OWASA

ORANGE WATER & SEWER AUTHORITY

Quality Service Since 1977

May 25, 2001

Mr. Sydney Paul Miller
NC Division of Water Resources,
Water Allocation Section
1611 Mail Service Center
Raleigh, NC 27699-1611

Dear Mr. Miller:

This letter represents the completion of Orange Water and Sewer Authority's application for a Round Three Jordan Lake water supply storage allocation. Per our telephone conversation of April 11, 2001, OWASA is providing this written response to the questions and comments listed in your letter of February 26, 2001 in lieu of a complete revision of our December 29, 2000 draft application package.

1. **Are there any agreements that would limit water deliveries to "Orange County" customers around the periphery of the OWASA service area?**

   I understood from our April 11 conversation that this question referred to any agreements that might limit OWASA's ability to "wheel" water to Orange County in the event that the County depended on OWASA for the delivery of water to which the County was entitled under its own Jordan Lake allocation.

   OWASA recently became party to a *Water and Sewer Management, Planning, and Boundary Agreement* with Orange County, Carrboro, Chapel Hill, and Hillsborough. Section VII.B. of that *Agreement* requires that any long-term non-emergency water transfer between OWASA and Orange County first be approved by the OWASA Board of Directors and the elected boards of Carrboro, Chapel Hill, and Orange County.

2. **What period of record are the percentages in Table 1 [page 1 of OWASA's December 29, 2000 draft application] based on? It looks like they're based on the same data as Table ES-2 (TM 3.2, executive summary).**

   The disaggregated demand percentages in Table 1 were derived from seven years of monthly consumption records compiled from July 1991 through June 1998.

3. **The finished water usage rates in Table 2 [page 2 of OWASA's December 29, 2000 draft application] are important and are consistent with the rates explained in TM 3.2. However, we note that in TM 3.1, average consumption for the period 1992-1998 for**

400 Jones Ferry Road
PO Box 366
Carrboro, NC 27510-0366

Equal Opportunity Employer
Printed on Recycled Paper

Voice (919) 968-4421
FAX (919) 968-4464
www.owasa.org

multi family separately metered accounts was 126 gpd (p.9), and average consumption for the same period for multi family master metered accounts was 125 gpd (p.10). Furthermore, TM 3.1 uses the rate of 126 gpd for multi family residential demand forecasts (p.21). Why the differing usage rates between the two documents, and why is the usage rate in TM 3.2 more reasonable?

The estimates of multi-family usage rates presented in TM 3.1 were based on incomplete data that were subsequently refined in the preparation of TM 3.2. When an accurate count of individual housing units associated with each master-metered water account was finally obtained, the revised consumption calculations (presented in TM 3.2) indicated 125 gpd for separately metered multi-family accounts and 142 gpd for master-metered multi-family accounts, which was consistent with the reasonable expectation that customers who paid their own water bills would consume less water overall than those who do not pay their bills directly. The figure of 137 gpd reported in Table 2 of our Draft Application represents the weighted average of all (separate metered plus master-metered) multi-family accounts.

4. **The projections of residential units, commercial employees and UNC/UNC Hospitals square footage seem reasonable (based on a cursory review). When we take the numbers provided in Tables A-19, A-20 and A-21 (TM 3.2, pp.19-20) and apply the usage rates in Table ES-2 (TM 3.2, executive summary), we obtain the following finished water demands *[data table not reproduced in this letter].***

   There is in fact a slight divergence of 0.1 to 0.2 mgd (approximately 1 percent of total demand) between OWASA's Table 3 finished water demand totals and the projections derived from the TM 3.2 Appendices. This was due to data rounding errors made in the preparation of Table 3. We do not believe that these affect the substance of our presentation.

5. **Your unaccounted-for rate of .09 is based on total raw water demand. Our intention in the application guidelines (p.4) is to apply an unaccounted-for water rate to the finished water subtotal, as well as a process water rate. According to Table 3 of your application (p.3), your average unaccounted-for water rate based on the finished water subtotal is about .10 (the maximum allowed in the application guidelines) and your average process water rate based on finished water subtotal is about .07. Applying those rates to the above finished water totals, we obtain the following raw water demands *[data table not reproduced in this letter].***

   From our April 11 conversation, I understood this to be a methodological note to OWASA. The corrected application of unaccounted-for water rates to finished, rather than raw water demands, results in the following total raw water demand projections:

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
OWASA Table 3	9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6
Corrected Projections	9.3	10.2	11.1	12.0	12.9	13.8	14.7	15.7	16.6	17.5	18.4

6. **Can you include a draft of the new [water conservation] ordinance you are contemplating, or the proposed revisions?**

   Agenda materials from OWASA's April 19, 2001 Board of Directors meeting are included with this letter.

7. **Your statement that 30-year sustainable yields were reduced by "approximately five percent" to obtain 50-year sustainable yields seems arbitrary. However, reviewing Technical Memorandum 5.1 indicates that Figure 13 (p.21) provides a basis for determining 50-year sustainable yields. You may want to cite that figure.**

   The December 29, 2000 draft application did not adequately describe the conversion of 30-year to 50-year sustainable yields, but Figure 13 (and associated data) of TM 5.1 was in fact the basis of those adjustments.

   Figure 13 indicates that OWASA's existing storage system (unconstrained by conveyance capacity) has a 30-year safe yield of approximately 15.1 mgd and a 50-year safe yield of approximately 14.3 mgd. In order to estimate the 50-year safe yield of the future storage system (i.e., with the 3 billion gallon expanded quarry), the same ratio (14.3/15.1) was applied to the 30-year safe yield of 20.5 mgd for the 3 bg stone quarry option reported in *TM 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options*. This was considered to be an appropriate estimating method, because both existing and future storage systems will be filled from the same University Lake/Cane Creek hydrologic system.

8. **All of the public benefits listed are the result of permitting the expanded quarry operations and are not related to the reservoir. Are there any additional benefits associated with the reservoir itself, once quarry operations cease?**

   The principle secondary benefit of the reservoir itself will be the permanent preservation of at least 120 acres of public greenspace surrounding a reservoir of about 60 acres. The eventual terms and conditions of public use and access to this area have not yet been established.

9. **Are the costs you discuss in this section (pp.14-17) in Year 2000 dollars?**

Costs information was derived from *TM 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options,* which employed July 1999 cost estimates. Details of the planning level and order-of-magnitude cost estimate methodology are provided on pages 5 through 7 of TM 5.2. The slight inflationary difference between 1999 and 2000 dollars is substantially smaller than the magnitude of uncertainty inherent in the cost estimating methods.

10. Please provide a map depicting OWASA's future service area and facilities, as described in Section 6.

As noted in our April 11 conversation, we provided the requested map with our December 29, 2000 draft application.

11. Line number 8 in Tables #1, #2, and #3 of Section 8-B [of the Local Water Supply Plan] (i.e., "Amount not returned to Source Basin") should be "0." Discharge and consumptive use are both in the source basin, therefore all water is returned to the source basin.

This comment is noted, and you may make the appropriate notation in the document we provided.

OWASA will be glad to provide any additional information that you may need.

Sincerely,

Edward A. Holland, AICP
Planning Director

attachments
cc: Ed Kerwin

AGENDA ITEM

PROPOSED REVISION TO WATER CONSERVATION ORDINANCES

PURPOSE

- To consider a draft discussion paper on a proposed approach to revising local water conservation ordinances.

BACKGROUND

- The existing conservation ordinances of Carrboro, Chapel Hill, and Orange County have been in place since the early 1980s and need to be updated. A staff memo, recent OWASA operational data, and draft discussion paper are attached.

ACTION NEEDED

- Discussion of attached materials and possible referral to Natural Resources and Technical Systems (NRTS) Committee for further development.

STAFF RECOMMENDATION

- Staff recommends that this matter be referred to the NRTS Committee.

April 19, 2001

OWASA

ORANGE WATER & SEWER AUTHORITY

Quality Service Since 1977

MEMORANDUM

TO: Ed Kerwin

FROM: Ed Holland

DATE: April 12, 2001

SUBJECT: Water Conservation and Demand Management

A draft *Water Conservation and Demand Management* discussion paper is attached for possible consideration by the Board of Directors. It outlines a proposed approach to revising the local conservation ordinances that have been in place since the early 1980s but are now out of date and somewhat obsolete.

Successively stringent water conservation stages would be invoked and enforced by Carrboro, Chapel Hill, and Orange County upon notice by OWASA that current demand conditions could not be reliably met by available resources. OWASA's determination would be triggered either by limiting conditions of reservoir storage or by peak daily demands experienced at the water treatment plant. The attached graphs summarize daily supply and demand conditions from May 1995 through October 2000.

The proposed ordinance is presented within the larger context of demand management in general and its long term role in OWASA's water supply strategy. The discussion paper mentions the proposed conservation rate structure, as well as several active programs – such as toilet and plumbing fixture retrofit, household and outdoor water use audits, etc. – that the Board may consider in the near future.

Next steps should probably include revision of the discussion paper by the Board and NRTS Committee, followed by circulation to Carrboro, Chapel Hill, and Orange County. As noted in the paper, we're expecting to receive a list of corresponding conservation practices to which the University would commit under the proposed Stage I, II, and III restrictions.

Please let me know if you need further information.

PROVIDE TO BOARD OF DIRECTORS
Approved EdL Date 4/12/01

Ed Holland

Edward A. Holland, AICP
Director of Planning

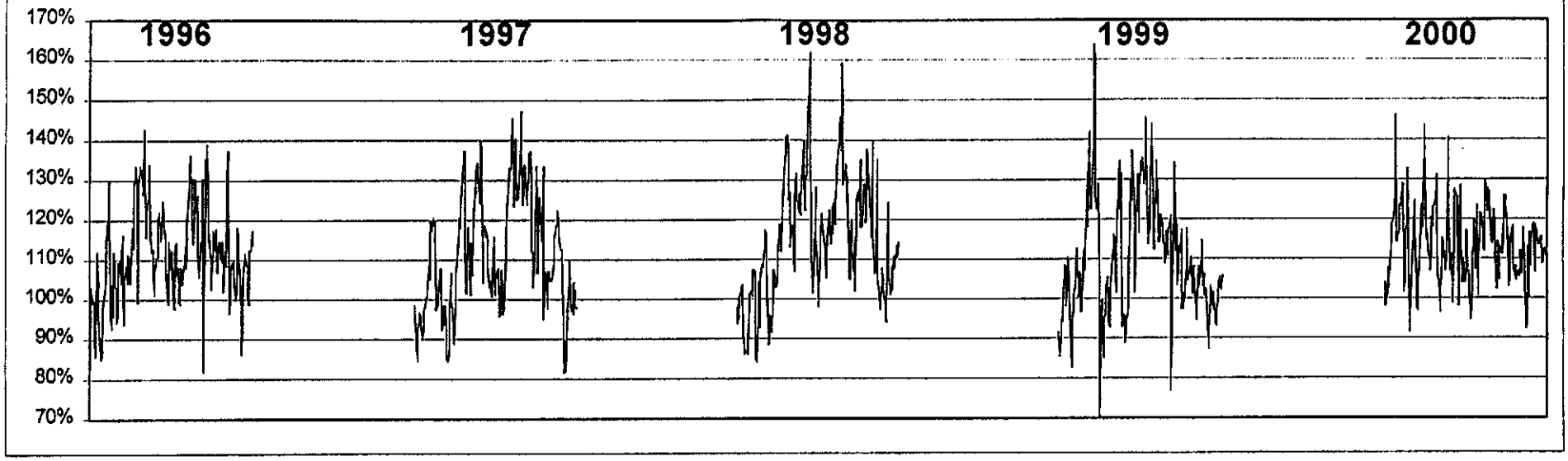
Attachments

400 Jones Ferry Road
PO Box 366
Carrboro, NC 27510-0366

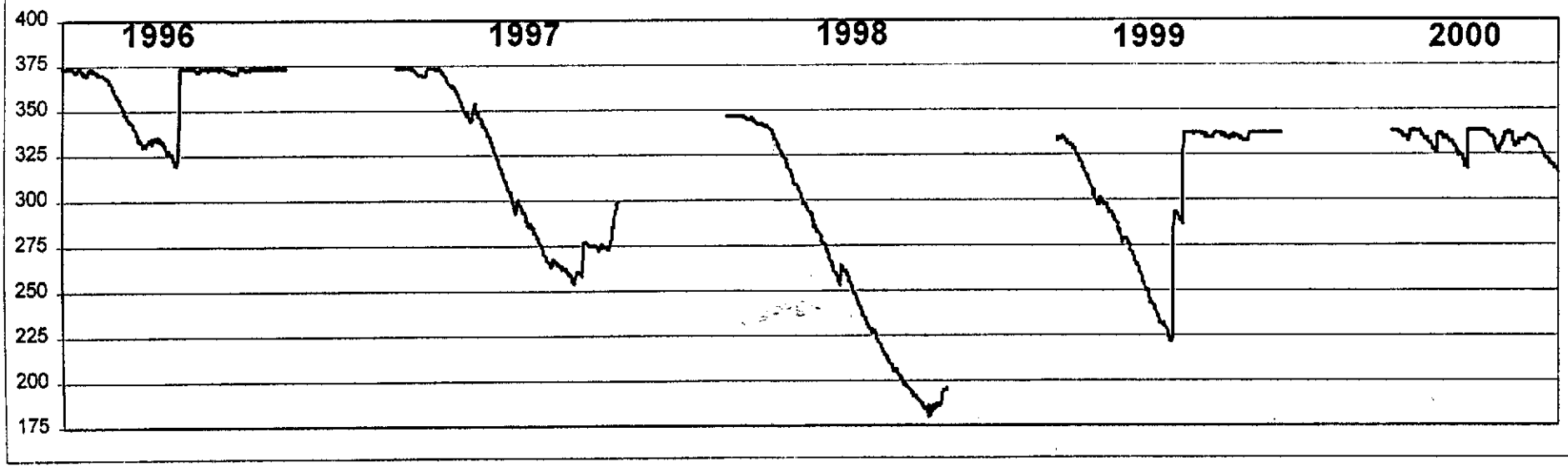
Equal Opportunity Employer
Printed on Recycled Paper

Voice (919) 968-4421
FAX (919) 968-4464
www.owasa.org

Daily Peaking Ratios (Daily Demand/12-Month Running Average), May - October



Days of Storage in Reservoirs, May - December



OWASA

ORANGE WATER & SEWER AUTHORITY

Quality Service Since 1977

Water Conservation and Demand Management
DRAFT Discussion Paper
April 12, 2001

Purpose

This paper outlines the basis for a new water conservation program for the Carrboro-Chapel Hill community served by OWASA. It is intended to support further discussion by the OWASA Board of Directors, elected officials of Carrboro, Chapel Hill, and Orange County, as well as officials of UNC-Chapel Hill and the community at large.

Context

Water conservation and demand management are key elements of OWASA's long term water supply strategy. These initiatives complement the more traditional capital development programs for raw water supply, treatment, storage, and transmission facilities that are needed to meet present and projected needs.

In addition to water conservation programs, OWASA has proposed a new seasonal conservation rate structure to be implemented during the coming year. A decision has not been finalized as of this writing, however, and is still subject to comments by the general public and further consideration by the OWASA Board.

Also under consideration are several active conservation initiatives that OWASA may sponsor. These may include programs to distribute and retrofit ultra low flush toilets (ULFTs) and other residential fixtures; water use audits for residential and non-residential customers; and special technical assistance for large outdoor water users. These options will require further discussion and consideration before OWASA commits to their implementation.

In addition to active conservation programs, OWASA recognizes that improved plumbing efficiency achieved in new construction and through the routine replacement of aging fixtures and appliances may offer substantial water savings over the long term future. Such changes are referred to as *passive* conservation because they are expected to occur without further intervention by outside agencies. OWASA is committed to collecting and analyzing data needed to detect the long term water savings that may be achieved through such trends and to incorporating these new findings into its long term demand forecasts.

400 Jones Ferry Road
PO Box 366
Carrboro, NC 27510-0366

Voice (919) 968-4421
FAX (919) 968-4464
www.owasa.org

Conservation Goals

OWASA's overall water conservation and demand management goals are twofold:

1. To reduce the rate of growth in overall water use in order to maximize existing and planned supply sources; and

2. To manage seasonal peak day demands that drive the costly expansion of water treatment, storage, and transmission facilities.

Existing Conservation Ordinances

The existing ordinances of Carrboro, Chapel Hill, and Orange County, which are virtually identical, were originally adopted (with OWASA's guidance) during the early 1980s. They invoke successively restrictive levels of voluntary and ultimately mandatory water conservation under drought conditions, as defined by specific water levels in University Lake. The ordinances no longer reflect the community's water resource status and needs, and are now considered to be obsolete.

It is proposed that new or revised ordinances incorporate the following tiers of action:

STAGE I: NO WASTEFUL USE – Year-round practices, voluntary participation, no enforcement

This stage of the conservation program would remain in effect year round unless superceded by successively more restrictive stages described below. Stage I would encourage a list of commonsense practices, such as:

- Irrigating lawns, gardens and shrubs only after dark or during pre-dawn hours.

- Avoiding wasteful outdoor uses, such as washing sidewalks, driveways, patios, and other hard surfaces.

- Using water saving devices in faucets, showers, and toilets.

- Limiting showers to five minutes; not leaving faucets running while shaving, brushing teeth, washing dishes; operating dishwashers and other appliances with full loads only.

STAGE II: MANDATORY CONSERVATION – Invoked/rescinded upon advice of OWASA, subject to local enforcement

This stage would be invoked upon OWASA's determination that current customer demands could not be sustained by available resources. This could be triggered either by the amount of stored water in OWASA's reservoir system (e.g., 150 days of water remaining) or by the daily demand exerted on OWASA's water treatment plant.

Certain conservation practices would become mandatory – subject to local regulatory enforcement – and are proposed to include:

- Irrigation of lawns, gardens, and shrubs on only two designated days of the week, only after dark or during pre-dawn hours.
- No water to be used for washing sidewalks, driveways, patios, or other hard surfaces.
- (Other limitations to be determined)

STAGE III: CRITICAL OR EMERGENCY CONDITIONS – Invoked/rescinded upon advice of OWASA, subject to stringent local enforcement

The most restrictive set of conservation measures would be invoked under emergency or other unforeseen conditions that constrained OWASA's water production capacity to less than the current level of customer demand. Such conditions might be caused by severe equipment failure, weather emergency (tornado, hurricane, ice storm, etc.), or other disaster.

- Emergency restrictions would be vigorously enforced and would include the prohibition of all outdoor and other non-essential water uses (to be defined).
- At OWASA's discretion, water service might be discontinued or reduced in certain parts of the service area through the manipulation of valves, pumps, and other appurtenances in order to preserve the availability of water for the UNC Hospitals, business district fire protection, and other critical community needs.

University Participation

Based on discussions underway at the time of this writing, UNC officials will provide a set of corresponding water saving practices that the University would implement concurrently with the invocation of Stages I, II, or III described above. These will be subject to review and discussion as they are received.

Next Steps

As noted at the beginning, this discussion paper is a first step toward developing new conservation ordinances for the community. Next steps will likely include revision by the OWASA Board and its Natural Resources and Technical Systems (NRTS) Committee, followed by circulation to Carrboro, Chapel Hill, and Orange County.

The OWASA Board anticipates and encourages substantial discussion by the local elected bodies and community at large.

Prepared by:

Edward A. Holland, AICP
Planning Director

Approved by:

Ed Kerwin
Executive Director

Jordan Lake Water Supply
Round Three Allocation Request

Draft Application

December 29, 2000

Submitted by:

Orange Water and Sewer Authority
Post Office Box 366
400 Jones Ferry Road
Carrboro, NC 27510
919-968-4421

OWASA

ORANGE WATER & SEWER AUTHORITY

Quality Service Since 1977

December 29, 2000

Mr. John Morris, Director
NC Division of Water Resources
1611 Mail Service Center
Raleigh, NC 27699-1611

Dear Mr. Morris:

I am pleased to submit this draft application for a Jordan Lake water supply allocation on behalf of the Orange Water and Sewer Authority (OWASA). We believe the information contained herein supports our preliminary request to reduce our existing 10 million gallon per day (MGD) Level II allocation to 5 MGD.

OWASA has invested substantial resources in our Jordan Lake option since 1988. These have included $149,000 in fees for the 10 MGD Level II allocation; $550,000 in the early 1990s for 125 acres of land adjacent to Corps of Engineers property on the western side of Jordan Lake; $25,000 for an intake siting study in 1991; and $60,000 in construction costs for pipe casings placed under U.S. Highway 64. It is obvious that our longstanding interest in Jordan Lake is more than casual, and it goes without saying that OWASA is committed to meeting any and all financial obligations associated with a Jordan Lake allocation.

Historically, our allocation has represented a supply that could supplement existing sources when their yield no longer meets the growing needs of the community we serve. More recently, OWASA's Comprehensive Water and Sewer Master Plan and its March, 2000 Water Supply 50-Year Vision paper identified the extended (3 billion gallon) Stone Quarry Reservoir as the best choice for the next increment of water supply expansion. This option has been strongly endorsed by our Board of Directors and the community.

Due to the extended time needed to increase the volume of the existing quarry through commercial rock extraction, as well as contractual commitments between OWASA and American Stone Company (our commercial quarrying partner), the expanded quarry is not expected to be available for use as a storage reservoir until 2035. The supply and demand analysis presented in the attached draft application indicates a likely deficit of up to several million gallons per day between 2020 and 2035. We propose using our Jordan Lake allocation as a temporary supplement to offset that deficit until the expanded Quarry Reservoir can be placed in service in or about 2035.

400 Jones Ferry Road
PO Box 366
Carrboro, NC 27510-0366

Voice (919) 968-4421
FAX (919) 968-4464
www.owasa.org

It is not known at this time if OWASA's use of its allocation will be in partnership through a regional enterprise, or more simply through a long-term finished water purchase/sale contract with the City of Durham and/or Chatham County.

For the past two years, OWASA staff have participated in active discussions with staff of both Durham and Chatham County about potential joint ventures in withdrawal, transmission, and treatment facilities, including the possible creation of a Jordan Lake water development authority. We have kept the OWASA Board of Directors well apprised of these discussions and opportunities, but they have not yet benefited from a full discussion with other leaders of the community, so it is premature to speculate on their eventual outcome.

OWASA will provide more detailed plans to the Environmental Management Commission (EMC) for its use of Jordan Lake water as these options are more fully developed in the months to come.

The OWASA Board has discussed the application process extensively and requests that I convey their keen interest in retaining a substantial portion of our 10 MGD Level II allocation. A critical element of OWASA's mission of providing an adequate supply of high quality drinking water has been maintaining a reliable range of long-term options for the future. Jordan Lake has always represented an important hedge against an uncertain future – and, as you well know – future water supply and demand scenarios are subject to major unknowns and uncertainties. Changes in underlying conditions or assumptions on which forecasts are based can result in radical changes to future scenarios. The Board of Directors has asked me share with you some of the major uncertainties inherent in OWASA's future supply and demand scenarios:

Service Area Growth and Demand – Our demand forecasts are based on an array of specific expectations, including the assumption that OWASA's service area, defined as the Urban Services Area delineated in the *Carrboro-Chapel Hill-Orange County Joint Planning Agreement*, will remain unchanged. OWASA's water demand forecasts also assume that the limited amount of land available for future growth and development under existing local policies will result in service area "buildout" sometime during the next 50 years. At that time, the historic trend of increasing water demands would level off at a demand of between 16 and 22 MGD. We note that the demand forecasting methods prescribed for these draft applications do not provide for any variation from the forecast demand curves. OWASA's own analyses include "high" and "low" bands of uncertainty that vary approximately 10 percent above and below the "expected growth" line.

Rate of Quarry Expansion and Ultimate Capacity – The ultimate yield of the extended Quarry Reservoir will depend on its water storage capacity. OWASA's sustainable yield projections are based on a final capacity of 3 billion gallons (BG). The current capacity of American Stone's active quarry is approximately 1 billion gallons. OWASA's existing Quarry Reservoir has a storage volume of 0.2 bg. American Stone's agreement with OWASA contains a "due diligence"

commitment to maintain rock production at an average rate of 650,000 tons per year, which corresponds to a quarry pit volume increase of 0.065 billion gallons per year. At this rate, quarry volume will increase by 1.95 bg over the next 30 years, providing a total volume of slightly more than 3 BG. If – due to economic conditions, market competition, or changes in corporate policy – American Stone's production activity decreased below this level, or if the company went out of business and stopped production altogether, then the usable storage volume and resulting water supply yield would be less than what has been projected.

Meteorological Variation and Climatic Change – The sustainable yield estimates calculated for OWASA's existing and future raw water supply system were based on historic temperature and streamflow records that reflect the natural variation and uncertainty characteristic of such observations. To the extent that future weather conditions differ from the historic range – reflecting either short term variation or longer term climatic changes – the yield of OWASA's water supply system will differ from what has been projected.

We urge your staff and the EMC to consider these and other uncertainties as you evaluate OWASA's and other requests.

Please consider this draft application as our preliminary request. We understand that OWASA retains the right to make substantial changes in this application should the need arise prior to the final application deadline currently scheduled for April 2001.

If you or your staff have any questions or need further information about the attached materials, please feel free to contact me directly or Mr. Ed Holland, OWASA's Planning Director.

Sincerely,

Ed Kerwin
Executive Director

attachments
cc: Mr. Sydney Paul Miller
OWASA Board of Directors

Jordan Lake Water Supply
Round Three Allocation Request

Draft Application

December 29, 2000

Submitted by:

Orange Water and Sewer Authority
Post Office Box 366
400 Jones Ferry Road
Carrboro, NC 27510
919-968-4421

Section I – Water Demand Forecasts

Orange Water and Sewer Authority (OWASA) developed water demand forecasts through the year 2050 as part of its Comprehensive Water and Sewer Master Plan. Forecasts were based on the best information and professional judgment available, as well as the following assumptions:

1. OWASA's long-term service area, which is defined as the Urban Services Area delineated by the *Carrboro-Chapel Hill-Orange County Joint Planning Agreement*, will remain unchanged during the 50-year planning period.

2. Future demands will continue to be determined by retail water sales within the Urban Services Area. The demand forecasts do not anticipate any retail or wholesale delivery outside of this service area.

3. Demand forecasts are based on linear extrapolations of historical housing, employment, and development trends. The moderate growth rates experienced during the past 20 to 25 years are expected to continue.

4. Due to the limited amount of land available for future growth and development under the existing plans and policies of Carrboro and Chapel Hill, OWASA's service area will likely be "built out" sometime within the 50-year planning period, but neither the timing nor rate of this is known.

Details of the demand forecasting methodology are presented in two technical memoranda (TMs) prepared for OWASA's Master Plan: *TM 3.1 – Water Demand Forecasts (June 18, 1999)* and *TM 3.2 – Baseline and Alternative Water Demand Forecasts (August 27, 1999)*. A summary is presented below.

Forecasts were disaggregated among four principle customer sectors: single family residential, multifamily residential, University/UNC Hospitals, and commercial/other accounts, which include a small number of irrigation-only meters. The relative demand by each of these sectors is presented in Table 1.

Table 1. Raw Water Demand by Major Use Sectors

Customer/Use Sector	Percent of Total
Single Family Residential	24%
Multifamily Residential	22%
Institutional (UNC/UNC Hospitals)	26%
Commercial/Other	13%
Treatment Process Water	6%
Unaccounted-for Water	9%
Total	**100%**

An analysis of seven years of OWASA customer records indicated an average daily raw water consumption of 199 gallons per day (gpd) per single family residence, 137 gpd per multi-family residence, 180 gpd per 1,000 gross square foot (gsf) of University/UNC Hospitals space, and 77 gpd per commercial (non-University/UNC Hospitals) employee.

Future raw water demands were estimated by multiplying these factors by the number of units expected to exist in each category at ten-year intervals out to the year 2050. For example, single family residential demands for the year 2020 were developed by multiplying 199 gpd by the number of single family homes projected for that year. This process was applied to each of the four demand sectors in five-year increments.

Building and employment estimates were based on an analysis of data in OWASA's service area since 1977, with residential growth based on an extrapolation of housing trends observed from 1990 through 1997. These data indicated growth rates of 343 new single family and 132 multi-family units per year within the Carrboro/Chapel Hill service area. In the absence of any predictors that these rates will change in the coming years, they were assumed to remain constant throughout the 50-year planning period. Similar analyses were conducted for the University/UNC Hospitals, and commercial/other sectors.

The underlying prediction parameters for future water use are summarized in Table 2. The resulting projections are presented in Figure 1 and Table 3.

Table 2. Use Factors for Calculating Raw Water Demand Forecasts

Customer Category	Units [1]	Base Year Value	Rate of Increase Per Year	Base Year	Water Use Per Unit (gpd) [2]
SF Residential	SF Homes	11,669	343	1997	199
MF Residential	DUs	13,855	132	1998	137
UNC/UNC Hospitals	GSF x 1,000	12,670	217	1997	180
Commercial/Other	Employees	13,273	408	1995	77

1. SF = Single Family MF = Multifamily DUs = Dwelling Units GSF = Gross Square Feet of total building space
2. Numbers in this column represent finished (treated) water billed to customers, which is approximately 17% less than the total amount of raw (untreated) water used to produce it.
   Raw Water Pumped to Plant = Total Finished Water Produced at Plant + Discarded Process Water
   Where: Total Finished Water Produced at Plant = Billed Water + Unaccounted-for Water
   Billed Water = 0.91 x Total Finished Water Produced at Plant
   Unaccounted-for Water = 0.099 x Billed Water
   Discarded Process Water = 0.06 x Raw Water Pumped to Plant
   Conversion: Raw Water Pumped to Plant = 1.169 x Finished Water Billed to Customers

Because the demand forecasts were based on an extrapolation of historic growth and unit consumption data, the distribution of demand among the major user categories in 2050 is not expected to differ substantially from the present day pattern illustrated in Table 1.

Varying the assumptions and input parameters (Table 2) would, of course, produce different future demand distributions.

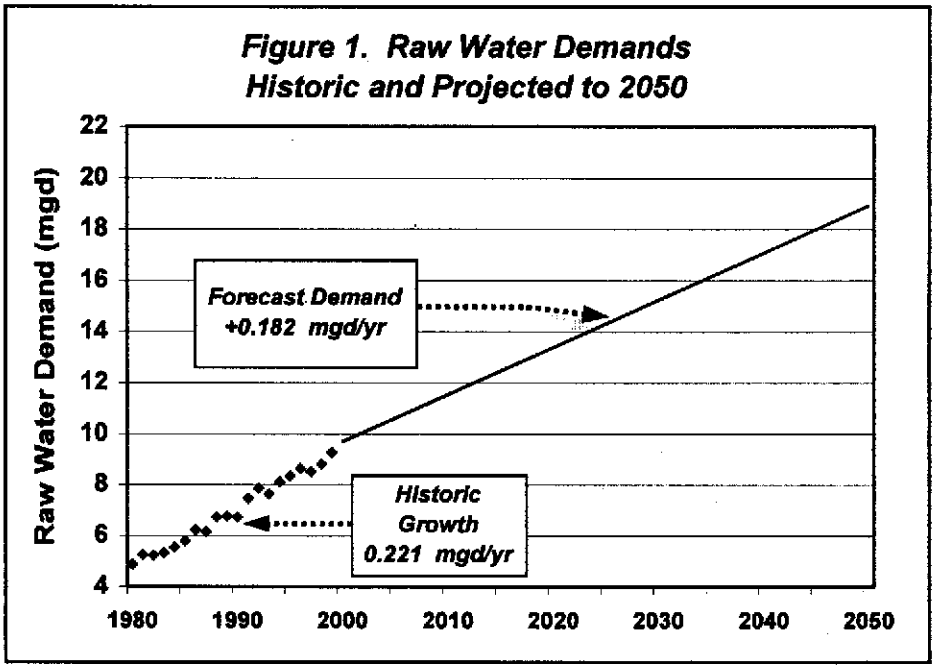


Table 3. Projected Average Day Raw Water Demands (MGD)

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Single Family Residential	2.5	2.9	3.2	3.6	3.9	4.2	4.6	5.0	5.3	5.6	5.9
Multifamily Residential	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.8
Commercial/Other	1.3	1.4	1.6	1.7	1.9	2.1	2.2	2.3	2.5	2.7	2.9
UNC/UNC Hospitals	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3
System Process Water	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1
Unaccounted-for Water	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.6
Total Raw Water Demand	**9.4**	**10.3**	**11.3**	**12.2**	**13.1**	**14.1**	**15.0**	**16.0**	**16.9**	**17.8**	**18.6**

Section II – Conservation and Demand Management

Analyses conducted under OWASA's Comprehensive Water and Sewer Master Plan included a review of water demand by specific end uses. Findings are summarized below in Table 4. These data were derived to estimate the potential cost-effectiveness of a variety of conservation and demand management options.

Table 4. Raw Water Demand by End Uses

Water Use	Percent of Total
Indoor faucets and sinks	13%
Showers and baths	10%
Dishwashers and washing machines	13%
Toilets and urinals	17%
Other indoor uses	8%
Heating and Cooling (UNC/UNC Hospitals)	14%
Outdoor and other uses	10%
Water treatment process water	6%
Unaccounted-for water	9%
Total	**100%**

It is notable that more than 50 percent of OWASA water is used through indoor plumbing fixtures (toilets, showers, sinks, and baths) and appliances (washing machines and dishwashers). Although outdoor uses (swimming pools, lawn/garden irrigation, and car washing) contribute substantially to short duration summertime peak demands, only about 10 percent of OWASA's total annual water production is used outdoors.

Carrboro-Chapel Hill is a relatively water-efficient community, as illustrated by the moderate residential use in both single and multifamily homes. Average residential consumption, which is derived by combining OWASA customer account data with single and multifamily Census figures, is about 75 gallons per person per day.

Technical Memorandum 3.3 – Long-Term Water Demand Forecasts with Conservation (January 24, 2000), developed for OWASA's Master Plan, provided a preliminary assessment of water conservation possibilities. This included the estimate that *passive* conservation practices achieved in new construction and through the routine replacement of aging fixtures and appliances may reduce the 2050 demand forecasts reported in Section I by as much as 18 percent.

Although promising for the future, these trends have not yet been observed among OWASA customers. In fact, preliminary data from new homes in the Carrboro-Chapel Hill service area have indicated an increase of approximately 10 percent per household among single family homes built since conservation-oriented national plumbing standards became mandatory in 1994. It is not known if this apparent increase is due to an increase in overall water use, or perhaps due to greater outdoor use associated with larger yards and gardens of many recently built homes.

In contrast to the substantial potential savings of passive conservation, TM 3.3 found that *active* conservation programs, such as toilet replacement incentives, residential retrofit kits, conservation rates, water use audits, and individual metering of new multifamily housing units, are only expected to reduce 2050 demands by less than two percent. This is due to the relatively small amount of OWASA water used for outdoor purposes, and also reflects the passive water savings that will eventually accrue without the initiation of active programs. Active programs do, however, offer proportionally greater short term savings by accelerating the implementation of certain practices, such as low flow plumbing fixtures, that would otherwise occur more slowly through "natural" replacement.

Except for the individual metering of new multifamily housing units, the technical analysis described above found the implementation costs would exceed the economic savings of those active programs – even when the cost savings realized through the deferral of major capital projects, such as water and wastewater treatment plant expansions, are taken into account.

OWASA recognizes that passive water savings may eventually accrue through the continued implementation of national plumbing standards that went into effect in 1994, but OWASA does not intend to incorporate these potential savings into future raw water demand forecasts until actual conservation effects can be observed and verified in local customer data. OWASA is committed to an ongoing program of data collection and analysis that will enable the detection of such trends, which can then be used to modify unit use and other assumptions on which the demand forecasts are based.

Ongoing Conservation and Demand Management Initiatives

OWASA's existing water conservation program is currently under revision and will be more fully developed by June 2001.

1. Water Conservation Ordinances: The current ordinances, which have been in place since the mid-1980s, invoke successively restrictive levels of voluntary and ultimately mandatory water conservation under drought conditions, as defined by specific water levels in University Lake. These ordinances are now considered to be obsolete, and no longer reflect the community's water resource status and needs.

A new ordinance is contemplated that would include several components focused on the dual goals of (1) reducing the rate of growth in overall water use, as measured by average

day demand on an annual basis; and (2) reducing seasonal peak day demands that drive the expansion of water treatment, transmission, and storage facilities. It is expected that the new ordinance will include several components:

Year-Round Requirements – such as "no wasteful use" provisions that would prohibit wasteful uses of water (still to be specified).

Drought Conditions or Extended Periods of Hot, Dry Weather – Certain conservation measures, such as odd/even irrigation use, or restricted irrigation hours, would be invoked under "trigger" conditions determined either by total raw water remaining in OWASA's Cane Creek/University Lake/Stone Quarry reservoir system and/or by single day production at the water treatment plant. For example, if the reservoir system contained less than 100 days of seasonal demand (based on the previous year's summertime usage pattern) or if treatment plant production levels exceeded 165 percent of the average day demand of the previous 12 months, mandatory conservation measures would be invoked.

Emergency Conditions – A more restrictive set of conservation measures would be invoked in the event of any failure of equipment, or any other unforeseen condition, that constrains OWASA's finished water production capacity to less than the current level of customer demand. Such restrictions would likely include the prohibition of all outdoor water use and would be accompanied by a major media campaign urging community-wide reduction of all water uses.

OWASA plans to introduce proposed revisions to the community's water conservation ordinances later in 2001.

2. Conservation Rate Structure: OWASA currently implements a uniform rate structure, whereby all customers are charged the same commodity rate of $2.90 per thousand gallons, regardless of the volume of water used. Additionally, all customers pay a fixed monthly service charge based on meter size of their service connection.

Per instructions of OWASA's Board of Directors, a consultant study is currently underway to evaluate several *conservation rate structure* options that would help achieve the dual goals of reducing overall (annual) and peak day water demands. The most promising methods under review appear to be (1) seasonal, (2) inverted block, and (3) average winter consumption rates. The study is scheduled for completion by June, 2001. A new conservation rate structure may be implemented by November 2001.

3. Leak Detection and Repair: OWASA's distribution system is rigorously monitored through a variety of operational programs, including systematic meter replacement and testing, systematic repair and rehabilitation of the most vulnerable water mains, and by closely monitoring unaccounted-for water. OWASA's rate of nine percent unaccounted-for water – calculated from the difference between total finished water pumped to the system minus total water billed – is well within industry standards for this performance measure.

4. Annual Water Audits: One of the recommendations of *Technical Memorandum 3.3 – Long-Term Water Demand Forecasts with Conservation (January 24, 2000)*, developed for OWASA's Master Plan, was the provision of water audits to major outdoor water users, in order to optimize irrigation systems in the service area. It is likely that the demand for such audits will increase with the implementation of conservation rates (described above) that will have the greatest impact on large seasonal users of outdoor water. Similar audit opportunities have been discussed with senior utility staff of University of North Carolina at Chapel Hill and UNC Hospitals, which represent OWASA's single largest customer.

OWASA offers free in-home assistance to customers whose consumption patterns indicate the presence of possible leaks or faulty fixtures.

5. Public Education: OWASA regularly publishes conservation tips in its quarterly customer newsletter and the local print and broadcast media, and provides water saving showerheads and low-flow faucet aerators at cost to customers who request them. Consumer guidance ranges from summertime lawn and gardening assistance to wintertime tips on how to avoid frozen pipes – which can result in major water loss.

6. Evaluation of Plumbing Retro-fit Programs: As noted above, plumbing retro-fit incentives were evaluated in TM 3.3, but were not found to be cost-effective for OWASA. These have not been ruled out, however, and may receive further consideration.

7. Evaluation of Water Reuse for Non-Potable Demands: Water reuse opportunities were evaluated in detail in a 1996 consultant report for OWASA and have been revisited in recent work completed for the Comprehensive Water and Sewer Master Plan. The greatest opportunity appears to be the potential use of reclaimed water to irrigate UNC's nearby Finley Golf Course. However, it is currently more cost-effective for UNC to withdraw Morgan Creek water directly for irrigation use than to purchase reclaimed water from OWASA. However, even if this opportunity were exploited, it would have no impact on raw water demands, as potable water is not currently used for golf course irrigation.

OWASA actively explored the non-potable use of reclaimed wastewater with developers of the Meadowmont project on the eastern edge of Chapel Hill, approximately one mile from the Mason Farm Wastewater Treatment Plant, but the estimated costs and benefits were not acceptable to the developers.

OWASA and UNC utility staff are currently examining opportunities to use water treatment process water (filter backwash, etc.) from the Jones Ferry Road Water Treatment Planht in the University's cogeneration and chiller plants. These facilities are major users of finished water, and could reduce water demands by several percent if treatment process water can be successfully substituted for finished water that is currently

used. Preliminary water quality investigations have been favorable, and staff are continuing to pursue these possibilities.

OWASA and UNC staff are actively seeking additional opportunities to use reclaimed water at new facilities planned for the University's Central Campus as well as the Horace Williams tract that will be developed for future mixed use.

Section III – Current Water Supply

OWASA's existing system consists of University Lake, the Cane Creek Reservoir, and the Quarry Reservoir, as summarized in Table 5.

Table 5. Characteristics of Existing OWASA Supply Sources	University Lake	Cane Creek	Quarry Reservoir
Year Developed	1932	1989	1979
Drainage Area (square miles)	30	31	<0.1
Total Volume (bg)	0.57	3.01	0.20
Usable Volume (bg)	0.45	2.98	0.20
Surface Area at Full Volume (acres)	212	500	10
Average Inflow (mgd)	18.9	20.1	<0.1
Minimum Release Requirements (mgd)	None	0.14 – 1.9 (depends on inflow)	None

Raw water from University Lake is pumped to the Jones Ferry Road Water Treatment Plant in Carrboro. Cane Creek water can either be pumped directly to the treatment plant or into Phil's Creek near the existing Quarry Reservoir, where it flows downstream to University Lake for repumping to the treatment plant; or, Cane Creek water can be pumped into the existing Quarry Reservoir and stored for later use. Water pumped out of the Quarry Reservoir can only be conveyed to the treatment plant via Phil's Creek and University Lake.

The safe yield of the existing Cane Creek/University Lake/Quarry Reservoir system was analyzed and reported in *TM 5.1 – OWASA Raw Water Supply Facilities Safe Yield Analysis (July 30, 1999)* and in *Safe Yield as a Function of Storage Volume(March 21, 2000),* both of which were conducted under OWASA's Comprehensive Water and Sewer Master Plan by CH2MHILL. Results are presented here in lieu of the USGS Mass Curve Analysis method prescribed for Round Three Jordan Lake allocation requests. CH2MHILL results, which were originally expressed as 30-year sustainable yields, have been reduced by approximately five percent to reflect the 50-year return frequency specified for the Jordan Lake requests. Details are available in the references cited above.

The analyses indicated that the 50-year safe yield of the existing raw water system is approximately 11.1 mgd. The system is presently constrained by certain limitations on the ability to pump and transmit water from University Lake, Cane Creek, and the Quarry Reservoir to the treatment plant. Increasing the capacity of raw water pumps and transmission mains can increase the 50-year safe yield of the storage system to about 14.3

mgd, which would represent the maximum practical use of the existing University Lake/Cane Creek/Quarry Reservoir system.

These conveyance upgrades are estimated to cost $10 million and are programmed into OWASA's 15-Year Capital Improvements Plan in time to meet the increase in demands that are projected to occur by 2008 when average day demands are expected to exceed the present system's 11.1 mgd safe yield. Additional water provided through the conveyance improvements would then meet raw water needs until about 2025, when average day demands are expected to exceed the 14.3 mgd safe yield of the upgraded system. As noted, this would represent the maximum practical use of OWASA's existing reservoir and quarry system.

The next anticipated increment of system expansion would be completion of the expanded Quarry Reservoir in 2035. As noted in the CH2MHILL technical documents, the increase in Quarry Reservoir storage volume from its present capacity of 0.2 BG to its expected capacity of 3.0 BG would represent an additional safe yield of 5.1 mgd, providing a total system yield of 19.4 mgd. Final approvals for the Quarry Reservoir expansion are expected by the end of 2001.

This expansion will occur through the ongoing extraction of rock from the American Stone Quarry operation located on OWASA property just to the west of the existing Quarry Reservoir. American Stone's lease agreement with OWASA allows this extraction to occur through 2030, when the operation will be discontinued and the resulting quarry pit converted to an offline storage reservoir. The OWASA-American Stone agreement contains a "due diligence" requirement that rock production will be maintained at a level sufficient to result in the 3.0 BG storage volume anticipated by 2030. OWASA's consultants have estimated that it will take between two and a half and six years to convert (and fill) the abandoned quarry pit to a usable storage reservoir. For planning purposes, it is assumed that the expanded quarry and all appurtenances needed to provide the 14.3 mgd safe yield will be in place by 2035.

Additional water supply alternatives are discussed in Section V.

Section IV – Future Water Supply Needs

A summary of raw water demand forecasts, existing water supply, and future needs is presented in Table 6 below and in Table 8-A of the Local Water Supply Plan Update.

Table 6. Summary of Existing Raw Water Supply and Future Needs (MGD)

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Existing System	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1	11.1
+ Conveyance Upgrades	0	0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
+ Expanded Quarry Reservoir	0	0	0	0	0	0	0	5.1	5.1	5.1	5.1
Total Available Supply	11.1	11.1	14.3	14.3	14.3	14.3	14.3	19.4	19.4	19.4	19.4
80% Supply	8.9	8.9	11.4	11.4	11.4	11.4	11.4	15.6	15.6	15.6	15.6
Service Area Demand	9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6
Surplus (Deficit) re: Total Supply	1.7	0.8	3.0	2.1	1.2	0.2	(0.7)	3.4	2.5	1.6	0.8
Surplus (Deficit) re: 80% Supply	(0.5)	(1.4)	0.1	(0.8)	(1.7)	(2.7)	(3.6)	0.4	(1.3)	(2.2)	(3.0)

Section V – Alternative Supplies

The following section reviews three alternative water supply scenarios. All assume that the raw water conveyance system upgrades to OWASA's existing system will be completed no later than 2010, thus optimizing the existing Cane Creek/University Lake/Quarry Reservoir system to its full 50-year sustainable yield of 14.3 mgd. The three alternative options are as follows:

1. Expand the Quarry Reservoir to 3.0 BG, as described previously, using a 5 MGD Jordan Lake allocation as a temporary supply supplement until the quarry expansion is completed.

2. Build a new dam at University Lake and raise the water level 22 feet.

3. Raise the existing Cane Creek Reservoir dam 20 feet, creating 3.0 BG of additional storage capacity.

In addition to the information provided below, technical details are available in *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999),* prepared for OWASA's Comprehensive Water and Sewer Master Plan.

Attributes of all three alternatives are summarized in Table 7.

#1 – Expanded Quarry Reservoir with Jordan Lake as a Temporary Supplement

Available Supply: OWASA would voluntarily reduce its existing 10 MGD Level II Jordan Lake allocation to 5 MGD. It is anticipated that this would only be necessary during the period from about 2020 to 2035 when a supply deficit may exist until the Quarry Reservoir expansion is completed in about 2035.

It is not known at this time if OWASA's access to Jordan Lake will be through a partnership in a regional enterprise or simply through a long-term finished water purchase/sale contract with the City of Durham or Chatham County.

Environmental Impact: Impacts of this scenario will be minimal. The quarry expansion is a continuation of an activity that has been ongoing for more than 20 years. Impacts of Jordan Lake water supply development – construction of an intake, pumping, transmission, and perhaps treatment facilities – represent baseline impacts to which of alternative supply scenarios are to be compared.

Water Quality Classification: The expanded Quarry Reservoir will store excess flows from the Cane Creek and University Lake reservoirs. All three of these water bodies are classified WS-II, and 90 percent of the 61-square mile drainage area is located within Orange County and subject to local source water protection regulations substantially

more restrictive than required by State water quality rules. Jordan Lake is as WS-IV water supply.

Timeliness: An advantage of this alternative is that Jordan Lake would only be used as a temporary supplement to OWASA's long-term water supply plan. As described above, the 5 MGD allocation would serve as a temporary "bridge" to mitigate any supply deficits that may occur before the Quarry Reservoir expansion is completed and ready for service.

Interbasin Transfer: This alternative would withdraw and discharges all water from and to the Haw River (2-1) drainage basin and does not represent an interbasin transfer.

Regional Partnerships: As noted above, it is not yet known whether OWASA will participate in the joint development of new Jordan Lake intake, pumping, and (possibly) treatment facilities, or simply purchase treated Jordan Lake water through its interconnections with Durham and/or Chatham County. Extensive discussions have occurred among the staff of all three entities about possible joint ventures, including the creation of a Jordan Lake water development authority.

Technical Complexity: Conversion of the completed quarry pit, which will likely be 250+ feet deep, to an offline storage reservoir will require the design and construction of major intake and pumping facilities. This component of the alternative is considered to be technically *complex*. Development of the Jordan Lake component will be *complex* if it includes the construction of new intake, pumping, and treatment facilities, but will be *not complex* if it only involves the upsizing of existing finished water interconnections between OWASA and Durham/Chatham County.

Institutional Complexity: Most of the institutional issues associated with the Quarry Reservoir expansion have been resolved locally, and final approvals are expected by the end of 2001. There are no known state or federal level complexities involved with this project. The expanded Quarry Reservoir component is considered to be *not complex* from an institutional perspective. The Jordan Lake component will be *complex* if it involves participation in a joint venture to develop the necessary intake, pumping, and treatment facilities, but institutional issues will be *not complex* if this component only involves a purchase/sale contract with Durham and/or Chatham County.

Political Complexity: Most of the local political issues surrounding the expanded Quarry Reservoir have been resolved and are considered to be *not complex* at this time. The Jordan Lake component, however, may become *very complex* depending on discussions with local officials. A proposed *Water and Sewer Management, Planning, and Boundary Agreement* among Carrboro, Chapel Hill, Hillsborough, Orange County, and OWASA would require that Carrboro, Chapel Hill, and Orange County approve a long-term purchase/sale contract between OWASA and Durham or Chatham County before such a contract could be executed. The proposed *Boundary Agreement* is currently undergoing final revisions before consideration by each of the local boards.

Public Benefits: In addition to water supply benefits to the community at large, the expanded Quarry Reservoir project will provide substantial secondary benefits to the community adjacent to the stone quarry. Details are available in the current draft of Orange County's Special Use Permit, which includes such provisions as the creation of a special No Fault Well Repair Fund for the neighboring community, commitments for noise reduction at the quarry operation, and the creation of permanent public greenspace around the expanded Quarry Reservoir when it is ultimately completed. All of these benefits are contingent on the successful issuance of a Special Use Permit by the Orange County Board of Commissioners for the quarry expansion. Secondary public benefits associated with the expanded Quarry Reservoir are considered to be *many.* Secondary benefits associated with the Jordan Lake component are considered to be *none.*

Consistency with Local Plans: During the past year, Carrboro, Chapel Hill, and Orange County all adopted resolutions necessary to accommodate the expanded Quarry Reservoir project in their local and joint land use plans. Final implementation details will be resolved through the Special Use process now underway. Consistency of the Jordan Lake component with local plans and policies has not yet been determined and will depend on the outcome of public discussion during the coming months.

Cost: Costs for the expanded Quarry Reservoir were developed in *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999),* prepared for OWASA's Comprehensive Water and Sewer Master Plan and are summarized below. These represent the net present value of the capital and O&M costs needed to convert the quarry to a water storage facility and to pump raw water to OWASA's treatment plant in Carrboro.

Costs have not yet been estimated for the Jordan Lake component of this scenario. Further discussion and guidance are needed to establish the most relevant cost comparison. This cost basis will depend on whether OWASA shares directly in the development costs of the Jordan Lake supply, or if OWASA simply purchases treated water directly from Durham and/or Chatham County.

Expanded Quarry Reservoir – Development and O&M Costs

Quarry Site Intake Structure	$1,100,000
Pump Station	$7,800,000
Valving, R/W Diversion	$ 100,000
RW Transmission Main	$2,180,000
University Lake Facilities	$ 440,000
Cane Creek Facilities	$ 130,000
Capital Cost Subtotal	$11,750,000
Engineering	$1,175,000
Legal & Administrative	$ 587,500
Regulatory Costs	$ 587,500

General Contingency	$1,175,000
NPV of $200,000 annual O&M Costs	$2,250,000
Total Project Cost	$17,525,000
Cost per gpd	$3.43/gpd

Alternative #2 – New Dam at University Lake

This alternative would include building a new dam on Morgan Creek about 400 feet downstream of the current structure. The water surface elevation would be 22 feet higher than the lake's current elevation. This option would include the relocation and/or improvement of several roadways, including three bridges and other structures, and would flood 265 acres of additional land. Additional property acquisition would probably be necessary.

Available Supply: This alternative would provide an additional 3.4 MGD of water supply. Details of the safe yield determination are available in Technical Memorandum 5.1 – *OWASA Raw Water Supply Facilities Safe Yield Analysis (July 30, 1999)*; *Safe Yield as a Function of Storage Volume(March 21, 2000)*; and *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999).* As noted previously, the 30-year safe yield estimates of these references have been reduced approximately 5 percent to approximate the 50-year safe yield called for in the Jordan Lake allocation request.

The 3.4 MGD of additional supply for this alternative does not account for minimum release or in-stream flow requirements that would likely be imposed on a new dam; i.e., actual available supply would be less than 3.4 MGD.

Environmental Impact: The impact of this project would be substantially *worse* than for Alternative #1, which would use Jordan Lake as a temporary supplement to the Quarry Reservoir expansion.

Water Quality Classification: The University Lake watershed is classified WS-II.

Timeliness: Given the environmental, institutional, and regulatory complexity of this project, it would require a minimum of 15 years to implement. If this alternative were pursued, OWASA would need to begin the process immediately.

Interbasin Transfer: None

Regional Partnerships: There are no opportunities for regional partnership in this alternative. It would be an OWASA-only project.

Technical Complexity: The design and construction of a new dam, property acquisition, road and bridge relocation, etc. render this a *very complex* project.

Institutional Complexity: Due to the numerous legal and regulatory requirements of property acquisition from the University of North Carolina – which owns University Lake and the surrounding land – environmental impact assessment and mitigation, instream flow considerations, and so forth, this project would be *very complex* from an institutional standpoint.

Political Complexity: This project – like any project involving the construction of a new dam, acquisition and inundation of property, and environmental mitigation – would, without a doubt, be *very complex* politically.

Public Benefits: This project would offer *no* secondary public benefits that are not already available at University Lake.

Consistency with Local Plans: This project appears to conform to existing land use plans and zoning requirements, but – as noted above – may not be politically acceptable to the local jurisdictions with planning and zoning authority.

Cost: Cost estimates for a new dam at University Lake were developed in *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999),* prepared for OWASA's Comprehensive Water and Sewer Master Plan and are summarized below.

New Dam at University Lake – Development and O&M Costs

New Dam and Spillway	$7,500,000
Water Quality/Sediment Control	$ 100,000
Intake Structure Modifications	$ 980,000
New Pump Station	$4,800,000
Road and Bridge Replacement	$2,730,000
Building Relocation	$ 970,000
Land Acquisition (270A @ $10,000)	$2,700,000
Capital Cost Subtotal	$19,780,000
Engineering	$3,956,000
Legal & Administrative	$1,978,000
Regulatory Costs	$1,978,000
General Contingency	$1,978,000
NPV of $110,000 annual O&M Costs	$1,240,000

Total Project Cost	$30,910,000
Cost per gpd	$9.09+/gpd

(Cost per gpd will be greater, depending available supply, which will ultimately be determined by minimum release requirements.)

Alternative #3 – Raise the Cane Creek Reservoir Dam

The Cane Creek Reservoir would be expanded by modifying the dam to raise the water surface elevation 20 feet above its present level, approximately doubling the usable storage volume to a total of 6 BG. This would require the relocation and/or improvement of several roadways, including two bridges, and would flood an additional 210 acres of surrounding farmland and woodland. Additional property acquisition would probably be necessary. Environmental impacts would be significant.

Available Supply: This alternative would provide an additional 5.1 MGD of water supply. Details of the safe yield determination are available in Technical Memorandum 5.1 – *OWASA Raw Water Supply Facilities Safe Yield Analysis (July 30, 1999)*; *Safe Yield as a Function of Storage Volume(March 21, 2000)*; and *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999)*. As noted previously, the 30-year safe yield estimates of these references have been reduced approximately 5 percent to approximate the 50-year safe yield called for in the Jordan Lake allocation request.

The 5.1 MGD of additional supply for this alternative assumes that the current minimum release requirements for the Cane Creek Reservoir will remain unchanged. If more restricted release requirements are imposed, the available supply from this alternative would be less than 5.1 MGD.

Environmental Impact: The impact of this project would be substantially *worse* than for Alternative #1, which would use Jordan Lake as a temporary supplement to the Quarry Reservoir expansion.

Water Quality Classification: The Cane Creek watershed is classified WS-II.

Timeliness: Given the environmental, institutional, and regulatory complexity of this project, it would require a minimum of 15 years to implement. If this alternative were pursued, OWASA would need to begin the process immediately.

Interbasin Transfer: None

Regional Partnerships: There are no opportunities for regional partnership in this alternative. It would be an OWASA-only project.

Technical Complexity: The design and construction of a new dam, property acquisition, road and bridge relocation, etc. render this a *very complex* project.

Institutional Complexity: Due to the numerous legal and regulatory requirements of property acquisition, environmental impact assessment/ mitigation, instream flow considerations – including the likelihood of litigation – this project would be *very complex* from an institutional standpoint.

Political Complexity: This project – like any project involving the construction of a new dam, acquisition and inundation of property, and environmental mitigation – would, without a doubt, be *very complex* politically.

Public Benefits: This project would offer *no* secondary public benefits that are not already available at the Cane Creek Reservoir.

Consistency with Local Plans: This project would appears to conform to existing land use plans and zoning requirements, but – as noted above – may not be politically acceptable to the local jurisdiction with planning and zoning authority.

Cost: Cost estimates for raising the Cane Creek dam were developed in *Technical Memorandum 5.2 – Planning Level Economic Evaluation of Raw Water Supply Options (September 9, 1999),* prepared for OWASA's Comprehensive Water and Sewer Master Plan and are summarized below.

Raise the Existing Cane Creek Dam – Development and O&M Costs

Raise Dam and Spillway	$17,070,000
Water Quality/Sediment Control	$ 100,000
Intake Structure Modifications	$1,000,000
Replace Dam Access Road	$ 360,000
New Pumps and Station Upgrade	$ 930,000
RW Line Upgrade	$ 360,000
Road and Bridge Replacement	$3,120,000
Land Acquisition (225A @ $10,000)	$2,250,000
Capital Cost Subtotal	$25,190,000
Engineering	$5,038,000
Legal & Administrative	$2,519,000
Regulatory Costs	$2,519,000
General Contingency	$2,519,000
NPV of $40,000 annual O&M Costs	$ 450,000
Total Project Cost	$38,235,000

Cost per gpd $7.50/gpd

(Cost per gpd will be greater if the available supply is reduced by more restrictive minimum release requirements.)

Table 7. Summary of Water Supply Alternatives

	#1 – Expanded Quarry with Jordan Supplement		#2 – New Dam at University Lake	#3 – Raise Dam at Cane Creek Reservoir
	Quarry	Jordan Lake		
Total Supply (MGD)	5.1	5.0	3.4*	5.1*
Environmental Impacts	Minimal	(Baseline)	Worse	Worse
Water Quality Classification	WS-II	WS-IV	WS-II	WS-II
Interbasin Transfer (MGD)	0	0	0	0
Regional Partnerships	No	Yes	No	No
Technical Complexity	Complex	Not Complex	Very Complex	Very Complex
Institutional Complexity	Not Complex	Complex	Very Complex	Very Complex
Political Complexity	Not Complex	Complex	Very Complex	Very Complex
Public Benefits	Many	None	None	None
Consistency with Local Plans	Yes	Unknown	Unknown	Unknown
Total Cost ($ Millions)	17.5	Unknown	30.9	38.2
Unit Cost ($ per gpd)	3.43	Unknown	9.09*	7.50*

* *Total supply will be less and unit cost will be higher with more restrictive instream flow requirements.*

Section VI – Plans to Use Jordan Lake

OWASA has held a 10 MGD Level II Jordan Lake allocation since the EMC first granted allocations in 1988. Historically, this allocation has represented a supply source that could supplement the University Lake, Cane Creek, and existing Stone Quarry supplies when their yield no longer met the growing needs of the community.

OWASA has invested substantial resources in its Jordan Lake option since 1988. These have included $149,000 paid to NCDENR for the 10 MGD Level II allocation; $550,000 in the early 1990s for 125 acres of land adjacent to Corps of Engineers property on the western side of Jordan Lake; $25,000 for an intake siting study in 1991; and $60,000 in construction costs for pipe casings placed under U.S. Highway 64.

More recently, OWASA's Comprehensive Water and Sewer Master Plan and its March, 2000 Water Supply 50-Year Vision paper identified the extended (3 billion gallon) Stone Quarry Reservoir as the best choice for the next increment of OWASA's water supply expansion. Although the necessary approvals have not yet been obtained for the quarry extension, OWASA expects that they will be granted before the EMC issues Round Three Jordan Lake allocations in December, 2001.

Due to the extended time needed to expand the existing quarry through commercial rock extraction, as well as contractual commitments between OWASA and American Stone Company (OWASA's commercial quarrying partner), the expanded quarry is not expected to be available for use as a storage reservoir until 2035. The supply and demand analysis presented in earlier sections of this application indicates a likely deficit of up to several million gallons per day between 2020 and 2035. OWASA plans to use its Jordan Lake allocation as a temporary supplement to offset that deficit until the expanded Quarry Reservoir goes into service in or about 2035. Because OWASA recognizes that its anticipated needs do not warrant the full 10 MGD Level II allocation that it currently holds, OWASA agrees to voluntarily adjust its allocation downward to 5 MGD.

As noted elsewhere in this application, it is not known at his time if OWASA's use of its allocation will be in partnership through a regional enterprise, or more simply through a long-term finished water purchase/sale contract with Durham and/or Chatham County.

For the past two years, OWASA staff have participated in active discussions with staff of both Durham and Chatham County about potential joint ventures in withdrawal, transmission, and treatment facilities, including the possible creation of a Jordan Lake water development authority. Because these opportunities have not yet benefited from a full and open public discussion, it is premature to speculate on their eventual outcome.

OWASA will provide more detailed plans to the EMC for its use of Jordan Lake water as these options are more fully developed in the months to come.

North Carolina Department of Environment and Natural Resources
Division of Water Resources

LOCAL WATER SUPPLY PLAN for JORDAN LAKE ALLOCATION APPLICATION 2000-2001
Part 1: Water Supply System Report for Calendar Year 2000

Completed By: Ed Holland, Planning Director Date: 12/26/00

SECTION 1: GENERAL INFORMATION

1-A. Water System: Orange Water and Sewer Authority 1-B. PWS Identification #: 03-68-010

1-C. River Sub-Basin(s): Haw River Subbasin (2-1)

1-D. County(s): Orange (Durham, Chatham)

1-E. Contact Person: Ed Holland Title: Planning Director

1-F. Mailing Address: Post Office Box 366 CITY: Carrboro ZIP: 27510

1-G. Phone: 919-968-4421 1-H. Fax: 919-968-4464 1-I. E-mail: eholland@owasa.org

1-J. Type of Ownership (Check One): Municipality County (Authority) District Non-Profit Association For-Profit Business
State Federal Other

SECTION 2: WATER USE INFORMATION

2-A. Population Served in 2000 Year-Round 72,000
Seasonal (if applicable) N/A For Months of N/A

2-B. Total Raw Water Use for CY 2000 including all purchased water: 3,364 Million Gallons (MG)

2-C. Average Annual Daily Raw Water Use in CY 2000: 9.191 Million Gallons per Day (MGD)

2-D. List 2000 Average Annual Daily Finished Water Use by Type in Million Gallons per Day (MGD):

	Metered Connections		Non-Metered Connections		Total
Type of Use	Number	Average Use (MGD)	Number	Estimated Average Use (MGD)	Average Use (MGD)
(1) Residential	15,800	4.235	0	0	4.235
(2) Commercial/Other	1,600	1.171	0	0	1.171
(3) Industrial	0	0	0	0	0
(4) Institutional (UNC)	300	2.430	0	0	2.430
(5) Sales to other Systems					0
(6) System Processes					0.552
(7) Subtotal [sum (1) thru (6)]					8.388
(8) Average Annual Daily Water Use [Item 2-C]					9.191
(9) Unaccounted-for water [(8) - (7)]					0.803

2-E. List the Average Daily and Maximum Day Water Use by Month for CY 2000 in Million Gallons per Day (MGD):

	Average Daily Use	Maximum Day Use	Max/Ave Ratio		Average Daily Use	Maximum Day Use	Max/Ave Ratio		Average Daily Use	Maximum Day Use	Max/Ave Ratio
Jan	7.4	8.8	1.19	May	10.0	12.5	1.25	Sep	9.9	11.3	1.14
Feb	8.2	8.9	1.09	Jun	10.3	14.0	1.36	Oct	10.1	11.2	1.11
Mar	8.3	10.7	1.29	Jul	10.0	11.4	1.14	Nov	9.1	11.0	1.21
Apr	8.3	9.6	1.16	Aug	10.1	11.9	1.18	Dec	8.5	10.6	1.25

2-F. List the system's 10 Largest Water Users and their Average Annual Daily Use in Million Gallons per Day (MGD) for CY 2000: (include sales to other systems)

Water User	Average Daily Use	Water User	Average Daily Use
UNC Power Plant	0.33	Kingswood Apartments	0.05
UNC Hospitals	0.19	Old Well Apartments	0.08
UNC North Chiller Plant	0.30	RRC Inc. (Carol Woods Retirement Community)	0.06
UNC Kenan Laboratory	0.07	The Villages Apartments	0.05
UNC Faculty Laboratory Research Building	0.05	University Mall	0.04

2-G. WATER SALES TO OTHER WATER SYSTEMS IN 2000 List all systems that can be supplied water through existing interconnections (regular and emergency). Mark the locations of connections on the System Map.

1 Water supplied to:		2 Average Daily Amount		3 Contract Amount		4 Pipe Size(s)	5*
Water System	PWSID	MGD	# of Days	MGD	Expiration Date	Inches	R or E
Durham	03-32-010	0	0	N/A	N/A	2" – 8"	E
Hillsborough	03-68-015	0	0	N/A	N/A	16"	E
Chatham County	03-19-126	0	0	N/A	N/A	16"	E

*NOTE Column 5 R=Regular Use, E=Emergency Use

2-H. What is the Total Amount of Sales Contracts for Regular Use? 0 MGD

SYSTEM NAME: Orange Water and Sewer Authority PWSID: 03-68-010

SECTION 3: WATER SUPPLY SOURCES

3-A. SURFACE WATER List surface water source information. Mark and label locations of intakes on the System Map.

1 Name of Stream and/or Reservoir	2 Drainage Area Square Miles	3 Is Withdrawal Metered? Y / N	4 Sub-Basin	5 Average Daily Withdrawal for days used		6 Maximum Day Withdrawal	7* Available Supply		8* System Component Limiting Daily Output		9 Useable On-Stream Raw Water Supply Storage Million Gallons	10* R or E
				MGD	# of Days	MGD	MGD	Qualifier	Capacity MGD	System Component		
University Lake	30	Y	Haw River (2-1)	6.2	360	11.5	11.1 MGD sustainable from total system	SY50 (see note below)	13.5	R,M	500	R
Cane Creek Reservoir	31	Y	Haw River (2-1)	5.6	235	10.2			11.5	R,M	2980	R
Stone Quarry Reservoir	<0.1	N	Haw River (2-1)	0	0	0			1.5	R	200	E
							11.1	Totals				

*NOTES Column 7 Supply Qualifiers: C=Contract amount, SY20=20-year Safe Yield, SY50=50-year Safe Yield, F=20% of 7Q10 or other instream flow requirement, T=Treatment plant capacity, O=Other (specify) Sustainable Yield of total system was determined in 1999-2000 work by CH2MHILL

Column 8 Component: R=Raw water pumps, T=Treatment facilities, M=Transmission main, D=Distribution system, O=Other (specify)_____

Column 10 R=Regular Use, E=Emergency Use

3-B. What is the Total Surface Water Supply available for Regular Use? 11.1 MGD

3-C. Does this system have off-stream raw water supply storage? No (Yes) Useable Capacity 200 Million Gallons

3-D. WATER PURCHASES FROM OTHER WATER SYSTEMS IN FY 2000

List all systems that can supply water to this system through existing interconnections (regular and emergency). Mark the locations of the connections on the System Map.

1 Water supplied by:		2 Average Daily Amount		3 Contract Amount		4 Pipe Size(s)	5* R or E
Water System	PWSID	MGD	# of Days	MGD	Expiration Date	Inches	
Durham	03-36-010	0	0	N/A	N/A	2" – 8"	E
Hillsborough	03-68-015	0	0	N/A	N/A	16"	E
Chatham County	03-19-126	0	0	N/A	N/A	16"	E

*NOTE Column 5 R=Regular Use, E=Emergency Use

3-E. What is the Total Amount of Purchase Contracts available for Regular Use? 0 MGD (Do not include emergency use connections in total)

SYSTEM NAME: Orange Water and Sewer Authority PWSID: 03-68-010

3-F. GROUND WATER List well information. ***Mark and label the location of all wells on the System Map.***

1 Name or Number of Well	2 Well Depth Feet	3 Casing Depth Feet	4 Screen Depth Top Feet	4 Screen Depth Bottom Feet	5 Well Diameter Inches	6 Pump Intake Depth Feet	7 Is Well Metered? Y / N	8 Average Daily Withdrawal for Days Used MGD	8 Average Daily Withdrawal for Days Used # of Days	9 Maximum Day Withdrawal MGD	10 12-Hour Supply Million Gallons	11* System Component Limiting Daily Output Capacity MGD	11* System Component Limiting Daily Output System Component	12* R or E
N/A														

*NOTES Column 11 Component: R=Raw water pumps, T=Treatment facilities, M=Transmission main, D=Distribution system, O=Other (specify)_____
Column 12 R=Regular Use, E=Emergency Use

3-G. What is the Total 12-Hour Supply of all wells available for Regular Use? _____ million gallons

3-H. Are ground water levels monitored? No Yes How often? _____

3-I. Does this system have a wellhead protection program No Yes Under development

SYSTEM NAME: Orange Water and Sewer Authority PWSID: 03-68-010

3-J. WATER TREATMENT PLANTS List all WTPs, including any under construction, as of 12/31/2000. ***Mark and label locations on the System Map.***

Water Treatment Plant Name	Permitted Capacity MGD	Source(s)
Jones Ferry Road Water Treatment Plant	15	Cane Creek Reservoir, University Lake, Stone Quarry Reservoir

3-K. What is the system's finished water storage capacity? 8.0 Million Gallons

SECTION 4: WASTEWATER INFORMATION

4-A. List Average Daily Wastewater Discharges by Month for CY 2000 in Million Gallons per Day (MGD)

	Average Daily Discharge		Average Daily Discharge		Average Daily Discharge		Average Daily Discharge
Jan	8.19	Apr	9.28	Jul	7.90	Oct	7.69
Feb	9.61	May	8.68	Aug	8.54	Nov	7.39
Mar	9.06	Jun	7.44	Sep	8.60	Dec	7.69

4-B. List all Wastewater Discharge and/or Land Application Permits held by the system. ***Mark and label points of discharge and land application sites on the System Map.***

1 NPDES or Land Application Permit Number	2 Permitted Capacity Dec. 31,2000 MGD	3 Design Capacity MGD	4 Average Annual Daily Discharge MGD	5 Name of Receiving Stream	6 Sub-Basin	7 Maximum Daily Discharge MGD
NC0025241	12.0	12.0	8.34	Morgan Creek	Haw River (2-1)	14.9 (July)

SYSTEM NAME: Orange Water and Sewer Authority PWSID: 03-68-010

4-C. List all Wastewater Discharge Connections with other systems. Mark and label the locations of connections on the System Map.

1 Wastewater Discharger		2 Wastewater Receiver		3 Average Daily Amount Discharged or Received		4 Contract Maximum
Name	PWSID	Name	PWSID	MGD	# of Days	MGD
OWASA	03-68-010	Durham	03-32-010	0.010	365	N/A

4-D. Number of sewer service connections: 15,500

4-E. Number of water service connections with septic systems: 1,100 (Number in Sub-basin 1 ____ Number in Sub-basin 2 ____ Number in Sub-basin 3 ____)

4-F. Are there plans to build or expand wastewater treatment facilities in the next 10 years? No Yes Please explain. Expansion of existing plant to 16 MGD is planned for 2006 or 2007

SECTION 5: WATER CONSERVATION and DEMAND MANAGEMENT ACTIVITIES

5-A. What is the estimated total miles of distribution system lines? 329 miles

5-B. List the primary types and sizes of distribution lines:

	Asbestos Cement (AC)	Cast Iron (CI)	Ductile Iron (DI)	Galvanized Iron (GI)	Polyvinyl Chloride(PVC)	Other
Size Range	6" 8" 12"	4, 6, 8, 10, 12, 16, 20	4, 6, 8, 12, 16, 24	1" 2"	2" 6" 12"	1" 2"
Estimated % of lines	55	19	19	1	5	1

5-C. Were any lines replaced in 2000? No (Yes) 8,000 linear feet

5-D. Were any new water mains added in 2000? No (Yes) 33,800 linear feet

5-E. Does this system have a program to work or flush hydrants? No (Yes) How often? Annually

5-F. Does this system have a valve exercise program? (No) Yes How often? _____

5-G. Does this system have a cross-connection control program? No (Yes)

5-H. Has water pressure been inadequate in any part of the system? (No) Yes Please explain. _____

5-I. Does this system have a leak detection program? No (Yes) What type of equipment or methods are used? (see narrative in Section II of JL appl)

5-J. Has water use ever been restricted since 1992? No (Yes) Please explain. Regional power outage during Hurricane Fran (September 1996) caused low pressure and water levels in the distribution system

5-K. Does this system have a water conservation plan? No (Yes) Please attach a copy. [Currently being updated; to be completed by 6/30/2001.]

5-L. Did this system distribute water conservation information in 2000? No (Yes)

5-M. Are there any local requirements on plumbing fixture water use which are stricter than the NC State Building Code? (No) Yes Please explain. _____

5-N. Does this system have a program to encourage replacement or retrofit of older, higher water-use plumbing fixtures? (No) Yes

5-O. Does this system have a water shortage or drought response plan? No (Yes) Please attach a copy. [Currently being updated; to be completed by 6/30/2001.]

5-P. Is raw water metered? No (Yes)

5-Q. Is finished water output metered? No (Yes)

5-R. Do you have a meter replacement program? No (Yes)

5-S. How many meters were replaced in 2000? 1,000 meters

5-T. How old are the oldest meters in the system? 15 years

5-U. What type of rate structure is used? Decreasing Block (Flat Rate) Increasing Block Seasonally Adjusted Other_____

Attach a detailed description of the rate structure to this document.

5-V. Are there meters for outdoor water use, such as irrigation, which are not billed for sewer services? No (Yes) # of meters 75

5-W. Does this system use reclaimed water or plan to use it within the next five years? (No) Yes # of connections _____ ; _____ MGD

[May use reclaimed water to irrigate UNC Finley Golf Course adjacent to wastewater plant.]

SECTION 6: SYSTEM MAP

Review, correct, and return the enclosed system map Check Plot to show the present boundaries of the water distribution system service area, points of intake and discharge, wells, water and wastewater treatment facilities, and water and wastewater interconnections with other systems. Also, show any proposed points of intake or discharge, wells, water and wastewater facilities, water and wastewater interconnections, and future service area extensions. Use symbols shown on the attached map.

LOCAL WATER SUPPLY PLAN for JORDAN LAKE ALLOCATION APPLICATION 2000-2001
Part 2: Water Supply Planning Report

Completed By: Ed Holland, Planning Director Date: 12/27/00

WATER SYSTEM: Orange Water and Sewer Authority PWSID: 03-68-010

SECTION 7: WATER DEMAND PROJECTIONS

7-A. Population to be Served	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Year-Round	71,600	78,100	84,400	90,800	97,200	103,600	110,000	116,500	122,900	129,300	135,700
Seasonal (if applicable)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Please list the months of seasonal demand: _____ Attach a detailed explanation of how projections were calculated.

Table 7-B. Projected Average Daily Service Area Demand in Million Gallons per Day (MGD). (Does not include sales to other systems)
Sub-divide each water use type as needed for projecting future water demands.

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Residential											
Single Family	2.5	2.9	3.2	3.6	3.9	4.2	4.6	5.0	5.3	5.6	5.9
Multifamily	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.8
(2) Commercial/Other	1.3	1.4	1.6	1.7	1.9	2.1	2.2	2.3	2.5	2.7	2.9
(3) Industrial	0	0	0	0	0	0	0	0	0	0	0
(4) Institutional											
UNC/UNC Hospitals	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.3
(5) System Processes	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1
(6) Unaccounted-For Water	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.6
(7) Total Service Area Demand [sum (1) thru (6)]	9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6

7-C. Is non-residential water use expected to change significantly through 2050 from current levels of use? (No) Yes
If yes, please explain; _____

Table 7-D. FUTURE SUPPLIES List all new sources or facilities which were under development as of December 31, 2000 and mark locations on the System Map.

Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply MGD	Development Time years	Year Online
Stone Quarry Reservoir Expansion		Surface	Haw (2-1)	WS-II	5.1	35	2035

*NOTE R=Regular Use, E=Emergency Use

7-E. What is the Total Amount of Future Supplies available for Regular Use? 5.6 MGD

Table 7-F. FUTURE SALES CONTRACTS that have been already agreed to. List new sales to be made to other systems.

1 Water supplied to:		2 Contract Amount and Duration			3 Pipe Size(s) Inches	4* R or E
System Name	PWSID	MGD	Year Begin	Year End		
N/A						

*NOTE R=Regular Use, E=Emergency Use

7-G. What is the total amount of existing Future Sales Contracts for Regular Use? 0 MGD

SECTION 8: FUTURE WATER SUPPLY NEEDS

Local governments should maintain adequate water supplies to ensure that average daily water demands do not exceed 80% of the available supply. Completion of the following table will demonstrate whether existing supplies are adequate to satisfy this requirement and when additional water supply will be needed.

Table 8-A. AVERAGE DAILY DEMAND AS PERCENT OF SUPPLY Show all quantities in MGD.

Available Supply, MGD		2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Existing Surface Water Supply	(Item 3-B)	11.1	11.1	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
(2) Existing Ground Water Supply	(Item 3-G)	0	0	0	0	0	0	0	0	0	0	0
(3) Existing Purchase Contracts	(Item 3-E)	0	0	0	0	0	0	0	0	0	0	0
(4) Future Supplies	(Item 7-E)	0	0	0	0	0	0	0	5.1	5.1	5.1	5.1
(5) **Total Available Supply** [sum (1) thru (4)]		11.1	11.1	14.3	14.3	14.3	14.3	14.3	19.4	19.4	19.4	19.4
Average Daily Demand, MGD												
(6) Service Area Demand	(Item 7-B, Line 7)	9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6
(7) Existing Sales Contracts	(Item 2-H)	0	0	0	0	0	0	0	0	0	0	0
(8) Future Sales Contracts	(Item 7-G)	0	0	0	0	0	0	0	0	0	0	0
(9) **Total Average Daily Demand** [sum (6) thru (8)]		9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6
(10) Demand as Percent of Supply	[(9) / (5)] x 100	85%	93%	79%	85%	92%	99%	105%	82%	87%	92%	96%
(11) **Supply Needed to maintain 80%**	**[(9) / 0.8] - (5)**	0.7	1.8	(0.2)	1.0	2.1	3.3	4.5	0.6	1.7	2.9	3.4
Additional Information for Jordan Lake Allocation												
(12) Sales Under Existing Contracts		0	0	0	0	0	0	0	0	0	0	0
(13) Expected Sales Under Future Contracts		0	0	0	0	0	0	0	0	0	0	0
(14) Demand in each planning period	[(6)+(12)+(13)]	9.4	10.3	11.3	12.2	13.1	14.1	15.0	16.0	16.9	17.8	18.6
(15) Supply minus Demand	[(5) - (14)]	1.7	0.8	3.0	2.1	1.2	0.2	(0.7)	3.4	2.5	1.6	0.8

SYSTEM NAME: Orange Water and Sewer Authority PWSID: 03-68-010

8-B. Does Line 10 above indicate that demand will exceed 80% of available supply before the year 2030? No Yes
If yes, your Jordan Lake Water Supply Storage Allocation Application should include the following items:

(1) Alternatives for obtaining additional water supply to meet future demands. Use the following tables to summarize the various future water supply alternatives available to your system. Attach a detailed description of each water supply project shown in each alternative. The sooner the additional supply will be needed, the more specific your plans need to be.

(2) A demand management program to ensure efficient use of your available water supply. A program should include: conducting water audits at least annually to closely monitor water use; targeting large water customers for increased efficiency; modifying water rate structures; identifying and reducing the amount of leaks and unaccounted-for water; and reusing reclaimed water for non-potable uses.

(3) Restrictive measures to control demand if the additional supply is not available when demand exceeds 80% of available supply, such as placing a moratorium on additional water connections until the additional supply is available or amending or developing your water shortage response ordinance to trigger mandatory water conservation as water demand approaches the available supply.

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#1) Expand Quarry Reservoir to 3 BG, Jordan Lake as Temporary Supplement	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply – Demand"	1.7	0.8	3.0	2.1	1.2	0.2	(0.7)	3.4	2.5	1.6	0.8
(2) Available supply from Project 1 (describe)	0	0	0	0	5.0	5.0	5.0	0	0	0	0
Available supply from Project 2 (describe)	0	0	0	0	0	0	0	5.1	5.1	5.1	5.1
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	1.7	0.8	3.0	2.1	6.2	5.2	4.3	8.5	7.6	6.7	5.9
(4) Total discharge to Source Basin	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
(5) Consumptive Use in Source Basin	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount not returned to Source Basin [(6) + (7)]	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

List details of the future supply options include in this alternative in the table below.

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
#1: Purchase treated Jordan Lake water from Durham	03-32-010	Surface	Haw (2-1)	WS-IV	5.0	20	2020
#2: Offline storage from expanded Quarry Reservoir	N/A	Surface	Haw (2-1)	WS-II	5.1	35	2035

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#2) New Dam at University Lake	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	1.7	0.8	3.0	2.1	1.2	0.2	(0.7)	3.4	2.5	1.6	0.8
(2) Available supply from Project 1 (describe)	0	0	0	0	0	3.4	3.4	3.4	3.4	3.4	3.4
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	1.7	0.8	3.0	2.1	1.2	3.6	2.7	6.8	5.9	5.0	4.2
(4) Total discharge to Source Basin	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
(5) Consumptive Use in Source Basin	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount not returned to Source Basin [(6) + (7)]	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
#1: Expand University Lake by building a new dam	N/A	Surface	Haw (2-1)	WS-II	3.4	15 to 20	2025

Attach additional pages as needed to summarize all alternatives.

Future Supply Alternative List the components of each alternative scenario including the planning period when each component will come online.

(#3) Expand Cane Creek Reservoir	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
(1) Line (15) from Table 8-A "Existing Supply - Demand"	1.7	0.8	3.0	2.1	1.2	0.2	(0.7)	3.4	2.5	1.6	0.8
(2) Available supply from Project 1 (describe)	0	0	0	0	0	5.1	5.1	5.1	5.1	5.1	5.1
Available supply from Project 2 (describe)											
Available supply from Project 3 (describe)											
(3) Supply available for future needs [(1) + (2)]	1.7	0.8	3.0	2.1	1.2	5.3	4.4	8.5	7.6	6.7	5.9
(4) Total discharge to Source Basin	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
(5) Consumptive Use in Source Basin	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
(6) Total discharge to Receiving Basin											
(7) Consumptive Use in Receiving Basin											
(8) Amount not returned to Source Basin [(6) + (7)]	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

List details of the future supply options include in this alternative in the table below.

Future Supply Sources

Future Source or Facility Name	PWSID (if purchase)	Surface water or Ground water	Sub-Basin of Source	Water Quality Classification	Additional Supply (MGD)	Development Time years	Year Online
#1: Raise Cane Creek Reservoir dam by 20 feet	N/A	Surface	Haw (2-1)	WS-II	5.1	15 to 20	2025

Attach additional pages as needed to summarize all alternatives.

8-C. Are peak day demands expected to exceed the water treatment plant capacity by 2010? No (Yes)
If yes, what are your plans for increasing water treatment capacity?

Capacity expansion is currently underway

8-D. Does this system have an interconnection with another system capable of providing water in an emergency? No (Yes) If not, what are your plans for interconnecting (or please explain why an interconnection is not feasible or not necessary).

8-E. Has this system participated in regional water supply or water use planning? No (Yes) Please describe.

For the past two years, OWASA staff has been actively engaged in discussions with the City of Durham and Chatham County about possible partnerships in developing western shore Jordan Lake intake, transmission, and treatment facilities. Historically, OWASA has been an active participant in a range of regional water resource partnerships, such as the Trianlge Area Water Supply Monitoring Project, the Upper Cape Fear River Basin Association, as well as numerous activities hosted by the Triangle J Council of Governments.

8-F. List the major water supply reports or studies used for planning. Comprehensive Water and Sewer Master Plan; 50-Year Water Supply Vision Paper (Both documents are posted on the OWASA website: http://www.owasa.org)

SECTION 9: TECHNICAL ASSISTANCE NEEDS

Is technical assistance needed:

9-A. to develop a local water supply plan? (No) Yes

9-B. with a leak detection program? (No) Yes

9-C. with a demand management or water conservation program? (No) Yes

9-D. with a water shortage response plan? (No) Yes

9-E. to identify alternative or future water supply sources? (No) Yes

9-F. with a capacity development plan? (No) Yes

9-G. with a wellhead or source water protection plan? (No) Yes

9-H. with water system compliance or operational problems? (No) Yes

9-I. with Consumer Confidence Reports? (No) Yes

9-J. Please describe any other needs or issues regarding your water supply sources, any water system deficiencies or needed improvements (storage, treatment, etc.), or your ability to meet present and future water needs. Include both quantity and quality considerations, as well as financial, technical, managerial, permitting, and compliance issues.