



ORANGE WATER AND SEWER AUTHORITY

*A public, non-profit agency providing water, sewer and reclaimed water services
to the Carrboro-Chapel Hill community.*

Agenda

Work Session of the OWASA Board of Directors

Thursday, October 11, 2018, 6:00 P.M.

OWASA Community Room

The Board of Directors appreciates and invites the public to attend and observe its meetings. For the Board's Work Session, public comments are invited on only items appearing on this agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

For items on the agenda, public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

The Board may take action on any item on the agenda.

Announcements

- a. Announcements by the Chair
 - Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.
- b. Announcements by Board Members
 - Update on the October 8, 2018 Finance Committee Meeting (Ray DuBose)
 - Tour of Cane Creek Watershed Lands on Friday, October 26, 2018 at 1:00 p.m. (John Young)
 - Natural Resources and Technical Services Committee Will Meet on Tuesday, October 30, 2018 at 4:30 p.m., OWASA Boardroom, to discuss Source Water Protection (John Young)
 - Natural Resources and Technical Services Committee Will Meet on Thursday, November 8, 2018 at 4:00 p.m., OWASA Boardroom, to Discuss Overall Approach for Managing Watershed Lands (John Young)
- c. Announcements by Staff
 - Update on the October 10, 2018 Carrboro Citizen's Academy – OWASA Session (Ed Kerwin)
 - Chapel Hill Peoples Academy – OWASA Session on Saturday, October 20, 2018 (Ed Kerwin)
- d. Additional Comments, Suggestions, and Information Items by Board Members (Yinka Ayankoya)

Consent Agenda

Information and Reports

1. Quarterly Report on Attendance at Board and Committee Meetings (Andrea Orbich)

Action

2. Minutes of the September 27, 2018 Closed Session of the Board of Directors for the Purpose of Discussing a Personnel Matter (Robert Morgan)

Regular Agenda

Discussion

3. Discuss Communications and Community Engagement (Linda Low)
4. Long Range Water Supply Plan (Ruth Rouse)
 - a. Scope and Schedule
 - b. Projected Demands and Yield
5. Review Board Work Schedule (Yinka Ayankoya/Ed Kerwin)
 - a. Request(s) by Board Committees, Board Members and Staff
 - b. October 25, 2018 Board Meeting
 - c. November 8, 2018 Work Session
 - d. 12 Month Board Meeting Schedule
 - e. Pending Key Staff Action Items

Summary of Work Session Items

6. Executive Director will summarize the key staff action items from the Work Session

Closed Session

7. The Board of Directors will convene in a Closed Session for the Purpose of Discussing a Personnel Matter (Robert Morgan)

Agenda Item 1

ORANGE WATER AND SEWER AUTHORITY - QUARTERLY REPORT

ATTENDANCE AT BOARD AND COMMITTEE MEETINGS

BOARD OF DIRECTORS	JULY 2018	AUGUST 2018	SEPTEMBER 2018
YINKA AYANKOYA, CHAIR	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
JEFF DANNER, VICE CHAIR	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Absent)
RAY DUBOSE, SECRETARY	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Absent)	September 13 WS (Canceled) September 27 Annual (Meeting)
BRUCE BOEHM	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
JODY EIMERS	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
ROBERT MORGAN	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
JOHN N. MORRIS	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
RUCHIR VORA	July 12 WS (Absent) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)

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BOARD OF DIRECTORS	JULY 2018	AUGUST 2018	SEPTEMBER 2018
JOHN A. YOUNG	July 12 WS (Meeting) July 26 Board (Canceled)	August 9 WS (Canceled) August 23 Board (Meeting)	September 13 WS (Canceled) September 27 Annual (Meeting)
TOTAL MEETINGS HELD:	1	1	1

Board – Board of Directors
 WS – Work Session

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Agenda Item 2

Orange Water and Sewer Authority

Closed Session of the Board of Directors

September 27, 2018

The Board of Directors of Orange Water and Sewer Authority met in Closed Session on Thursday, September 27, 2018, following the Board meeting.

Board Members present: Yinka Ayankoya (Chair), Ray DuBose (Secretary), Bruce Boehm, Jody Eimers, Robert Morgan, John Morris, Ruchir Vora and John A. Young.
Board Member absent: Jeff Danner (Vice Chair).

Other present: Robert Epting (General Counsel) and Robin Jacobs.

ITEM ONE

The Board of Directors met in Closed Session with staff to evaluate General Counsel's annual performance review.

No official action was taken at the meeting.

The meeting was adjourned at 9:30 p.m.

Robert Morgan, Chair
Human Resources Committee

Agenda Item 3:

Discuss Communications and Community Engagement

Purpose:

The Communications and Community Relations Officer (CCRO) has met individually with more than 30 representatives – at OWASA and in the community – to listen and learn from their experiences with OWASA, about their perceptions of the organization, their needs from the organization, and their goals for the organization. The objective of the exercise was to help shape the development of a communications and community engagement plan for OWASA.

Following these interviews, the CCRO shared the highlights of her findings and facilitated two planning discussions – one with OWASA’s director team and one with a representative group of staff – to ensure the communications planning process is participatory and representative of organizational needs at all levels.

At the Board meeting, the CCRO will share her findings from her interview series and her facilitated discussions with OWASA staff. The CCRO will facilitate a similar discussion with the board to ensure their insights as leaders in the community, who are in touch with the engagement needs of the community, are incorporated. She will invite dialogue on the data presented and feedback on the development of the communications plan, priorities, and processes that are currently in development.

Information:

None

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Agenda Item 4:

Long-Range Water Supply Plan

- a. Scope and Schedule
- b. Projected Demands and Yield

Purpose:

To receive the OWASA Board of Directors' questions, comments, and feedback regarding draft water supply projections for use in the update of the Long-Range Water Supply Plan (LRWSP) and scope and schedule of the overall work.

Scope and Schedule of the LRWSP Update

The OWASA Board of Directors approved a [*Charter for Long-Range Water Supply Plan*](#) at its March 27, 2014 meeting. This document outlines the project vision, need for the project, tasks and deliverables, water supply alternatives that will not be evaluated in the LRWSP, and risks. At the time the Charter was approved, it was anticipated that the LRWSP would be completed in calendar year 2016 and any identified budget needs for implementation would be presented to the Board in early 2017 for inclusion in the fiscal year 2018 budget. Staff initially planned to use existing population projections from the Town of Chapel Hill and Carrboro. Subsequent to the Charter being approved, staff learned of the regional effort to update growth projections as part of transportation planning efforts; the local government staff recognized the level of effort they were contributing to that effort and encouraged OWASA to use that data. Triangle J Council of Governments led that regional planning effort, and their project manager believed that data would be available for OWASA in 2016. Delays in that project, as often occurs in large regional planning efforts, resulted in OWASA receiving draft data in April 2018 and final model runs in June 2018.

The OWASA Board of Directors approved [*Community Engagement Plan for Long-Range Water Supply Plan Update*](#) at its February 12, 2015 work session; this document was updated in November 2016 based on feedback from the Board of Directors provided during discussion on Goals and Objectives at its November 10, 2016 work session. At that November 2016 work session, the Board agreed that the community would be most interested in understanding how much water we will need in the future and providing feedback on the alternative methods to meet those future needs. This Plan identifies important stakeholders, key topics to seek feedback from the community, key information to provide to the community, and methods to provide information and receive feedback. As part of this community engagement effort, staff has developed a project [webpage](#) and developed a project email address (LRWSP@owasa.org).

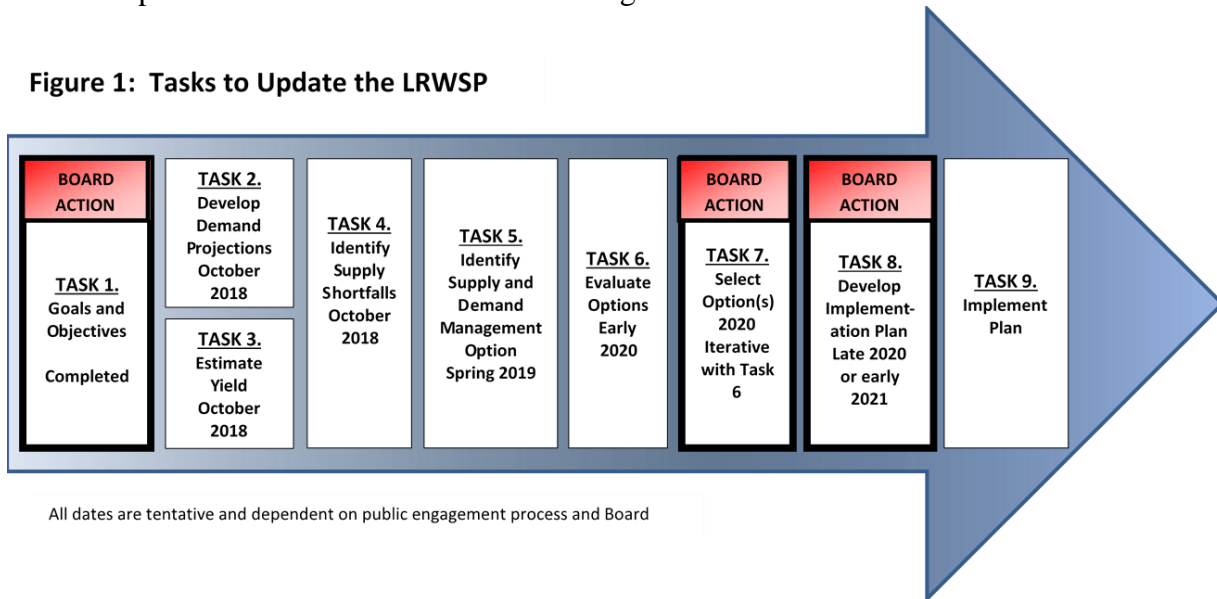
Staff developed [*Evaluating Supply and Demand Management Alternatives Against Goals and Objectives for the Long-Range Water Supply Plan Update*](#) and presented this document to the Board of Directors on November 10, 2016. (Note: supply alternatives are those that create a new or expanded source of water and demand management alternatives are those that promote a

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more efficient use of water). At that meeting, the Board agreed that staff could use those goals to evaluate supply and demand management alternatives against.

Tasks to update the LRWSP are illustrated in Figure 1 and include:

Figure 1: Tasks to Update the LRWSP



- Task 1: Develop goals and objectives to evaluate supply and demand management alternatives against – completed in November 2016.
- Task 2: Estimate community’s future water supply needs – Draft demand projections are included in this agenda package; as described later, staff will finalize these demand projections based on Board, local government, University of North Carolina (UNC), neighboring utilities, and consultant feedback. We plan to present final demand projections in January or February 2019 to the Board of Directors assuming we receive timely feedback from outside reviewers.
- Task 3: Incorporate climate change into our water supply yield estimates – Since the 2001- 2002 drought is still the drought of record, the estimated yield of our water supply system will not change. However, staff is working with a graduate student at the University of South Carolina who is evaluating the dependability of that estimated yield under different climate change assumptions. Yield information is included in this agenda package; any new information from the graduate student’s research will be incorporated and presented to the Board in January or February 2019 along with final demand projections.
- Task 4: Identify any shortfall in water supply – Draft information is provided in this agenda package; staff plans to present any updated information to the Board in January or February 2019 along with final demand projections.
- Task 5: Identify water supply and demand management alternatives to meet future water supply needs - Staff will develop a preliminary list of supply and demand management alternatives to evaluate in the plan and present these to the Board of Directors prior to completing the alternatives analysis. This is also planned to be shared with the community. This list will be based in information included in the Project Charter (identifies alternatives we will not include) and feedback the Board has provided over the

years. Assuming that final demand projections are available in January or February 2019, this draft list of alternatives would be presented to the Board of Directors in spring 2019 followed by a public comment period. Based on public comments, staff would bring a final list of supply and demand management alternatives to the Board in early summer 2019.

- Task 6: Evaluate supply and demand management alternatives – The alternatives selected in Task 5 will be evaluated against the goals and criteria developed in Task 1. Our consultant, Hazen and Sawyer, will be evaluating the alternatives including capital and operating costs. This task will also include developing a Conservation Plan as identified in Strategic Initiative 1 of the Strategic Plan. Staff plans to bring draft information on the alternatives analysis to the Board for feedback during the first half of calendar year 2020.
- Task 7: Identify the preferred mix of water supply and demand management alternatives; this task will likely be iterative with Task 6. Both tasks will include public involvement. Hazen and Sawyer will also assist with this task.
- Task 8: Develop the LRWSP and identify the resources needed to implement it
- Task 9: Implement the LRWSP

Background on Demand Projections:

Preparation of a long-term water demand projection is an essential task for OWASA, and it is the first step in the update of our LRWSP. It is required to evaluate how much water we expect to need to provide to our customers in the future, the ability (reliable yield) of our existing water supply sources to meet future needs, and the need for and cost-effectiveness of additional supply-side and/or demand-side strategies (including the expansion of our reclaimed water system).

The long-term demand projection is also essential for other purposes, such as:

- evaluating the need for capacity improvements to our drinking water treatment plant, pumping and storage facilities, and distribution system; and
- developing our long-range wastewater flow projection, which in turn will be used to inform our plans and decisions regarding the need for and timing of future investments in capacity expansions in our wastewater collection, treatment, and recycling systems.

Since there is a high level of uncertainty in developing water demands over the next fifty years, it is important to evaluate our potential demands periodically and the assumptions upon which they are based. If our projections are too low, we could face greater risks during drought, more frequent and severe water use restrictions, and potential limitations on new development and connections to our water, wastewater, and reclaimed water systems. On the other hand, if our projections are too high, we risk making costly, unneeded expansions in our infrastructure systems.

OWASA does not project growth within our service area. The Towns of Carrboro and Chapel Hill and UNC provide information regarding future population and employment.

Key Steps to Develop the Draft Water Demand Projections

After considering the data requirements, complexities, and uncertainties involved in different water demand projection methods, staff proposes that we use a simple and understandable water demand projection approach that includes water use input variables which we can readily obtain, track, and use. We applied unit demands based on OWASA data (gallons per day per dwelling unit for residential development and gallons per square foot per day for nonresidential development) to the growth projections for our service area that were recently estimated for the regional Metropolitan Transportation Plan using the CommunityViz model. This planning effort was spearheaded by the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization and the Capital Area Metropolitan Planning Organization to create a more efficient regional transportation system covering portions of ten counties. As part of this process, the Triangle J Council of Governments used the CommunityViz tool to estimate where residential population and employment growth would occur. Those growth projections included data for 2045 and for build-out conditions, which staff assumed would occur in 2070. If build-out occurs sooner, the demands presented in this report would occur earlier, and if it occurred later, the demands presented would occur later.

The key steps in our approach for the draft baseline projection presented in this report are:

1. Determine the annual demands for the “Base Year” (calendar year 2017).
2. Determine the water use factors or unit demands based on 2014-2017 billed use data that will be applied to single family residential, master-metered multi-family residential, University of North Carolina (UNC) and UNC Health Care, and other types of commercial development. These most recent four years of data were used to reflect the most recent customer behaviors and fixture updates.
3. Use the CommunityViz model to obtain the number of new dwelling units for single family and multi-family development and employment square footage for both the “2045 Scenario” and “Build-Out Scenario”. Assume that growth is linear and that build-out occurs in 2070.
4. Apply the water use factors from step 2 to the growth projections.
5. Adjust demands from existing and new development to reflect conservation assumptions.
6. Factor in water treatment and distribution system losses to derive the total projected demand on our water supply reservoirs.
7. Evaluate the sensitivity of the results to changes in key assumptions.

Key Assumptions to Develop the Water Demand Projections

Key assumptions made to develop the draft baseline projection through 2070 are:

1. OWASA’s retail service area as defined in the *Water and Sewer Management, Planning and Boundary Agreement* will remain unchanged, and we will not provide wholesale or retail water service beyond the existing Urban Service Area boundary of Carrboro and Chapel Hill.
2. Federal and state regulations will allow us to continue with our reclaimed water (RCW) program and our water treatment plant process water recycling system.

3. Dwelling unit and economic growth projections (employment and non-residential development) through 2045 are assumed to be consistent with the projections from the CommunityViz 2045 Scenario. As noted above, we assume the growth projected to occur by 2045 occurs at a uniform rate between now and then, and that the CommunityViz Build-Out scenario growth projections for our service area will be realized at a linear rate from 2046 to 2070.
4. Water use factors for the various types of projected development are based on recent unit demands determined from our water use analysis, as summarized in the attached draft report. The key water use assumptions for new development are:
 - a. new individually-metered single-family residences will use 4,200 gallons/unit/month;
 - b. new master-metered multi-family dwelling units will use 3,300 gallons/unit/month; and
 - c. new non-residential development will use 75 gallons/day/1,000 square feet

The above factors are similar to recent findings from the Town of Cary’s detailed analysis of billed water use among its major customer classes.
5. Non-revenue water (such as water used for line flushing, water used for firefighting, and system leaks) will continue to be approximately 10% of our raw water demands.
6. There will not be any major expansion of our RCW system, and our annual RCW demands will remain constant through the 50-year planning horizon.

Draft Water Demand Projections

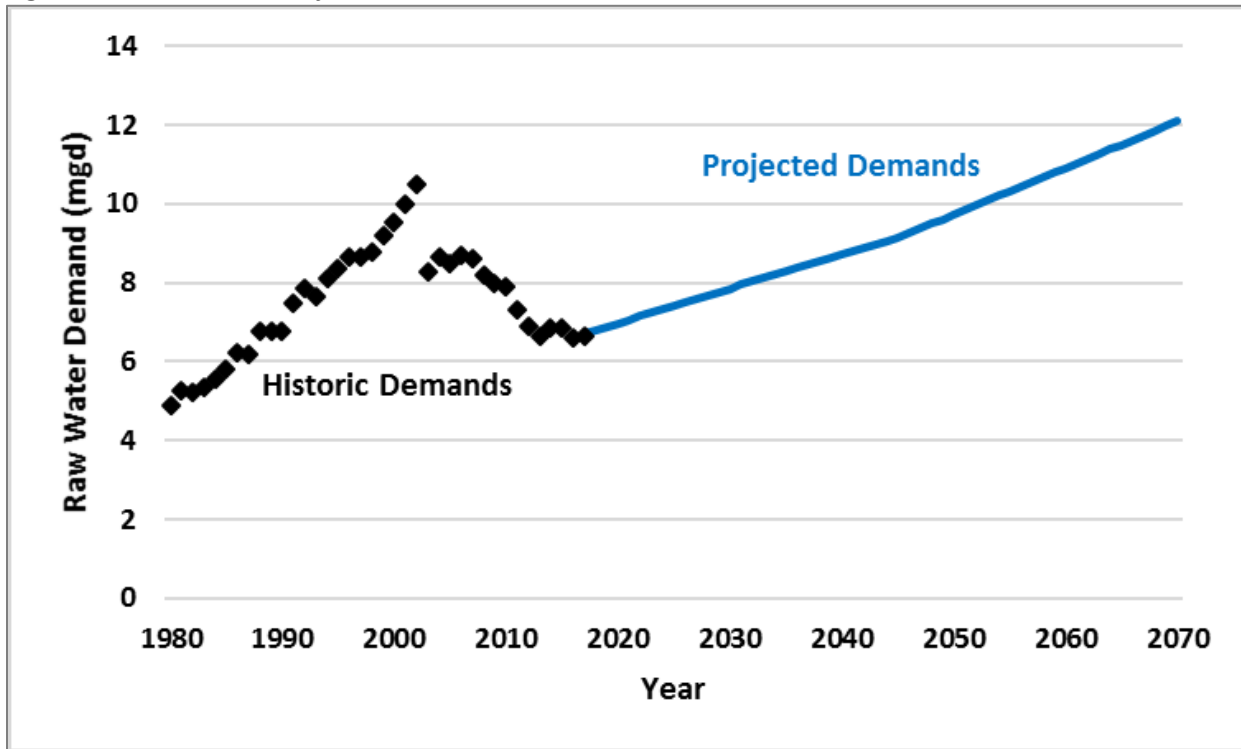
The approach and assumptions outlined above resulted in the demands summarized in Table 1 as compared to the demands included in the 2010 LRWSP; Figure 1 shows the projected demands along with our historic raw water demands.

Table 1: Draft Raw Water Demand Projections Compared to Projections in 2010 LRWSP

Year	Draft 2018 Total Raw Water Demands*	2010 LRWSP Projected Raw Water Requirements	Percent Change from 2010 Projection
2025	7.42	9.03	-17.9%
2030	7.86	9.68	-18.8%
2035	8.29	10.24	-19.1%
2040	8.71	10.79	-19.3%
2045	9.14	11.33	-19.3%
2050	9.73	11.86	-18.0%
2055	10.32	12.39	-16.7%
2060	10.91	12.91	-15.5%
2065	11.50	N/A	N/A
2070	12.09	N/A	N/A

* Includes 10% adjustment to account for non-revenue water (fire-fighting, flushing, leaks, etc.)

Figure 1: Historic and Projected Raw Water Withdrawals



“What If” Scenarios for our Water Demand Projections

Our long-term demand projection is based on the key assumptions described above, all of which have some degree of uncertainty. We have evaluated how sensitive the projection is to changes in several of the key assumptions.

Table 2 summarizes how certain changes in key assumptions affect the long-term demand projection.

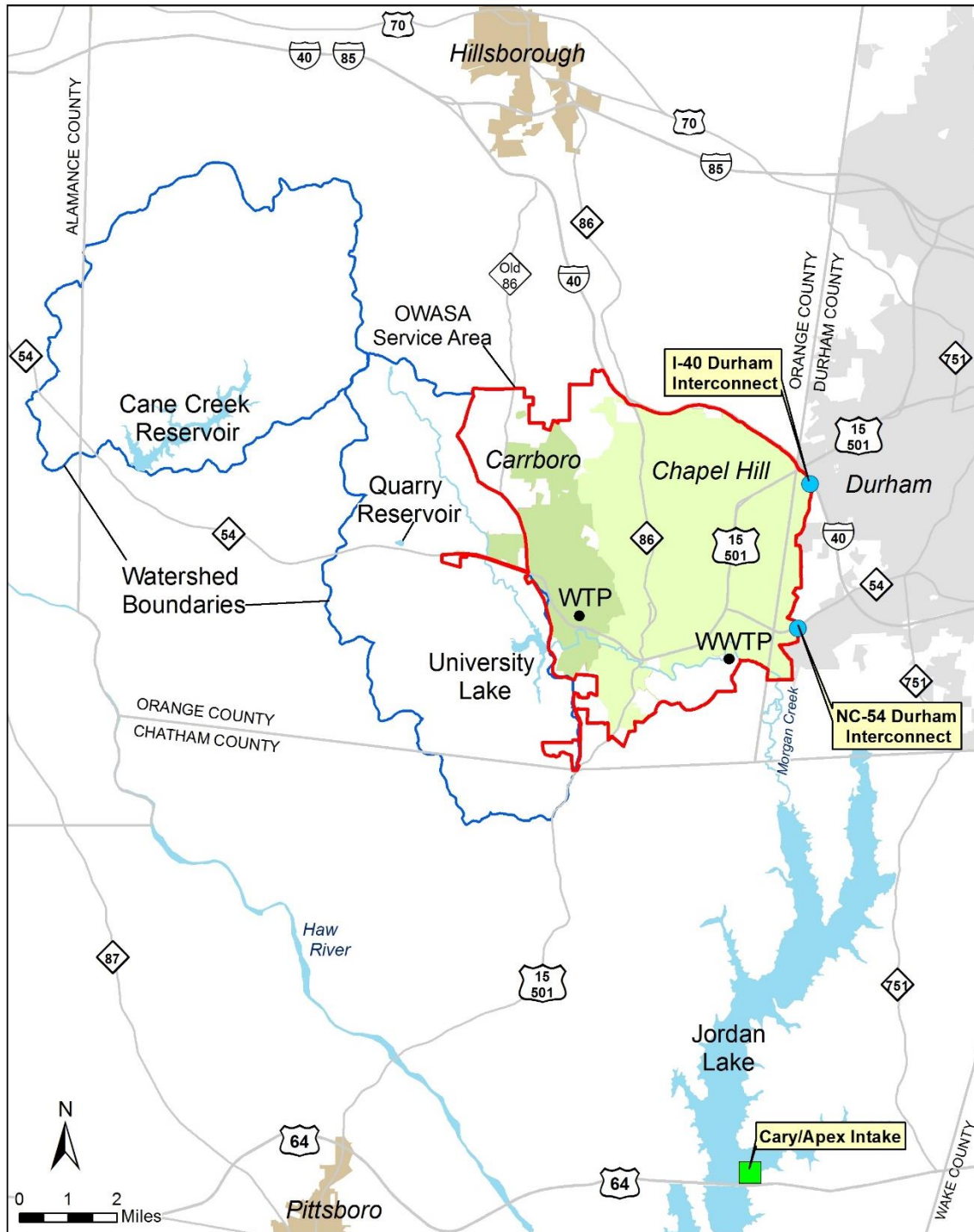
Table 2: Sensitivity of Projection to Changes in Single Assumptions

Change in Key Assumption	Projected Effect on Drinking Water Demands	Projected Effect on Raw Water Demands
Projected number of dwelling units or water use factor for residential use is 10% greater than the baseline	Increase by 0.14 mgd by 2045 0.26 mgd by 2070	Increase by 0.16 mgd by 2045 0.29 mgd by 2070
Projected growth in non-residential square footage is 15% greater than assumed in the baseline	Increase by 0.17 mgd by 2045 0.39 mgd by 2070	Increase by 0.19 mgd by 2045 0.43 mgd by 2070
RCW service is extended to meet cooling tower water demands at UNC's Cogeneration Plant	Annual billed drinking water demands would be about 0.09 mgd lower, but overall total billed sales would remain the same.	Annual raw water withdrawals would be about 0.10 mgd lower than the baseline projection.
Urban service area is extended and water service is provided to a Meadowmont or Southern Village type development intensity over a 908 acre area	Increase by 0.53 mgd at project build-out	Increase by 0.58 mgd at project build-out
Water plant process water recycling system is no longer in service	N/A	0.56 mgd by 2045 0.75 mgd by 2070
Reclaimed water system is no longer in service	0.77 mgd This increase would mostly occur during the peak demand summer months.	0.85 mgd This increase would mostly occur during the peak demand summer months.

Yield of OWASA's Water Supply Reservoirs

OWASA's existing locally managed water supply sources include University Lake, Cane Creek Reservoir, and the Quarry Reservoir. In addition, OWASA has an allocation of five percent of Jordan Lake's water supply pool which we can access through the Cary-Apex water intake and their treatment plant; Cary-Apex would then wheel drinking water through the City of Durham and our interconnections. Figure 2 illustrates the location of these sources.

Figure 2: OWASA's Water Supply Reservoirs



Hydrologic modeling completed for the 2010 LRWSP estimated the combined yield of our three locally managed reservoirs (not including Jordan Lake allocation) as approximately 10.5 million gallons per day (mgd). This estimate is based on a recurrence of the 2001-02 drought of record and that we reserve 20 percent of our storage to provide us with some time to develop or obtain an emergency supplemental supply of water, such as a temporary intake on the Haw River should supply from Jordan Lake not be accessible. It also assumes that we can optimally operate

our reservoirs for water supply; water quality conditions in one reservoir sometimes keep us from operating our reservoirs optimally. We have not experienced a new drought of record since the 2010 LRWSP was prepared; therefore, there has been no change in the estimated yield of our locally managed reservoir system.

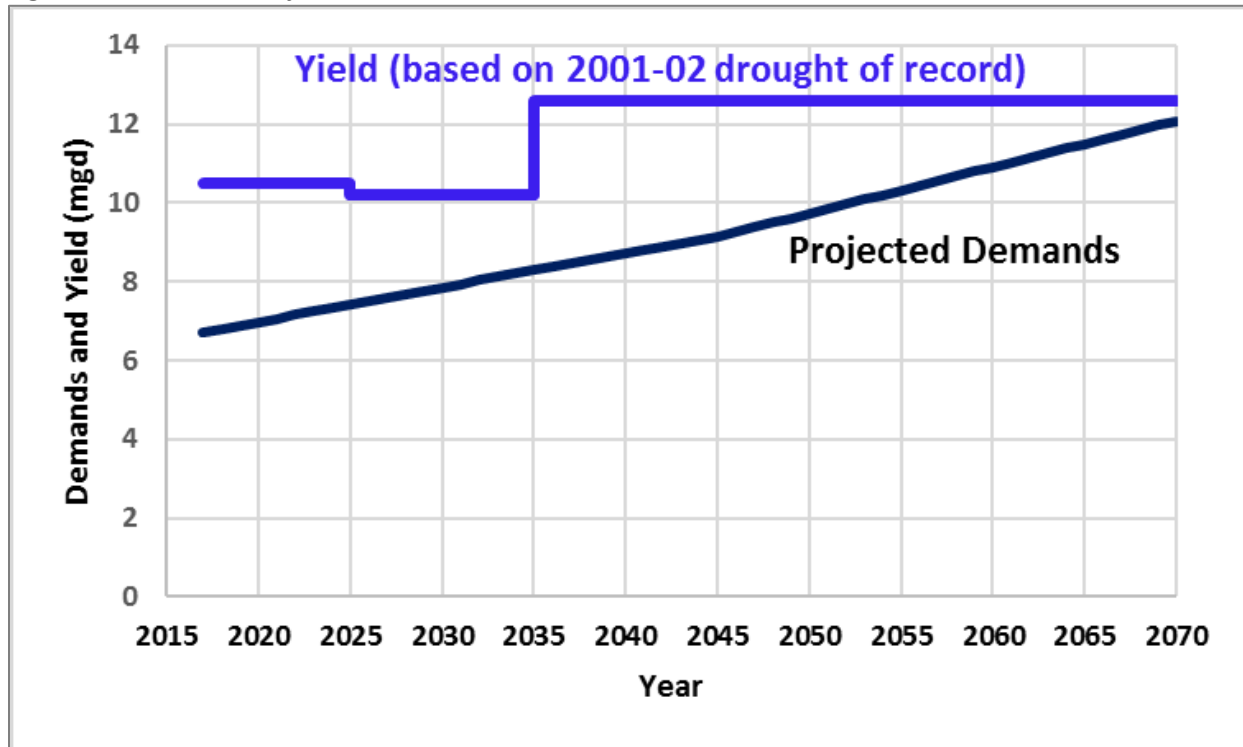
As noted above, OWASA also has an allocation of 5 percent of the water supply storage in Jordan Lake. Modeling completed by the North Carolina Division of Water Resources (DWR) indicates that this is an approximate yield of 5 mgd. Simply adding that 5 mgd to the yield of our local reservoirs results in an available supply of 15.5 mgd. This number is likely conservative since we can time withdrawals from several reservoirs to maximize the yield. An analysis completed as part of the 2010 LRWSP to evaluate the impact of including our Jordan Lake allocation on our supply estimated that our yield would actually increase between 4.8 mgd and 6.5 mgd depending on the pumping rate and period of time that water was withdrawn.

Currently OWASA does not have guaranteed access to this allocation. OWASA has mutual aid agreements with both the Town of Cary and City of Durham, but these agreements do not guarantee supply. Options to provide OWASA greater control to access its Jordan Lake allocation will be evaluated as part of the LRWSP.

The 2010 LRWSP identified the expansion of the Quarry Reservoir (shallow option – with pumping access down to 385 feet MSL, which is the limit of our existing Quarry Reservoir raw water pump station) as the most cost-effective option for a supplemental water supply source. Martin Marietta has a permit to mine the land adjacent to our existing Quarry through December 2030. OWASA plans to drain the Quarry Reservoir in approximately 2025 to enable Martin Marietta to connect it with the pit they are currently mining, thereby creating one large reservoir. We would then fill the expanded Quarry Reservoir with water from Cane Creek Reservoir (the Quarry Reservoir has a very small drainage area and would not fill without supplemental water); we estimate that it will take approximately five years to fill the expanded Quarry Reservoir. The 2010 LRWSP estimated that this option will provide approximately 2.1 mgd of additional yield, for a total system yield of 12.6 mgd (excluding our Jordan Lake allocation).

Figure 3 illustrates our draft projected demands with our local reservoir yield, including the changes in the Quarry Reservoir described above; it does not include our allocation from Jordan Lake. It should be noted that the projected demands included on the graph do not account for the uncertainty associated with our assumptions and methods. Staff could include uncertainty shading based on the individual “what if” scenarios summarized above; alternatively if the Board thinks it would be beneficial to complete a Monte Carlo analysis to better quantify the uncertainty in the projection analysis, staff can pursue that option.

Figure 3: OWASA's Projected Water Demands and Estimated Yield



The yield in this figure does not include OWASA's allocation from Jordan Lake of 5 percent of the water supply pool. Estimates from DWR indicate this would increase yield approximately 5 mgd. Modeling completed as part of the 2010 LRWSP estimate that access to our Jordan Lake allocation would increase our yield by 4.8-6.5 mgd depending on the pumping rate.

Researchers at Carolinas Integrated Sciences and Assessments (CISA) at the University of South Carolina are collaborating with OWASA and Hazen and Sawyer to understand the water supply yield implications of climate change for OWASA. The goal is to assess potential climate-driven changes in the dependability of OWASA's raw water supply over the next 50-year planning horizon.

The researchers are using a two-step approach where the initial focus is on identifying specific climate conditions that threaten the reliability of OWASA's water supply (vulnerability analysis), and then this information is used to develop plausible and credible future projections of these unfavorable climate conditions from the climate models (climate change analysis).

The researchers first evaluated the OWASA system (with the shallow option to expand the Quarry Reservoir), using hydrologic models provided by Hazen and Sawyer which were used to estimate the yield of OWASA's reservoir system for the 2010 LRWSP and other follow-on work to that Plan. They will evaluate the system assuming a large number ($n = 5000$) of 'synthetic' hydroclimate inputs¹ (i.e., rainfall, streamflow, and reservoir evaporation). These simulations will enable us to isolate and characterize climate conditions that would likely compromise

¹ Synthetic hydrologic and/or meteorological data are commonly used in water resource studies to supplement observational records, which give us a limited view of natural variability in climate and especially of extreme conditions like droughts.

OWASA's goals; in this case the initial goal was to meet a water demand of approximately 13 mgd based on the demand projections included in the 2010 LRWSP.

Exploratory analysis reveals that the combined effect of the length of a drought and its severity can tell us when reservoir levels are likely to drop below a Stage 3 water shortage advisory as defined in our [Water Shortage Response Plan](#) while meeting a demand of 13 mgd. In most cases, only intense droughts lasting approximately 24 months or longer seem to reduce the reservoir storage to these critical levels. The researchers also noted that there are a sizeable number of simulations that result in lower yields even when rainfall is higher during the 24 months. The researchers are currently investigating these anomalous cases.

The next step will be to assess the plausibility of the critical drought conditions (i.e., how likely is low rainfall over 24 months to occur) using publicly-available climate change models. This will also require some evaluation of how well these climate models can simulate the multi-year extreme dry conditions (the 24 months noted above).

Proposed Next Steps:

Staff proposes the following next steps to complete the water demand projections task of the LRWSP update (note: many of these steps can be completed concurrently):

- Incorporate the Board's comments and feedback into a revised draft projection and report.
- Have Hazen and Sawyer, our engineering consultant for the LRWSP update, prepare a statistical analysis of the effects of weather on overall system demands, and incorporate the results into the revised draft report.
- Share the revised draft report with Hazen and Sawyer to provide a technical review of the results.
- If the Board desires, retain a consultant to complete a Monte Carlo simulation and incorporate the results of that analysis into the revised draft report.
- Share the revised draft report with the Towns, County, University, UNC Health Care, and others to receive their technical review and corrections, questions, comments, and suggestions.
- Share the revised draft report with nearby water utilities, and continue to exchange information and analyses regarding demand projections and water use analyses.
- Present a final draft baseline projection and report for further review and guidance by the Board. No formal resolution is needed; however, it would be important to have the Board's acceptance of the projections as the starting point for future analyses in the LRWSP.
- Once the projection is finalized, use it as a basis for identifying projected long-term shortfalls in supply and evaluating the need for and cost-effectiveness of additional supply-side and/or demand-side strategies.

Staff Recommendation:

Staff recommends that the Board provide feedback concerning the draft water demand projections and scope and schedule of the overall project. The following questions may help guide the Board's discussion:

- Does the Board agree that our relatively simple demand projection approach (including use of the regional transportation modeling growth projections as the basis for our preliminary demand projection) is a reasonable approach given the available data, the lack of local, long-term population and development projections, and the uncertainties?
- Are the water use factors and other assumptions we have made a reasonable basis for developing the draft projection?
- Are the "What if..." scenarios presented in this draft report adequate to convey the sensitivity of the baseline projection to changes in key assumptions, or are additional analyses needed to inform the Board's discussions?
- Does the Board desire a more rigorous statistical analysis of scenarios and an associated probabilistic-based range of projections, using a method such as a Monte Carlo simulation?
- Does the Board concur with the proposed next steps, including the proposed approach to seek public review and comment on the draft projections?
- Does the Board have any feedback on the overall scope and schedule to update the LRWSP?

Given the uncertainty in long-term water demand projections, staff also recommends that we review the assumptions surrounding the demand projections every five years or so. No formal Board action is requested or needed at this time.

Information:

- Attachment 1: Draft Report: Preliminary Long-Range Water Demand Projections Through 2070

Long-Range Water Supply Plan Update

Draft Report:

Preliminary Long-Range Water Demand Projections Through 2070

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Long-Range Water Supply Plan Update

Draft Report:

Preliminary Long-Range Water Demand Projections Through 2070

WHAT'S THE PURPOSE OF THIS REPORT?

This draft report presents a preliminary “baseline” long-term water demand projection for the Orange Water and Sewer Authority (OWASA) service area through the year 2070. It provides an overview of the supporting information, analyses, and methods used to develop the projection, and it highlights some of the key uncertainties and sensitivities that surround the draft demand projection. This draft projection and report have been prepared by OWASA staff.

Discussion and refinement of the assumptions, draft baseline projection, uncertainties, and sensitivity analysis is the Board of Directors’ and staff’s initial work task relating to the planned update of OWASA’s 2010 Long-Range Water Supply Plan (LRWSP). The 2010 LRWSP had a 50-year planning horizon, but conditions and assumptions have changed since that was prepared. As part of OWASA’s [Strategic Plan](#), the Board of Directors identified the need to update the LRWSP to incorporate the best available information on projected long-term water demands, adequacy of existing supplies, anticipated capacities and costs of supply-side and demand-side strategies, and other key factors.

HAS THIS DRAFT PROJECTION AND REPORT BEEN REVIEWED BY ANY OTHER PARTIES?

No. Staff has not yet sought external review and comment on the preliminary baseline projection and this draft report. We want to incorporate the Board’s comments and revisions before we seek external review and comment on the draft baseline projection and report.

WHAT ARE SOME KEY HIGHLIGHTS OF THIS DRAFT REPORT?

Some of the key points are:

- The draft baseline long-term water demand projection through the year 2070 is based on the most up-to-date housing unit and economic growth (non-residential space and employment) projections and water use trends analyses available for the OWASA service area. The development projections include a 2045 development scenario, and a “build-out” scenario that does not correspond to any specific time horizon beyond 2045. The development scenarios were originally developed as part of a collaborative regional modeling (CommunityViz model) and planning project for preparation of the 2045 Metropolitan Transportation Plan. OWASA does not project growth in our service area. The Town of Chapel Hill and Carrboro and the University of North Carolina at Chapel Hill (UNC) provide information regarding future population and employment.
- We believe our water demand modeling approach is appropriate given the available data, lack of more specific local development and population growth projections for our service area, and uncertainty surrounding many of the variables and assumptions upon which our draft baseline projection has been based.
- The draft baseline demand projection presented in this report is lower than the corresponding demand projection for the “Expected Scenario” included in OWASA’s 2010 LRWSP. Table 1

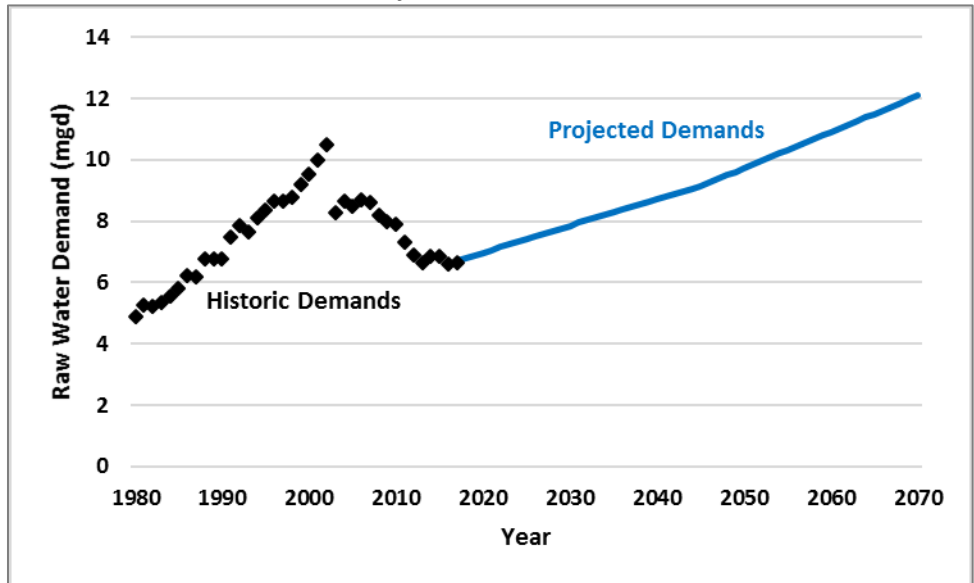
provides a summary comparison of the two projections. Figure 1 illustrates these latest projections along with historic raw water demands.

Table 1.
Comparison of Raw Water Demand Projections from 2010 LRWSP
and September 2018 Draft Report

Year	Draft 2018 Total Raw Water Demands*	2010 LRWSP Projected Raw Water Requirements	Percent Change from 2010 Projection
2025	7.42	9.03	-17.9%
2030	7.86	9.68	-18.8%
2035	8.29	10.24	-19.1%
2040	8.71	10.79	-19.3%
2045	9.14	11.33	-19.3%
2050	9.73	11.86	-18.0%
2055	10.32	12.39	-16.7%
2060	10.91	12.91	-15.5%
2065	11.50	N/A	N/A
2070	12.09	N/A	N/A

* Includes 10% adjustment to account for non-revenue water (fire-fighting, flushing, leaks, etc.)

Figure 1.
Historic and Projected Raw Water Withdrawals



- Past projections by OWASA and other agencies have typically over-projected long-term water demands for the OWASA service area. Various long-term water demand forecasts prepared during the period from 1969 to 2008 for the Chapel Hill-Carrboro area exceeded our 2017 actual demands

by about 5% to 120%. Some key contributing factors are that the projections: (a) under-estimated the extent to which our customers would reduce their use of water through water use efficiency and conservation measures; (b) under-estimated the effects that seasonal rates, increasing block rates, and increasing price of water and wastewater services would have on our customers; and (c) over-estimated the rate of population and economic growth for our service area.

Our “Expected Scenario” demand projection from the 2010 LRWSP is within about 15% of our actual raw water demands for 2017.

- The Carrboro, Chapel Hill, and Orange County planning departments participated in the regional transportation plan modeling effort to develop growth projections and allocations for the respective planning jurisdictions in the region; however, the towns have not recently prepared any official long-term population and economic growth forecasts. Chapel Hill just commenced a 2049 Land Use Plan update project that will focus on key growth areas throughout the town. Staff from The University of North Carolina at Chapel Hill (UNC-CH) and UNC Health Care also provided information incorporated into the CommunityViz model. UNC-CH is updating its Master Plan, but specific growth projections for UNC-CH are not yet available. The North Carolina Office of State Budget and Management (OSBM) has prepared a 20-year (2037) population growth projection for the State and each of its 100 counties; however, OSBM does not prepare any population projections for municipalities within the state.
- Although long-term planning is important, it is extremely difficult if not impossible to foresee all the technological, legal, socio-economic, climatological, and other changes and events that will occur in the future – especially for the 50-year planning horizon we are using. The accuracy of population, economic growth, and associated water demand projections will likely decline the farther into the future we project.
- There is uncertainty surrounding many of the key factors that will shape the future water demands of our service area, such as:
 - the rate of population and employment growth that is projected to occur;
 - the types of residential and non-residential growth projected to occur (as compared to the development projections from the regional transportation model);
 - the extent to which low impact development (green infrastructure to capture stormwater, water-smart landscaping, etc.), high performance building, and other development trends and applicable regulatory requirements will affect future demands;
 - the extent to which water use efficiency and water use habits will change over time and affect water demands by our existing and future customers;
 - how future water use will be affected by changes in price, household size and income, etc.;
 - and
 - the effect that a warming climate may have on long-term water demands (irrigation demands, cooling water requirements, etc.).

The installation of advanced metering infrastructure (AMI) will help us address some the uncertainty, but projections into the future are always inherently uncertain. AMI may also result in additional demand reductions as customers become more aware of their water use and leaks are identified more quickly.

WHY IS THE LONG-TERM WATER DEMAND PROJECTION ESSENTIAL TO OWASA?

Preparation of a long-term water demand projection is an essential task for OWASA, and is the first step in the update of our LRWSP. It is required to evaluate how much water we expect to need to provide to our customers in the future, the ability (reliable yield) of our existing water sources to meet future needs, and the need for and cost-effectiveness of additional supply-side and/or demand-side strategies (including the expansion of our reclaimed water system).

The long-term demand projection is also essential for other purposes, such as:

- evaluating the need for capacity improvements to our drinking water treatment plant, pumping and storage facilities, and distribution system; and
- developing our long-range wastewater flow projection, which in turn will be used to inform our plans and decisions regarding the need for and timing of future investments in capacity expansions in our wastewater collection and treatment system.

The long-term demand projections have important implications for OWASA, our customers, and the environment. If our projections are overly conservative (much higher than actually occurs in the future), we face the risk of making costly, unneeded investments to expand the capacity of our water, wastewater, and reclaimed water (RCW) system infrastructure. If our projections are too low, we could face greater risks during drought, more frequent and severe water use restrictions, and potential limitations on new development and connections to our water, wastewater, and reclaimed water systems.

Either outcome could have a number of negative effects, such as higher charges and greater inconvenience and hardship for our customers; loss of public confidence, and greater impacts on the environment and the local economy.

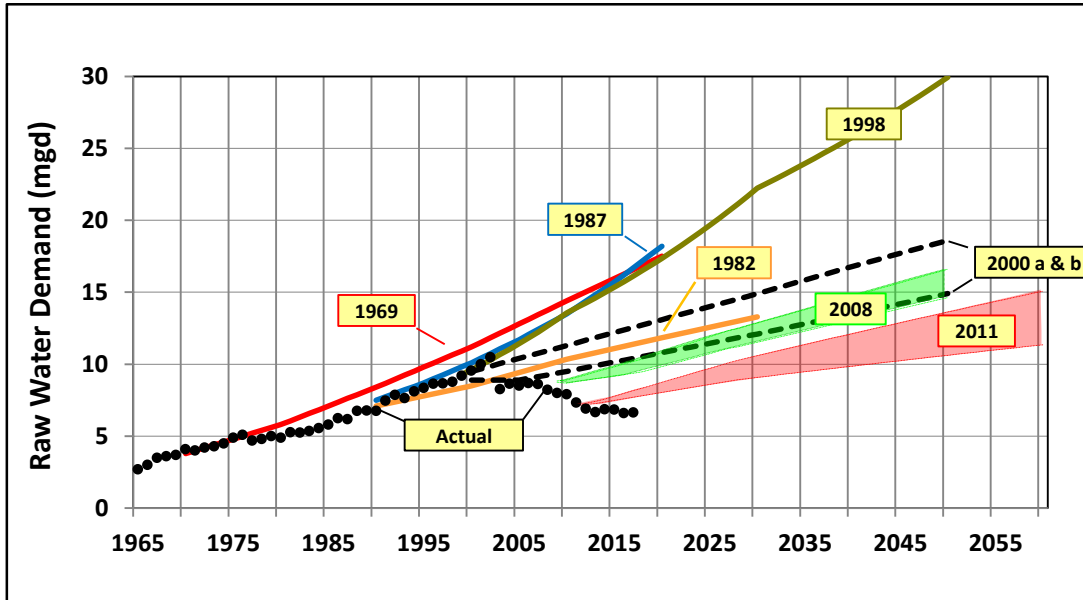
In light of the long lead times involved in water supply planning, design, permitting, and development, our approach is to use a 50-year planning horizon. We acknowledge that the level of uncertainty increases the farther into the future our projections go, but we believe preparation of a 50-year projection enables us to proactively and strategically evaluate and consider alternative strategies for meeting the long-term water, wastewater, and reclaimed water needs of the Chapel Hill-Carrboro community in a more sustainable manner.

In light of the importance of our long-range demand forecast on infrastructure planning and investments, staff recommends that we review our long-range projections every five years or when major changes in key trends and assumptions are identified, and that we revise the projections (and associated long-term plans) as needed to reflect the changed conditions.

WHAT HAS BEEN THE GENERAL ACCURACY OF OUR PAST DEMAND PROJECTIONS?

OWASA and other agencies have issued several long-term water demand projections for the Chapel Hill-Carrboro community. The oldest projection we have reviewed was from 1969, and the most recent was prepared for the 2010 LRWSP, as revised in 2011. Figure 1 shows how those projections compared to our historical annual raw water demands.

Figure 2.
Past Long-Range Water Demand Projections Compared to Actual Water Withdrawals



- 1969:** *Report to the the University of North Carolina on Water Supply for Chapel Hill, North Carolina*, Hazen and Sawyer Engineers, August 1969.
- 1982:** *Final Cane Creek EIS*, NC Department of Natural Resources and Community Development, Division of Environmental Management, September 1982.
- 1987:** *Main Report, Eno River Capacity Use Investigation*, NC Department of Natural Resources and Community Development, December 1987.
- 1998:** *UPDATE 98.xls*, unpublished Microsoft Excel spreadsheet file, Orange Water and Sewer Authority, 1998, Ed Holland, Planning Director.
- 2000a:** "Baseline" projection, from *Comprehensive Water and Sewer Master Plan, Technical Memorandum 3.3, Long-Term Demand Forecasts with Conservation*, CH2MHill, January 21, 2000.
- 2000b:** "Active Conservation" projection, from *Comprehensive Water and Sewer Master Plan, Technical Memorandum 3.3, Long-Term Demand Forecasts with Conservation*, CH2MHill, January 21, 2000.
- 2008:** "Higher Conservation, Greater Reuse" and "Less Conservation, Less Reuse" demand projections, from *Annual Review and Update of Strategic Trends and Master Plan Issues*, staff memorandum to OWASA Board of Directors, October 17, 2008.
- 2011:** OWASA Projections, Long-Range Water Supply Plan; revised 8/30/2011

A key observation shown in Figure 2 is that starting around 2000, our community's actual water demands have been considerably lower than what was previously projected to occur in our service area over the long-term. The projections prepared during the period from 1969 to 2008 for the Chapel Hill-Carrboro community have exceeded our 2017 actual demands by about 30% to 120%. At projection year 10 and 20 (10 and 20 years from the date the projection was completed), the projections for years 10 and 20 were off by a range of -3% to 43% and -13% to 143%, respectively.

In hindsight, these older projections did not anticipate the demand reduction effects of water conservation and efficiency, nor the effects of seasonal rates, increasing block rates, and increasing price of water and wastewater services. They also over-estimated the future rate of population growth for the

Chapel Hill-Carrboro community. The shift from single-family to multi-family residential development in our service area may also have played a role. Projections made prior to 2006 did not anticipate the substantial reductions in raw water demands that resulted from implementation of the drinking water treatment plant process recycling system in 2002, or the reclaimed water (RCW) system in 2009.

Another key observation is that the very stable period of linear growth in water demands came to an end around the time of the record drought of 2001-2002.

A concerted effort was made to incorporate these factors in our most recent projections done for the 2010 LRWSP; explicit calculations were included for estimated conservation by existing customers, new connections, and the RCW system. The 2010 projection for 2017 is within about 15% of our actual adjusted raw water demands for 2017. However, some of the assumptions made for that projection are not expected to hold up over time. For example, development of Carolina North, the University's planned major satellite campus, was expected to be underway by now, but those plans are now on indefinite hold.

WHAT DEMAND PROJECTION APPROACH HAVE WE TAKEN FOR OUR 2018 PROJECTION AND WHY?

After considering the data requirements, complexities, and uncertainties involved in different water demand projection methods, staff proposes that we use a simple and understandable water demand projection approach that includes water use input variables which we can readily obtain, track, and use. In the absence of long-term population and development projections from Carrboro and Chapel Hill, we apply those water use input factors to the residential dwelling unit and non-residential (employment and non-residential square footage) growth projections for our service area that were recently developed for the regional CommunityViz model.

The key steps in our approach for the draft baseline projection presented in this report are:

1. Determine the annual demands for the "Base Year" (calendar year 2017).
2. Determine the water use factors (i.e, gallons per day per dwelling unit for residential demand and gallons per day per square foot for nonresidential demand) based on 2014-2017 billed use data that will be applied to the various types of development included in the population and economic growth projections from the CommunityViz model.
3. Use the "2045 Scenario" growth projections to determine the 2045 water demand projection. Assume that additional growth will occur at a constant linear rate between now and 2045.
4. Assume that the "Build-Out Scenario" growth projections in the CommunityViz model correspond to 2070 (regional communities involved in that effort did not define a build out year), and that the additional growth will occur at a constant linear rate from 2046 to 2070.
5. Apply the water use factors to the growth projections.
6. Adjust demands from existing development to reflect the assumed rate at which those demands will decline as our existing customers implement additional permanent water conservation measures.
7. Adjust the water use factors for future development to reflect assumed reductions resulting from continued improvements in water use efficiency in new development.

8. Add the projected water demands for the new development to the projected demand from existing customers to obtain the projected total demands by our customers.
9. Factor in water treatment and distribution system losses to derive the total projected demand on our water supply reservoirs.
10. Evaluate the sensitivity of the results to changes in key assumptions.

WHAT KEY ASSUMPTIONS HAVE WE MADE FOR OUR DRAFT BASELINE WATER DEMAND PROJECTION?

Key assumptions we have made for developing our draft baseline projection through 2070 are:

1. OWASA's service area as defined in the *Water and Sewer Management, Planning and Boundary Agreement* will remain unchanged, and we will not provide wholesale or retail water service beyond the existing Urban Service Area boundary of Carrboro and Chapel Hill.
2. Federal and state regulations will allow us to continue with our reclaimed water (RCW) program and our water treatment plant process water recycling system.
3. Dwelling unit and economic growth projections (employment and non-residential development) through 2045 are assumed to be consistent with the projections from the CommunityViz 2045 Scenario. As noted above, we assume the growth projected to occur by 2045 occurs at a uniform rate between now and then, and that the CommunityViz Build-Out scenario growth projections for our service area will be realized at a linear rate from 2046 to 2070.
4. Water use factors for the various types of projected development are based on recent unit demands determined from our water use analysis, as summarized in a later section of this report. The key water use assumptions for new development are:
 - a. new individually-metered single-family residences will use 4,200 gallons/unit/month;
 - b. new master-metered multi-family dwelling units will use 3,300 gallons/unit/month; and
 - c. new non-residential development will use 75 gallons/day/1,000 square feet.

The Town of Cary recently completed a detailed analysis of billed water use among its major customer classes. As a check, OWASA staff compared the above factors based on our billing data, and they are similar to those that Cary developed.

5. Non-revenue water (such as water used for line flushing, water used for firefighting, and system leaks) will continue to be approximately 10% of our raw water demands.
6. There will not be any major expansion of our RCW system, and our annual RCW demands will remain constant through the 50-year planning horizon.

Our projections also reflect the assumption that water use will continue to decline over time as a result of the effects of the U.S. Environmental Protection Agency's WaterSense program, the U.S. Department of Energy's Energy Star program, early leak detection provided by our investment in automatic metering infrastructure, and the nation-wide water efficiency requirements specified in the Energy Policy Act of 1992.

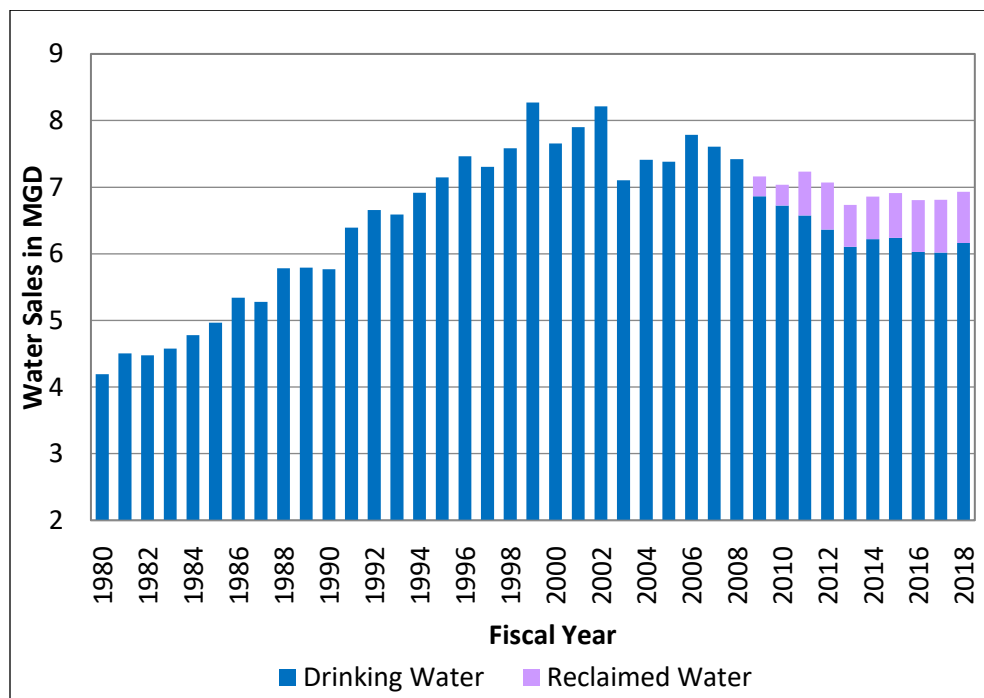
WHAT ARE SOME KEY TRENDS AND WATER USE FACTORS IN OUR SERVICE AREA?

The water use metrics incorporated in the draft baseline projection have been derived from staff's recent analysis of billed water use data for OWASA's major customer classes, as summarized below.

Overall Water Use by Our Customers

Figure 3 shows the annual average-day billed water use, in millions of gallons per day (MGD), for our drinking water and RCW systems for Fiscal Years (FY) 1980 to 2018. Like Figure 2, this graph shows a remarkably linear rate of growth in billed use from 1980 through about 2002, followed by a steady decline which appears to have bottomed out around 2013.

Figure 3.
Average-Day Billed Water Use by OWASA Customers (Drinking Water and Reclaimed Water)
Fiscal Years 1980 - 2018

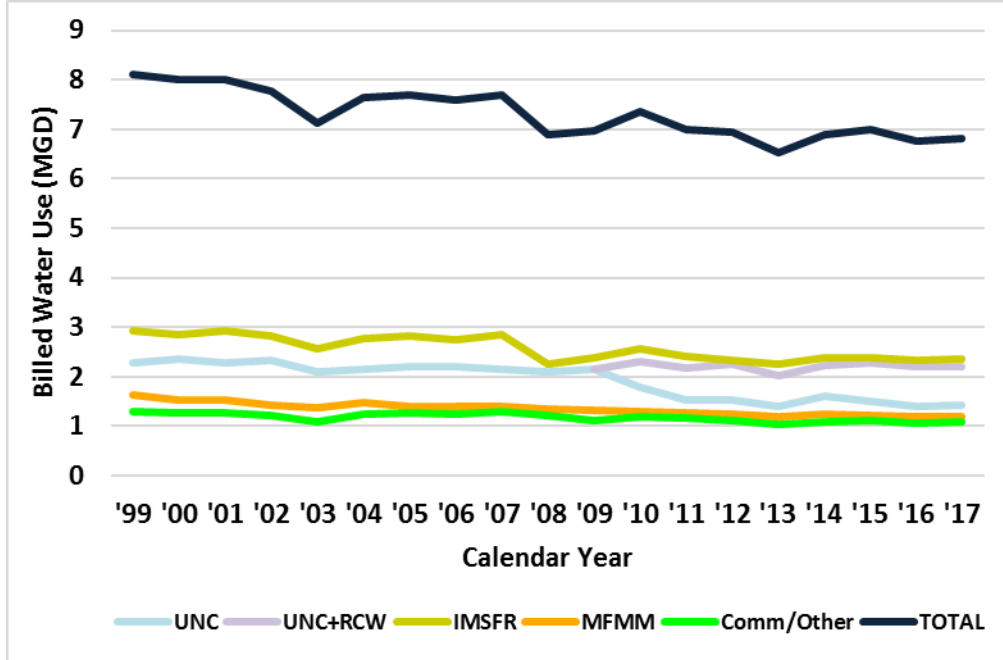


This figure also shows that RCW billed water use has remained relatively stable over the past few years. No major new RCW customers were added to the system during that time.

Figure 4 shows the historical annual average-day billed water demands for OWASA's four major customer groups for Calendar Years (CY) 1999 to 2017. The four groups are:

- Individually-Metered Single Family Residential (IMSFR);
- Master-Metered Multi-Family Residential (MFMM);
- Commercial/Retail/Other (Comm/Other); and
- UNC/UNC Health Care.

Figure 4.
Average Annual Billed Water Use By Major Customer Group, CY 1999 – 2017 (in MGD)

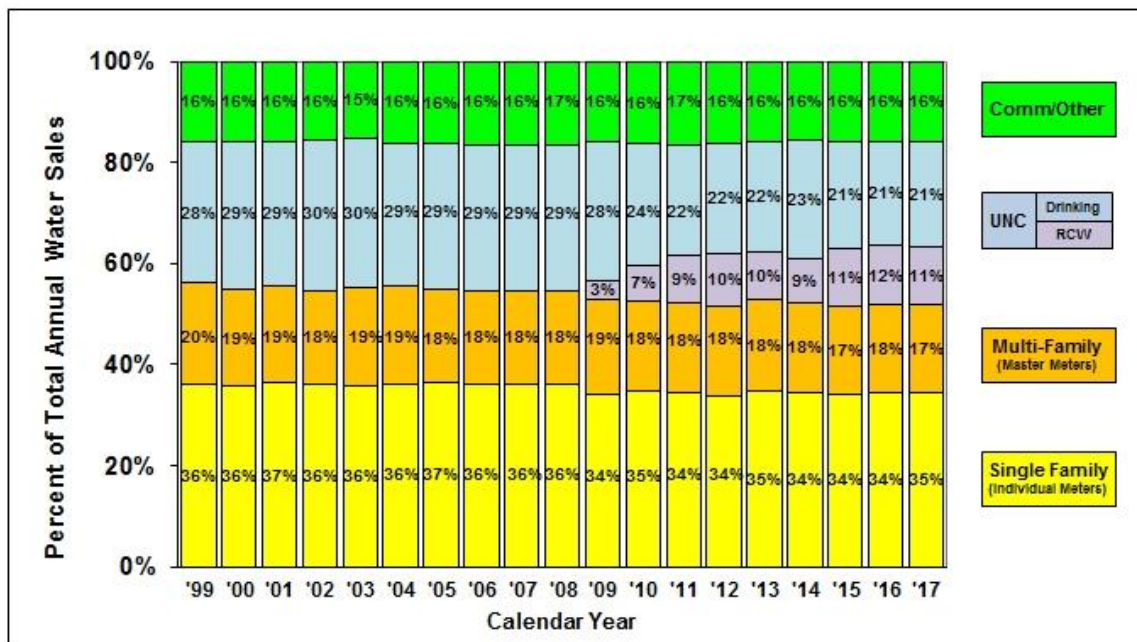


The key take-away from this graph is that the demand for water across each of these major sectors generally declined through 2013-2014, and has remained relatively stable for past few years. Some key factors contributing to declines shown above include:

- implementation of seasonal water conservation rates for all customers in 2002 and of increasing block water rates for our individually-metered single family residential customers in 2007;
- the 2001-2002 record drought and near-record drought of 2007-2008, both of which involved extensive water conservation education and outreach efforts (as well as the implementation of drought surcharges in the 07-08 drought) across the region and required mandatory water use restrictions to reduce demands and extend the local supply;
- implementation of private submetering and rebilling systems in many of the master-metered multi-family complexes in our service area;
- implementation of many major water use efficiency improvements by UNC-CH and UNC Health Care; and
- the State’s enactment of Session Law 2007-546 (Senate Bill 668) in 2007, which required that water use in all existing buildings owned by the State and The University of North Carolina be reduced by at least 20% compared to FY 2002-2003 water use. The reductions were required to be achieved by December 31, 2009. The law also requires that all new State buildings, including those built by UNC-CH, be a minimum of 20% more water-efficient than previously required under the State Plumbing Code.

Figure 5 shows the relative *portion* of total annual billed sales for our four major customer groups for CY 1999 – 2017. The key take-away from this graph is that the relative demand for water across these major sectors has remained relatively constant for nearly the past twenty years.

Figure 5.
Percent of Total Annual Billed Water Sales, By Major Customer Group, CY 1999 – 2017

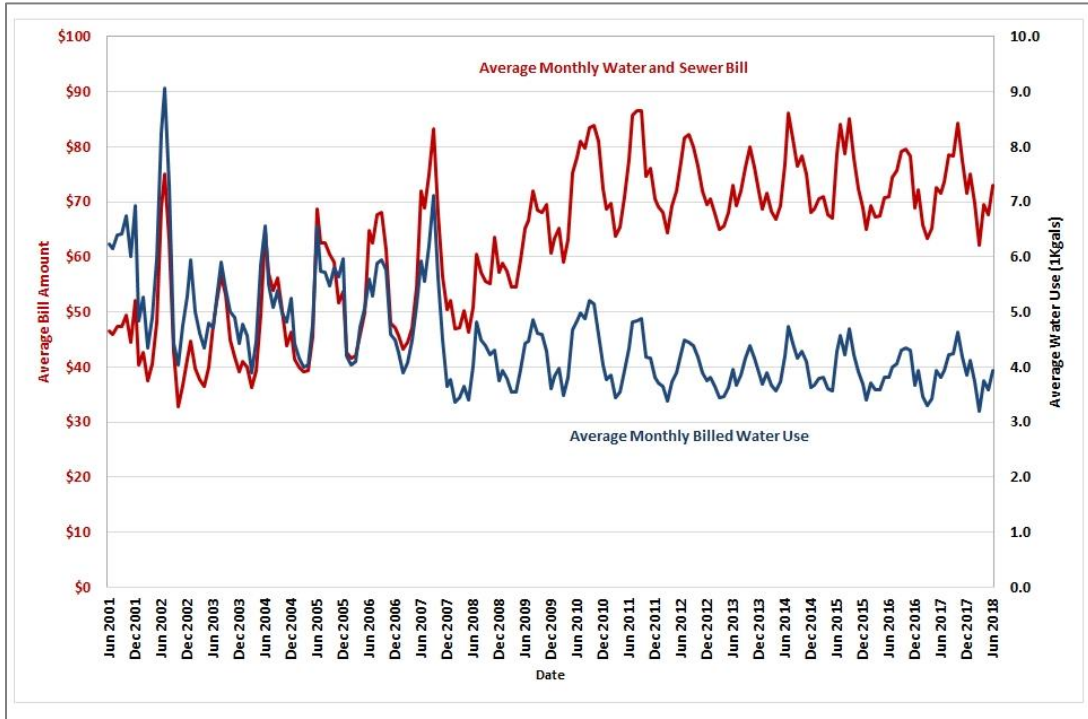


While the proportionate amount of billed use across our major customer classes has been relatively stable for many years, it is uncertain whether this trend will continue.

Water Use by Individually-Metered Single-Family Residential (IMSFR) Customers

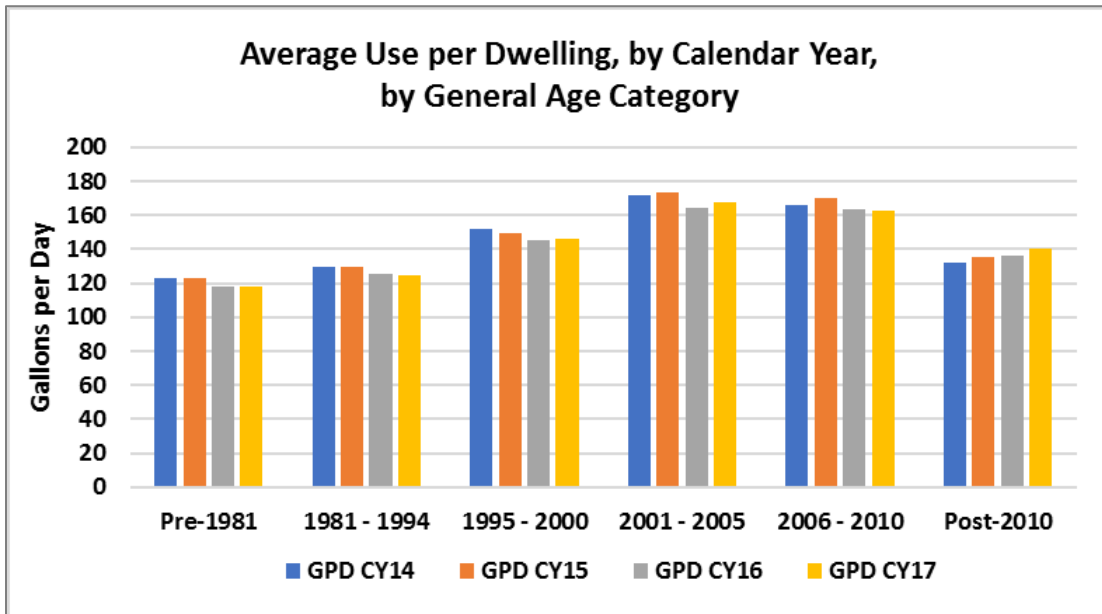
Figure 6 shows the average monthly billed water use for our IMSFR customers for the period 2001 to 2017. The 12-month running average declined substantially from 2001 through about 2013, and has remained relatively constant at 4,000 gallons/month since that time. Two major step reductions occurred around the times when OWASA adopted stronger conservation rate structures. Coincidentally, those rate structures changes were made about the same time as two extreme droughts (record drought of 2001-2002 and extreme drought of 2007-2008). In recent years, annual average monthly billed use among this major customer class has remained relatively stable at about 4,000 gallons/month/account.

Figure 6.
Average Monthly Billed Water Use and Billed Charges for OWASA's
Individually-Metered Single Family Residential Customer Class - 2001 to 2017



We have used IMSFR billing data and County tax parcel data to analyze average daily water use by general age range of IMSFR dwelling units in our service area. The age ranges selected are intended to reflect the times when major changes occurred in national water efficiency requirements. Figure 7 shows how average daily billed water use during CY 2014 – 2017 has varied, by general age range of dwelling units. One general observation from this graph is that homes built from 2010 to present appear to be using less water than homes built between 2001 and 2010. That could reflect the installation and use of more water-efficient fixtures and appliances in newer homes; however, it could also be a function of household size, house and/or lot size, and other factors.

Figure 7.
Average Daily Billed Use for Individually-Metered Single Family Residences,
by General Age of Residence, for Calendar Years 2014 - 2017



Based on the above analyses, staff recommends using an average water use factor of 140 gallons/day (4,200 gallons/month) for new IMSFR dwelling units built in the OWASA service area.

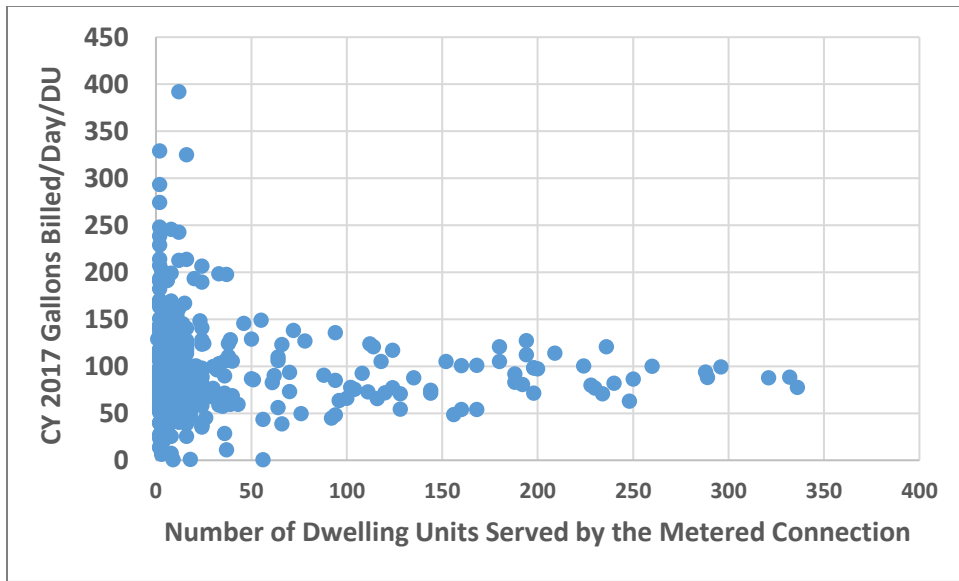
Water Use by Master-Metered Multi-Family Residential Customers

As shown above in Figure 5, water use by OWASA’s Multi-Family Master-Metered Residential (MFMM) customer class has historically accounted for about 17 to 20% of average-day water sales. As shown in Figure 4, overall water use in this class steadily declined from CY 1999 to around CY 2013, but has been relatively stable for the past few years.

One key factor that has substantially affected water use within our MFMM customer class is the installation of private submetering and rebilling systems in both old and new apartment complexes. A prior analysis by OWASA concluded that a number of existing apartment complexes in our service area reduced their overall average water use by around 15 to 20% after installing private submetering and rebilling systems. That is consistent with the findings of the *National Multiple Family Submetering and Allocation Billing Program Study* which reported that submetering and rebilling achieved an average water savings of more than 15% (21.8 gallons/day/unit).

For those MFMM customer accounts for which we have dwelling unit counts (covers about 16,000 dwelling units), we have analyzed average-day water use per dwelling unit, assuming full occupancy (which results in an under-estimate of the actual water use/occupied unit). Figure 8 shows distribution of CY 2017 average-day use per unit by MFMM service connection for which we have data on the number of units. The overall average was about 100 gallons per day/unit; however, we again emphasize that the actual use per *occupied* unit would be higher.

Figure 8.
Average-Day Billed Water Use/Dwelling Unit by Number of Units Served for
Master-Metered Multi-Family Residential Connection, CY 2017



Some key factors affecting water use in the MFMM customer class are: the age and size of the dwelling units; the number of occupants per unit; the occupancy (vacancy) rates of the various complexes; the presence of swimming pools, laundry facilities, and other features; the extent to which water use efficiency measures have been installed; and the extent to which private submetering and rebilling systems have been implemented, as discussed above.

Based on our analyses, staff recommends using an average water use factor of 110 gallons/day for new MFMM dwelling units built in the OWASA service area. This factor includes a modest adjustment for general water use for offices, laundry areas, swimming pools, and other common facilities that are oftentimes metered separately from the residential buildings.

Water Use by Non-Residential, Non-UNC/UNC Health Care Customers

Figure 4 summarizes average annual billed water use for our Non-Residential, Non-UNC/UNC Health Care customers, also referred to as our Commercial/Other customer group. This broad group includes commercial, office, retail, and institutional customers, as well as some major mixed use development projects, such as East 54, 140 West, and Greenbridge.

Figure 9 shows CY 2017 average-day water use/1,000 square feet for a subset of about 100 Non-Residential, Non-UNC/UNC Health Care buildings of various types. Together, those buildings represent about 5 million square feet of building area.

Figure 9.
CY 2017 Average-Day Water Use/1,000 Square Feet for Subset of Non-Residential Buildings

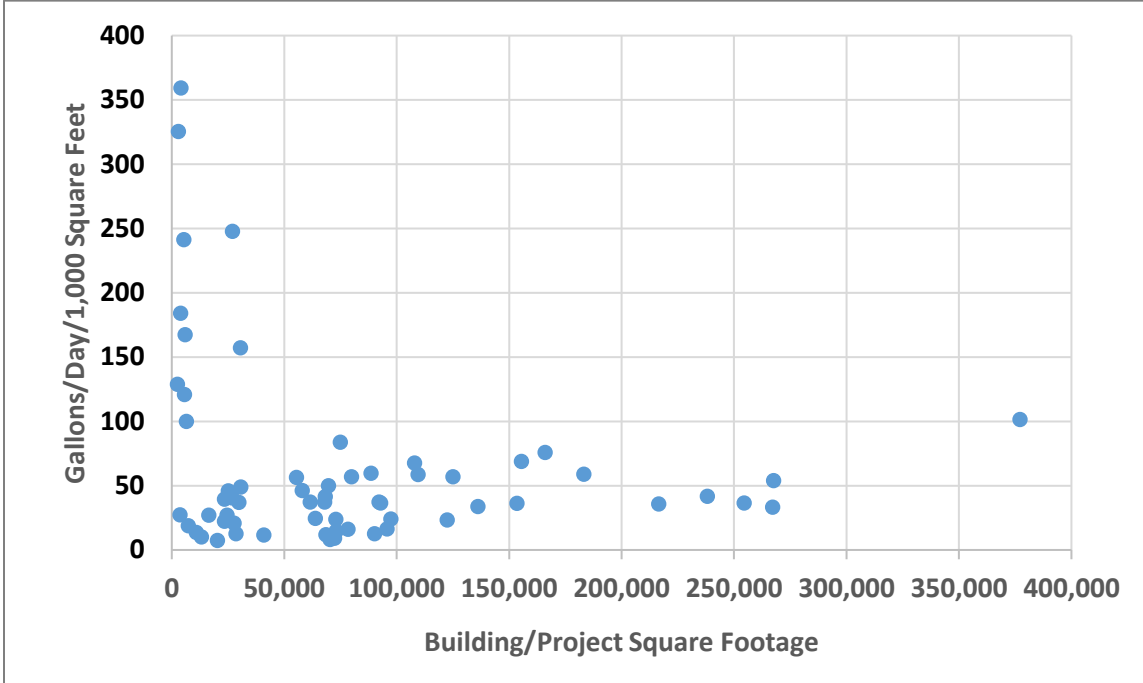


Figure 10.

CY 2017 Average-Day Water Use/1,000 Square Feet for Subset of UNC Buildings

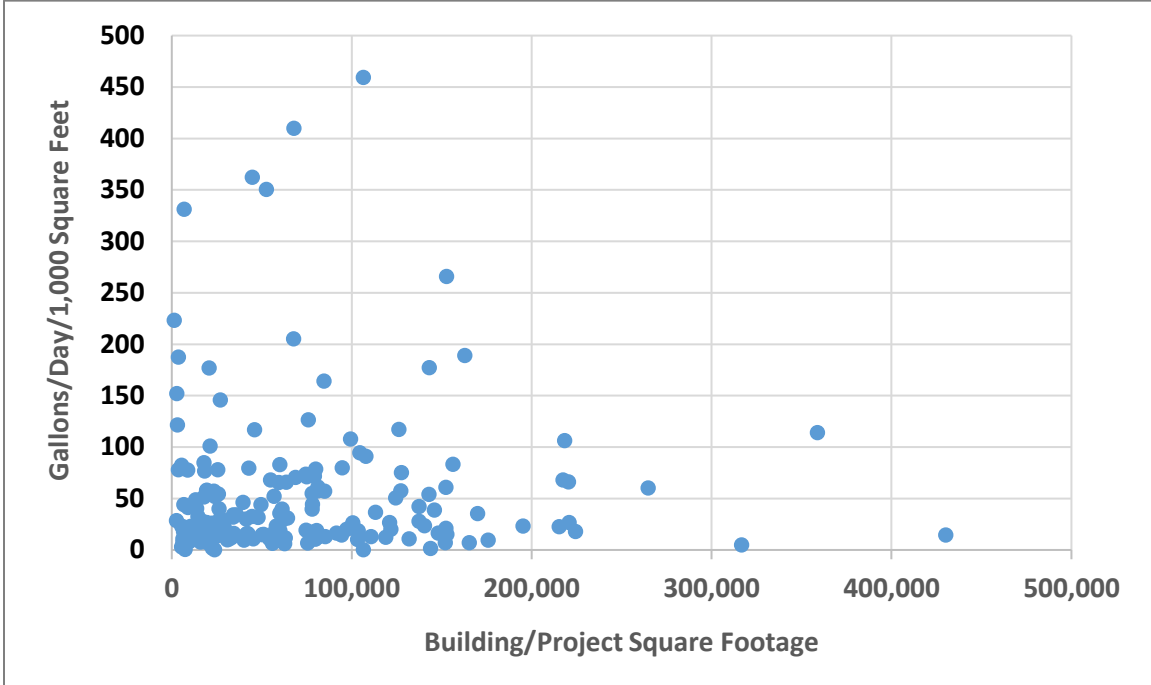
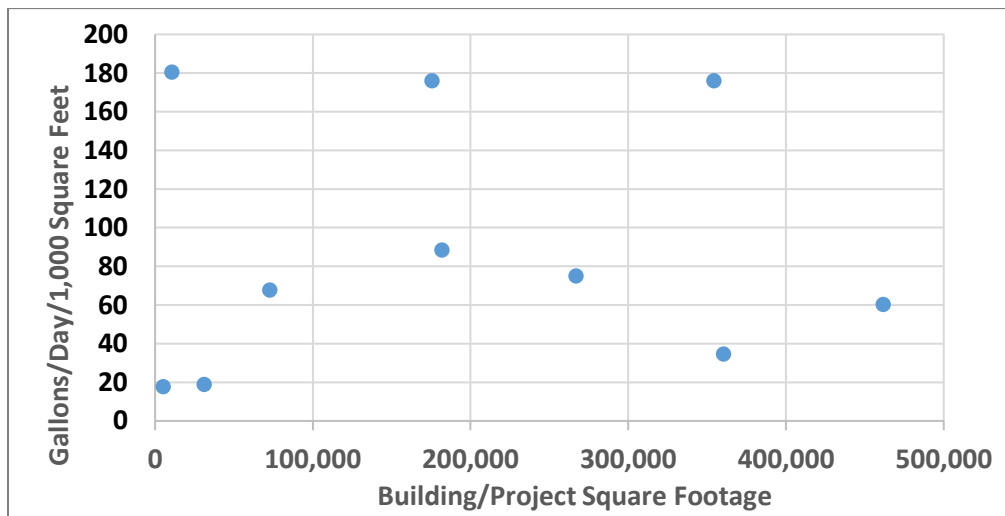


Figure 11 shows average-day water use during CY 2017 for 10 major UNC Health Care buildings on or in close proximity to the main campus. These buildings total about 2 million square feet of building area, and had an average use of 92 gpd/1,000 square feet and a median of about 71 gpd/1,000 square feet. This analysis under-estimates the actual requirements of these buildings, as it excludes the associated water requirements for UNC Health Care’s central cooling facilities and operations that serve most of the buildings included in the above analysis.

Figure 11.

CY 2017 Average-Day Water Use/1,000 Square Feet for Subset of UNC Health Care Buildings



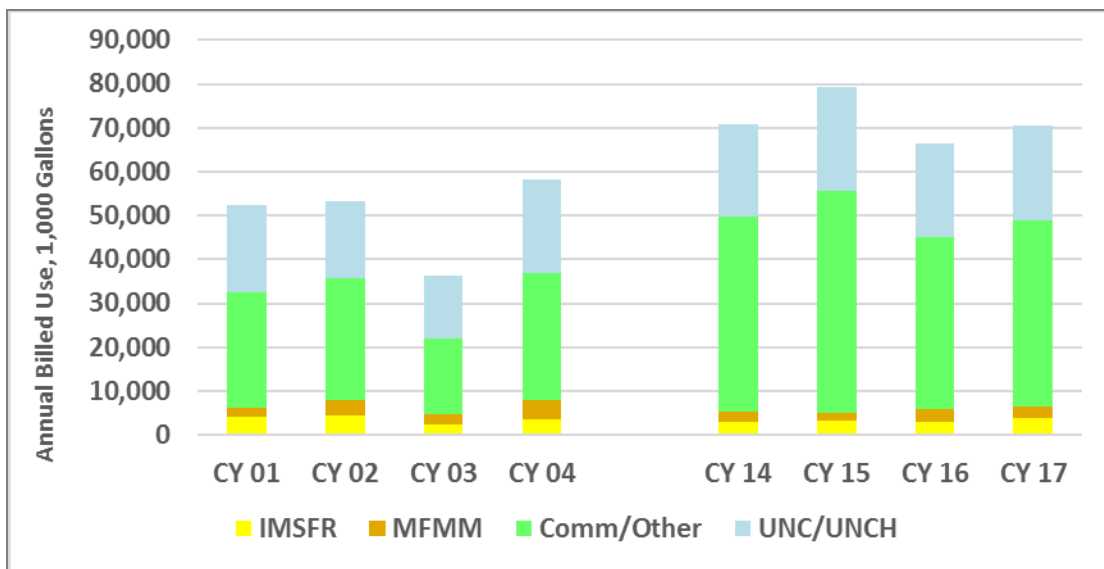
The combined analysis of four years (CY 2014 – 2017) of billed water use for nearly 300 non-residential buildings and commercial centers totaling nearly 20 million square feet of building area indicated an overall average water use factor of about 60 gpd/1,000 square feet. However, this is considered an underestimate of actual use, as it excludes UNC-CH’s and UNC Health Care’s use of water and reclaimed water for central heating and cooling operations that serve many of the buildings included in the above analysis. It also does not consider other non-residential water uses, such as public pools and car washes. To account for this, we have added a 25% adjustment factor for a total use of 75 gpd/1,000 square feet.

Water Use Through Irrigation Meters

The above analyses and graphs include billed drinking water use through irrigation meters serving customers within the four major customer groups. Billed drinking water use through irrigation meters has averaged slightly less than 0.2 mgd for the last four calendar years, accounting for only slightly more than 3% of the total billed drinking water use by our customers.

However, as shown in Figure 12, a comparison of the four-year period from CY 2014 – 2017 with four-year period from CY 2001 – 2004 indicates that billed drinking water use through separate irrigation meters has increased more than 40% compared to the CY 2001 – 2004 period. The number of separate irrigation meters has increased by more than 30% since 2004; however, the overall average use per meter was 8% lower in CY 2017 than in CY 2004. Some irrigation demands are now being met by the reclaimed water system and harvested rainwater, thereby offsetting the need to use our essential drinking water supply sources for irrigation.

Figure 12.
Comparison of Average-Day Billed Drinking Water Use for Irrigation-Only Meters
For the Periods CY 2001 – 2004 and CY 2014 - 2017



Our draft baseline projection does not assume any proportionate increase in irrigation demands in our service area.

WHAT IS THE BASIS FOR THE RESIDENTIAL AND NON-RESIDENTIAL GROWTH PROJECTIONS?

As discussed above, our draft baseline water demand projection is largely driven by the residential and non-residential growth projections prepared for the Carrboro-Chapel Hill area as part of the 2045 Metropolitan Transportation Plan. Those growth projections were developed by local governments in portions of ten counties in the Triangle region with assistance from Triangle J Council of Governments (TJCOG). Using information provided by those local governments, including expected land use and development constraints for 2045, TJCOG used the Triangle CommunityViz 2.0 Model to project where future growth would occur in the region. The OSBM’s 20-year, county-level population projections for 2037 were extended to 2045 then used in the model to determine the amount of residential growth allocated at the county level. The CommunityViz model was used to spatially allocate the projected growth based on land suitability, the type of place each parcel is today and what the applicable local planning department expects it to be in the future, development constraints, and other factors.

TJCOG provided OWASA a parcel-level dwelling unit and economic (employment and non-residential square footage) growth projection database which was incorporated into OWASA’s Geographic Information System (GIS). The database included the growth allocation data for the OWASA service area for the 2045 Scenario and the “Build-Out” scenario (which has an unspecified timetable). The allocations are the additional growth the regional model projects to occur within the OWASA service area, based on the input of the local planning departments and other factors as summarized above.

Table 2 summarizes the 2045 and Build-Out allocations from the CommunityViz model.

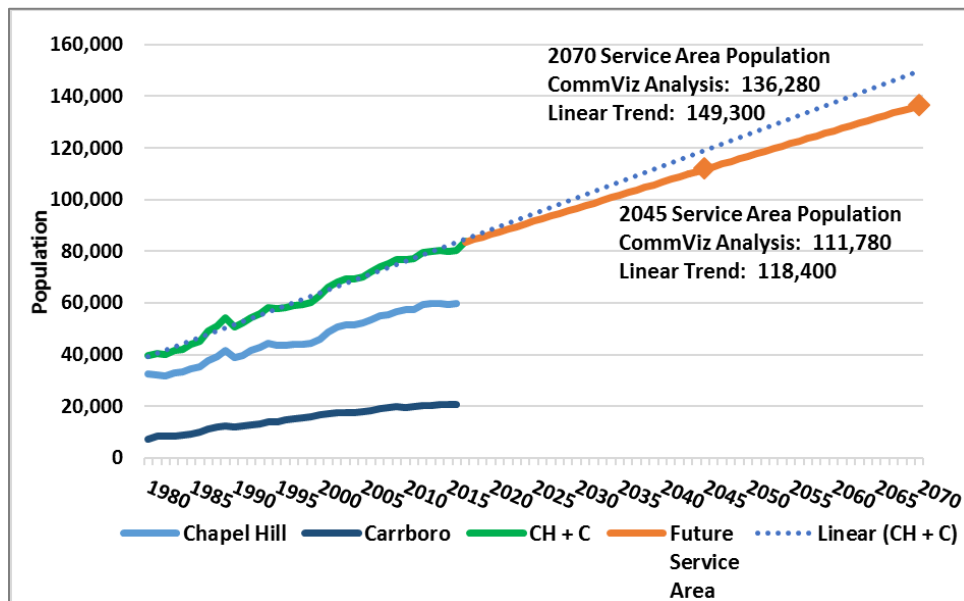
Table 2.
Residential Dwelling Unit and Non-Residential Building Space
Growth Allocations from CommunityViz 2045 and Buildout Scenario

Development Type	Units	# People per DU ^(a)	New Residential Growth (Dwelling Units)		Projected # of New Residents Added		Annualized Rates # New DUs/Year	
			2045	Build-Out	2045	Buildout	2018 - 2045	2046 - 2070
Single-Family Residential	# DUs	2.6	3,639	3,639	9,461	9,461	130	0
Multi-Family Residential	# DUs	2.1	9,001	20,712	18,902	43,495	321	468
RESIDENTIAL SUBTOTAL:			12,640	24,351	28,364	52,957	451	468
Development Type	Units	# Emp. /1,000 SF	Growth (Square Feet)		Projected # of New Employees Added		Annualized Rates # New Non-Res SqFt/Year	
			2045	Build-Out	2045	Buildout	2018 - 2045	2046 - 2070
Industrial	Sq. Ft.	1.8	514,444	519,444	926	935	18,373	200
Office	Sq. Ft.	3.3	5,203,030	10,186,061	17,170	33,614	185,823	199,321
Service-Low	Sq. Ft.	2.9	6,774,483	11,863,793	19,646	34,405	241,946	203,572
Service-High	Sq. Ft.	3.2	775,938	6,221,563	2,483	19,909	27,712	217,825
Retail	Sq. Ft.	2.9	2,877,931	9,142,069	8,346	26,512	102,783	250,566
NON-RESIDENTIAL SUBTOTAL:			16,145,826	37,932,930	48,571	115,375	576,637	871,484

(a) Number of residents per household was from CommunityViz modeling assumptions.

We then used the household population density factors from the CommunityViz model to determine the additional number of residents projected for our service area for each of the two scenarios. That population increase was added to our 2017 baseline year population estimate for our service area (approximately 83,500 people), and then compared to the Year 2045 and Year 2070 population estimates we derived by extending the historical trend line for population growth in the OWASA service area, which is assumed to be the same as the trend line for the combined population of Carrboro and Chapel Hill. Figure 13 shows the results of that comparison.

Figure 13.
Linear Trend Projection for Future Combined Population of Chapel Hill and Carrboro as Compared to Projected Population of OWASA Service Area Based on CommunityViz Model



These two different methods provide reasonably similar results, as the projected total service area population indicated from the CommunityViz 2045 and Build-Out (2070) scenarios is about 6,600 (5.6%) and 13,000 (8.7%) less, respectively, than the total service area population projected simply by extending the historical linear growth trend line for our service area. Staff also compared the projections to those provided in the recent State of the Community Report; that report showed 2050 projections for the towns (which varies a little from our service area) of 128,755 based on a linear projection from 1990-2010 data. This is about 12,270 (9.4%) more than predicted from the orange line in Figure 13. The 2050 projection for the towns was 102,310 based on a recent, short-term linear trend projection from 2010-2017 data. This is about 12.3% lower than the projection derived using the CommunityViz growth projections, since recent growth has been slower than the longer-term historical rate shown in Figure 13.

WHAT IS THE DRAFT LONG-TERM WATER DEMAND PROJECTION FOR OUR SERVICE AREA?

Following the methods and assumptions summarized above, we have developed a preliminary draft baseline water demand projection for our service area. Table 3 summarizes the projected water demands for five-year increments through 2070.

Table 3.
Raw Water and Customer Demand Projections from Draft 2018 Projection Model
(Figures shown are in MGD)

Year	Projected Customer Demands		Draft 2018 Total Raw Water Demands*
	Drinking Water Demands	Reclaimed Water Demands	
2025	6.74	0.77	7.42
2030	7.14	0.77	7.86
2035	7.53	0.77	8.29
2040	7.92	0.77	8.71
2045	8.31	0.77	9.14
2050	8.85	0.77	9.73
2055	9.38	0.77	10.32
2060	9.92	0.77	10.91
2065	10.45	0.77	11.50
2070	10.99	0.77	12.09

** Includes 10% adjustment to account for non-revenue water (fire-fighting, flushing, leaks, etc.)*

Based on the growth and development projections and water use assumptions summarized in this draft report and incorporated in the demand projection, growth in our non-residential water demands is expected to increase at a faster rate than our residential sector water demands.

WHAT DATA LIMITATIONS AND UNCERTAINTY DO WE FACE AS WE DEVELOP OUR PROJECTION?

The information and understanding and the techniques we have used to develop the draft baseline projection are imperfect; therefore, our projection contains uncertainty. Some key sources of uncertainty are:

- the rate of population growth that is projected to occur;
- the rates and types of residential and non-residential growth projected to occur (as compared to the development projections from the regional transportation model);
- the potential for local governments to agree to expand the urban service area boundary, thereby opening up additional land for growth and development that will require water and sewer services from OWASA;
- the extent to which low impact development, high performance building, and other development trends will affect future demands;
- the extent to which water use efficiency and water use habits will change over time and affect water demands in both existing developments and new developments;
- the effect that a warming climate will have on long-term water demands, such as irrigation and cooling water requirements; and
- how future water use will be affected by changes in price, household income, etc.

HOW SENSITIVE IS THE PROJECTION TO CHANGES IN KEY ASSUMPTIONS?

Our long-term demand projection is based on the key assumptions described above, all of which have some degree of uncertainty. We have evaluated how sensitive the projection is to changes in several of the key assumptions,

Table 4 summarizes how certain changes in key assumptions affect the long-term demand projection.

Table 4.
Sensitivity of Projections to Changes in Single Assumptions

Change in Key Assumption	Projected Effect on Drinking Water Demands	Projected Effect on Raw Water Demands
Projected number of dwelling units or water use factor for residential use is 10% greater than the baseline	Increase by 0.14 mgd by 2045 0.26 mgd by 2070	Increase by 0.16 mgd by 2045 0.29 mgd by 2070
Projected growth in non-residential square footage is 15% greater than assumed in the baseline	Increase by 0.17 mgd by 2045 0.39 mgd by 2070	Increase by 0.19 mgd by 2045 0.43 mgd by 2070
RCW service is extended to meet cooling tower water demands at UNC's Cogeneration Plant	Annual billed drinking water demands would be about 0.09 mgd lower, but overall total billed sales would remain the same.	Annual raw water withdrawals would be about 0.10 mgd lower than the baseline projection.
Urban service area is extended and water service is provided to a Meadowmont or Southern Village type development intensity over a 908 acre area (acreage based on Town of Chapel Hill ETJ outside our service area and drainage area on 15-501 near Smith Level Road inside Orange County)	Increase by 0.53 mgd at project build-out	Increase by 0.58 mgd at project build-out
Water plant process water recycling system is no longer in service	N/A	0.56 mgd by 2045 0.75 mgd by 2070
Reclaimed water system is no longer in service	0.77 mgd This increase would mostly occur during the peak demand summer months.	0.85 mgd This increase would mostly occur during the peak demand summer months.

We do not have any specific analyses upon which to make meaningful assumptions regarding how a warming climate may affect our customers' future demands for water. We plan to have Hazen and Sawyer complete a statistical analysis of how our overall water demands have historically been affected by

changes in temperature and precipitation, and we will provide the conclusions of that evaluation to the Board.

HAVE WE ATTEMPTED TO STATISTICALLY QUANTIFY THE UNCERTAINTY IN OUR PROJECTION?

No, but that could be very helpful in better understanding and explaining the uncertainty in our projection. It could also help us to estimate the probability (likelihood) that our demands will be below or above certain thresholds at key points in the future.

If the Board desires, we can engage a consultant to do such an analysis, using a method like Monte Carlo simulation (MCS). MCS is a tool for doing “What if...” analyses and for systematically modeling a range of possible outcomes by substituting different values for any combination of the important input variables included in the water demand projection model. The values modeled by MCS are randomly selected from a specified probability distribution of possible values. The end result is a large set of demand simulations, the results of which can be statistically analyzed and used to convey the probability of certain outcomes. For example, the results could be used to present outcomes such as “Based on our simulation model, we estimate that there is a 90% chance that water demand will be less than 12 mgd in the next 25 years.”

WHAT DOES STAFF SEE AS THE KEY CONCLUSIONS FROM THIS NEW DRAFT PROJECTION?

When compared to the prior demand projection from the 2010 LRWSP, the draft long-term demand projection presented in this report indicates that demands may be even lower than those previously projected for the 2010 “Expected” growth scenario. Table 5 provides a summary comparison of the two projections.

Table 5.
Comparison of Raw Water Demand Projections from 2010 LRWSP
and September 2018 Draft Report

Year	Draft 2018 Total Raw Water Demands*	2010 LRWSP Projected Raw Water Requirements	Percent Change from 2010 Projection
2025	7.42	9.03	-17.9%
2030	7.86	9.68	-18.8%
2035	8.29	10.24	-19.1%
2040	8.71	10.79	-19.3%
2045	9.14	11.33	-19.3%
2050	9.73	11.86	-18.0%
2055	10.32	12.39	-16.7%
2060	10.91	12.91	-15.5%
2065	11.50	N/A	N/A
2070	12.09	N/A	N/A

* Includes 10% adjustment to account for non-revenue water (fire-fighting, flushing, leaks, etc.)

WHAT ARE THE PROPOSED NEXT STEPS?

Key next steps for our water demand projection task are:

- Incorporate the Board's comments and guidance into a revised draft projection and report.
- Have Hazen and Sawyer prepare a statistical analysis of the effects of weather on overall system demands, and incorporate the results into the revised draft report.
- Share the revised draft report with Hazen and Sawyer to provide a technical review of the results.
- If the Board desires, retain a consultant to complete a Monte Carlo simulation and incorporate the results of that analysis into the revised draft report.
- Share the revised draft report with the Towns, County, University, UNC Health Care, and others to receive their technical review and corrections, questions, comments, and suggestions.
- Share the revised draft report with nearby water utilities, and continue to exchange information and analyses regarding demand projections, water use analyses, etc.
- Present a final draft baseline projection and report for further review and guidance by the Board. No formal resolution is needed; however, it would be important to have the Board's acceptance of the projections as the starting point for future analyses in the LRWSP.
- Share final projections with community as described in the Community Engagement Plan
- Once the projection is finalized, use it as a basis for identifying projected long-term shortfalls in supply, evaluating the need for and cost-effectiveness of additional supply-side and/or demand-side strategies, etc.

Agenda Item 5:

Review Board Work Schedule

Purpose:

- a) Request(s) by Board Committees, Board Members and Staff
- b) October 25, 2018 Board Meeting
- c) November 8, 2018 Work Session
- d) Review and update the 12 Month Board Meeting Schedule
- e) Review Pending Key Staff Action Items

Information:

- Draft agenda for the October 25, 2018 meeting
- Draft agenda for the November 8, 2018 meeting
- 12 Month Board Meeting Schedule
- Pending Key Staff Action Items from Board Meetings

October 11, 2018

Agenda
Meeting of the OWASA Board of Directors
Thursday, October 25, 2018, 7:00 P.M.
Chapel Hill Town Hall

In compliance with the "Americans with Disabilities Act," interpreter services are available with five days prior notice. If you need this assistance, please contact the Clerk to the Board at 919-537-4217 or aorbich@owasa.org.

The Board of Directors appreciates and invites the public to attend and observe its meetings. Public comment is invited either by petition upon topics not on the Board's agenda, or by comments upon items appearing on the Board's agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

Public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

Announcements

1. Announcements by the Chair
 - A. Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.
2. Announcements by Board Members
 - A. Natural Resources and Technical Services Committee Will Meet on Tuesday, October 30, 2018 at 4:30 p.m. to discuss Source Water Protection (John Young)
 - B. Natural Resources and Technical Services Committee Will Meet on Thursday, November 8, 2018 at 4:00 p.m. to Discuss Overall Approach for Managing Forested Watershed Lands (John Young)
3. Announcements by Staff
 - A. OWASA Employee Service Awards (Ed Kerwin)
 - B. Update on the October 20, 2018 Chapel Hill Peoples Academy – OWASA Session (Ed Kerwin)
4. Additional Comments, Suggestions, and Information Items by Board Members (Yinka Ayankoya)

Petitions and Requests

1. Public
2. Board
3. Staff

Consent Agenda

Information and Reports

1. 12 Month Board Meeting Schedule (Yinka Ayankoya/Ed Kerwin)

Action

2. Position Reclassification for Distribution and Collection Department (Todd Taylor)
3. Minutes of the September 27, 2018 Annual Meeting of the Board of Directors (Andrea Orbich)
4. Minutes of the October 11, 2018 Closed Session of the Board of Directors for the Purpose of Discussing Potential Litigation and a Personnel Matter (Robert Morgan)

Regular Agenda

Discussion

5. Review Draft Water Treatment Plant and Wastewater Treatment Plant Reliability and Risk Assessment Action Plan (Mary Darr)
6. Discuss Recreational Fees for Out-of-County Visitors (Johnny Riley)
7. Discuss Draft OWASA Action Items Recurring Every 3 to 5+ Years (Ed Kerwin)

Discussion and Action

8. Approve Agua Vista (Advanced Metering Infrastructure) Policies (Stephen Winters)

Information and Reports

9. Financial Report for the Three Month Period Ended September 30, 2018 (Stephen Winters)

Summary of Board Meeting Action Items

10. Executive Director will summarize the key action items from the Board meeting and note significant items for discussion and/or action expected at the next meeting

Closed Session

11. The Board of Directors will convene in a Closed Session for the Purpose of Discussing a Personnel Matter (Robert Morgan)

Agenda
Work Session of the OWASA Board of Directors
Thursday, November 8, 2018, 6:00 P.M.
OWASA Community Room

The Board of Directors appreciates and invites the public to attend and observe its meetings. For the Board's Work Session, public comments are invited on only items appearing on this agenda. Speakers are invited to submit more detailed comments via written materials, ideally submitted at least three days in advance of the meeting to the Clerk to the Board via email or US Postal Service (aorbich@owasa.org/400 Jones Ferry Road, Carrboro, NC 27510).

For items on the agenda, public speakers are encouraged to organize their remarks for delivery within a four-minute time frame allowed each speaker, unless otherwise determined by the Board of Directors.

The Board may take action on any item on the agenda.

Announcements

- a. Announcements by the Chair
 - Any Board Member who knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight is asked to disclose the same at this time.
- b. Announcements by Board Members
 - Update on the October 30, 2018 Natural Resources and Technical Services Committee Meeting (John Young)
 - Update on the November 8, 2018 Natural Resources and Technical Services Committee Meeting (John Young)
- c. Announcements by Staff
- d. Additional Comments, Suggestions, and Information Items by Board Members (Yinka Ayankoya)

Regular Agenda

Discussion

1. Discuss Process to Update Strategic Plan (Ed Kerwin)
2. Discuss Priorities for Natural Resources and Technical Services Committee (John Young/Ruth Rouse)
3. (Tentative) Key Focus Areas for OWASA's Executive Director (Ed Kerwin)
4. Review Board Work Schedule (Yinka Ayankoya/Ed Kerwin)
 - a. Request(s) by Board Committees, Board Members and Staff
 - b. December 13, 2018 Work Session
 - c. January 10, 2019 Work Session
 - d. 12 Month Board Meeting Schedule
 - e. Pending Key Staff Action Items

Summary of Work Session Items

5. Executive Director will summarize the key staff action items from the Work Session

OWASA Board of Directors – 12 Month Board Meeting Schedule (October 5, 2018)

Month	Board Meetings		Committee & Other Meetings
	Work Session	Business Meeting	
October 2018	Discuss Communications and Community Engagement <i>Discuss Demands & Yield, Scope and Schedule of LRWSP</i> CS – Prepare for ED Review	Employee Service Awards Q1 Financial Report Position Reclassification for Distribution and Collection Department Approve AMI Policies Discuss Recreational Fees for Out-of-County Visitors Discuss Action Plan from WTP & WWTP Reliability and Risk Assessment Project Discuss Draft OWASA Action Items Recurring Every 3 to 5+ Years CS – ED Review	<i>Chatham-Orange Joint Planning Task Force Meeting (10/4/2018)</i> <i>Finance Committee Meeting to discuss longer-term approach/strategy for operating cost management (10/8/2018)</i> <i>Carrboro Citizen's Academy – OWASA Session (10/10/2018)</i> <i>Chapel Hill Peoples Academy – OWASA Session (10/20/2018)</i> <i>Tour of OWASA's Cane Creek Watershed Lands (10/26/2018)</i> <i>NRTS Committee Meeting to continue discussion of source water protection (10/30/2018)</i>
	10/11/2018	10/25/2018	
November 2018	Discuss Process to Update Strategic Plan Discuss Priorities for NRTS Committee Discuss/Approve ED Key Focus Areas	<i>Holiday - no meeting</i>	<i>NRTS Committee Meeting to discuss overall approach for managing forested watershed lands (11/8/2018)</i> <i>HR Committee Meeting to discuss retiree health and 457 deferred compensation (TBD)</i>
	11/8/2018		
December 2018	Award the Gravity Sewer Rehabilitation Package #3 Contract Discuss KPI Deep Dive on Water Loss and Non-Revenue Water Strategic Trends Report and Strategic Plan Update (Tentative) Discuss Updating Strategic Plan	<i>Holiday - no meeting</i>	<i>NRTS Committee Meeting – topic to be determined (12/4/2018)</i>
	12/13/2018		

OWASA Board of Directors – 12 Month Board Meeting Schedule (October 5, 2018)

January 2019	Employee Health and Dental Insurance Update Appoint Audit Firm Affordability Outreach Program Plan Update (Tentative) Authorize Applying for SRF Loans (Tentative) LRWSP Final Demands and Yield 1/10/2019	(C) (C) (C) (C)	Annual Lakes Recreation Report CIP Semiannual Report Q2 Financial Report FY 20 Budget Calendar and Assumptions (Tentative) Award the WWTP Solids Thickening Improvements Construction Contract 1/24/2019	(C) (C) (C) (C)
February 2019	CS – Prepare for General Counsel Interim Review 2/14/2019	(C)	CS – General Counsel Interim Review 2/28/2019	(C)
March 2019	FY 20 Draft Budget & Rates Review AMI Manual Read CS – Prepare for ED Interim Review (Tentative) LRWSP – Discuss Water Supply and Demand Management Alternatives 3/14/2019	(C) (C)	Annual Update of the Energy Management Plan FY 20 Draft Budget & Rates and Proposed Staff Rate Adjustment Recommendation Set date for Public Hearings – FY 20 Budget & Rates CS – ED Interim Review 3/28/2019	(C) (C) (C) (C)
April 2019	Review Employee Health and Dental Insurance Renewals FY 20 Draft Budget and Rate Adjustment Information Appointment of the Nominating Committee 4/11/2019	(C) (C) (C)	Q3 Financial Report FY 20 Budget and Rates Discussion and Authorize Staff to Publish Proposed Rates 4/25/2019	(C)
May 2019	Approve Employee Health and Dental Insurance Renewals Discuss Employee Merit Pay for FY 2020 5/10/2019	(C) (C)	Public Hearings – FY 20 Budget and Rates (Tentative) Approve New Banking Services Provider 5/23/2019	(C)
June 2019	Approve FY 20 Budget and Rates, including merit pay decision Election of Officers (Tentative) LRWSP – Final Water Supply and Demand Management Alternatives 6/13/2019	(C) (C)	TBD 6/27/2019	
July 2019	TBD 7/11/2019		TBD 7/25/2019	
August 2018	TBD 8/8/2019		Preliminary 12 Month Financial Report CIP Semiannual Report CS – Prepare for General Counsel Review 8/22/2019	(C) (C) (C)
September 2018	EEO/Affirmative Action Report Annual Report on Disposal of Surplus Personal Property CS – General Counsel Review 9/12/2019	(C) (C) (C)	Annual Report and Financial Audit Approve General Counsel Engagement Strategic Trends Report and Strategic Plan Update CS – Prepare for ED Review 9/26/2019	(C) (C) (C) (C)

The 12 Month Board Meeting Schedule shows Strategic Plan initiatives and other priority efforts that the Board and staff plan to give greatest consideration to during the next twelve months. The schedule also shows major recurring agenda items that require Board action, or items that have been scheduled in response to the Board's prior standing request. This schedule does not show all the items the Board may consider in a work session or business meeting. It also does not reflect meetings at which the Board will discuss and act on the update of the Strategic Plan.

The 12 Month Board Meeting Schedule will be reviewed and updated at each monthly work session and may also be discussed and updated at the Board's business meetings.

OWASA Board of Directors – 12 Month Board Meeting Schedule (October 5, 2018)

In addition to the initiatives shown in this schedule, staff will be working on other Strategic Plan and organizational priorities that are not expected to require major additional discussion with the Board except as part of budget deliberations.

The schedule implies that the following Strategic Plan initiatives would be addressed beyond the 12-month period. The Board may conclude that one or more of the following initiatives are higher priority. The schedule will be revised as needed to reflect the Board's priorities, and any additional initiatives that the Board may decide to address.

- Development of a plan and policy framework for OWASA lands is considered a longer-term priority. The NRTS Committee discussed this issue in September 2017 and determined it was lower priority than Forestry Management. Staff presented an overall approach for Forestry Management to the Board in May 2018, and this was referred to the NRTS Committee for further discussion; NRTS is scheduled to discuss later this year.
- Improve effectiveness as a learning organization is considered a longer-term priority.
- Water Conservation Plan will be prepared concurrent with update of the Long-Range Water Supply Plan.

The OWASA Board determines which topics it wants to explore as a full Board (potentially in a work session format) and which topics it wants to assign to Board committees or committee chairs for further analysis and development of recommendations. Board also determines priorities and desired timeframes for addressing topics. Committee meetings will be updated on the schedule routinely.

Abbreviations Used in Draft Schedule:

(C)	Recurring agenda item (generally these are “required” items)	KPI	Key Performance Indicator
AMI	Advanced Metering Infrastructure	LRWSP	Long-Range Water Supply Plan
CE	Community Engagement	MOA	Memorandum of Agreement
CEP	Community Engagement Plan	MST	Mountains-to-Sea Trail
CIP	Capital Improvements Program	MFMM	Multi-Family Master Meter
COLA	Cost of Labor Adjustment	NCDOT	North Carolina Department of Transportation
CS	Closed Session of the Board	NRTS	Natural Resources and Technical Services
CY	Calendar Year	Q	Quarter
D&I	Diversity and Inclusion	RFP	Request for Proposals
ED	Executive Director	SRF	State Revolving Fund
EEO	Equal Employment Opportunity	SOW	Scope of Work
FY	Fiscal Year	TBD	To Be Determined
HR	Human Resources	WTP	Water Treatment Plant
JLP	Jordan Lake Partnership	WWTP	Wastewater Treatment Plant

Pending Key Staff Action Items from Board Meetings

No.	Date	Action Item	Target Board Meeting Date	Person(s) Responsible	Status
1.	9-27-2018 5-10-2018	Schedule NRTS Committee Meeting in October to discuss source water protection	NA	Rouse/Orbich	Complete – initially scheduled 9-11-2018 but canceled due to Hurricane Florence; meeting rescheduled for 10-30-2018 at 4:30 pm
2.	9-27-2018	Schedule Tour of OWASA’s Cane Creek watershed lands in October for new and interested Board Members	NA	Rouse/Orbich	Complete - tour scheduled for 10-26-2018 at 1:00 pm
3.	9-27-2018	Discuss the scope and schedule (in addition to projected demand and raw water yield) for the Long-Range Water Supply Plan	10-11-2018	Rouse	Complete – Board discussion scheduled for 10-11-2018
4.	9-27-2018	Provide a summary of the After Action Review on Hurricane Florence preparations and response	NA	Taylor	
5.	7-12-2018	Provide the Board by email staff’s draft questions on Social Responsibility and Environmental Sustainability to be included in staff’s RFP for banking services. Staff will consider feedback from individual Board members and issue RFP. Staff will review and rank banking proposals on all criteria except Social Responsibility and Environmental Sustainability, which will be discussed by the Board.	TBD	Winters	Complete – e-mail sent on 8-23-2018
6.	7-12-2018	Address the Board’s feedback on the action plan on communications during OWASA-related emergencies.	NA	Low	
7.	7-12-2018	Address the Board’s feedback in preparing the consultant’s final report on the WTP and WWTP Reliability and Risk Assessment Evaluation. Provide the Board staff’s action plan to address the report’s recommendations.	10-25-2018	Darr Taylor Loflin M. Dodson	Complete – Board discussion scheduled for 10-25-2018
8.	5-10-2018	Provide the Board information for discussion at a future meeting regarding the timing of the next review of the Employee Pay Administration Guidelines.	10-25-2018	Glasgow	Complete - e-mail sent on 9-6-2018 and part of the list of key tasks/actions for recurring Board attention over the next five years

Pending Key Staff Action Items from Board Meetings

No.	Date	Action Item	Target Board Meeting Date	Person(s) Responsible	Status
9.	5-10-2018	Provide the Board a list of key tasks/actions for recurring Board attention over the next five years.	10-25-2018	Kerwin	Complete - e-mail sent on 7-19-2018
10.	9-27-2018 5-10-2018	Schedule a NRTS Committee meeting to discuss overall approach for managing OWASA's forested watershed lands.	NA	Rouse	Complete – originally scheduled for 11-14-2018; rescheduled for 11-8-2018
11.	5-10-2018	Schedule a Finance Committee meeting in the fall of 2018 to discuss longer-term approach/strategy for cost management.	NA	Winters	Complete – scheduled for 10-8-2018
12.	4-26-2018	Provide Board via email information about renewal and replacement reserves for the reclaimed water system to include an outlook for future capital investment.	NA	Winters Taylor M. Dodson Gangadharan	Complete – email to the Board on 10-4-2018
13.	4-26-2018	Discuss out-of-County fees for lake use for the next recreation season.	10-25-2018	Taylor Loflin	Complete - on 12-Month Board Meeting Schedule
14.	1-25-2018	Incorporate Board Members suggestions in the next CIP report.	8-23-2018	Gangadharan	Complete
15.	1-25-2018	Consider an Open House and other opportunities to attract greater MWBE participation in bidding construction projects.	NA	Gangadharan	Complete – Staff provided an update with the August 23, 2018 CIP Semiannual Report and noted that ongoing MWBE outreach efforts and results will continue to be reported in future CIP semiannual reports.
16.	11-9-2017	Address Board member feedback on Strategic Trends Report for next year.	12-13-2018	Rouse	
17.	10-12-2017	Schedule future Board discussion about low-flow benchmarks to be used once AMI is implemented.	TBD	Winters Taylor	