fear River subbasin.

Cost

Holly Springs most recently paid the City of Raleigh $34,000 per month for capital costs for its 1.2 MGD emergency supply based on a 2012 contract. This monthly cost increases approximately $500-$1,000 per month each year. Assuming a $750-per-month increase during 2013 and 2014, the capital cost share is expected to be approximately $35,500 per month for 2014, or $426,000 per year. If Holly Springs paid this capital cost over the course of 20 years, this alternative would cost $8.52 million.

Alternative 4 – New Intake and WTP for Town of Holly Springs

Alternative 4 includes construction of a new water treatment plant for the Town of Holly Springs. Although no specific allocation from Jordan Lake would be requested, the Town would need to withdraw 12.2 MGD from the Cape Fear River downstream of the lake.

Jordan Lake Allocation Request

Alternative 4 does not require an allocation from Jordan Lake. However, the Town would withdraw its 12.2 MGD demand from the Cape Fear River downstream of the lake, affecting the amount of water available in the lake. Therefore, this alternative is similar to Alternative 1 except that Holly Springs would construct a new intake in the lake and a new water treatment plant.

Available Supply

This alternative is contingent on the Town being able to withdraw its 12.2 MGD demand from the Cape Fear River downstream of Jordan Lake. The Town evaluated this option for its water supply in the past and submitted an environmental document scoping letter to the State Clearinghouse in 2001.

Environmental Impacts

This alternative would result in much more environmental impact than the preferred alternative. It would require a new intake, new water treatment plant, and new transmission mains.

Water Quality Classification

This alternative would require reclassification of a portion of the Cape Fear River near the new intake to WS-IV CA.

Timeliness

The timeliness of this alternative is rated as Less Timely than the preferred alternative due to the increased time needed to reclassify the river, submit an environmental document, and design, permit, and construct the infrastructure.

Interbasin Transfer

There is no IBT impact expected for this alternative.

Regional Partnerships

This alternative does not involve a regional partnership and involves no coordination with other regional entities.

Technical Complexity

The Technical Complexity is rated as Complex for this alternative due to the necessity of a new intake, water treatment plant, and significant lengths of transmission main.

Institutional Complexity

The Institutional Complexity is rated as Very Complex for this alternative. This alternative would require allocation of a portion of the Cape Fear River to Holly Springs for withdrawal of its demand for treatment. It would also increase the complexity of infrastructure, reducing any shared facilities. Reclassification of the Cape Fear River would require a lengthy and complex process of public hearings and environmental evaluations.

Political Complexity

The Political Complexity is rated as Very Complex for this alternative. This alternative would require elected officials to allocate more financial resources to construct the new intake, water treatment plant, and transmissions mains.

Public Benefits

This alternative will generate few secondary public benefits. The Town could maintain the emergency connections with Harnett County, Raleigh, and Apex, but these would not provide as much water as a continuous supply source other than the Cape Fear River. The emergency connections with Raleigh and Apex would provide a limited amount of water, and the Harnett County connection would not provide an alternative source, because Harnett County and Holly Springs would both withdraw water from the Cape Fear River.

Consistency with Local Plans

This alternative is not consistent with local comprehensive land use plans, growth management plans, and capital improvement plans. The Town made a decision years ago to eliminate this alternative in its long-term water supply plans.

Cost

The Town of Holly Springs considered this alternative years ago. A report prepared for the Town by Marziano and Minier, PA Consulting Engineers in 1998 described the alternative of constructing a new WTP and intake on the Cape Fear River. The Town evaluated this option and submitted an environmental document scoping letter to the State Clearinghouse in 2001. The Marziano and Minier report indicated that this alternative would cost approximately $4.4 million more than the alternative of purchasing water from Harnett County. The Town ultimately selected the Harnett County alternative. The total cost for the new WTP alternative was $16.5 million (in 1998) based on a 6-MGD WTP, intake, and transmission main. Based on ENR cost indexing, this cost would exceed $27 million in 2014 dollars, or approximately $4.50 per GPD, just for the first phase of the WTP (6 MGD). The WTP would need to be sized at 8.8

MGD to address the demands in 2060. This alternative would cost significantly more than the other alternatives and is not considered feasible.

Selected Alternative

Alternative 1 is the preferred alternative. This alternative is in agreement with the JLP's RWSP. As such, any changes to the allocation request in this alternative could have an impact on the ability of other partners to meet their needs. This alternative represents a regional alternative for which allocation requests have been coordinated, and to the best knowledge of the partners, will not have a substantial negative impact on either the ability of Jordan Lake to meet all applicants' requests for water, or downstream users and the environment.

This alternative results in the least environmental impact and no required river reclassification. It is timely and results in no IBT. It is the least complex alternative technically, institutionally, and politically. It is consistent with land use, growth, and capital improvement plans.

This alternative would benefit the public by providing redundancy in Holly Springs' water supply as well as long term reliability. Maintaining the Town's Jordan Lake allocation would provide an additional source of water through emergency connections in case of a chemical spill or other emergency in the Cape Fear River or in case of a failure of the transmission main from Harnett County. This level of redundancy is particularly important for Holly Springs in that it increases the ability of the Town to provide a reliable water supply to the Novartis Vaccines manufacturing and processing facility – the only pandemic flu vaccine manufacturing plant in the United States.

SECTION VI. PLANS TO USE JORDAN LAKE

Based on the need demonstrated in Section IV, and the alternatives analysis presented in Section V, Holly Springs is planning to implement Alternative 1. Accordingly, this application includes a request for Jordan Lake Water Supply Storage in the amount of a 2% Level II Allocation. This represents no change from the existing 2% Level II Allocation. The future projected 2060 need is for a 2.2% allocation.

Implementation Plan and Timeline

Table IV.1 in Section IV illustrated the projected demand in five-year increments and contrasted the demands to the available supply utilizing current available sources. Need was calculated by subtracting current source water supply availability (i.e. yield) from projected average day water demand. By 2030, demand as percent of supply reaches a critical stage, and by 2040, a water deficit results and the need for additional water is abundantly clear. Furthermore, finished water supply will have to be increased in excess of the need shown in the table to ensure a factor of safety, meet peak demands, and partially account for uncertainty in the long-range demand projections.

Access to Jordan Lake

The Town of Holly Springs would access its Jordan Lake allocation through the US Army Corps of Engineers releasing additional water downstream through Jordan Dam and negotiating a contract with Harnett County to treat the additional water in excess of 10 MGD and move it through the existing connection.

Raw and Finished Water Quality Monitoring Plan

Holly Springs does not have a water treatment plant. Thus any allocation would be treated by a Harnett County and would be received by Holly Springs as finished water.

Estimate of Costs

Jordan Lake Costs

The selected alternative will require payment to DENR of $91,041 to convert the Town's Level II Jordan Lake allocation to a Level I allocation in the future. This conversion is estimated to be needed in 2040.

Discussion

Alternative 1 is the alternative selected by Holly Springs for its future water supply. Holly Springs requests a Jordan Lake Water Supply Storage allocation in the amount of a 2% Level II Allocation. This represents no change from the existing 2% Level II Allocation. The future projected 2060 need is for a 2.2% allocation. This alternative will meet the Town's project demand with the least impacts while providing redundancy in the Town's system.

REFERENCES

Holly Springs Preliminary Engineering Report (1998). Prepared for the Town of Holly Springs by Marziano and Minier, PA Consulting Engineers.

Jordan Lake Allocation Round 4 Excel Workbook (2012). Prepared by the North Carolina Division of Water Resources.

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Town of Holly Springs Demand Projection Study (2011). Prepared by CDM Smith for the Town of Holly Springs.

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Triangle Regional Water Supply Plan: Volume I – Regional Needs Assessment (February 20, 2012, Revised May 14, 2012). Prepared for the Jordan Lake Partners by Triangle J Council of Governments.

Triangle Regional Water Supply Plan: Volume II – Regional Alternatives Analysis (Revised Draft, April 18, 2014). Prepared for the Jordan Lake Partners by Triangle J Council of Governments.

Western Wake Regional Wastewater Management Facilities Engineering Report (2009). Prepared for the Western Wake Partners by Brown and Caldwell.

APPENDIX

Appendix A

Triangle Regional Water Supply Plan – Volumes I and II

(provided on CD)