Orange Water and Sewer Authority
OWASA is Carrboro-Chapel Hill's not-for-profit public service agency delivering high quality water, wastewater, and reclaimed water services.

Agenda
Virtual Work Session of the OWASA Board of Directors
Thursday, November 12, 2020, 6:00 P.M.

Due to COVID-19 public health concerns, the Orange Water and Sewer Authority (OWASA) Board of Directors is conducting this meeting virtually utilizing Microsoft Teams software. Board Members, General Counsel and staff will be participating in the meeting remotely.

The Board of Directors appreciates and invites the public to attend and observe its virtual meetings online. Public comment is invited via written materials, ideally submitted at least two days in advance of the meeting to the Board of Directors by sending an email to board_and_leadership@owasa.org or via US Postal Service (Clerk to the Board, 400 Jones Ferry Road, Carrboro, NC 27510). Public comments are also invited during the Board Meeting via telephone, and you will need to be available to call-in during the meeting. Please contact the Clerk to the Board at aorbich@owasa.org or 919-537-4217 to make arrangements by 3:00 p.m. the day of the meeting.

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.
   - November 4, 2020, Chapel Hill Town Council Reappointed John Morris and Appointed Kevin Leibel to the OWASA Board of Directors
   - Care to Share (Customer Assistance) Day on November 19, 2020

b. Announcements by Board Members
   - On-boarding Update for OWASA's Executive Director (Jody Eimers)

c. Announcements by Staff
   - Update on Orange County Climate Council Public Event (Mary Tiger)
   - Long-Range Water Supply Plan Webinar on November 17, 2020 (Ruth Rouse)

d. Additional Comments, Suggestions, and Information Items by Board Members (Chair)

Consent Agenda

Action

1. Minutes of the October 8, 2020 Virtual Work Session of the Board of Directors (Andrea Orbich)
2. Minutes of the October 22, 2020 Virtual Meeting of the Board of Directors (Andrea Orbich)
3. Minutes of the October 22, 2020 Closed Session of the Board of Directors (Jody Eimers)

Regular Agenda

Discussion

4. Energy Management Plan Update (Mary Tiger)

5. Long-Range Water Supply Plan: Drought Response Operating Protocol (Ruth Rouse)
6. Consideration of an Amendment to the Water and Sewer Management, Planning and Boundary Agreement Boundary (Ruth Rouse)
7. Determine Process for Selecting Audit Firm for Fiscal Year 2021 (Stephen Winters)
8. Review Board Work Schedule
    a. Request(s) by Board Committees, Board Members and Staff (Ray DuBose)
    b. December 10, 2020 Work Session (Todd Taylor)
    c. January 14, 2021 Work Session (Todd Taylor)
    d. 12 Month Board Meeting Schedule (Todd Taylor)
    e. Pending Key Staff Action Items (Todd Taylor)

Action

9. Resolution Honoring the Service of Ruchir Vora to the Carrboro-Chapel Hill-Orange County Community as a Member of the Orange Water and Sewer Authority Board of Directors (Ray DuBose)

Summary of Work Session Items

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

Closed Session

11. The Board of Directors will Meet in Closed Session for the Purpose of Discussing a Personnel Matter, as provided in N.C. General Statutes 143.318.11(6) (Jody Eimers)

Orange Water and Sewer Authority

Virtual Meeting of the Board of Directors

October 8, 2020

The Board of Directors of the Orange Water and Sewer Authority (OWASA) held its duly noticed regular work session by virtual means in accordance with law, on Thursday, October 8, 2020, at 6:00 p.m. utilizing Microsoft Teams software.

Board Members present: Raymond (Ray) DuBose (Chair), Bruce Boehm (Vice Chair), Jody Eimers (Secretary), Yinka Ayankoya, Robert Morgan, John N. Morris, Bruce Runberg and Ruchir Vora.

OWASA staff present: Mary Darr, Monica Dodson, Jesse DuClau, Robert Epting, Esq. (Epting and Hackney), Stephanie Glasgow, Blake Hodge, Robin Jacobs (Epting and Hackney) Andrea Orbich, Nicholas Rogers, Ruth Rouse, Todd Taylor, Stephen Winters and Richard Wyatt.

Others present: Peg Carlson (Director, Center for Public Leadership and Governance at UNC School of Government), Meg Holton (UNC Water Resources Manager) and Ed Kerwin.

Motions

1. Bruce Runberg made a motion to approve the Minutes of the September 10, 2020, Virtual Work Session of the Board of Directors; second by Robert Morgan and the motion was unanimously approved.

2. Bruce Boehm made a motion to approve the personal leave bonuses as follows in lieu of traditional cost of labor and merit-based compensation adjustments for the Fiscal Year 2021 Budget Year and the additional personal leave days are eligible to be used during calendar year 2021:

- Employees that earn an 'Exceptional' rating on their annual performance evaluation will receive five additional personal leave days on January 1, 2021.
- Employees that earn an 'Exceeds Expectations' rating on their annual performance evaluation will receive four additional personal leave days on January 1, 2021.
- Employees that earn an 'Meets Expectations' rating on their annual performance evaluation will receive three additional personal leave days on January 1, 2021.
- Employees that earn a "Below Expectations" rating on their annual performance evaluation in October 2020 are not eligible to receive additional personal leave."

Second by Ruchir Vora and the motion was unanimously approved.

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Announcements

Ray DuBose announced that due to COVID-19 public health concerns, the OWASA Board of Directors held the work session virtually utilizing Microsoft Teams software. Mr. DuBose stated that Board Members, General Counsel, and staff participated in the meeting remotely.

Mr. DuBose asked if any Board Member knew of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight to disclose the same at this time; none were disclosed.

Mr. DuBose said the Chapel Hill Town Council delayed the OWASA Board Member appointments planned for October 7, 2020. The appointments are now tentatively scheduled for a November Council meeting.

Item One: Quarterly Report on Attendance at Board and Committee Meetings

The Board received this as an information item.

Item Two: Minutes

Bruce Runberg made a motion to approve the Minutes of the September 10, 2020, Virtual Work Session of the Board of Directors; second by Robert Morgan and the motion was unanimously approved. Please see Motion 1.

Item Three: One-time Additional Employee Personal Leave Merit Bonuses

Todd Taylor, Executive Director, proposed the Board approve providing additional personal leave day bonuses to employees in lieu of traditional compensation adjustments. He noted that due to budget impacts from COVID-19, OWASA's Fiscal Year 2021 Budget does not include compensation adjustments for employees. He proposed the Board approve additional personal leave days to acknowledge the stellar performance of OWASA's essential employees during the extraordinary circumstances of the COVID-19 pandemic.

Bruce Boehm made a motion to approve the personal leave bonuses as follows in lieu of traditional cost of labor and merit-based compensation adjustments for the Fiscal Year 2021 Budget Year and the additional personal leave days are eligible to be used during calendar year 2021:

- Employees that earn an 'Exceptional' rating on their annual performance evaluation will receive five additional personal leave days on January 1, 2021.

- Employees that earn an 'Exceeds Expectations' rating on their annual performance evaluation will receive four additional personal leave days on January 1, 2021.

- Employees that earn an 'Meets Expectations' rating on their annual performance evaluation will receive three additional personal leave days on January 1, 2021.

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- Employees that earn a "Below Expectations" rating on their annual performance evaluation in October 2020 are not eligible to receive additional personal leave."

Second by Ruchir Vora and the motion was unanimously approved. Please see Motion 2.

Item Four: Annual Review and Update of Strategic Trends and Utility Planning Issues for Fiscal Year 2020

Ruth Rouse, Planning and Development Manager, provided an update on strategic trends and utility planning issues for fiscal year 2020. Staff reported that based on current demands and projections, we have sufficient raw water supply for the next few decades under most conditions; there is no anticipated need to expand capacity of our treatment plants for several decades; and continued investment in renewal and replacement of infrastructure is needed to ensure reliable and high-quality service. Staff will stay abreast of research and advances in technology.

The Board expressed appreciation to staff for a report well done and suggested the following additions for consideration into the next report: provide information in reclaimed water technology section regarding direct potable reuse; contact national (USGS/NOAA/NASA) agencies regarding a study on remote sensing to evaluate algal blooms in reservoirs; and information about the impact of climate change on wastewater treatment plant capacity and integrity of the site.

Staff will develop a summary of strategic and key initiatives as part of the update of OWASA's new strategic plan and set up an information session for interested Board Members to learn about OWASA's participation in America's Water Infrastructure Act.

Item Five: Review Board Work Schedule

There were no items of note.

Item Six: Summary of Work Session Items

Todd Taylor noted the following items for staff follow-up:

- Develop summary of strategic and key initiatives as part of the update of OWASA's new strategic plan.
- Consider in 2021 Strategic Trends Report: including information in RCW technology section on direct potable reuse; summarizing USGS/NOAA/NASA study on remote sensing to evaluate algal blooms; and including information about impact of climate change on WWTP capacity and integrity.
- Set up information session for interested Board Members to learn about OWASA's participation in America's Water Infrastructure Act and General Counsel will provide an opinion on this topic.

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Item Seven: Discuss the Results of the 2020 Board Self-Assessment

The Board reviewed and discussed the results of 2020 Board Self-Assessment which was facilitated by Peg Carlson, Director, Center for Public Leadership and Governance at UNC School of Government.

The Board identified the following next steps which will be discussed at the October 22, 2020 Board meeting:

- Clarify how issues/topics are assigned to various Board committees.
- Evaluate/revisit the purpose and process for Board Work Sessions and committee structures.
- Board Members should speak up if they did not hear an action item recorded.
- Ask Community Engagement Committee to define the nature and types of public comments that require responses from the Board.
- Determine if the Board wants to solicit staff and general counsel input on how the Board is functioning.
- Create methods for addressing and tracking Board-only issues; i.e., those not assigned to staff.

Without objection, the Board meeting was adjourned at 9:10 p.m.

Respectfully submitted by:

Andrea Orbich
Executive Assistant/Clerk to the Board

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ITEM 2

Orange Water and Sewer Authority

Virtual Meeting of the Board of Directors

October 22, 2020

The Board of Directors of the Orange Water and Sewer Authority (OWASA) held its duly noticed regular meeting by virtual means in accordance with law, on Thursday, October 22, 2020, at 6:00 p.m. utilizing Microsoft Teams software.

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

OWASA staff present: Mary Darr, Monica Dodson, Vishnu Gangadharan, Robert Epting, Esq. (Epting and Hackney), Stephanie Glasgow, Robin Jacobs, Esq. (Epting and Hackney), Ken Loflin, Andrea Orbich, Nick Rogers, Kelly Satterfield, Todd Taylor, Stephen Winters and Richard Wyatt.

Others present: Meg Holton (UNC Water Resources Manager) and Ben Poulson (UNC Associate Director of Energy Services).

Motions

1. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Honoring the Service of Michael Wolfgang to the Orange Water and Sewer Authority and Carrboro-Chapel Hill-Orange County Community. (Motion by Ruchir Vora, second by Jody Eimers and the motion was unanimously approved.)

2. Ruchir Vora made a motion to approve the Minutes of the September 24, 2020 Virtual Annual Meeting of the Board of Directors, second by Jody Eimers and the motion was unanimously approved.

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Announcements

Ray DuBose announced that due to COVID-19 public health concerns, the OWASA Board of Directors held this meeting virtually utilizing Microsoft Teams software. Mr. DuBose stated that Board Members, General Counsel, and staff participated in the meeting remotely.

Mr. DuBose asked if any Board Member knows of a conflict of interest or potential conflict of interest with respect to any item on the agenda tonight to disclose the same at this time; none were disclosed.

Mr. DuBose announced that Mary Tiger and he attended the October 15, 2020, virtual Orange County Climate Council meeting. He said the Climate Council discussed plans for the virtual public-facing community update event, scheduled for tonight at 7:00 p.m. The purpose of the

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event is to provide an update on the Climate Council's work over the past year; Ms. Tiger will attend the event on behalf of OWASA. The next meeting will be held virtually on November 19, 2020.

Todd Taylor, Executive Director, announced that Mary Darr, OWASA's Director of Engineering and Planning, has been promoted to the General Manager of Operations position effective November 1, 2020.

Petitions and Requests

Ray DuBose said no petitions or requests were received from the public.

Mr. DuBose asked for petitions and requests from the Board and staff; none were received.

Item One: 12 Month Board Meeting Schedule

The Board received this as an information item.

Item Two: Resolution Honoring the Service of Michael Wolfgang to the Orange Water and Sewer Authority and the Carrboro-Chapel Hill Community

Ruchir Vora made a motion to approve the resolution, second by Jody Eimers and the motion was unanimously approved. Please see Motion 1.

Item Three: Minutes

Ruchir Vora made a motion to approve the Minutes of the September 24, 2020 Virtual Annual Meeting of the Board of Directors, second by Jody Eimers and the motion was unanimously approved. Please see Motion 2.

Item Four: Update on OWASA's COVID-19 Information and Discussion by the Board

Todd Taylor, Executive Director, provided an update on OWASA's response to COVID-19, including its phased plan for returning to normal operations. He said staff continues to take proactive measures to ensure we are providing the community with high-quality and reliable water, wastewater, and reclaimed water services during the COVID-19 pandemic.

Stephen Winters, Director of Finance and Customer Service, said a temporary moratorium on service disconnection for non-payment remains in-place. He provided an update on the extent and severity of past due accounts, including staff's work to contact those customers who are in arrears to provide information on where customers may apply for financial assistance. Mr. Winters noted a new program, NC HOPE, from the State of North Carolina which has funded the program with $117 million to help pay rent and utilities. He reported that staff provided a letter to support the Town of Carrboro's application for Community Development Block Grant funding to be used to provide financial assistance for rent, utilities, and other housing-related costs.

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Item Five: Financial Report for the Three-Month Period Ended September 30, 2020

Stephen Winters, Director of Finance and Customer Service, provided a presentation on the financial report for the three-month period ended September 30, 2020. He said all but one of OWASA's financial performance targets were met, and staff is trying to limit operating expenses while continuing to assess the lingering financial impact of COVID-19 on the community. Water and sewer revenue were about $241,000 greater than budget, and operating expenses were about $448,000 less than budget.

Item Six: Reliability and Resiliency Improvements Update

Mary Darr, Director of Engineering and Planning, detailed OWASA's ongoing efforts to improve the reliability and resiliency of the services provided to customers. Ms. Darr said most all activities identified in the earlier summary report have been completed, programmed into future capital improvement projects, or integrated into staff's day-to-day work practices.

Bruce Boehm suggested the next update include a comparison of best-in-case reliability and resiliency improvement practices to include a summary of those practices OWASA is currently not pursuing and why.

Ruchir Vora suggested the next update include reliability and resiliency activities for our raw water facilities.

The Board expressed appreciation to staff on a well-done report and agreed to continue receiving annual progress updates on the recommendations made in this report.

Item Seven: Update on the 2020 Board Self-Assessment

The Board agreed the Board Chair and Executive Director will consider scheduling agenda items which require significant discussion to Work Sessions rather than the Regular Board meetings. Agenda items requiring particular focus or extended review might be scheduled for separate, special meetings as necessary to provide sufficient time for discussion.

The Board agreed to be vigilant in reminding the Executive Director if items are omitted in his summary of action items at the conclusion of Board meetings.

The Board agreed that requests and inquiries received from the public require prompt and responses by OWASA staff and may occasionally require response from the Board. Yinka Ayankoya and Ray DuBose will draft a statement on what types of comments require responses either from appropriate staff, or from the Board as a whole. Generally, Board Members should refer public inquiries to the Executive Director, or to the Board Chair, and should not attempt to speak for the Board except where authorized by the Board. Care should be taken to thank the public for their inquiries, concerns, and complaints, especially when made at Board meetings.

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The Board agreed Bruce Boehm will take the lead to develop a draft 360° Board assessment questionnaire to solicit staff and General Counsel's input on how the Board is functioning and once the questionnaire is developed, it will be circulated to Board before distribution to staff and General Counsel.

The Board agreed it will continue to schedule Board self-assessments and diversity and inclusion training on the 12 Month Board Schedule. The Board self-assessments may not need to be conducted each year, but if scheduled, the self-assessment will be scheduled before the end of the fiscal year and as a special meeting.

The Board agreed the importance of minding the distinction between governance and policy issues, for which it has primary responsibility, and management and operational issues for which the Executive Director and OWASA staff are responsible. The Board's interest and continuing oversight of the overall operations and management of OWASA is to be recognized, and encouraged, and the Executive Director and staff's responsibilities are to be observed, discussed, and maintained. Board Members acknowledged the importance of this distinction as an ongoing topic of interest.

Item Eight: Summary of Board Meeting Action Items

Todd Taylor noted the following staff action items and provided an overview of the next two Board meetings;

- Continue the Reliability and Resiliency Improvements Update in 2021 and a comparison of best-in-class reliability and resiliency improvement practices (highlight what practices are not currently being pursued and why) as well as raw water intake facilities;
- Look for opportunities to use special Board meetings when appropriate and strategically schedule more discussion items in work sessions;
- Assist Bruce Boehm to prepare a 360° Board Assessment for feedback from leadership staff and legal counsel;
- Add reoccurring item for Board self-assessment and schedule as a special meeting;
- Agenda items for November 12, 2020 virtual Work Session:
    - Annual Update of Energy Management Plan
    - Long-Range Water Supply Plan – Drought Response Operating Protocol
    - Determine process for selecting audit firm for Fiscal Year 2021
    - (tentative) Response to Petition to modify the Water and Sewer Management, Planning and Boundary Agreement
- Agenda items for the December 10, 2020 virtual Annual Meeting:
    - Discuss Draft Plan for Developing Strategic Plan
    - (tentative) Long-Range Water Supply Plan – Drought Response Operating Protocol
    - (tentative) Sewer Use Ordinance and Service Lateral Policy Updates to align with House Bill 873

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Item Nine Closed Session

Without objection, the Board convened in a Closed Session for the Purpose of discussing a personnel matter as provided in NC General Statutes 143.318.11(6).

Following the Closed Session, the Board reconvened in open session, reported that no action was taken in the closed session, and the meeting was adjourned at 8:55 p.m.

Respectfully submitted by:

Andrea Orbich
Executive Assistant/Clerk to the Board

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ITEM 3

Orange Water and Sewer Authority

Closed Session of the Board of Directors

October 22, 2020

The Board of Directors of Orange Water and Sewer Authority met virtually in Closed Session on Thursday, October 22, 2020, following the Board meeting.

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

Staff present: None

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Item One

The Board of Directors met in Closed Session without staff to evaluate the first four months performance of OWASA's new Executive Director.

No official action was taken at the meeting.

The meeting was adjourned at 8:55 p.m.

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Jo Leslie Eimers, Chair
Human Resources Committee

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Agenda Item 4:

Energy Management Plan Update

Purpose

To obtain the Board's feedback and guidance on and approval of the proposed Energy Management Plan Update

Background

OWASA's Energy Management Program is a comprehensive and inclusive approach to reducing electricity and natural gas use across the organization. Over the past decade, we have made tremendous progress, not just in reducing our energy use and greenhouse gas emissions, but in imbedding energy in our decision-making on capital improvements, operations, and maintenance activities.

The table below outlines our progress against energy management objectives set by the OWASA Board of Directors in 2015.

	Objective	***Progress***	***Annual Avoided Costs (FY20)***
1:	Reduce use of purchased electricity by 35% by the end of Calendar Year 2022 compared to the Calendar Year 2010 baseline	*Purchased energy use reduced by 29.4%*	*About $525,000*
2:	Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.	*ACHIEVED: Purchased natural gas reduced by 28%*	*About $40,000*
3:	Beneficially use all WWTP biogas ~~by 2022~~[1], provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.	*ON HOLD*	*NA*
4:	Formally engage local governments and partners in discussion about potential development of a biogas-to-energy project at the Mason Farm WWTP.	*COMPLETED*	*NA*
5:	Seek proposals for third-party development of renewable energy projects on OWASA property.	*3 of 5 planned solar lease projects will off-set over 425,000 kWh of purchased electricity, reducing FY20 purchased electricity by 2.7%*	*Year 1 (and all subsequent years): the lease payment will be less than the energy savings*

[1] In 2018, the OWASA Board of Directors determined that there was no apparent and cost-effective strategy to achieve this goal by 2022. As a result, the OWASA Board abandoned the 2022 deadline, but maintained the commitment long-term.

This progress is the result of OWASA's three-tiered energy management strategy:

1) Conservation and optimization efforts
2) Investment in cost-effective energy efficiency projects
3) Energy-minded decision-making

This year, with the installation of three photovoltaic (PV) solar arrays, OWASA will add a fourth tier to our strategy: renewable energy.

With our natural gas use reduction goal achieved/surpassed and electricity goal within reach, the following Plan celebrates our progress and outlines a series of strategies that have potential to further reduce our use of purchased electricity and achieve our goal by the end of 2022. It also introduces considerations for OWASA's energy management potential beyond 2022.

Action Needed

Staff requests questions, feedback, and approval on the Energy Management Plan Update from the Board of Directors. If the Board needs additional information and/or requests changes to the report, approval can occur at a later date.

It is important to note that funding for the strategies included in this plan will be proposed alongside other organizational priorities in future budget considerations. The Energy Management Plan Update is intended to provide a progress update and a plan for what is needed to meet strategic goals established by the Board. Staff requests approval of the Plan to include projects in the upcoming budgets for the Board's consideration. Although the Energy Management Plan is designed to be cost neutral (at minimum) in the long-term, short term needs may need to be prioritized above long-term strategies. In approving the Plan, the Board is asked to approve the overall approach and the potential ahead, if funded.

Consistent with past practice, we do not believe a formal resolution is needed for this matter. We do recommend, however, that if and when the Board supports moving forward with the proposed plan, it considers acting on this matter via approval of a motion, perhaps along the lines of the following:

> *"Motion that the Board of Directors approves the proposed 2020 Energy Management Plan Update and authorizes staff to proceed in accordance with the approach described in the proposed plan."*

Attachment

- Draft Energy Management Plan Update



2020 Energy Management Plan Update

ORANGE WATER AND SEWER AUTHORITY

OWASA is Carrboro-Chapel Hill's not-for-profit public service agency delivering high quality water, reclaimed water, and wastewater services.

Executive Summary

OWASA's Energy Management Program is a comprehensive and inclusive approach to reducing electricity and natural gas use across the organization. Over the past decade, we have made tremendous progress, not just in reducing our energy use and greenhouse gas emissions, but in imbedding energy in our decision-making on capital improvements, operations, and maintenance activities.

The table below outlines our progress against energy management objectives set by the OWASA Board of Directors in 2015.

	Objective	***Progress***	***Annual Avoided Costs (FY20)***	***GHG Reduction***
1:	Reduce use of purchased electricity by 35% by the end of Calendar Year 2022 compared to the Calendar Year 2010 baseline	*Purchased electricity use reduced by 29.4%*	*About $525,000*	*GHG from purchased electricity reduced by 49%*
2:	Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.	*ACHIEVED: Purchased natural gas reduced by 28%*	*About $40,000*	*GHG from purchased natural gas reduced by 39% since 2010*
3:	Beneficially use all WWTP biogas ~~by 2022~~[1], provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.	*ON HOLD*	*NA*	*NA*
4:	Formally engage local governments and partners in discussion about potential development of a biogas-to-energy project at the Mason Farm WWTP.	*COMPLETED*	*NA*	*NA*
5:	Seek proposals for third-party development of renewable energy projects on OWASA property.	*3 of 5 planned solar lease projects will off-set over 425,000 kWh of purchased electricity, reducing FY20 purchased electricity by 2.7%*	*Year 1 (and all subsequent years): the lease payment will be less than the energy savings*	*Will reduce OWASA's current annual emissions by 3% (142 metric tons/year)*

Our progress is the result of OWASA's three-tiered energy management strategy:

1) Conservation and optimization efforts
2) Investment in cost-effective energy efficiency projects
3) Energy-minded decision-making

[1] In 2018, the OWASA Board of Directors determined that there was no apparent and cost-effective strategy to achieve this goal by 2022. As a result, the OWASA Board abandoned the 2022 deadline, but maintained the commitment long-term.

This year, with the installation of three photovoltaic (PV) solar arrays, OWASA will add a fourth tier to our strategy: renewable energy.

With our natural gas use reduction goal achieved/surpassed and electricity goal within reach, the following Plan celebrates our progress and outlines a series of strategies that have potential to further reduce our use of purchased electricity and achieve our goal by the end of 2022. It also introduces considerations for OWASA's energy management potential beyond 2022.

Background

OWASA uses a significant amount of energy to operate our water, wastewater and reclaimed water facilities, protect the environment, and provide service to about 83,300 residents through about 21,800 customer accounts in the Carrboro-Chapel Hill community. From July 2019 through June 2020[2], our facilities used about 60 billion BTUs of energy – enough to power about 910 average American homes for a year. That energy came at a cost of about $1.1 million, comprising about 5% of our annual operating expenses in Fiscal Year 2020.

By reducing our use of energy and increasing our use of renewable energy sources, we reduce the environmental impact of our operations, lower operating costs, and improve reliability and resiliency of the services we provide.

In 2014, the OWASA Board of Directors identified the "Implementation of an Energy Management Program" to be a top strategic priority for the organization. Since that time, with the assistance of OWASA staff, the OWASA Board of Directors has reviewed an assessment of OWASA's energy use, established Calendar Year (CY) 2010 as the baseline year, identified concrete goals and objectives against that baseline, worked with staff to define an energy management program, regularly tracked energy data against the baseline, and developed and approved annual plans in pursuit of the following goals:

Objective 1: Reduce use of purchased electricity by 35% by the end of Calendar Year 2022 compared to the Calendar Year 2010 baseline.

Objective 2: Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Objective 3: Beneficially use all WWTP biogas ~~by 2022~~[3], provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.

Objective 4: Formally engage local governments and partners in discussion about potential development of a biogas-to-energy project at the Mason Farm WWTP.

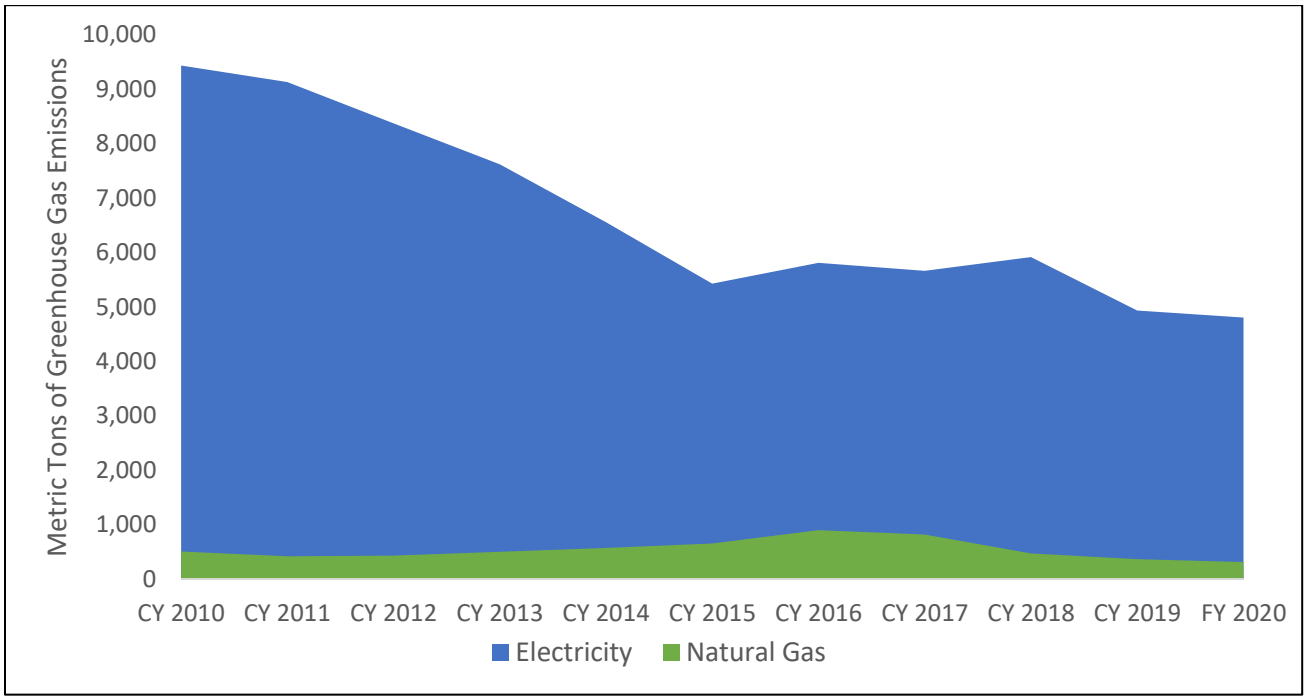
Objective 5: Seek proposals for third-party development of renewable energy projects on OWASA property.

[2] Please note that, due to the timing of this report's delivery to the OWASA Board of Directors this year, we will be comparing the Fiscal Year of 2020 (from July 2019 through June 2020) to previous calendar years. We are making this change in order to provide an update on a more recent "annual" energy use. However, for purposes of continuity, we will continue to report against calendar year energy use.

[3] In 2018, the OWASA Board of Directors determined that there was no apparent and cost-effective strategy to achieve this goal by 2022. As a result, the OWASA Board abandoned the 2022 deadline, but maintained the commitment long-term.

In the pursuit of these objectives, OWASA is committed to reducing our direct emissions of greenhouse gases. **Since 2010, we have reduced our greenhouse gas emissions associated with our use of purchased natural gas and electricity by 52%,** from 10,663 to 5,113 metric tons per year. A portion of this reduction is due to a decline in the carbon intensity of Duke Energy's generation portfolio. The remaining reduction is due to OWASA's improved energy efficiency and conservation. Figure 1 shows the annual greenhouse gas emissions attributed to OWASA's electricity and natural gas over the past ten years.

Figure 1: Greenhouse Gas Emissions from OWASA's Electricity and Natural Gas Use



OWASA's Energy Management Program is designed to systematically identify and evaluate energy management opportunities and to pursue those deemed to be cost-effective for the organization. (Cost-effective has been defined as having a positive net present value within the rated life of the asset). It is also structured to more directly integrate energy management and clean energy strategies into our everyday decision-making.

The OWASA Board of Directors requested that Staff incorporate the social cost of carbon (SCC) in the business case evaluations of clean energy projects and to base the economic value of carbon emission reductions on the Federal Interagency Social Cost of Carbon Working Group's central value for the SCC. This provides a method for quantifying the societal costs of climate change, including (but not limited to) changes in net agricultural productivity, human health, and property damages from increased flood risk. Using the methodology, we have avoided over $1.3 million of costs to society as a result of OWASA's energy management efforts and Duke Energy Carolina's transition away from carbon intensive energy sources when compared to the baseline year of 2010.

OWASA's Energy Management Program involves staff from across the organization, including a committed group of individuals serving on the organization's Energy Team, as well as numerous partners and stakeholders. Our program employs a comprehensive, systematic methodology for

identifying, evaluating, and prioritizing clean energy strategies that will increase the sustainability of our organization and community for years to come. (Appendix A summarizes the criteria that the OWASA Energy Team uses to prioritize clean energy strategies.) Our Energy Management Plan is a result of the collective contributions of all those involved in our Program.

This document serves as an update to OWASA's 2019 Energy Management Plan (EMP), as well as an update provided to the OWASA Board regarding our solar lease project in September 2019. It documents our progress towards our energy management goals and objectives and presents an updated suite recommendations and proposed strategies for further improving our use of energy and reducing our carbon footprint.

The remainder of this document summarizes our progress against our energy goals to-date. It celebrates our successes and identifies a path forward to meet, and eventually surpass, the goals set by the Board of Directors five years ago.

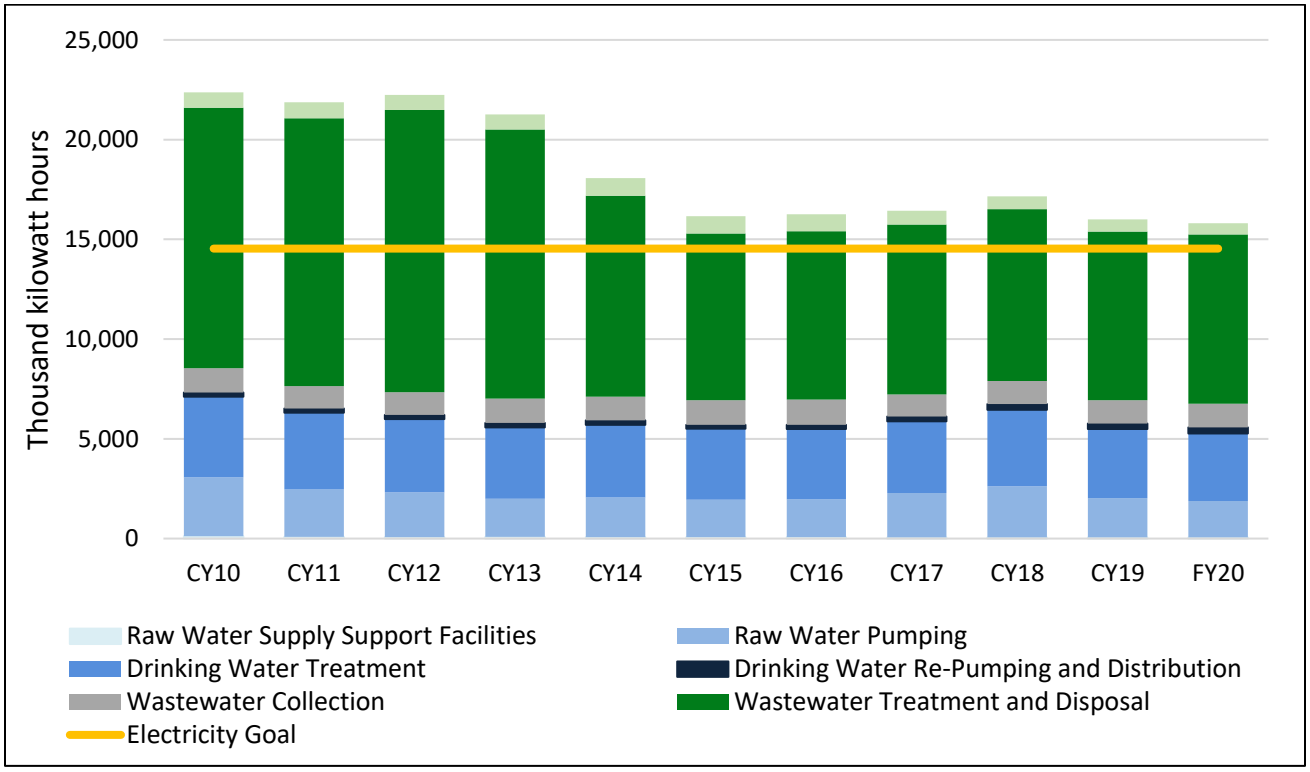
Update and Progress Towards Electricity Use Goals

Reduce use of purchased electricity by 35% by the end of Calendar Year 2022 compared to the Calendar Year 2010 baseline (Objective 1). In support of Objective 1, seek proposals for third-party development of renewable energy projects on OWASA property (Objective 5).

Trends in Electrical Energy Use and Costs

Figure 2 shows eleven years of historical electrical energy use (serviced by Duke Energy Carolinas and Piedmont Electric Membership Corporation) across all OWASA facilities by major functional area. The trend demonstrates a significant and sustained reduction in energy use throughout this time, realized from investments in more energy efficient equipment and processes, as well as water conservation. **In Fiscal Year 2020 (FY20), OWASA collectively used 29.4% less electrical energy than in Calendar Year 2010.**

Figure 2: Electrical Energy Use and Intensity by Major Functional Area



Our commitment to reducing and managing one of the largest line items in our operating budget has resulted in significant financial savings for OWASA rate payers. In 2010, OWASA was billed $1.26 million for electricity at an average of $0.0575 per kWh. In FY 2020, we were billed $1.04 million at an average of $0.0658 per kWh. In absolute dollars, we spent about $225,000 less on electricity in FY 2020 than in 2010. However, if we had used the same amount of electrical energy in 2020, as we did in 2010, charged at 2020 levels, we would have paid about $436,000 more. This is a more accurate way of calculating our energy cost savings.

Additionally, as a large commercial/industrial customer, our energy management program includes a detailed and regular analysis of our energy rate contracts. Our avoided costs are lower than what they would have been without these efforts. In other words, we have made

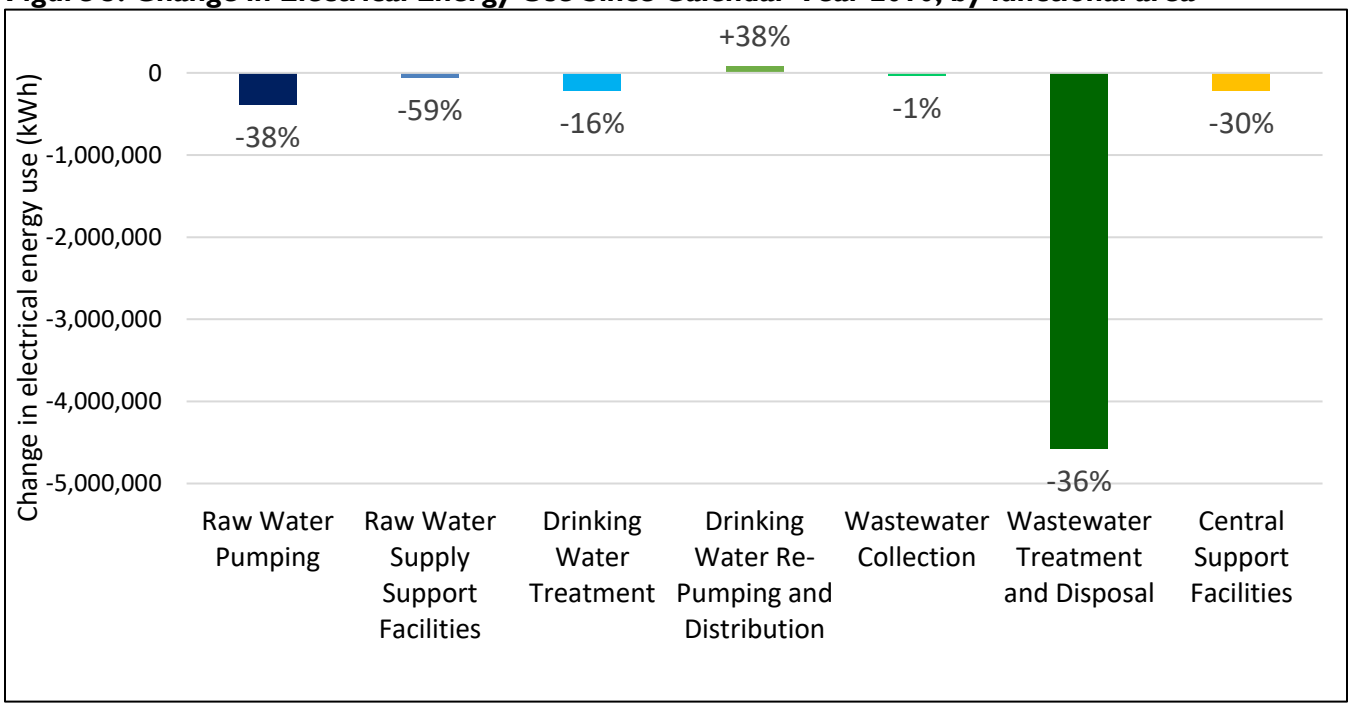
changes to our rate structure in partnership with Duke Energy over the last ten years that have brought down our costs per kWh. For example, we adjusted the minimum contract demand for three facilities, which we estimate avoided an additional $13,000 each year in energy costs. Additionally, after a cost-benefit analysis, we opted out of participation (i.e. contribution) in Duke Energy's energy efficiency rider at the Wastewater Treatment Plant, the Cane Creek Reservoir complex, and the Jones Ferry Road campus. These changes effectively reduce our per kWh rate. We estimate this saved OWASA approximately $75,000 last year. Moreover, we intentionally shift demand to off-peak periods when we can to reduce our demand charges.

In sum, through our strategic energy management efforts (energy use reduction; rate modifications; opting out of energy efficiency rider), we avoided about $525,000 in annual energy expenses in FY20.

Summary of Implemented Electricity Management Strategies

Figure 3 shows the change in electrical energy use since 2010, by functional area. The size of the bar represents the change in electrical energy use in kilowatt hours (kWh), while the text within the figure shows the percent change for that functional area.

Figure 3: Change in Electrical Energy Use Since Calendar Year 2010, by functional area



The reductions in our electricity use are attributable to the following projects and practices:

Increase in Aeration Efficiency at Wastewater Treatment Plant (WWTP): The most significant reduction in electrical energy use over the past ten years has been in wastewater treatment and disposal, primarily due to a $8.4 million investment in energy efficient blowers, mixers, and fine bubble diffused aeration system (funded with a 20-year, no interest loan from the NC State Revolving Fund). This capital project has resulted in a reduction of about 4 million kWh/year and represents about an 18% reduction against our 2010 baseline.

Raw Water Pumping Efficiency Upgrade: We've also seen a significant decrease in the amount of energy used for raw water pumping. This is due in part to the installation of a new, low-flow pump and variable frequency drive (VFD) at the University Lake Pump Station which has enabled us to better optimize system-wide raw water pumping across a wide range of demand conditions. The University Lake Pump Station Improvement project cost about $300,000, most of which was funded with an American Reinvestment and Recovery Act grant. We estimate that this project is responsible for a reduction of about 500,000 kWh per year, representing a 2% reduction against our 2010 baseline.

In addition, in recent years, we restored use of the larger water main between University Lake and the Jones Ferry Water Treatment Plant and upgraded the raw water pumps at University Lake. Within the last fiscal year, we have begun to see the impact of this project, further reducing the energy use intensity of our raw water pumping.

Water Conservation and Use of Reclaimed Water: Our customers' water use stewardship has helped to reduce our use of energy across the board, from pumping raw water, treating and delivering drinking water, collecting and pumping wastewater, and treating and disposing of wastewater. In Fiscal Year 2020, we treated about 13% less drinking water than in 2010, despite a 9% increase of customer accounts.

About half of this demand reduction can be attributed to a concurrent increase in reclaimed water demands. Since 2010, we increased our annual production and delivery of reclaimed water from about 195 million to 247 million gallons, which we estimate uses about three-quarters of the energy required to pump and treat raw water from our reservoirs.

Additionally, in 2018-2019, OWASA upgraded all our meters used for billing customers with Advance Metering Infrastructure. This technology allows for early notification of potential leaks. Over the last year, our Agua Vista Web Portal has detected over 17,000 potential leaks.

Moreover, the work of our Distribution and Collections and Engineering Teams to repair and replace leaking and broken water lines help to maintain a minimal amount of water loss in the system. In addition to ensuring reliable water service, this is an important energy management effort.

Given current energy use intensity estimates for finished drinking water, wastewater treatment, and reclaimed water treatment and delivery, we estimate that the reduction in drinking water demand corresponds to an estimated annual energy savings of about 357,000 million kWh per year (about 1.6% of the 2010 baseline).

LED Lighting: We have replaced approximately 80% of our lighting with LED efficient lighting technology. We estimate that this has saved another 350,000 kWh of electricity use (1.5% of 2010 baseline).

Heating, Ventilation, and Air Conditioning (HVAC) Unit Upgrades: As our HVAC equipment reaches the end of its 15-year rated life, we are replacing our HVAC equipment with high-efficiency units. We estimate that through these upgrades, most notably the replacement of the HVAC unit in the OWASA Administration Building, we have reduced our use of purchased electricity by about 200,000 kWh/year (1.0% of 2010 baseline).

Energy-Minded Decision Making: We estimate that the remaining electricity reduction is the result of a suite of energy efficiency projects, such as cool roof installations on buildings, replacement of pumps, motors, and motor controls with more efficient equipment and VFDs, and an on-going commitment to optimization of our operations with energy management in mind.

Organizational Energy IQ: There are also a series of strategies implemented in recent years to improve the energy "IQ" of the organization and integrate energy data into day-to-day decision making. It is difficult to quantify the impact of these initiatives but over time their impact can be significant.

Through the energy management program, we have received outside funding to host two in-depth energy workshops in our facilities. In 2018, the NC State University Industrial Assessment Center funded an expert in pump efficiency from the Department of Energy (DOE) to teach a two-day course at OWASA, using our pump stations as class examples.

Additionally, we have deployed a series of online tools to help inform the maintenance and replacement of our infrastructure with energy in mind. Access to energy data can be a powerful tool for energy savings as well as asset management. For example, using energy use data, we noticed that energy use at the Calvander Finished Water Pump Station had almost doubled (from 7,500 kWh/month to 14,500 kWh/month). Triggered by this dramatic increase in energy use, our maintenance team investigated and found that a check valve was malfunctioning, causing the pumps to work much harder than necessary. Fixing the problem in a timely manner prevented energy waste and protected the health of the pumps.

We are using a dynamic pump optimization tool called Specific Energy that provides real-time information (based on actual pump curves) on the most energy efficient pumping scheme to achieve desired flows. We have deployed this technology with our finished water pump station, and we are proposing its use at more pump stations in this 2020 Energy Management Plan. This resource helps to inform real time energy efficient decision-making by our Operations Team.

Upcoming Electrical Energy Management Strategies

(described in detail in Appendices A and B)

To meet our goal of 35% reduction in purchased energy by 2022, we need to reduce our annual electrical energy use by an additional 1.3 million kWh, another 5.6% percentage points of the 2010 baseline. Each year, our EMP identifies a series of energy management strategies to pursue and evaluate. These plans have provided us with a blueprint and budget for reducing our use of purchased electricity.

Over the last year, we have continued to identify and evaluate new and upcoming energy management strategies.

The following section provides a summary of strategies that have been recently completed, are underway, and are proposed to pursue or evaluate. Table 1 below lists each of these strategies, their estimated electrical energy reduction potential (if enough information is available to develop an estimate), a three-year timeline, cost estimates, and assignment of the responsible party for moving forward with each strategy. Appendix B provides a more detailed description of each one.

Projects recently completed (savings pending): We have recently completed a suite of energy management strategies for which it is too early to fully measure their impact on energy use. **We estimate that these projects will ultimately reduce our use of purchased electricity by at least 105,000 to 160,000 kWh per year (0.5 – 0.7% of the 2010 baseline).**

Projects underway (savings pending): For these energy management strategies currently underway for which we can estimate savings, **we estimate that these projects will ultimately reduce our purchased electricity by at least 441,500 to 626,000 kWh per year (2.0- 2.8% of the 2010 baseline).**

Projects currently in CIP: Of the projects in our CIP, seven have the potential to improve the energy efficiency of our operations. For these projects, the reduction in energy savings is a secondary rather than primary objective. From preliminary information that we have on some of these projects, **we estimate that this suite of strategies has the potential to reduce purchased electricity by at least 188,000 to 302,000 kWh per year (0.9-1.4% of the 2010 baseline)**. These reductions will likely occur post-2022. Other projects are too early in the engineering and design phase to estimate energy savings. (Please note that these projects could be delayed from the projected timeline in the FY22-FY26 CIP.)

Strategies to implement and evaluate/implement: Based on a favorable evaluation against the criteria of OWASA's Energy Management Program, the Energy Team recommends the implementation of three additional strategies in the coming years.

In addition, there are five additional strategies that are recommended for further evaluation. These projects have potential but given current uncertainty about their specific costs and benefits, it is currently unclear if these are viable strategies for OWASA. If the evaluation proves favorable, staff may request funding to pursue these strategies in the FY22 budget.

The most significant strategy proposed to implement is the solar photovoltaic system at Cane Creek Reservoir. Due to budget constraints in FY21, we renegotiated our solar lease agreements for the PV systems planned for the Administration Building, the Operations Center, and our Biosolids Site in order to achieve $0 down payment (beyond what would be covered by a rebate from Duke Energy) and annual lease payments that were equal or less than projected energy savings. Unfortunately, we were unable to achieve this with the Cane Creek Reservoir Solar lease agreement. In the fall of 2020, we will submit an application for a $100,000 grant from the Orange County Climate Action Fund to use for a down payment on this project. With this funding, we can achieve a $0 down payment (when combined with Duke Energy's solar rebate) and lease payments that are less than projected energy savings. (In other words, the cost will be less than what we will save on our energy bill in Year 1).

Without the installation of the Cane Creek Reservoir Solar PV system, we estimate that these projects will reduce our use of purchased electricity by at least an additional 17,500 to 486,000 kWh per year (about 0 – 2.4% of the 2010 baseline).

With the pending installation of the Cane Creek Reservoir Solar PV system, we estimate that these projects will reduce our use of purchased electricity by at least an additional 492,500 to 1.06 million kWh per year (about 2.2 – 4.8% of the 2010 baseline). Installing the Cane Creek Reservoir solar PV system with the help of the Orange County Climate Action Grant will assure that we meet and surpass our goal for reduced use of purchased electricity by the end of 2022.

Table 1: Project Plan for Electricity Management Strategies and Estimated Energy Savings and Costs

Energy Management Strategy	Estimated Potential Energy Savings (kWh)	Timeline and Cost (in $1,000s) Light shading: Study Dark shading: Implement			Project Management
		FY 21	FY 22	FY 23	
Recently Completed (Savings Pending)					
University Lake Pump Station Improvements	80,000 – 110,000				Engineering
WWTP Switchgear Building HVAC Replacement	25,000 – 50,000				Engineering
Partnership for Clean Water Self-Assessment and Optimization	NQ				Team Effort
Underway (Savings Pending)					
Optimize WWTP Filter Backwash	20,000 – 100,000				WWTP Ops
Increase Level of Morgan Creek Wet Well	50,000 – 58,000				WWTP Ops
Reduce WWTP Aeration Foam	21,500 - 43,000				Eng./WWTP Ops
Pump Optimization Tool (Finished Water Pump Station)	TBD	6	6	6	Sustainability/WTP Ops
Pump Station Operational Assessments (277-40)	TBD	80			Engineering
Solar Lease Projects on Admin, Ops, and Biosolids Site	350.000 – 425,000	26	26	26	Sustainability
Analysis of Operational Changes with Odor Control System (WWTP)	TBD	TBD	TBD	TBD	Engineering
Online ORP/Nitrate Monitoring	TBD				WWTP Ops
Currently in CIP (Savings Realized Post-2022)					
Reduction of I&I in Wastewater System (276-17 & 18)	TBD				Eng./Ops/ Sustainability
Building Envelope Rehabilitation (278-68)	TBD				Engineering
HVAC: Equipment Replacement (As needed and >15 years old) (272-51)	50,000 – 52,000				Engineering

Energy Management Strategy	Estimated Potential Energy Savings (kWh)	Timeline and Cost (in $1,000s) Light shading: Study Dark shading: Implement			Project Management
		FY 21	FY 22	FY 23	
SCADA Master Plan (272-49)	TBD				Engineering/Ops
Cane Creek Raw Water Transmission Main (271-05)	TBD				Engineering
Cane Creek Pump Station Improvements (270-16)	138,000–250,000				Engineering
Finished Water Pump Replacement (272-42; 272-54)	TBD				Engineering
WWTP Facilities Planning (Master Plan) (278-75)	TBD (See below)				Engineering
Off-Site Biosolids Mixing Project (TBD)	TBD				Engineering
Implement and Evaluate/Implement					
Solar PV Lease at Cane Creek Reservoir	475,000 – 525,000	27	27	27	Sustainability
Reduce operating speeds at NPW pump station, using pump optimization tool	17,500 – 35,000	17	3.5	3.5	Sustainability/ WWTP Ops
Install pump station energy monitoring at University Lake Pump Station	TBD	30	7	7	Sustainability/ WTP Ops./Asset Mgmt
Install pulsed large bubble mixing at Rogerson Drive PS	75,000 – 107,000	20			Sustainability / WWTP Ops
Install pulsed large bubble mixing in on-site biosolids storage tank	160,000 – 250,000	75			Engineering
Reduce operating speeds at NSL PS, using pump optimization tool	35,000 – 70,000	20	*4*	*4*	Sustainability /WWTP Ops
WWTP UV System Energy Assessment	TBD				WWTP Ops and Maintenance
WWTP Non-Potable and Potable Water Conservation	15,000-24,000				Sustainability/ Maintenance

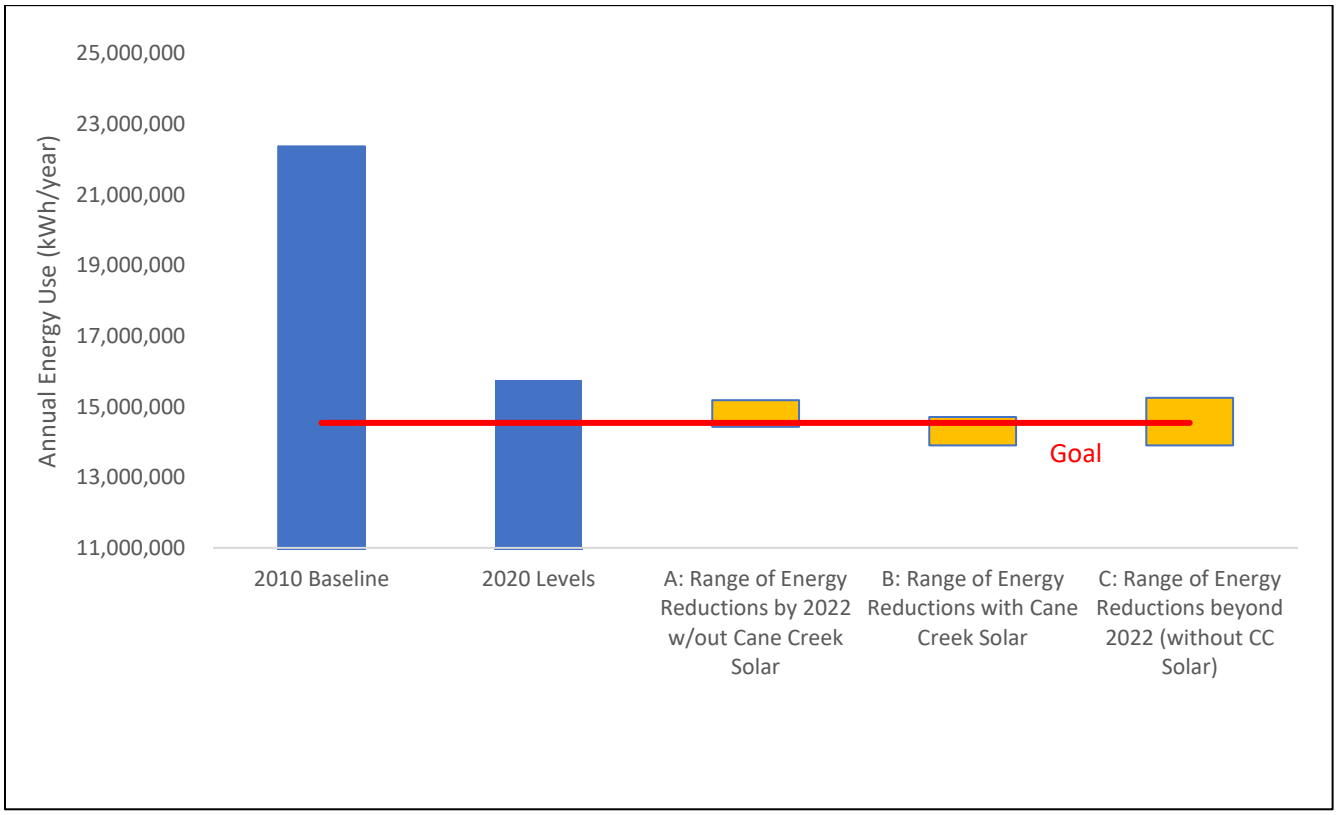
Figure 4 shows the impact of various scenarios for energy management, as described below.

Scenario A assumes that we implement the energy projects currently underway and those proposed to be evaluated and implemented before the end of 2022. The range reflects the range of potential savings. Scenario A assumes that the Cane Creek Reservoir Solar PV project is not installed. Under this scenario, it is highly unlikely that we will achieve our goal to reduce purchased electricity by 35% by 2022.

Scenario B assumes that we implement the energy projects currently underway and those proposed to be evaluated and implemented before the end of 2022 AND that the Cane Creek Solar PV System is installed. In installing the Cane Creek Solar PV project, we are much more likely to achieve our electricity goal by 2022.

Scenario C looks beyond 2022 and incorporates potential energy savings associated with projects currently in the CIP, assuming that the Cane Creek Reservoir Solar PV project is not developed. While promising more energy savings, without the Cane Creek Solar PV system, there is a still a possibility that we will not achieve our 35% reduction goal.

Figure 4: Summary of Progress and Potential Towards Achieving Objectives 1 and 5



Fiscal Year 2022 Proposed Budget: In addition to what is budgeted for projects currently in the CIP, the following is requested in the FY22 budget to pursue evaluation and implementation of the strategies listed above:

- **Operations and Maintenance Budget: $146,700**
  - Online Energy Dashboard: $3,200
  - Pump Station Optimization Start-Up Costs
    - University Lake: $23,000
    - Non-Potable Water: $10,000
    - Nutrified Sludge: $12,000
  - Pump Station Optimization Annual Fees
    - Finished Water Pump Station: $6,000
    - Non-Potable Water: $3,500
    - University Lake: $7,000
    - Nutrified Sludge: $4,000
  - Solar Lease Payments for Administration, Operations Center, and Biosolids Systems: $26,000
  - Solar Lease Payments for Cane Creek Reservoir PV System: $27,000
  - Analysis of pulsed large bubble mixing at Rogerson Drive: $20,000

- **Capital Improvement Plan: $75,000**
  - Preliminary Engineering Report for On-Site Biosolids Storage Tank: $75,000

Although shown as expenses, many of the projects have corresponding energy savings associated with them. If successful, this suite of projects is projected to save OWASA an additional $45,000 to $145,000 in electricity costs per year.

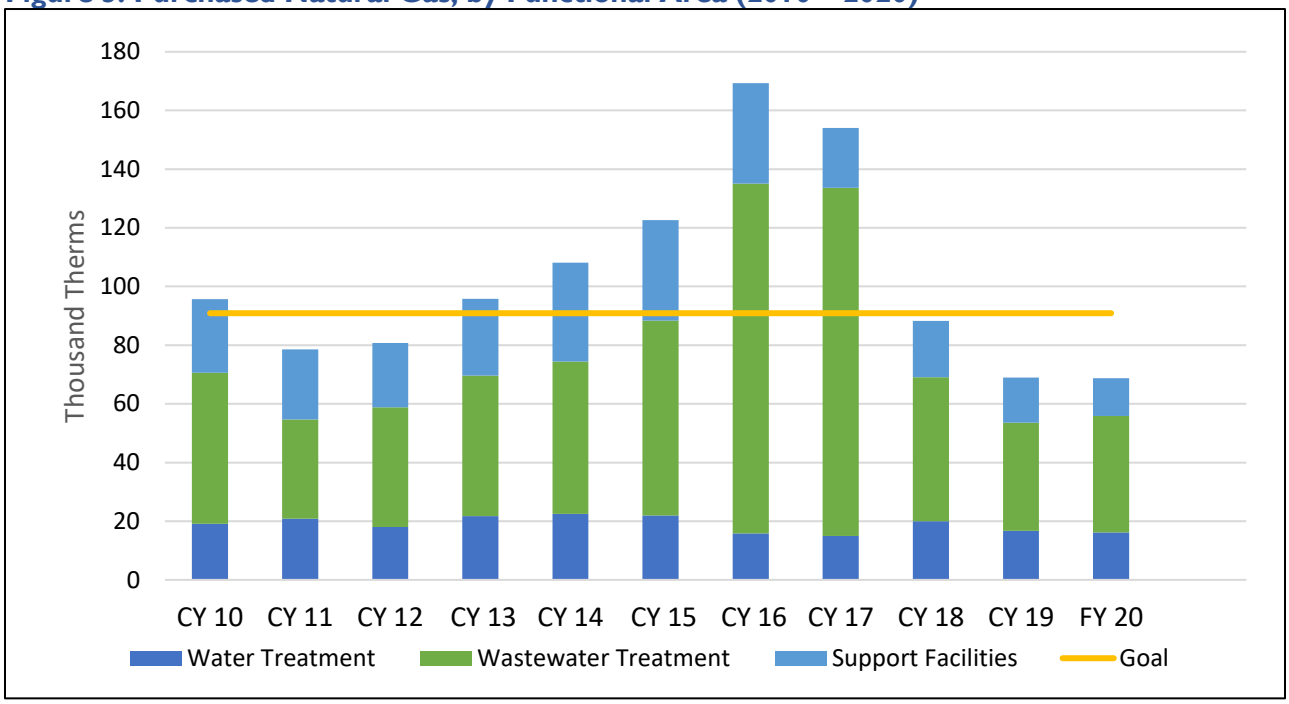
Update on Achievement of Natural Gas Goals

Objective 2: Reduce use of purchased natural gas by 5% by the end of Calendar Year 2020 compared to the Calendar Year 2010 baseline.

Trends in Natural Gas Use and Costs

Figure 5 shows historical natural gas use across the major functional areas, based on monthly billing data for our nine different natural gas accounts over the past nine years and how this use compares to our goal of reducing purchased natural gas by 5% from 2010 levels.

Figure 5: Purchased Natural Gas, by Functional Area (2010 – 2020)



In 2020, we surpassed our 5% goal, using 28% less natural gas than in 2010.

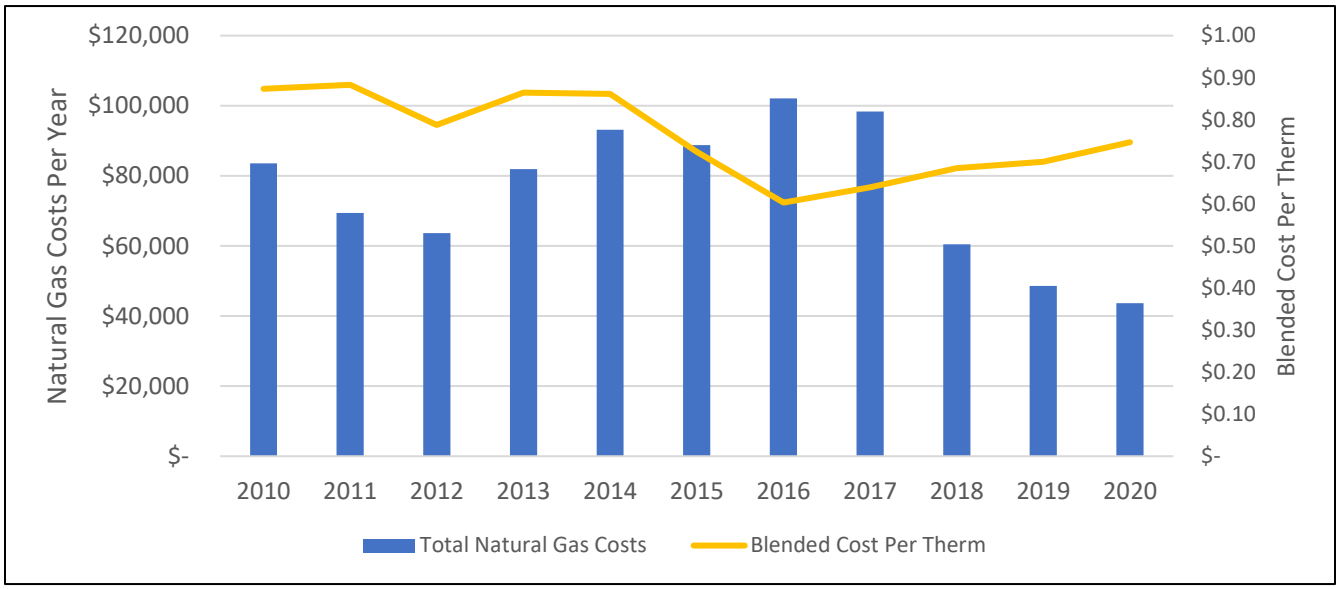
The primary driver for meeting this goal was bringing the biogas-to-boiler system back online at the Mason Farm WWTP, which has historically accounted for the largest amount of natural gas we use. Natural gas is used mostly as a supplemental fuel for running the two boilers that heat anaerobic digestors for solids treatment. Methane – or biogas – is produced as a by-product of the digestion process and under normal operations is used as the primary fuel in our boilers at the plant. However, from 2015 through March 2018, we had to rely almost exclusively on purchased natural gas to heat the boilers while two digesters and our gas storage unit were undergoing major rehabilitation. In restoring the biogas-to-boiler system in March 2018, we reduced our natural gas use at the WWTP by about 70,000 therms per year.

We also use natural gas for space and water heating at our 400 Jones Ferry Road campus. The new HVAC system in the Administration Building significantly reduced our use of natural gas for space heating. This system has resulted in a savings of 7,000 -11,000 therms per year.

In other spaces, adjustments to thermostats, improvements to building insulation, and investment in high efficiency HVAC equipment has further helped to reduce our use of natural gas.

Figure 7 summarizes trends in natural gas costs over the past ten years**. Our natural gas conservation resulted in about $40,000 less in expenditures in FY20 than in CY10.** This conservation will be even more valuable to the organization if and when natural gas prices increase to the levels that they were earlier in the decade.

Figure 7: OWASA's Natural Gas Costs (2010 – 2018)



We are committed to sustaining our reduction in natural gas use and continuing to identify cost-effective opportunities to further decrease our use of natural gas, alongside a reduction in electricity use.

Update on Biogas to Energy Objectives

Objective 3: Beneficially use all WWTP biogas ~~by 2022~~, provided the preferred strategy is projected to have a positive payback within the expected useful life of the required equipment.

Objective 4: Formally engage local governments and partners in discussion about potential development of biogas-to-energy project at the Mason Farm WWTP.

Given financial uncertainties regarding analyzed options to beneficially use all WWTP biogas and the lingering potential for regional collaboration on a more economically feasible project, in 2018, the OWASA Board of Directors agreed to repair the biogas-to-boiler system, support complementary analysis of potential regional partners, and abandon a previously set goal to have a biogas-to-energy project completed by 2022.

OWASA is currently pursuing an update to a Wastewater Treatment Plant Master Plan. Biogas-to-energy, as well as FOG (Fats, Oils and Grease) receiving and co-digestion strategies, will be an important consideration in any update to the Master Plan.

Although, there are no obvious paths forward at this time, we will continue our commitment to identify a cost-effective strategy to utilize 100% of the biogas generated at the WWTP. In the meantime, we will remain diligent in our efforts to utilize half of the biogas produced on-site in the boilers that heat the digesters.

The Future of OWASA's Energy Management Program

With our natural gas use reduction goal achieved/surpassed and electricity goal within reach, OWASA is beginning to think about the next chapter of our Energy Management Program. Over the past decade, we have made tremendous progress, not just in reducing our energy use, but in imbedding energy in our decision-making on capital improvements, operations, and maintenance activities. Ensuring that our progress is sustained will continue to be an important component of our Energy Management Program.

We will also continue to identify, evaluate, and pursue strategies that offer marginal reductions in our energy use through energy conservation and cost-effective investment in energy efficiency projects. Although we have "picked much of the low-hanging fruit," it will be important to maintain a strategic and systematic approach to advancing clean energy at OWASA. We hope that our budget allows for OWASA to continue to think long-term in terms of energy investments and continue to pursue energy projects that will result in positive net present value over the life of an asset.

This will include the eventual evaluation of installing solar PVs on the top of the clearwell at the Jones Ferry Road Water Treatment Plant. This project was originally proposed alongside the other solar projects included in this Plan. However, in a recent inspection of the clearwell, we identified repairs in the roof that are needed before solar PV could be installed. Once these repairs are made, we will reconsider the installation of solar PV on the clearwell. The original design estimated that approximately 220,000 kWh of clean energy could be generated per year from this system.

Additionally, this year, we will begin the process of updating our long-term Master Plan for the Mason Farm Wastewater Treatment Plant (WWTP). The purpose of this project is to update a long-range plan for meeting capacity and nutrient reduction needs in the future. It will also be an important time to consider the energy impact of various strategies and treatment approaches. Last year, we engaged a firm to conduct a high-level assessment of potential energy saving strategies for the WWTP. The consultant proposed a suite of energy management projects that would have a significant impact on the integrated processes at the WWTP. As such, it is recommended that these projects be considered within the larger context of the Master Plan. It is too early to say what will or will not be viable strategies to pursue at the Mason Farm Wastewater Treatment Plant; however, they are noted in Appendix B of this Plan.

Beyond our electricity and natural gas use to power our facilities, OWASA directly uses fuel to operate our fleet and indirectly uses energy in the materials that we use and way that we conduct our business. Staff anticipates that next year's Energy Management Plan will provide recommendations to the Board on continuing and potentially expanding OWASA's Energy Management Program.

Conclusion

OWASA's Energy Management Program is a comprehensive and inclusive approach to reducing electricity and natural gas use across the organization. Through implementation of the program, we have realized and sustained energy use and greenhouse gas emission reductions.

When developing the budget for FY22 for the Board's consideration, staff plans to present options for investing in the evaluation and pursuit of energy management strategies from this Plan.

It is important to note that funding for the strategies included in this plan will be proposed alongside other organizational priorities in future budget considerations. This Energy Management Plan Update is intended to provide a progress update and a plan for what is needed to meet strategic goals established by the Board.

Staff requests approval of the Plan to include projects in the upcoming budgets for the Board's consideration.

In approving the Plan, the Board is asked to approve the overall approach and the potential ahead, if funded. Although, the Energy Management Plan is designed to be cost neutral (at minimum) in the long-term, short term needs may need to be prioritized above long-term strategies.

Appendix A: Strategy Evaluation and Prioritization

Strategies included in the Appendix B summaries were developed from staff expertise, as well as information learned through two recent assessments. OWASA engaged the firm AESC, Inc (Energy Engineering for Utilities and Industry) to conduct a high-level assessment of energy saving potential at the Mason Farm Wastewater Treatment Plant. Projects introduced by this assessment are noted as sourced by "AESC" in Appendix B. In addition, OWASA engaged Kimley-Horn to conduct pump station evaluations. Projects identified through these assessments are sourced as "Kimley-Horn."

As reviewed, discussed, and accepted by the OWASA Board of Directors, the OWASA staff evaluated each strategy qualitatively against the following six criteria (and guiding considerations).

1. Financially Responsible (High level)
   a. Likely a good use of public funds
   b. Financial viability of similar projects in similar organizations and circumstances
   c. Opportunities for outside funding/financing
2. Realistic/Implementable
   d. Degree to which the strategy has been proven at a scale relevant to our operation
   e. Organizational capacity to undertake and manage the project
   f. Reasonable amount of staff time to implement
3. Operational Impacts
   g. Consistent with how OWASA wants to operate
   h. Degree to which strategy helps to resolve an existing or expected problem
   i. Impact on safety, comfort, and productivity
4. Energy/Carbon Reduction Potential
   j. Potential to reduce OWASA's energy use and/or carbon emissions
5. Coordination with Other Projects
   k. Interdependence with other project(s)
   l. Potential to take advantage of economies of scale to save money and/or staff time
6. Community Impacts
   m. Stakeholder enthusiasm
   n. Coordination with community initiatives

After reviewing energy management summaries (See Appendix B), the OWASA Energy Team met on Oct. 13, 2020 to review, discuss, and prioritize each of the energy strategies.

Projects were then categorized as:

Energy Management Projects Recently Completed (1-3)

Energy Management Projects Underway (4-11)

Energy Management Projects Currently in the CIP with Potential to Reduce Energy Use (12-23)

Energy Management Projects to Pursue and Evaluate (24-33)

Energy Management Projects to Consider in Wastewater Treatment Plant Master Plan (34-45)

Energy Management Projects to Delay Until Upgrade (46-53)

Appendix B: Energy Management Summaries – 2020 Update

Energy Management Projects Recently Completed

1. University Lake pump station improvements

In an early phase of this project, we re-activated the use of a parallel 42" water line for delivering University Lake raw water to the Water Treatment Plant. In recent years, we had only used a 24" water line. Due to the decrease in friction in the larger water line, we decreased our energy use intensity (kWh used to pump a million gallons of water)) by about 7%. We estimate that this will save approximately $7-$10 per million gallons pumped when pumping from University Lake (or 85 – 120 kWh per million gallons pumped).

The second phase of the project involved replacing Pumps #1 (200 hp), #2 (200 hp), and #3 (400 hp) at the University Lake Pump Station with two 450 hp pumps with variable frequency drives (VFDs), as well as completely rehabilitating Pump #4. Following this change, we have seen an additional 13% decrease in energy use intensity. We estimate that this will save an additional $6-$8 per million gallons pumped (or 75 – 100 kWh per million gallons pumped).

Historically, the energy use intensity has been lower for the Cane Creek Pump Station than for the University Lake Pump Station, despite being almost 10 miles further from the Jones Ferry Road Water Treatment Plant. Through the improvements made in this project, this should change, which will significantly reduce the overall energy required for raw water pumping.

Estimated Energy Savings: Assuming that we pump approximately 500 million gallons from University Lake ever year, these improvements have the potential to decrease annual energy use by 80,000 – 110,000 kWh and reduce electricity costs by $6,500 - $9,000 in year 1.

2. Switchgear HVAC

In early 2020, we replaced the 6 SEER HVAC system in the Switchgear building with a high-efficiency Liebert Unit. The older unit had reached the end of its useful life.

Estimated Energy Savings: This unit is estimated to save 25,000 – 50,000 kWh per year.

3. Administration Building HVAC

An innovative water-to-water heat exchange (using water from the distribution system for thermal loading and off-loading) in the OWASA Administration Building was completed in early 2019. With over a year of use, we can now document the savings of this project. A comparison of September 2019 through August 2020* energy use data estimated that the new HVAC system is responsible for:

- A 29% decrease in electricity use (a savings of about 145,000 kWh and $12,000 per year), accounting for the increase in energy use and cost for retreating the water returned to the Water Treatment Plant
- A 97% decrease in natural gas use (a savings of 13,600 therms and $15,500 per year)

Energy Management Projects Underway

4. Extend WWTP backwash filter cycles and reduce air scouring frequency

Source: AESC and EMP

Up until recently, the tertiary filters were back-washed and air scoured on a rotating three-day basis so that two filters were washed daily. We are working to reduce frequency of high-energy backwashing and constraining backwash aeration to what is essential to meaningfully filter turbidity and head-loss performance metrics rather than fixed schedule. Energy savings are achieved as the tertiary filter backwash pumps and blowers operate less frequently.

Estimated Energy Savings: Depending on the optimal frequency, savings projected range from 20,000-100,000 kWh/year ($1,600 - $8,000)

Operational Considerations: Staff will take an incremental approach to adjusting cycles. On July 22, 2020, we moved to a 2-1-2 cycle. If that goes well, we will move to a 1-2-1 cycle in the Winter of 2021.

Recommended Next Step: Underway, move to 1-2-1 cycle in Winter of 2021

5. Increase Morgan Creek pump station wet well level

Source: AESC, Kimley-Horn, EMP

The four pumps at the Morgan Creek pump station are each rated at 7,500 gallons per minute (gpm) and 30 feet total dynamic head (TDH), which makes this one of OWASA's most energy-intensive pump stations This strategy involves increasing the wet well level to reduce the lift required for the pump to overcome. The pump station has excess capacity to quickly reduce the wet well level prior to and during a storm.

This change can be made programmatically via the Supervisory Control and Data Acquisition (SCADA) system, and can most likely be done in-house without outside assistance from an integrator.

Estimated Energy Savings: 50,000 -58,000 kWh/year ($3,500/year)

Operational Considerations: On August 19, 2020, Operators increased the wet well level by one foot to 3.5 feet. This adjustment took the water level right below the influent pipe to the station. Shortly after the wet well was increased, we experienced difficulties with the Morgan Creek Pump Station unrelated to this change. Levels were lowered again to troubleshoot the issue. We will be closely evaluating the situation in the Morgan Creek Wet Well.

Recommendation: Attempt raising the wet well levels again once conditions in the wet well are fully evaluated and improved

6. Reduce plant water foam control spray demand

Source: AESC

The existing 5 HP foam pump operates at full speed, 24 hours a day, 365 days per year. The 25 HP plant water pump also operates 24 hours each day, 365 days per year with a VFD. Installing a control to spray

only when needed will allow the foam pump to operate at reduced hours and the plant water pump to operate on average at reduced operating speeds thus saving pump energy.

This project is currently underway and will be completed in the Winter of 2020.

Estimated Energy Savings: An assessment by AESC estimated that this has the potential to save 43,000 kWh/year ($2,500/year)

Operational Considerations: Minimizing foam has many benefits for the aeration process. Moreover, there is a safety benefit to installing a fixed spray system, rather than running hoses across the deck of the aeration basins.

Recommended Next Step: Finish project and evaluate impact in 2021

7. Wastewater pump station operational and needs assessments (277-40)

Source: EMP

In 2019, a detailed evaluation of six of OWASA's pump stations was conducted to determine the energy usage of the pumps and the condition of the critical site components. Pump energy usage analysis was based on measured pump performance tests as well as pump speed and operating level data from historical SCADA data. The project objectives were to determine if energy usage could be reduced by making modifications to each of the pump stations and to develop a list of tasks to be completed at each station, based on either improving energy efficiency or the condition of the components. Recommendations from Phase 1 of the evaluations are considered in this plan.

In 2020-2021, we will conduct a similar analysis on six more pump stations (Phase 2).

Pump Station Name	Phase of Evaluation	Annual Energy Use (kWh)	Number of Associated Pumps	Total Associated Horsepower
Morgan Creek	Complete	580,000	4	400
Reclaimed Water	Complete	550,000	4	650
NSL	Complete	440,000	4	300
Lake Ellen	Complete	41,000	2	60
Countryside	Complete	67,000	2	68
Non-Potable Water	Complete	92,000	3	75
Intermediate Pump Stations #1 and #2	Phase 2	400,000	6	330
Rogerson Drive	Phase 2	750,000	4	800
Eastowne	Phase 2	28,000	2	100
Meadowmont #1	Phase 2	22,000	2	30
Heritage Hills	Phase 2	34,000	2	100
Eubanks	Phase 2	41,000	2	100

Estimated Energy Savings: No direct energy savings associated with this project

Operational Considerations: These pump station evaluations have the added benefit of investigating the health of the pump station. Recommendations on operational improvements will be considered by the wastewater team accordingly.

Recommended Next Step: Pursue Phase 2 of Pump Station Evaluations and consider recommendations in FY22 budget and beyond.

8. Solar Lease Projects at Administration, Ops. Center and Biosolids site

Source: EMP

Last year, in order to make progress on the energy goals set by the Board of Directors, we entered into a solar lease partnership with Eagle Solar and Light. Under a solar lease partnership, ESL owns and maintains solar panels on OWASA land and facilities. The energy generated by the solar panels offsets energy used by our facilities. OWASA receives the purchased electricity (kWh) and cost reduction on our Duke Energy bills. This agreement also allows us to take advantage of up to $75,000 in rebates from Duke Energy for each facility with solar panels.

The original locations proposed for solar installations were: (a) rooftop of the Admin Building; (b) rooftop of the Operations Center; (c) top of the clearwell; (d) small portion of a field on our biosolids property; and (e) portion of a field at Cane Creek Reservoir. We subsequently delayed any solar development on the top of the clearwell until needed repairs identified in a recent inspection are made and at Cane Creek due to financial constraints.

The original lease agreements required a down-payment from OWASA and had five-year terms. At the end of the five years, OWASA would have had the option to purchase the system. Given the budget situation for FY21, we worked with ESL to re-negotiate the leases. We re-signed leases that required no additional down payment (beyond the Duke Energy rebate) AND in year 1 (and all subsequent years), the lease payment will be less than the energy savings. In other words, from year 1, these projects will provide a cost benefit (or at least break even) to OWASA ratepayers. These lease agreements have 25-year terms. We have renegotiated leases for the solar PV systems for the Admin Building Rooftop, the Operations Center Rooftop , and Biosolids Field . Unfortunately, we have yet to identify a way that we can pursue the Cane Creek Reservoir installation and meet the goal of no down payment and annual lease payments less than energy savings.

We are now in the final stages of project planning and permitting for the three following solar PV installations. Below is the proposed plan for construction:

1. Biosolids Ground-Mount System: Construction in late-October through late-November (2020)
2. Operations Center Rooftop: Construction in mid-December through mid-January (2021)
3. Administration Building Rooftop: Construction in mid-January through mid-February (2021)

Estimated Energy Savings: Approximately 427,757kWh/year

Operational Considerations: Administration Building Rooftop panels will be installed after the roof replacement is completed. Under the lease agreement, Eagle Solar and Light will maintain the solar PV systems.

Recommended Next Step: Install and evaluate solar PV

9. Recommission odor control system

Source: EMP

The Mason Farm Wastewater Treatment Plan (WWTP) has multiple odor control systems located throughout the plant. Air from various processes in the plant are pumped to chemical and dry media scrubbers. The odor control system is estimated to use approximately 900,000 kWh per year. In 2018, Hazen and Sawyer conducted a high-level balancing assessment of the odor control system that included a review of duct sizing, air intakes, and the ability to appropriately balance the system. As a follow-on, it was recommended that OWASA conduct a recommissioning of its odor control system to ensure that there is balance in the system. This process would help ensure that the odor control system is working as efficiently and effectively as possible. It could also inform settings for changes in operations, to help maintain balance in the system. The potential energy savings that could be realized from commissioning the odor control system are uncertain, but as one of the largest energy-using systems at the WWTP, fine-tuning odor control operations has great potential.

This project is currently underway and the findings from the analysis are pending.

Estimated Energy Savings: TBD

Operational Considerations: The odor control system at the WWTP is an integrated and complex system. It will be important that recommissioning, if recommended, is pursued with a comprehensive systems-thinking approach.

Recommended Next Step: Evaluate the findings of the odor control study and pursue (with caution) recommended adjustments

10. Impact and cost evaluation of operational changes with aeration basin odor scrubbers (WWTP)

Source: EMP

This strategy assesses the costs and benefits of how the dry media scrubber system for the aeration basins is operated. This system alone is estimated to use about 500,000 kWh/year. It is an opportune time to assess the costs/benefits, as it is nearing the time to replace the carbon in the filters (about $50,000 project).

The odor control system was designed to treat the air from all aerated cells, as well as the nitrified sludge (NSL) basins. However, about two years ago, plant staff adjusted how the aeration basins are operated and began aerating two uncovered cells – without a significant change in observed odors by staff or odor complaints from neighbors.

Currently, an engineering consultant is evaluating the effects of decreasing the air flow rates and potentially decommissioning part of the odor control system at the Wastewater Treatment Plant. The intent of the project is to reduce energy usage and redirect existing capacity to parts of the plant where increased odor control is needed.

Estimated Energy Savings: TBD

Operational Considerations: The odor control system at the WWTP is an integrated and complex system. It will be important to approach any recommissioning, if recommended, with a comprehensive systems-thinking approach.

Recommended Next Step: Evaluate the findings of the odor control study and pursue (with caution) recommended adjustments

11. Online ORP/Nitrate monitoring

Source: EMP

Although we have achieved greater energy efficiency in our aeration system at the Mason Farm WWTP, this process still uses approximately 5% of the electricity used at the Plant (approximately 1.6 million kWh per year). Energy is used to power blowers in aerated basins that help to reduce nutrients and organic matter in the water and in mixers, which run in all basins to maintain an environment that supports the necessary biology. The aeration system maintains dissolved oxygen concentrations at optimum levels for the biological treatment process. By optimizing the biological treatment process and aeration system, OWASA could reduce energy and chemical use while improving treatment performance.

In 2020, we installed two ORP (oxidation reduction potential) probes in the back channels of the aeration basins that will help us optimize the biological treatment process and aeration system. These probes have the potential to allow us to turn down the air during the time these back channels are aerated. The data will be integrated into the SCADA system and will allow for real-time "dialing" of blowers and mixers.

Estimated Energy Savings: TBD

Operational Considerations: Control of the aeration system and turndown of the blowers needs to be considered for the mixing it provides.

Recommended Next Step: Monitor and assess the potential to turn down blowers in 5A and 5B channels.

Energy Management Projects Currently in the CIP with Potential to Reduce Energy Use

12. Reduction of inflow and infiltration in wastewater system (276-18, 276-48)

Source: Multiple plans

OWASA regularly conducts preventative and corrective maintenance on our sewer collection system to identify and stop inflow and infiltration (I&I). I&I generates additional flow that needs to be pumped to and treated at the Wastewater Treatment Plant. In reducing I&I, we reduce the energy required to pump and treat this water.

In 2020, we completed a Gravity Sewer Master Plan that included temporary flow and capacity modeling. We have strategically implemented Cured-in-Place-Pipe Lining (CIPP) sewer pipe lining and manhole lining. We have begun a program to monitor pump run times on pump stations in the collection systems and have initiated a program to replace defective lateral caps. We are beginning a comprehensive investigation of I&I in the Rangewood neighborhood.

Data collected from the system will be stored in a newly commissioned dashboard tool to track and trend I&I. Through this series of initiatives, our goal is to target and reduce I&I in the collection system.

Estimated Energy Savings: Difficult to quantify, but it is important to manage energy peaking at wastewater pump stations and the wastewater treatment plant

Operational Considerations: There are a myriad of operational benefits to reducing I&I

Recommended Next Step: Support Asset Manager and Distribution and Collections Team in efforts to reduce I&I

13. Building envelope rehabilitation (278-68)

Source: CIP

This project includes the rehabilitation of building envelope systems (roofs, walls, windows, etc.) at a prioritized set of OWASA's buildings and structures as recommended by a FY 2017 condition assessment. This project has the potential to reduce heating and cooling load on the impacted buildings; however, it is difficult to estimate the energy savings expected from this strategy at this point. Impacts on energy use will be incorporated into decision-making for these projects.

Estimated Energy Savings: Difficult to quantify, but it is important to managing energy used for HVAC to ensure efficient operations

Operational Considerations: Envelope maintenance is required as general maintenance on our buildings

Recommended Next Step: Continue to evaluate and prioritize envelope rehabilitation and consider the energy impacts of such work

14. HVAC: Equipment Replacement (272-51)

Source: CIP FY22-FY23

An assessment conducted through the Energy Management Program recommended the replacement of aging, inefficient HVAC units with more efficient units once they have reached the end of their rated life. The project provides scheduled funding for the replacement of identified HVAC units that are over their rated service life (typically 15 years) with units rated at or above 15 SEER (seasonal energy efficiency ratio). Existing units identified for replacement are listed below:

Unit Location	**Potential Energy Savings**
Warehouse Office	1,000 kWh/year
WWTP Lab	27,000 kWh/year
WWTP Filter Building	24,000 kWh/year

This project also currently include an update to the control system at the Operations Center and the Water Treatment Plant's administration building.

Estimated Energy Savings: 50,000 – 52,000 kWh/year

Operational Considerations: Proactively replacing HVAC equipment at the end of its useful life, rather than at failure significantly reduces the risk of unexpected failure, which could lead to disruption of operations and higher costs for replacement.

Recommended Next Step: Include energy use reduction as a secondary objective of the project

15. SCADA Master Plan (272-49)

Source: CIP FY 21

This project will evaluate the entire SCADA system at the Water Treatment Plant (WTP) and other water facilities to identify deficiencies, potential improvements, and the development of a phased master plan to ensure optimal performance. Improving our use of SCADA at both treatment plants has the potential to allow for increased and better integration of energy use data into day-to-day decision making.

Estimated Energy Savings: TBD

Operational Considerations: The primary reason for this project is to reduce operational risk.

Recommended Next Step: Include energy use management as an objective of the project.

16. Cane Creek raw water transmission main (271-05)

Status: CIP FY 21

In advance of the planned upgrade of the Cane Creek Pump Station, the Capital Improvement Program (CIP) includes a project in FY21 to evaluate the friction coefficient of the existing 24-inch diameter raw water main from the Cane Creek Reservoir to the Quarry Reservoir. This test will help determine if the main needs to be cleaned to restore its designed carrying capacity. This study and any related follow-up work are planned to be completed prior to initiation of design on the pump station improvements.

Estimated Energy Savings: TBD from improvements in transmission that increases pump efficiency

Operational Considerations: The primary reason for this project is to improve the operations of raw water pumping from Cane Creek Reservoir.

Recommended Next Step: Include energy use reduction as a secondary objective of the project

17. Cane Creek pump station improvements (270-16)

Source: CIP FY23-FY25

Funds are included in the CIP for FY 2023 - FY 2025 for adding automatic generator transfer switchgear, building a permanent enclosure for the generator, and installing variable frequency drives (VFD). An analysis conducted by the NC State University Industrial Assessment Center estimated that the installation of VFDs at the Cane Creek Pump Station could result in a savings of 138,000 – 227,000 kWh per year. Some of these savings may not be available if the Cane creek Transmission main inline generator occurs.

Additionally, the 2017 Energy Management Plan evaluated in-pipeline turbines for hydropower generation and recommended that pursuit of this specific strategy be "delayed until upgrade." This Main Capacity Study is an opportunity to consider current technology and infrastructure upgrades that could be viable for generating in-line hydropower in the raw water transmission line. It has been estimated by previous studies that there is enough flow and fall from Cane Creek Raw Water Main to the head of the Jones Ferry Road Water Treatment Plant to generate about 250,000 kWh/year. The use of inline hydro may be able to offset the cost or need of VFD's at the Cane Creek Pump Station. The project is especially viable if the in-line sleeve valve needs to be replaced as well.

Estimated Energy Savings: 138,000 – 227,000 kWh per year (estimated by NCSU Industrial Assessment Center); 250,000 kWh/year (if inline hydropower is developed)

Operational Considerations: The primary reason for this project is to improve the operations of raw water pumping from Cane Creek Reservoir.

Recommended Next Step: Include energy use reduction as a secondary objective of the project; consider in-line hydro in the alternative analysis for the project

18. Finished water pump rehabilitation and replacement (272-54)

Source: CIP FY23

The WTP uses four pumps (Finished Water Pumps Nos. 4 through 7) to send drinking water from the plant into the distribution system. Finished water pumping is the largest consumer of electrical energy at the WTP. Pumps Nos. 4, 6 and 7 utilize variable frequency drives (VFD) and have pumping capacity ranges from 6 to 10 MGD, from 7 to 12 MGD, and from 3 to 7 MGD, respectively. A VFD is being installed on Pump No. 5 as part of an on-going project (272-42).

The existing VFD for Finished Water Pump No. 6 was installed in 2000. Repair parts for the unit are becoming increasingly difficult to obtain, and recent maintenance problems indicate the need for near-term replacement. Funds are included in FY 2023 for this replacement.

Estimated Energy Savings: TBD, unlikely to be large but an important energy project nonetheless

Operational Considerations: Replaces aging assets

Recommended Next Step: Include energy use reduction as a secondary objective of the project

19. Wastewater Treatment Plant Facilities Planning (278-75)

Source: CIP FY21-FY23

The most recent hydraulic and treatment capacity evaluation of the WWTP was completed in 2010 and determined that the next WWTP capacity upgrade to 18.5 million gallons per day (MGD) would cost $59 million (2010 dollars) but would not be required until at least 2030.

Funds are provided in FY 2021 through FY 2023 to perform an updated capacity evaluation and facility master plan for the WWTP. This project creates an opportunity to consider game-changing ideas that can improve processes and reduce energy use. Moreover, it will allow us to consider if and how co-

digestion of high strength organic waste could be incorporated into our operations and allow for a viable biogas-to-energy strategy.

Estimated Energy Savings: TBD

Operational Considerations: Countless possible impacts to operations

Recommended Next Step: Incorporate energy savings as an objective of the Master Plan, expand the consideration of future strategies to include innovative energy-saving projects, and incorporate energy use into the decision criterion

20. Off-site biosolids mixing project (278-88)

Source: CIP FY21

Use of our off-site biosolids storage tanks has increased significantly over the past few years as we work to meet our goal of applying 75% of our biosolids directly to agricultural land as a liquid. The off-site storage tanks serve as a buffer and help us to manage biosolids volumes when conditions (such as weather) do not allow us to apply biosolids directly to farmland. Over the past 12 months, we used over 400,000 kWh to load, unload, and mix biosolids at the off-site storage facility. That was nine times more energy than we used at this facility in 2010.

The FY21 Capital Improvement Program includes funding for an analysis of mixing alternatives for the off-site storage tanks. This request is primarily driven by the need to improve the effectiveness of mixing in the storage tanks; however, it has the added potential benefit of improving the energy efficiency of mixing.

Estimated Energy Savings: TBD

Operational Considerations: The primary reason for this project is to improve the operations of and mixing capabilities in the storage tanks.

Recommended Next Step: Include energy use reduction as a secondary objective of the project

21. WWTP Return Activated Sludge (RAS) pumping improvements (278-88)

Source: CIP FY24-FY25

A FY 2018 evaluation of the WWTP RAS pumping system made several recommendations to improve the reliability of the system:

- Replace aging and obsolete RAS pumps for secondary clarifiers No.1, 2 and 3 with larger design flows
- Installation of piping to allow for rapid connection of a backup diesel pump (to be purchased through future Capital Equipment budget)
- Install new RAS piping between Clarifier Nos. 2 and 3 and the nitrified sludge (NSL) tanks

Funds are included in FY24 and FY25 for completion of recommended improvements.

Estimated Energy Savings: TBD, likely to be minor but still an important energy-related project

Operational Considerations: The primary reason for this project is to improve the reliability of the system.

Recommended Next Step: Include energy use reduction as a secondary objective of the project

22. Intermediate pump station pump/motor replacements (278-93)

Source: CIP FY25

We are currently budgeting to evaluate and replace the pumps and motors in the intermediate pump station at the WWTP in FY25. The pump station evaluation will help to identify energy saving opportunities in this project.

Estimated Energy Savings: TBD

Operational Considerations: The primary purpose of this project is to replace aging assets.

Recommended Next Step: Include energy use reduction as a secondary objective of the project

Energy Management Projects to Pursue and Evaluate

23. Solar lease project at Cane Creek

Two of the five solar projects originally planned have been delayed: the Cane Creek Reservoir 360 kW system and the Clearwell 180 kW system. The Clearwell system has been delayed until repair of the clearwell top can be made. For the Cane Creek system, we were, unfortunately, unable to achieve the simultaneous financial goals of no effective down payment and annual lease payments less than energy savings. In order to achieve the goals, we will require an additional $100,000 to supplement the $75,000 rebate from Duke Energy to put down on the system with a 25-year lease term. We are applying for the Orange County Climate Action Grant Program to make up the difference.

Estimated Energy Savings: 524,406 kWh/year

Operational Considerations: Eagle Solar and Light will be responsible for operating and maintaining the system. It will require more attention to mowing and weed maintenance around the solar array.

Recommended Next Step: Pursue Orange County Climate Action Funding

24. Reduce operating speeds on Non-potable water (NPW) System, using pump optimization tool

Source: Kimley-Horn

This site operates to maintain a pressure in the NPW system without any pressure or volume storage. Reducing the speed at which this site operates will result in energy savings. K-H recommend that we

investigate running the pumps at a slower speed, as well as install a hydropneumatics tank to allow for some pressure and volume storage to reduce the amount of time the pumps are required to run at or near full speed.

Estimated Energy Savings: 35,000 kWh/year ($2,200/year) by adjusting the control regime to operate the majority of the time at 85% speed.

Operational Considerations: To accomplish this, programmatical changes will be necessary.

Recommended Next Step: Install Specific Energy to help with this ($13,000 upfront cost + $3,425 annual cost)

25. Pump Station Energy Monitoring and Pumping Optimization Technology at University Lake

In 2020, we upgraded the University Lake Pump Station with two new pumps with VFDs. Additionally, we rehabilitated an older, smaller third pump. There are multiple benefits to installing a pump monitoring system on the University Lake Pump Station.

1) As an essentially new pump station, a pump monitoring technology could help ensure that the pump station is operating as designed.
2) We can develop a baseline on pump health on which we can compare performance for years to come to help in the management of this asset.
3) Raw water pumping is a third largest functional use of energy at OWASA (after wastewater treatment and drinking water treatment and pumping). Installing a pump optimization technology on one of our largest pump stations sets us up to optimize energy use in our raw water pumping for years to come.
4) There are challenges to pumping water when University Lake is at low levels. A tool that monitored pump performance in relation to lake levels could help to better understand the impact of lake levels on pump performance and operations.

Estimated Energy Savings: TBD

Operational Considerations: Multiple benefits (see above)

Recommended Next Steps: Pursue Specific Energy technology for University Lake Pump Station (estimated cost: $23,000 set-up fee + $7,000 annual fee)

26. Retrofit aeration blowers with high efficiency inlet filters

Source: AESC

The secondary treatment basin receives air from the (4) 250 HP Turblex blowers rated at 5000 scfm to deliver low pressure dissolved oxygen to the activated sludge process. The blowers are staged based on dissolved oxygen (DO) content in the aeration basins. Each blower utilizes a standard filter on the air inlet, which may be replaced with a higher efficiency model. Pressure drop at this filter is significant and adds to the blower load. Blower savings are estimated at 2% from the reduced filtration pressure drop.

Currently, we use MERV (minimum efficiency removal value) 11 filters in the blowers.

Estimated Energy Savings: 46,000 kWh/year ($2,700/year)

Operational Considerations: Estimated implementation costs are $16,000

Recommended Next Step: Evaluate the feasibility and cost of using high efficiency inlet filters.

Update: Given the layout of our blower building, we are not able to retrofit the blowers to use high efficiency inlet filters. This project will not work for OWASA and is not recommended to pursue. The potential energy savings and costs have been removed from the report.

27. Install Pulsed Large Bubble Mixing in Rogerson Drive Pump Station

Source: AESC

The purpose of this measure aims to reduce the energy demand associated with the pass-through of dissolve sulfide, sBOD and Ammonia-N generated in the collection system that is added to in-plant processes.

The sequential large bubble mixing system provides bursts of air radially through narrowly spaced twin plates fixed to the floor of the wet well. This burst radiates a broad plate of air outward, which induces formation of a large bubble (3-4 feet in diameter) into the liquid at the bottom of the Rogerson Drive PS wet well. Mixing is created via the buoyant force of the massive bubble rising through the liquid. The upward velocity of the bubble both pushes and pulls water through the column by creating pressure at the top of the rising bubble, and vacuum below the bubble as it rises.

Additionally, at the moment of the "burst," the air provides a shallow, intense hydraulic shock wave outward across the floor of the tank. This hydraulic shock wave essentially helps to jar any organic sediments off of the floor and into the flow of water coming in towards the bubble. This dual moment of energy prevents the accumulation of lighter sediments, keeping all but the densest solids (such as rocks and heavy grit) in suspension. These otherwise settled organics currently ferment creating both odors and sulfides, reduced generation will improve the corrosive environment that currently exists.

Aside from the mixing function, sequential large bubble mixing provides additional benefits in a wide variety of applications. While major benefits are seen in the tanks using the SLB Mixers, several benefits are realized in downstream processes and effluent quality. The basic categories of benefit are:

- Energy-efficient mixing
- Low maintenance effort
- Prevents sediment accumulation
- Increases active tank volume
- Eliminates septicity associated with sedimentation
- Increases biological activity and efficiency in activated sludge
- Reduces solids loading rate to secondary clarifiers
- Reduces RAS pumping requirement
- Reduces filter loading and backwash
- Reduces chorine demand or UV energy demand

The floor-mounted bubble ejection plates are typically secured to the existing concrete bottom of the wet well without any significant retrofitting. The large bubbles do not strip any significant H2S because of their surface area ratio. The robust mixing action eliminates accumulation of sediments and floating

grease, which would otherwise contribute to septicity and H2S generation, thus it actually reduces nuisance conditions and maintenance requirements.

Estimated Energy Savings: 107,000 kWh/year ($6,000/year)

Operational Considerations: Currently, grit mixing system does not work well at RDPS. This strategy could help with this. According to Wil, SGWASA utilized a similar technology, and it worked well.

Recommendation: Study – work with vendor (Pulsed Hydraulics) to evaluate further (Budget for working with AESC to help evaluate impact: $20,000)

28. Install pulsed large bubble mixing in on-site biosolids storage tank

Source: AESC

Currently, we use a 128-horsepower diffused air mixing system in the onsite biosolids storage tank. This system includes a fixed coarse bubble diffuser grid located near the floor of each of the biosolids holding tanks (fed by the blowers used for aeration). The system is operated intermittently prior to scheduled removal of the material. Due to settling between operation, transfer pumps are used to recirculate material to supplement the current system. Nonetheless, material still accumulates, and the tanks are taken off-line for cleaning about twice per year.

AESC recommended a pulsed large bubble mixing system. The sequential large bubble mixing system provides bursts of air radially through narrowly spaced twin plates fixed to the floor of a tank or vessel. This burst radiates a broad plate of air outward, which induces formation of a large bubble (3-4 feet in diameter) into the liquid at bottom of tanks and vessels. Non-aerated mixing is created via the buoyant force of the massive bubble rising through the liquid. The upward velocity of the bubble both pushes and pulls water through the column by creating pressure at the top of the rising bubble, and vacuum below the bubble as it rises. As the large bubble rises through the tank, it creates micro-currents along the sides of the bubble which creates latent eddies to enhance the mixing effect.

Aside from the mixing function, sequential large bubble mixing provides additional benefits. While some of the benefits are seen in the tanks using the SLB Mixers, several benefits are realized in downstream processes and effluent quality. The basic categories of benefit for the Biosolids Storage Tank are:

- Energy-efficient mixing
- Low maintenance effort
- Prevents sediment accumulation
- Increases active tank volume

The floor-mounted bubble ejection plates are typically secured to the existing concrete bottom of the wet well without any significant retrofitting. Further analysis of the existing operation should be evaluated to determine feasibility.

In 2018, CDM Smith conducted a business case analysis of replacing the current system with a more effective hyperboloid mixer. (They also analyzed the operational costs and benefits of running the current diffused air mixing system continuously.) In their analysis, they estimated that the current system uses about 300,000 kWh/year assuming our current intermittent operating strategy. (If it ran continuously, it would use approximately 839,000 kWh/year.) Assuming the same intermittent operating

strategy, CDM Smith estimated that two new 30-hp gear-driven hyperboloid mixers would use about 140,000 kWh/year. The up-front cost for the new mixers is estimated to be approximately $410,000.

On energy costs alone, a hyperboloid mixer was not recommended. The Energy Team recommends that a hyperboloid mixer be considered when operational needs require the upgrading of the biosolids storage tank mixing system. That time seems to be now.

Estimated Energy Savings: 160,000 – 250,000 kWh/year ($9,600 - $15,000/year)

Operational Considerations: A new system would likely be more reliable, relieve the demands on the main aeration system, and reduce the impact of mixing equipment on the odor control system.

Recommended Next Step: Budget for a Preliminary Engineering Review of alternative mixing strategies for the on-site biosolids tanks ($75,000)

29. Reduce operating speeds at Nutrified Sludge site, using pump optimization tool

Source: Kimley-Horn

This site currently operates the majority of the time in the 65% to 80% speed range. Adjusting the speed of this station to operate more slowly will result in energy savings. The slowest practical speed available is 60%. K-H recommend OWASA investigate the implications of adjusting the program regime to bias the pumps towards the lower end of the practical speed range. Care should be taken to make sure program changes do not negatively affect treatment processes.

Estimated Energy Savings: 35,000 -70,000 kWh/year ($4,400/year)

Operational Considerations: Unsure about what the impact of this change would be on the process; we need to conduct more analysis

Recommendation: Study; if potentially viable, consider Specific Energy to help with this ($15,000 upfront cost + $4,100 annual cost)

30. Wastewater Pump Station Energy Monitoring and Pumping Optimization Technology (Specific Energy)

Source: Multiple sources

The 2019 Energy Management Plan recommended the installation of a pump station optimization technology, Lift Station Guardian (LSG) on at least one wastewater pump station. This product is similar to the pump optimization tool because it conducts a pump performance analysis (monthly rather than daily) and provides recommendations on when the cost of pump repair or replacement is less than energy savings. LSG conducts high resolution monitoring of lift station behavior to track pump health and support preventative maintenance decisions. Our current practice is to run a pump to failure provided we have pumping system redundancy. This can be a challenge under current situations where it may take up to 16 weeks to replace a pump. Knowing ahead of time when a pump might fail could help us get ahead of this.

Upon further study, it was determined that the Lift Station Guardian was not a viable technology for our facilities. Instead, we requested a series of quotes for Specific Energy Optimization technology. When

aligned with recommended control strategies from Kimley-Horn's evaluation, there are two pump stations for which we should consider installation of Specific Energy Technology from an energy perspective: the Non-Potable Water (NPW) Pump Station and the Nutrified Sludge (NSL) Pump Station.

Pump Station	Annual Energy Use (kWh/year)	Pump Station Evaluation	Cost of Specific Energy Installation and Annual Fee	Recommended Control Strategy Relevant to Pump Speed	Estimated Savings
Knolls	25,000	No	$8,100 + CITI + $1,500 (annual service fee)	NA	
Meadowmont #1	21,000	Phase 2	$8,100 + CITI + $1,500 (annual service fee)	TBD	
Morgan Creek	265,000	Phase 1	$11,700 + CITI + $4,208 (annual service fee)	Optimization and 2 pumps running	13,500/yr ($810/yr)
NPW	296,000	Phase 1	$9,900 + CITI + $3,425 (annual service fee)	Optimization	35,000 kWh/yr ($2,100/yr)
NSL	420,000	Phase 1	$11,700 + CITI + $4,100 (annual service fee)	Slowest practical speed	70,000 kWh/yr ($4,400/yr)
RCW	520,000	Phase 1	$11,700 + CITI + $5,150 (annual service fee)	None without hydropneumatics tank	
RDPS	795,000	Phase 2	$11,700 + CITI + $5,600 (annual service fee)	TBD	
Countryside	70,000	Phase 1	TBD	None	
Lake Ellen	50,000	Phase 1	TBD	None	

Estimated Energy Savings: See recommendations above regarding NPW and Nutrified Sludge (NSL) pump station monitors

Operational Considerations: Assuming the process can handle changing the speed, it should have minimal negative impact on operations and measurable improvements on pump health

Recommended Next Step: Pursue Specific Energy technology for the NPW pump station, and perhaps the NSL pump station (see cost estimates above)

31. UV system optimization

Source: CIP

The UV Disinfection System at the Wastewater Treatment Plant is estimated to use about 5% of the annual electrical energy use at the WWTP (about 400,000 kWh per year). Currently, our UV banks are flow-paced (banks and lamps turn on and off, depending on the flow), and we use high-efficiency light bulbs. Although we are measuring the transmissivity of the water, it is not directly being used to control the system. If we can incorporate a real-time transmittance information and control system, we could

potentially turn down the UV system light intensity automatically when it is not demanded by the water quality. Additional investigation is needed to determine if this is possible and cost-effective given our existing UV system.

The City of Grand Rapids, Michigan moved from an exclusively flow-paced UV disinfection system to one that incorporated real-time monitoring of percent ultraviolet transmittance (%UTV) and light intensity. They reduced energy use of the system by 65%. A 65% reduction in the amount of energy that we use for UV disinfection would reduce energy use at our WWTP by an estimated 210,000 kWh per year, but we don't yet know if we could achieve this level of savings.

Estimated Energy Savings: TBD; relevant case studies site a 65% reduction in energy used for UV disinfection

Operational Considerations: Minimal, but could increase the complexity and automation of UV System; Very important to consider and evaluate the impact on reclaimed water quality

Recommended Next Step: Evaluate further

32. Wastewater Treatment Plant water conservation: potable and non-potable

Source: EMP

Non-potable water (i.e. NPW; wastewater treatment plant effluent) is re-used throughout the Mason Farm WWTP for various processes that require water and can be met with non-drinking quality water. The current NPW system provides process water throughout the plant and runs underground. While we have metered total NPW use for a little over a year (we use about 360,000 gallons of NPW each day), we do not meter it on a process level.

Additionally, there is opportunity to assess and reduce the use of potable water at the Mason Farm Wastewater Treatment Plant. OWASA expends 2,356 kWh for every million gallons of water treated. With an annual demand of 16.4 million gallons of annual water demand, this water use accounts for over 38,000 kWh of energy.

Estimated Energy Savings: We anticipate a 30% reduction in NPW energy use from the new pumps and the NPW water use reduction from the new rotary drum presses for solids, taking energy use from the system from about 11,500 kWh per month to 8,000 kWh per month for an annual savings of about 40,000 kWh. Assuming water conservation could reduce pump run time by 25%, the energy use of the NPW system could be reduced another 24,000 kWh per year.

Operational Considerations: Metering NPW water would increase knowledge of operations at the WWTP and would help to identify potential sources of NPW system leaks and efficiencies

Recommended Next Steps:

- Once new rotary drum thickeners are installed, meter NPW use throughout the plant to help quantify the amount of water lost to leaks
- Audit NPW water uses for water conservation opportunities (cost to audit the water system and repair)

Energy Management Projects to Consider in Wastewater Treatment Plant Master Plan

33. Pure Oxygen Infusion at Rogerson Drive Pump Station

Source: AESC

This measure offers an innovative alternative to current aeration technology utilizing high velocity engineered nozzles to create clouds of micro nano-bubbles to be utilized upstream of the treatment facility. Delivering supersaturated oxygen and other gas-water solutions through high velocity nozzles creates "clouds" of micro-nanobubbles which optimize remediation or wastewater treatment, biological activity and wastewater odor management. The recommended measure neutralizes dissolved sulfide and would create an aerobic environment to prevent downstream generation of sulfide, ammonia-N and volatile acids which contribute to significant corrosion, add to the oxygen-energy demand at the treatment plant and increases the toxicity to the activated sludge process. This measure proposes to reduce organic loading to the treatment facility through integration at Rogerson Drive pump station.

The micro-nanobubble solution enables oxygen to remain in the solution up to weeks without measurable loss to off-gassing. This process combines enhanced dissolution capabilities and patented high velocity nozzles for superior oxygen transfer efficiency delivering up to 40x more dissolved oxygen than conventional aeration. The micro nano-bubbles oxygen-water emulsions range from a few nanometers to microns in diameter, resulting in a reduced rate of rise, and minimizing losses to off gassing. This increases the time that dissolved oxygen is available for stabilizing aerobic conditions, biological processes, chemical treatment and environmental remediation.

Estimated Energy Savings: Estimated at 143,000 kWh/year

Operational Considerations: Rapid dissolved oxygen delivery is effective in preventing conditions that produce odors and health hazards; Inline injection could potentially assist in reducing sewer pipe corrosion; Low operating costs, minimal operator requirements; Increased positive biological activity, enhanced organic sludge reduction, oxidation of various contaminants; Micro-nanobubbles' low buoyancy reduces off gassing; The micro nano-bubble process results in enhanced solubility and gas transfer efficiency, making higher concentrations available, providing more interface surface area and extended time in solution. It combines for better biological activity, chemical reactions or emulsification of various contaminants; Potential elimination the operation of "Peacemaker" odor control system

Recommendation: Consider in WWTP Master Plan

34. Develop side stream treatment for digester filtrate

Source: AESC

Digester filtrate is a major energy load to the Biological Nutrient Removal (BNR) system. The digester filtrate is blended at the BNR entrance with primary influent flow. Digester filtrate is highly concentrated with Ammonia-N, creating a large biological load that the BNR aeration system must remove. The digester filtrate also creates alkalinity demand and pH fluctuation which affects stability of the activated sludge process causing them to carry excess bio-solids. This all adds to energy demand for basic treatment, oxidation of excess solids and mixing of excess tank volume. It is recommended to install a side treatment system which can specifically target the biology of the digester filtrate. The side treatment would include NanO2 Oxygen infusion and bio-augmentation in a spare tank, specific location

to be determined. The recommendation not only reduces the activated sludge aeration load but also reduces chemical cost (pH control and acetic acid) and provides better process balance for downstream systems.

Estimated Energy Savings: Estimated 330,000 kWh/year

Operational Considerations: Multiple operational considerations

Recommendation: Consider in WWTP Master Plan

35. Chemically enhanced primary treatment in headworks

Source: AESC

A semi-standard practice is to add 8-20 mg/L ferric chloride and 0.1-0.5 mg/L cationic polymer to raw sewage entering the plant. This increases solids removal across primary clarifiers. Additionally, the recommendation allows higher hydraulic loading rate and reduction in number of tanks in service which translates to reduced pumping energy and potentially creates redundancy in the system. The increased removal of solids in the primary means reduced pass-through of particulate and colloidal BOD, which reduces blower energy in BNR system. Iron salts also promote biological fermentation, which could enhance the performance of the fermenter, when returned to service. As a potential future side benefit an increase in digester gas should be expected from this measure, this would be impactful if OWASA pursued generation technologies utilizing digester gas as the fuel or considered in other co-generation studies currently under consideration.

Estimated Energy Savings: 129,000 kWh/year

Operational Considerations: Multiple operational considerations; Could help to minimize solids, if we go down to two clarifiers.

Recommendation: Consider in WWTP Master Plan

36. Bioaugmentation of Primary Fermenter

Source: AESC

It is recommended to add selected bacterial cultures to produce specific, desired volatile fatty acids (VFAs) in the secondary treatment basin. The goal is to reduce or even eliminate casual production of toxic VFAs that negatively impact nitrifying bacteria yet increase biological oxygen demand and thus the load on the blowers. Through generation of the correctly balanced VFAs there would also be a significant reduction in the chemical costs needed to maintain process specifications (i.e. caustic to balance pH when over producing nitrification). If an aeration train can be removed from service, there would be additional energy savings from no longer needing to operate the associated mechanical mixers.

Estimated Energy Savings: 49,000 kWh/year

Operational Considerations: Multiple operational considerations

Recommendation: Consider in WWTP Master Plan

37. Secondary Treatment Ammonia Based Aeration Control, Pulsed Bubble Mixing and Oxygen Infusion

Source: AESC

The plant currently utilizes dissolved oxygen (DO) measurement and fixed setpoint control for aeration sequencing. DO control is a proxy to ensure that biological processes are occurring but often results in over aeration and/or chemical utilization. Activated sludge mixing is mostly achieved using submerged Invent hyperboloid mixers in each zone. The plant has three activated sludge aeration trains, each with four zones which can be used as either aerobic or anoxic zones, as needed. Utilizing an active monitoring system such as ammonia-based aeration control will reduce energy associated with excessive aeration blower and mixer demands. Ammonia-based aeration control (ABAC) is a feed-forward and feed-back cascade control concept for controlling total ammonia nitrogen (NHx-N) in the secondary treatment process. Its main goals are to tailor the aeration intensity to the NHx-N loading and to maintain consistent nitrification/denitrification, to meet effluent limits but minimize excessive energy consumption. The time interval for nitrification and denitrification phases is based on real time measurements of NH4-N and NO3-N in the SBR tank. Understanding both NH4-N and NO3-N levels in the treatment basin ensures the correct level of DO for the nitrification stage and prevents nitrate exhaustion causing orthophosphate release during the denitrification state or untreated nitrate harming the total nitrogen compliance and reducing settling efficiency. This improves floc formation and settling. This increases treatment capacity and will likely support removal of one BNR train from active service during dry-weather months, eliminating energy wasted in mixing of excess volume. Should the wastewater eventually have a specific ammonium and total nitrogen limit, functionality can be built into the control strategy to allow priority to be given to a particular parameter, giving the plant maximum compliance protection and improved treatment flexibility.

The function of the pulsed large bubble technology is to improve overall mixing and gain full function of tank volumes for secondary treatment. Large bubble mixing will eliminate “dead zones” on the floor and in the corners of the tanks (~10% of tank volume). It will also eliminate toxicity and oxygen demand associated with septic sludge accumulating on the floor of the tanks and gain full treatment activity.

The sequential large bubble mixing system provides bursts of air radially through narrowly spaced twin plates fixed to the floor of a tank or vessel. This burst radiates a broad plate of air outward, which induces formation of a large bubble (3-4 feet in diameter) into the liquid at bottom of tanks and vessels. Non-aerated mixing is created via the buoyant force of the massive bubble rising through the liquid. The upward velocity of the bubble both pushes and pulls water through the column by creating pressure at the top of the rising bubble, and vacuum below the bubble as it rises. As the large bubble rises through the water, it creates micro-currents along the sides of the bubble which creates latent eddies in the column of water. These eddies spin the mixed liquor in anoxic and aerobic zones. It also entraps diffused air bubbles in the aerobic zones, causing the small aeration bubbles to linger in the water, and continue oxygen transfer to the activated sludge. Additionally, at the moment of the “burst,” the air provides a shallow, intense hydraulic shock wave outward across the floor of the tank. This hydraulic shock wave essentially helps to jar any organic sediments off the floor and into the flow of water coming in towards the bubble. At the water surface, the velocity gradient moves any foam away from the middle of the tank and towards the outer perimeter, where it is usually pulled back into the water, or where may be removed. This helps to keep the surface of the tank clear of foam and debris that can harbor undesired organisms, such as Nocardia. Oxygen infusion offers an innovative addition to current aeration technology utilizing high velocity engineered nozzles to create clouds of micro nano-bubbles to be used in combination with the current aeration blowers. Delivering supersaturated oxygen and other gas-

water solutions through high velocity nozzles to create "clouds" of micro-nanobubbles which optimize remediation or wastewater treatment, biological activity and wastewater odor management.

Below is an overview of the key characteristics and benefits of this measure:

• The micro-nanobubble solution enables oxygen to remain in the solution for prolonged periods without measurable loss to off-gassing. The SOTE of infused oxygen is not constrained by tank depth as there is virtually no rate of rise. This process combines enhanced dissolution capabilities and patented high velocity nozzles for superior oxygen transfer efficiency delivering up to 40x more dissolved oxygen than conventional aeration. The micro nano-bubbles oxygen-water emulsions range from a few nanometers to microns in diameter, resulting in near-zero rate of rise, and minimizing losses to off gassing. This increases the time that dissolved oxygen is available for biological processes, chemical treatment and environmental remediation.

• Rapid dissolved oxygen delivery effective in preventing conditions that produce odors; SOTE approaching 95% with a rated alpha factor of 1.0.

• Low operating costs, minimal operator requirements

• Increased biological activity, enhanced organic sludge reduction, oxidation of various contaminants

• Micro-nanobubbles' low buoyancy virtually eliminates off gassing

• The micro nano-bubble process results in enhanced solubility and gas transfer efficiency, making higher concentrations available, providing more interface surface area and extended time in solution. It combines for better biological activity, chemical reactions or emulsification of various contaminants.

Estimated Energy Savings: 610,000 kWh/year ($36,700/year)

Operational Considerations: This strategy will be a key consideration in efforts to reduce nitrogen levels in effluent.

Recommended Next Step: Consider in WWTP Master Plan

38. Convert Aeration Basin(s) to Simultaneous Nitrification / Denitrification

Source: AESC

In combination with installing Ammonia-based aeration control (see strategy above), it is recommended to utilize a simultaneous Nitrification Denitrification (SNdN) control strategy. Biological nitrogen removal from wastewater typically happens through aerobic nitrification (from ammonia to nitrate) and anoxic denitrification (nitrate to nitrogen gas). If conversion is directly from ammonia to nitrogen gas, there is less oxygen required, reduced air demand and therefore less energy consumed. SNdN technologies can produce reuse quality effluent and meet the most stringent nutrient limits given the right flowsheet and appropriately sized diffused aeration systems. As the most common challenge to getting the full benefit from SNdN is turndown of equipment and process monitoring. Systems must be equipped with enough aeration turndown and similar process turndown. The Mason Farm WWTP appears to have adequate turndown in its aeration equipment. Automation should properly control oxygen delivery to efficiently hit operator adjustable set-points. Consistent nitrogen removal can be achieved and tight limits with ammonia-N below 1 mg/l and TN below 3mg/l in conventional activated sludge systems.

Estimated Energy Savings: 430,000 kWh/year

Operational Considerations: This strategy (in combination with ABAC – see above) will be a key consideration in efforts to reduce nitrogen levels in effluent.

Recommended Next Step: Consider in WWTP Master Plan

39. Convert Dewatering and Sludge Handling to Thermal Vacuum Desiccation System

Source: AESC

The thermal vacuum desiccation (TVD) system pasteurizes, lyces and dries sludge to an increased control point, typically in the range of 85-98% TS. The system uses thermal (steam) vacuum and dehydration to produce dried solids with low emissions, high-energy efficiencies and where applicable pathogen kill. In a single operation involving two stages, the liquid waste is first dewatered under pressure and then dried under vacuum. While the DryVac unit appears physically similar to standard plate filter presses, the actual plates are replaced by DryVac Elastic Envelope Modules (DEEMs). These modules expand and contract according to pressure/vacuum being applied either externally or internally. The system can make use of waste heat and is an excellent heat sink for potential waste heat from power generation technologies (for example internal combustion engine). This could allow the DryVac unit to operate with or in the absence of the digestion system. The estimated energy savings are assumed to be in the absence of digestion, energy savings are also achieved by no longer running the existing dewatering equipment.

• Stage One: the dewatering takes place in a very similar way as with the rotary press. That is, conditioned sludge is pumped into the sludge chambers, which are lined with filter cloths; solids are retained in the press while liquids are forced out.

• Stage Two: is where the DryVac process differs from standard filtration presses. In the drying stage, low-pressure steam is used to inflate the DEEMs and, at the same time, a vacuum is applied to the filtrate ports. During this process the cells lyse to release biophysically held water and the cake is squeezed as the DEEMs inflate. The application of heat to the filter cake and the pulling of a vacuum on the filter chamber result in the remaining water being vaporized at low temperature. The walls of the expanding DEEMs remain in contact with the sludge ensuring effective heat transfer. By regulating the duration of the drying stage, the dry solids of the end product can be accurately controlled. Because the cake is much drier (~90-95% TS) than with a conventional press, at the end of the drying cycle the solids drop out easier, leaving the DEEMs relatively clean. The net benefit here is a significantly reduced solids handling cost while still being able to land apply the dried solids cake and therefore no penalty in disposal related costs.

Estimated Energy Savings: 570,000 kWh/year

Operational Considerations: AESC reports that Thermal Vacuum Desiccation meets the UW EPA 503 regulations for Class A biosolids. Staff have expressed concerns/have questions about the viability of this strategy given current infrastructure. Staff also doubts the capital costs projected for this project ($1.7 million).

Recommended Next Step: Consider in WWTP Master Plan

40. Implement Solids Retention Time (SRT) Control removing Secondary Clarifier

Source: AESC

The plant currently utilizes a dissolved oxygen control for aeration sequencing. With only infrequent monitoring of treatment constituents, energy is wasted with extended mixing and aeration cycles, over-processing and delay in cycle-time control. Utilizing recommended ammonia-based aeration control (38) and simultaneous nitrification denitrification (39) along with solids retention time (SRT) control improves overall BNR performance and minimizing energy demand. SRT is a process measure used to control the mass of biology in the BNR. It is often controlled longer than is necessary, sometimes greater than 20 days, causing excessive energy demands as bio-solids oxidize in the BNR rather than downstream in the digester(s). Automating this process, typically in the 8-10 days range, will reduce the number of oxidizing bio-solids which create added BOD thus demand on the aeration blowers and creates added solids production in the secondary clarifiers. It is preliminarily estimated that adequate SRT control would result in needing to operate only one secondary clarifier. This would reduce the energy required for the system. Furthermore, it would give the plant extra redundancy and reduce wear and tear on the equipment, improving its life expectancy and associated maintenance and replacement costs.

Estimated Energy Savings: 112,000 kWh/year

Operational Considerations: Current plant infrastructure and control limitations are significant to achieve tighter controls

Recommended Next Step: Consider in WWTP Master Plan

41. Install 1 MGD Reflective UV Treatment Chamber Train

Source: AESC

Reflective chambers enhance UV efficacy so that it is possible to achieve greater dosage with lower wattage. Reflective chamber light systems capitalize on UV light "bouncing back" through the water multiple times until absorbed by the intended targets rather than concrete walls. This required significantly lower source light, source power, and overall energy consumption. The existing UV system operates well at high and medium plant loading. However, the existing UV system has minimal turndown capability for low load operation and has operational deficiencies when attempting to trim beyond the system capability. Overall, the UV system demonstrates excellent UV transmittance (UVT) specifically calibrated to 254 nm and with many years of quality remaining life expected. Therefore, it is recommended to install a trim UV treatment chamber train. The recommended system will provide matched capacity during low load operation and has a better UVT performance. It is estimated that energy savings will be achieved for approximately 40% of the annual operating hours.

Estimated Energy Savings: 114,000 kWh/year

Operational Considerations: Staff have questions on the cost viability of this strategy, considering that it is likely to require extensive construction.

Recommended Next Step: Consider in WWTP Master Plan

42. Convert Trickling Filtration Beds to EQ Basins

Source: AESC

This measure proposes to utilize the existing trickling filters system as the primary means for equalization. The trickling filters are estimated at a total capacity of 1,000,000 gallons. This measure would serve to reduce treatment plant power by improving the organic loading through controlled hydraulic loading when conditions allow for utilization of the recommended equalization (EQ). The existing infrastructure to facilitate this measure does exist but will need to be extensively overhauled to ready them as equalization basins. The cost could be significant to modify the trickling filters to EQ basins, the specifics of this cost has not been evaluated in detail. Although the facility could greatly improve from EQ capacity this may not make economic sense, especially with other recommended measures supporting the balancing of organic and hydraulic loading.

Estimated Energy Savings: 80,000 kWh/year ($4,800/year)

Operational Considerations: An EQ basin would provide significant benefit to operations on a day-to-day basis. However, the cost would be great.

Recommended Next Step: Consider in WWTP Master Plan

43. Install High Efficiency Digester Mixing System

Source: AESC

This project suggests replacing one 45HP digester gas mixing pump and connected distribution nozzles with a submersible mixing device internal to the digester. The new mixers will be equipped with real-time intelligent controls to adjust speed to save energy and avoid cavitation. Additionally, the fully adjustable mixers increase redundancy and mixing energy across the tank while maximizing tank turnovers to increase biogas production. The new mixers allow the operators to adjust the height and angle from outside the tank and allows for easy access for mixer inspection and maintenance without the need to remove the digester from service. It is proposed to replace the existing mixing pumps with a more efficient internal, submersible mixing system. The new mixing system would be approximately 10HP, while maintaining or exceeding the number of daily turnovers required by the site.

Estimated Energy Savings: Estimated 220,000 kWh/year

Operational Considerations: Multiple operational considerations

Recommended Next Step: Consider in WWTP Master Plan

44. Install Organic Rankine Cycle (ORC) Power Generation Unit Utilizing Digester Gas

Source: AESC

The WWTP utilizes anaerobic digestion to treat biosolids. The digestion process produces digester gas as a co-product of the system. Digester gas is used as the sole fuel source for the hot water boilers that provide heating to the digester solids. Approximately 50% of the produced digester gas is used in the boilers. Excess digester gas is flared, providing minimal benefit to the facility nor larger societal benefit.

OWASA has previously evaluated many alternatives to utilize the digester gas in the hope of identifying a useful and cost-effective option. To date a viable option has not been identified. It is recommended for further investigation into an Organic Rankine Cycle power generator. Preliminary analysis is presented in this report for a 240kW output system with an estimated simple payback of approximately 11 years.

Estimated Energy Savings: Estimated 1,610,000 kWh/year

Operational Considerations: Multiple operational considerations

Recommended Next Step: Consider in WWTP Master Plan

Energy Management Projects to Delay Until Upgrade

45. Install Hydropneumatic Tank on WWTP NPW System

Source: Kimley-Horn

Installation of a hydropneumatic tank may reduce the amount of time that the pumps are in operation because they are trying to maintain pressure. Additional investigations are required to determine sizing and whether a significant savings can be realized.

Estimated Energy Savings: TBD

Operational Considerations: A hydropneumatic tank would better regulate pressure in the system and improve operations.

Recommendation: Delay until upgrade/technology advancement

46. Install VFDs on Treatment Plant Odor Scrubbers

Source: AESC

The WWTP is equipped with a 40 HP Main Odor Scrubber Fan and a 25 HP Biofilter Foul Air Fan. The odor exhaust fans are used to remove potentially harmful build-up of H2S gas. The exhaust fans operate full speed 24 hours per day with fixed damper positions throughout the exhaust collection system. It is recommended to install a VFD on each of the exhaust fans as well as H2S meters with a feedback loop controlling the VFD speed. The fans could operate at reduced speeds depending on the measured H2S PPM in the space.

It is recommended to have multiple H2S meters for each fan and the meter with the higher PPM reading would dictate the speed of the fan. The dampers throughout the exhaust collection system could be set to the fully open position to remove unnecessary pressure drops in the system. Sizable energy savings can be achieved as the power draw of the fan is proportional to the cube of the speed, according to fan affinity laws. The auditor used an exponent of 2 rather than 3 to be conservative, with the understanding that the third power is theoretical.

Estimated Energy Savings: 198,000 kWh/year ($11,900/year) – if partnered with projects that reduce foul air flow

Operational Considerations: This strategy has potential energy savings if foul air flow is reduced through other measures. Currently, increased air flow is needed. Staff is skeptical about the efficacy of the technology.

Recommendation: Delay until upgrade/technology advancement

47. Install Pony Blower for Secondary Treatment

Source: AESC

The secondary treatment basin receives air from the (4) 250HP Turblex blowers rated at 5000 scfm to deliver low pressure dissolved oxygen to the activated sludge process. The blowers are staged based on dissolved oxygen (DO) content in the aeration basins. Each blower is capable of turn down to 45% capacity. It is most common for the aeration demand to require either one or two blowers to run at a time. During the site visit one blower was operating at minimum turndown (45% capacity) and a second blower was operating at approximately 80-85% capacity.

It is not recommended to install a pony blower at this time as there appears to be adequate turndown capacity with implementing the recommended measures in this report that impact aeration load. It is conservatively forecasted that with implementation of other measures to turn down aeration needs, a single blower would operate at near minimum turndown. It is recommended to monitor the aeration blower performance to appropriately determine the future relevance of a pony blower.

Estimated Energy Savings: Unknown

Operational Considerations: Staff is unsure about the viability of this strategy given current infrastructure and controls on aeration system.

Recommended Next Step: Delay until upgrade

48. Install Sludge Density Meter in Digester

Source: AESC

Monitoring of the inlet sludge density will improve control of sludge concentration and heat demand in the digesters. The sludge concentration will, through a feedback loop, dictate the pumping rate and temperature control thereby reducing the amount of cold water entering the digester and reducing pumping rates. Heating demand on the boiler would be reduced thereby maintaining a greater available volume of digester gas, this would be beneficial if a viable utilization of digester gas is implemented in the future.

Estimated Energy Savings: 66,000 kWh/year

Operational Considerations: In 2020, we will be installing new rotary drum thickeners, and we will not be able to judge sludge thickness. Staff is skeptical about the efficacy of current technology.

Recommended Next Step: Delay, continue to monitor technology

49. Upsizing the impellers at Morgan Creek Pump Station

Source: Kimley-Horn

Upsizing the impellers has the potential to offer savings up to approximately $5k per year. Combining this with other alternatives could increase the savings even more. If OWASA needs more capacity or needs to replace an impeller, K-H recommend considering upgrading the impellers and then reevaluating the station to determine the optimum speed ranges to operate in based on test results with the new impellers.

Includes installing full diameter impellers in each pump. This option would also be coupled with other options to maximize efficiency but without test data from a new impeller, combined scenario calculations are not possible.

Estimated Energy Savings: 60,000 kWh/year ($5,000/year)

Operational Considerations: Unknown

Recommendation: Delay until upgrade

50. Install additional hydropneumatics tanks on Reclaimed Water (RCW) system and on-site at UNC

Source: Kimley-Horn

The reclaimed water station operates to maintain a pressure range with limited volume/pressure storage. Adjusting the controls regime does not result in a very significant energy savings under any scenario. The greatest energy savings is to adjust the controls such that the largest pumps run more often than the smaller pumps, but this is estimated to only save approximately $2,500 per year. Installing additional storage in the RCW system would allow for a reduction in the amount of time that each pump is in operation and would allow for more flexibility to adjust the pumps so they operate in a more efficient range. The intent of the additional hydropneumatic tank would be to "buffer" the RCW station from fluctuations in demands, resulting in less frequent starts/stops. Furthermore, the hydropneumatic tank and/or elevated storage to meet system demands and pressures, reducing pump run times and energy consumption.

Estimated Energy Savings: Unknown

Operational Considerations: This strategy would help to manage pressure fluctuations in the reclaimed water distribution system.

Recommendation: Delay until upgrade

51. Water tank-mounted micro-wind turbine

Source: EMP

The 2017 Energy Management Plan considered the installation of large-scale wind turbines and found such an approach for OWASA unviable given the generally low average wind speeds in our region. However, micro-wind turbines have recently emerged as potentially promising for installation on elevated water tanks. The installations would be relatively simple and for water tanks with associated

or nearby energy use, could help offset small but continuous energy needs. These turbines (such as this https://www.halo.energy/technology) are relatively small, 20-kW installations with the potential to generate 8,000 – 15,000 kWh per year. They are designed to take advantage of the wind tunnel created by the round shape of the tank itself. It is estimated that a unit would cost about $20,000 to purchase plus installation costs. Although the generation potential is relatively small, the Energy Team recognizes the unique nature of this renewable energy generation potential and recommends additional analysis of a potential pilot application at the Nunn Mountain Elevated Tank.

Estimated Energy Savings: TBD, relatively small

Operational Considerations: Minimal, relatively new technology

Recommended Next Step: Monitor technology and evaluate upon upgrade

52. Use batteries to improve system resilience, reduce energy costs, and utilize renewable energy

Source: EMP

According to Bloomberg New Energy finance, the price of a lithium-ion battery dropped 73% since 2010, due in part to technology improvements and economies of scale. We are approaching a time where batteries could be used to provide back-up power for small pump stations, which would potentially be a more resilient approach than mobile generators for managing power outages. Moreover, when partnered with renewable energy generation, batteries can provide options for significantly reducing our use of purchased electricity and evening out our demand on the grid.

As OWASA considers power resiliency for the future, the Energy Team recommends that analysis of what situations and at what price points do batteries become a viable option for system resiliency, energy cost reduction, and renewable energy integration in OWASA's operations. In particular, the Energy Team recommends that the upcoming study of diesel fuel capacity needs at our pump stations include a consideration of the incorporation of batteries for back-up generation needs (particularly at smaller pump stations).

Evaluations for Cane Creek solar system were completed this year, but there was no cost competitive way to add batteries as of yet.

Estimated Energy Savings: TBD

Operational Considerations: Potential to avoid deploying mobile generators when power is out

Recommended Next Step: Monitor technology and evaluate upon upgrade

Agenda Item 5:

Long-Range Water Supply Plan: Drought Response Operating Protocol

Purpose:

To receive guidance from the Board of Directors on incorporating OWASA's Drought Response Operating Protocol into the Water Shortage Response Plan to improve the resiliency of OWASA's existing water supply by improving access to our Jordan Lake allocation.

Background:

- OWASA has two documents that describe actions it will take during water shortages due to drought or operational emergencies: (1) the Water Shortage Response Plan (WSRP, Attachment 1), and (2) the Drought Response Operating Protocol (DROP, Attachment 2).
- The WSRP is required by North Carolina General Statute 143-355(l), which was enacted in response to the drought of 2007-08. Requirements of the WSRP are included in the statute and in regulation 15A NCAC 02E .0607. Attachment 3 includes summary information on the WSRP.
- The WSRP includes triggers for when OWASA declares mandatory water shortages based on storage in our three local water supplies: Cane Creek Reservoir, University Lake, and the Quarry Reservoir. OWASA also has had an allocation of water from Jordan Lake since 1988; our current allocation would provide about 5 million gallons per day, which we can access through our mutual aid agreements.
- The OWASA Board of Directors adopted the DROP on January 10, 2013. The DROP is a Board-adopted policy, and there is no regulatory requirement for this document.
- The DROP states that OWASA shall declare a Water Shortage Advisory no later than when the total water storage in the University Lake, Cane Creek and Quarry Reservoirs drops to within 10 percent of the mandatory Stage 1 triggers specified in our WSRP.
- Therefore, the DROP provides our customers and the community with timely notice of potential water shortages and provides an opportunity to reduce demands on a voluntary basis before mandatory conservation measures are initiated (beyond year-round requirements) and drought surcharges are imposed.
- However, the DROP approved by the OWASA Board of Directors in January 2013 prohibits OWASA from proactively purchasing water from neighboring utilities or from using water originating from our Jordan Lake water supply allocation before a Stage 1 (or more severe stage) water shortage threshold has been met as outlined in the WSRP.
- In the near-term, more flexibility in accessing our Jordan Lake allocation would help increase the resiliency of our reservoirs. Under the current situation, we have no assurance that we will be able to access our Jordan Lake allocation in a drought. During water shortages, other utilities may need to access their Jordan Lake allocations, and we may be limited in the amount of water we can receive due to infrastructure constraints (e.g., the capacity of the Cary/Apex Water Treatment Plant (WTP) and/or interconnection capacity).

- OWASA and other local utility staff recognized the limited drinking water the Cary/Apex WTP can provide during a drought and the need to make good use of Jordan Lake as a regional resource. Thus, OWASA partnered with other utilities to have Dr. Greg Characklis (Professor, UNC Department of Environmental Science and Engineering, and Director of UNC Center on Financial Risk in Environmental Systems) conduct a study to determine how the region could work together to optimize use of Jordan Lake given current infrastructure limitations. Professor Characklis's report emphasizes the importance of earlier purchases of water through Cary, from OWASA's allocation, as an important strategy in maximizing use of the Jordan Lake water resources for all regional partners, especially during early stages of drought, (potentially before a Stage 1 shortage), to reduce the risk of severe shortages.
- The OWASA Board of Directors determined at its August 13, 2020 work session that Jordan Lake is the most cost-effective option to meet our long-term (50-year) water supply needs. However, the restrictions that the DROP places on our use of our Jordan Lake allocation would make our Jordan Lake options less effective and ultimately, more costly. For the alternatives where OWASA would make a capital investment in the Western Intake and WTP, OWASA would be making significant capital investments that we would only be able to access or use during severe water shortages.
- In order to increase the near-term resiliency of OWASA's water supply and to make viable any potential alternative to more reliably access our Jordan Lake allocation, the Board of Directors authorized staff to develop a process to modify the DROP at its August 13, 2020 work session.
- The WSRP and DROP are related and somewhat redundant documents. In order to avoid potentially contradictory language between two documents, staff recommends that the provisions of DROP that do not impede access to our Jordan Lake allocation be incorporated into the WSRP, and that the DROP be rescinded. The WSRP is required to be updated at least every five years, and the Board and public will have opportunities to review the document each time it is updated.

Incorporating DROP provisions into WSRP

Staff propose modifying the following sections of the WSRP:

- Section 4 – replace language regarding DROP
- Section 5, Mandatory Water Shortage Response Triggers – this section would be modified to include the voluntary advisory levels on the WSRP Figures 5-1 through 5-4. Text explaining the advisory stage would also be included.
- Section 9, Public Review and Comment – this section would be updated to reflect the meetings where the Board discussed incorporating DROP into WSRP.
- Appendix C: Drought Response Operating Protocol – this section would be removed.
- Appendix D: Resolutions Approving OWASA's Water Shortage Response Plan – this section would be updated to include a new resolution of the Board's approval of the updated WSRP.

In addition to these changes, staff would also update staff contact information in Section 2, incorporate the most recent rate information in Section 4, and make other minor edits. Suggested changes are shown in revisions mode in Attachment 1.

Staff and Counsel Recommendation and Action Needed:

Staff recommends incorporating provisions in DROP into the WSRP as it consolidates documents and eliminates the potential for conflicting language in the near term and in the future as we update the WSRP as required by statute. When the WSRP is modified and approved by the Board of Directors, staff recommends the Board of Directors eliminate the DROP. Staff believes that this process will be more efficient for the Board and staff.

If the Board concurs with this recommendation, we recommend the Board authorize staff to proceed to modify the WSRP. Draft motion language follows:

> *Motion to authorize staff to proceed to modify the Water Shortage Response Plan to incorporate the water shortage advisory information in DROP for future consideration by the Board.*

Information:

Attachment 1: Water Shortage Response Plan

Attachment 2: Drought Response Operating Protocol

Attachment 3: Background on OWASA's Water Shortage Response Plan

Note: This version includes the approved June 2018 Water Shortage Response Plan (WSRP) with suggested changes in revisions mode if Board decides to move forward with incorporating DROP provisions into WSRP

WATER SHORTAGE RESPONSE PLAN

(DATE WSRP APPROVED BY BOARD)

Orange Water and Sewer Authority

Carrboro, North Carolina







ORANGE WATER AND SEWER AUTHORITY

WATER SHORTAGE RESPONSE PLAN

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APPENDIX A – OWASA WATER CONSERVATION STANDARDS

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APPENDIX C~~D~~ – RESOLUTIONS APPROVING OWASA'S WATER SHORTAGE RESPONSE PLAN

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SECTION 1.

PURPOSE AND BACKGROUND

This Water Shortage Response Plan (WSRP) describes the actions Orange Water and Sewer Authority (OWASA) will take during a water shortage condition due to drought or special operational constraints, including the measures that OWASA will implement to reduce potable water use during such shortage conditions. This plan has been prepared as required by North Carolina General Statute (NCGS) 143-355(l).

That statute requires most public water systems in the State to have a State-approved WSRP as a component of their Local Water Supply Plan. State regulations governing water use during droughts and water emergencies (15A NCAC 02E .0607) and Session Law 2008-143 passed in July 2008 set forth specific items that must be included in local WSRPs.

OWASA's WSRP is generally organized along the lines of the North Carolina Division of Water Resources' (DWR) *Water Shortage Response Plan (WSRP) Guidelines* issued in January 2009. This plan meets the following criteria as required by the State, including:

- ✓ tiered levels of water conservation measures or other response actions based on the severity of a water shortage condition;
- ✓ each tier is based on increased severity of drought or water shortage condition and represents increasingly stringent conservation measures;
- ✓ specific measurements of available water supply, water demand and system conditions that OWASA *must use* to determine the severity of water shortage conditions and to initiate water use reduction measures and the movement between various water shortage stages;
- ✓ procedures that will be followed to ensure compliance with the provisions of the plan;
- ✓ procedures for affected parties to review and comment on the plan prior to final adoption;
- ✓ procedures to receive and review applications for variances from specific requirements, and the criteria that will be used to evaluate such requests;
- ✓ general method for evaluating the effectiveness of the plan; and
- ✓ procedures for reviewing and revising the plan, which must be done at a minimum of every five years concurrent with the update of the state-required Local Water Supply Plan.

DWR is responsible for reviewing all Water Shortage Response Plans to ensure they meet the State's minimum requirements.

This plan is only one part of OWASA's long-term water conservation and demand management efforts. The OWASA Board of Directors approved a Long-Range Water Conservation and Demand Management Goal and Objectives in April, 2005. OWASA's primary strategies for

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achieving its long-term conservation goals and objectives, and which are complementary to this WSRP but not described in this document, are:

- ✓ implementing aggressive conservation pricing structures, including increasing block water rates for residential customers, year-round water rates for all irrigation use, and seasonal water rates applicable to all other customers;

- ✓ promoting the use of reclaimed water for non-drinking purposes;

- ✓ treating and recycling drinking water treatment plant process water back to the head of the water plant; and

- ✓ providing education and awareness, including targeted water use audits for customers, technical assistance to developers, etc.

Additionally, water demands by OWASA's existing and future customers will be shaped by factors outside the control of OWASA, including but not limited to:

- ✓ Session Law 2007-546 (Senate Bill 668), "*An Act to Promote the Conservation of Energy and Water Use in State, University, and Community College Buildings*;"

- ✓ changes in water use efficiency standards of the NC Plumbing Code, as suggested in the North Carolina Department of Environment and Natural Resources' report titled "*Recommendations for Water Efficiency Standards for Water-Using Fixtures in Residential and Commercial Buildings*" (January 2009); and

- ✓ changes in climate, precipitation, and/or land use, which would affect rates and patterns of inflows into OWASA's water supply reservoirs, as well as customer demands.

Additional information about OWASA's comprehensive water conservation efforts is available on OWASA's website at www.owasa.org; by e-mail to info@owasa.org; by phone at 919-968-4421; by fax to 919-968-4464; or by mail to OWASA, 400 Jones Ferry Road, Carrboro, NC 27510.

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SECTION 2.

AUTHORIZATION

OWASA's Executive Director is responsible for: (a) declaring a Water Shortage as described in this Plan; (2) enacting the applicable provisions of this WSRP; and (3) overseeing implementation of the Plan. In the Executive Director's absence, OWASA's General Manager of Operations is responsible for such actions.

As required by NCGS 143-355, OWASA will implement the provisions of this Plan whenever the trigger conditions established herein (and/or as they may be revised from time to time in accordance with Section 10 of this plan) occur.

Following is the contact information for the above-listed individuals as of the date of this plan:

PRIMARY RESPONSIBILITY
Todd Taylor~~Ed Kerwin~~, or Successor
Executive Director
Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

Telephone: 919-537-4216~~1~~
E-Mail: ~~ekerwin@owasa.org~~ttaylor@owasa.org

ALTERNATE
Mary Darr~~Todd Taylor~~, or Successor
General Manager of Operations
Orange Water and Sewer Authority
400 Jones Ferry Road
Carrboro, NC 27510

Telephone: 919-537-42~~41~~6
E-Mail: ~~ttaylor@owasa.org~~mdarr@owasa.org

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SECTION 3.

NOTIFICATION OF EMPLOYEES AND CUSTOMERS

OWASA will, as soon as possible, notify its employees, customers, and the public if and when a Water Shortage declaration is issued as described in Sections 4 and 5. Such notification will be provided via several methods, including but not limited to the following:

1. OWASA's Executive Director (or designee) will notify the following officials and agencies:

   - ✓ OWASA Board of Directors;
   - ✓ OWASA General Counsel;
   - ✓ Managers of the Towns of Carrboro and Chapel Hill, and Orange County; and
   - ✓ Division of Water Resources and the Public Water Supply Section within the NC Department of Environment and Natural Resources.

2. The Executive Director (or designee) will inform all OWASA employees of changes in Water Shortage stages and conservation requirements applicable to OWASA customers. This will be communicated via one or more methods, including but not limited to:

   - ✓ e-mail through the OWASA Local Area Network;
   - ✓ presentations at staff and crew meetings; and
   - ✓ memoranda or other written materials.

   Employees will be reminded of their role and responsibility and applicable procedures for monitoring and responding to potential or actual violations of applicable water use restrictions. If an employee observes such an event, he/she will be instructed to attempt to inform the customer of the restrictions in effect, the observed violation, the need for corrective action by the customer, and consequences of repeat violations.

3. OWASA's Communications and Community Relations Officer (or designee) will contact the news media (including newspapers, television, and radio) and provide them with information about the applicable declaration, associated requirements, water rate surcharges if applicable, etc. Such notifications may be made by e-mail, website postings, news releases, telephone, etc. News releases will include the name(s) and contact information of the OWASA staff member(s) that will be primarily responsible for addressing media inquiries.

   As in the past, OWASA will make extensive use of e-mail, the media, the OWASA website, etc. to provide information to its customers about the need to conserve water, the use restrictions in effect, and water rate surcharges if applicable.

4. The Communications and Community Relations Officer (or designee) will be responsible for updating the OWASA website in a timely manner regarding current information on the status of local water supply and demands, Water Shortage declarations, conservation requirements, and water rate surcharges if applicable.

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5. The Communications and Community Relations Officer (or designee) will assist OWASA staff in responding to customer inquiries.

6. The Communications and Community Relations Officer (or designee) will contact local law enforcement personnel about the applicable water conservation requirements in effect during the declared Water Shortage.

7. If feasible, OWASA will notify residential and non-residential customers of water restrictions via media and e-mail. In addition, OWASA staff may provide targeted information to the following customers:

    - ✓ The University of North Carolina at Chapel Hill;
    - ✓ UNC Hospitals;
    - ✓ Chapel Hill-Carrboro City Schools;
    - ✓ multi-family residential property owners/managers/residents;
    - ✓ irrigation customers;
    - ✓ hotels, motels, and restaurants; and
    - ✓ others as appropriate.

8. OWASA may place informational signs at high-visibility locations, such as the OWASA Administration Building, local town halls, entranceways to Carrboro and Chapel Hill, etc.

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SECTION 4.

WATER SHORTAGE RESPONSE PROGRAM

The cornerstones of OWASA's water shortage response strategy are:

1. Water Conservation Standards, including year-round water use restrictions;

2. OWASA's water rate surcharges that are implemented during a declared water shortage and increase as the severity of the shortage increases; and

3. Public education and awareness, including provisions for voluntary issuance of a water shortage advisory by OWASA during unusually dry periods.

Water Conservation Standards

OWASA has established Water Conservation Standards that apply to the use of OWASA drinking water by all customers. The current Standards, which went into effect in June 2009, include year-round water use restrictions and four tiers of increasingly strict requirements depending on the severity of water shortage conditions.

The Water Conservation Standards are summarized in Table 4-1. The full text of the current Standards is included as Appendix A.

To complement and support OWASA's water shortage response program, the Town of Carrboro, Town of Chapel Hill, and Orange County enacted local water conservation ordinances which incorporate all of OWASA's Water Conservation Standards. The applicable provisions of the local ordinances go into effect upon a request by OWASA and subsequent proclamation by the chief elected official of each jurisdiction.

(The implementation and associated enforcement actions under the local water conservation ordinances is outside the direct control of OWASA. OWASA works very closely with the local governments to coordinate monitoring and enforcement efforts to promote compliance with applicable use restrictions.)

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Table 4-1.

SUMMARY OF KEY CONSERVATION STANDARDS FOR OWASA DRINKING WATER *

Effective June, 2009

Water Use	Year-Round	Stage 1	Stage 2	Stage 3	Emergency
Spray Irrigation of **Turf / Grass** (on designated days of the week as noted)	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	1 day per week, up to 1/2 inch per week, 6 pm - 10 am only ** Odd Addresses: Tues. Even Addresses: Thurs.	X**	X**	X
Spray Irrigation of **Non-Turf Plant Materials** (on designated days of the week as noted)	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	1 day per week, up to 1/2 inch per week, 6 pm - 10 am only ** Odd Addresses: Tues. Even Addresses: Thurs.	X***	X
Drip irrigation, underground drip emitters, soaker hose, hand-watering, and other non-spray methods allowed *at any time* or frequency	✓	✓	✓	✓	X
Washing of Building Exteriors **Before Painting**	✓	✓	✓	X	X
General Cleaning of Building Exteriors, Paved Areas, Etc.	✓	✓	X	X	X
Filling, Refilling, or Topping Off Ornamental Ponds, Fountains, etc.	✓	✓	X	X	X
Vehicle Washing	✓	✓	Only at commercial or institutional facilities where at least 50% of the water is being recycled, or is from a non-potable source or well	X	X
Filling, Refilling, or Topping Off of Swimming Pools and Backyard-Scale Facilities to Support Wildlife	✓	✓	✓	✓	X
Flushing or Pressure Testing New Water Lines	✓	✓	✓	✓	Only if captured and returned to system

Year-Round Requirements, Regardless of Water Shortage Condition

> Automatic controllers and rainfall or soil moisture sensors required on all irrigation systems
> "Wasteful" water use* prohibited at all times
> Water leaks must be repaired within 10 days of discovery and/or notification by OWASA
> Water may be served in restaurants and other dining facilities only at customer's request
> Hotel/motel linens may only be changed upon customer changeover, every 5 days, or upon customer request

Symbols and Notes

* *For the actual text of OWASA's Water Conservations Standards, please see Appendix A ~~please use the following link: http://www.owasa.org/conservationstandardsmarch26_2009~~*

✓ *Water use is allowed.*

X *Water use is not allowed.*

** *Restrictions may not apply to public purpose athletic fields, recreational fields, or public purpose botanical sites operated in compliance with OWASA-approved Water Conservation Plans.*

*** *Restrictions may not apply to public purpose botanical sites operated in compliance with OWASA-approved Water Conservation Plans.*

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Water Rate Surcharges During Declared Water Shortages

In 2007, OWASA adopted water rate surcharges to be imposed during declared water shortages. The surcharges were implemented during the 2007-2008 drought and resulted in a substantial reduction in water use.

Based on that experience, OWASA refined the surcharges in 2008 to apply more equitably to all customer classes throughout all drought stages.

Table 4-2 summarizes the water rate surcharges included in OWASA's October 1, 202020~~17~~ schedule of rates and fees. When the surcharges are implemented, the applicable water rates in effect are increased by the factors shown in the table. The OWASA Board of Directors, at its discretion, may from time to time revise the water rate surcharges following a public hearing on OWASA's rates, fees and charges.

Table 4-2.

WATER RATE SURCHARGES IN DECLARED WATER SHORTAGES

Individually-Metered Residential						**Multi-family Master-metered Residential**	**Non-Residential and Irrigation-Only**
Block:	Res. Block 1	Res. Block 2	Res. Block 3	Res. Block 4	Res. Block 5		
Use Level: (gallons)	1,000 to 2,000	3,000 to 5,000	6,000 to 10,000	11,000 to 15,000	16,000 and up		
Stage 1	No surcharge	No surcharge	1.25 times normal Block 3 rate	1.5 times normal Block 4 rate	2 times normal Block 5 rate	1.15 times year-round rate	1.15 times seasonal and irrigation-only rate
Stage 2	No surcharge	1.25 times normal Block 2 rate	1.5 times normal Block 3 rate	2 times normal Block 4 rate	3 times normal Block 5 rate	1.25 times year-round rate	1.25 times seasonal and irrigation-only rate
Stage 3 and Emergency	No surcharge	1.5 times normal Block 2 rate	2 times normal Block 3 rate	3 times normal Block 4 rate	4 times normal Block 5 rate	1.5 times year-round rate	1.5 times seasonal and irrigation-only rate

Calculating OWASA's Water Rates With Water Shortage Surcharges in Effect

Based on the water rates in effect as of October 1, 2017 (and which will be revised at the discretion of the OWASA Board of Directors), here are a couple illustrations of how OWASA's water rates change when water rate surcharges are in effect.

Example 1: *The Block 3 water rate for individually-metered residences is $8.39~~7.83~~ per 1,000 gallons of water use (use between 6,000 and 10,000 gallons). When the Stage 1 water rate surcharge is in effect, the Block 3 rate would increase to $10.49~~9.7875~~ per 1,000 gallons (an increase of 25%).*

Example 2: *The Peak Season (May – October) water rate for all non-residential and non-irrigation customers is $8.47~~7.91~~ per 1,000 gallons of water use. Under Stage 3 surcharges, the Peak Season water rate would increase to $12.71~~11.865~~ per 1,000 gallons (an increase of 50%).*

Public Education and Awareness

A comprehensive public education and awareness program is an essential component of OWASA's WSRP and water conservation efforts. During a drought or other shortage condition, the demand reductions achieved will depend primarily on how successful the education and awareness program is at gaining customer cooperation. That effort will be more successful if the public is informed about why conservation is necessary, the severity of the shortage, rate surcharges in effect, actual demand during the shortage and expected demand reductions, and how customers can achieve those reductions.

OWASA's public education and awareness program:

- ✓ provides for timely and regular notification to customers about the severity of a water shortage situation and why conservation is necessary;
- ✓ includes a variety of means to inform customers (electronic news releases to media, community organizations, and to customers who have shared their e-mail addresses; local and regional print and broadcast media; the OWASA website; direct mailings; signs and bus placards; newspaper articles and ads; etc.);
- ✓ provides information about what OWASA is doing to maintain a safe and adequate water supply and what specific measures customers can take to conserve water;
- ✓ provides the community with updates on the effectiveness of water conservation efforts; and
- ✓ includes information in Spanish on our website and for regional Latino media, local agencies serving the Hispanic community, etc.

Appendix B includes examples of brochures that OWASA mailed to customers during Stage 1 and Stage 2 of the 2007/2008 drought, and an example of an ad that was placed in a local newspaper during that drought.

OWASA will also declare ~~OWASA's Board of Directors adopted a Drought Response Operating Protocol (DROP) in January 2013 (Appendix C). The DROP states that OWASA shall declare~~ a Water Shortage Advisory ~~-~~ no later than when the total water storage in the reservoirs drops to within 10 percent of the mandatory Stage 1 triggers as shown in Section 5 of this Plan. At such time, OWASA will communicate with the Carrboro and~~Board of Aldermen,~~ Chapel Hill Town Councils, Orange County Board of Commissioners, and the University of North Carolina at Chapel Hill about the potential need for water use restrictions~~ and possible water purchases from neighboring utilities~~ should the situation worsen. OWASA will also provide public notice to its customers and other stakeholders about the likelihood for water use restrictions.

Major Water Conservation Initiatives of OWASA

Following the extreme droughts of 2001-2002 and 2007-2008, OWASA implemented a number of important strategies to reduce and manage customer demands throughout the year, including:

1. Implementing a permanent process water recycling system at the Jones Ferry Road Water Treatment Plant. This has reduced average daily raw water withdrawals by about 7% since the fall of 2002.

2. Establishing seasonal water rates for all customers beginning in 2002 and subsequently implemented a five-tiered increasing block rate structure for all individually-metered residential customers beginning in 2007.

3. Implementing a new reclaimed water system to initially serve the University of North Carolina at Chapel Hill. This system reduces drinking water demands by approximately 0.7~~65~~ million gallons a day (mgd).

4. Continuing water conservation education and awareness efforts for OWASA customers, including information and technical assistance for customers interested in implementing cost-effective conservation measures.

As a result of these strategies and the conservation efforts by OWASA customers, average day water sales in the OWASA service area are about the same now as they were ~~in 1991~~about 30 years ago despite about a 70~~60~~% increase in OWASA~~'s~~ customer ~~base~~accounts during that period.

Together, these measures have reduced the community's risk to droughts and other water shortage conditions, thereby reducing the need for additional restrictions during such events. It is, however, essential that OWASA have a water shortage response program in place to respond to such events because the potential for a water shortage due to drought or other event always exists.

SECTION 5.

MANDATORY WATER SHORTAGE RESPONSE TRIGGERS

As required by NCGS 143-355, OWASA has established a set of specific measurements of available water supply and demand conditions to: assess the severity of water shortage conditions during extended droughts; guide the initiation of water use reduction measures; and guide the transition between the various water shortage stages described in this Plan. The measurements and rationale are explained below.

From time to time, it may be necessary to implement water use restrictions in response to certain drinking water system emergencies, such as water main breaks, water quality problems, planned and unplanned maintenance events, natural disasters, etc. OWASA's water shortage response strategy for operational emergencies is also described below.

OWASA staff continually monitors and evaluates the operational status of water supply, treatment, and distribution system components to ensure that customer demands can be met at any given time. Staff also tracks customer demands and the amount of raw water supply remaining in each supply source on a daily basis. USGS streamflow gaging data are monitored closely to determine conditions and trends in inflows to the reservoirs. This and other information is used to guide OWASA's water shortage response strategy.

Triggers for Implementing Water Shortage Response Stages During Extended Droughts

OWASA's drought management decisions are guided primarily by the estimated level of risk that usable reservoir storage will decline to 20 percent (approximately 700 million gallons [MG]) or less during the next 12 months. At a raw water demand level of 7.5 mgd, 700 MG of raw water supply on-hand would meet customer needs for approximately three months during an extreme drought, thus providing time to implement emergency water supply augmentation and conservation measures.

Water supply risk is determined from OWASA's Reservoir Optimization Model (OWASA-ROM), which includes a statistical analysis of 82 years of actual and simulated streamflow records (1926-2007) for the Cane Creek/University Lake/Quarry Reservoir supply system. The model simulates what reservoir storage levels would be under various levels of annual average-day demand, storage volume remaining at a given time of the year, and historical streamflows and evaporation rates.

The average-day demand for the year is adjusted to reflect historical monthly demand ratios for the OWASA system. The model reflects OWASA's operating protocols and the capacities of existing raw water pumping and transmission facilities. It simulates reservoir inflows, levels and demands on a daily time-step, and evaluates the reliability of the system to meet demands while maintaining a minimum emergency storage reserve target of 20% of total capacity as a margin of safety.

OWASA-ROM has been used to estimate the total reservoir storage volumes (percent remaining) that correspond to approximately 2% (2 years in 82), 10% (8 years in 82) and 20% (16 years in 82) probabilities that reservoir storage will be drawn down to 20% or less of storage during the

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following 12 months under various annual average-day demand levels and assuming no other action taken to reduce demands and/or augment the supply.

In the late fall, winter and early spring, when inflows are typically higher and demand lower, reservoir storage can drop to relatively low levels before the risk of drawdown to 20% or less during the following 12 months becomes significant. From late spring through fall, when demand rises and inflows decline, the level of risk for a given demand increases.

This analysis has been used to establish the trigger levels that will automatically result in OWASA's implementation of the various Water Shortage stages and associated restrictions.

Figures 5-1 through 5-4 show the trigger levels that will apply to the implementation of successive Water Shortage response stages under annual average-day demands of 7.0, 8.0, 9.0, and 10.0 mgd, respectively. (OWASA projects average-day raw water withdrawals will be about 7 mgd in Fiscal Year 2021~~18~~.)

Figures 5-1 through 5-4 also include a water shortage advisory level, which is represented by a black dashed line on the graphs. OWASA will declare a Water Shortage Advisory no later than when the total water storage in the reservoirs drops to within 10 percent of the mandatory Stage 1 triggers as shown on Figures 5-2 through 5-4. At such time, OWASA will communicate with the Carrboro and Chapel Hill Town Councils, Orange County Board of Commissioners, and the University of North Carolina at Chapel Hill about the potential need for water use restrictions should the situation worsen. OWASA will also provide public notice to its customers and other stakeholders about the likelihood for water use restrictions and request that customers voluntarily conserve water.

OWASA's Executive Director will declare the appropriate Water Shortage stage (including the Advisory) within five (5) working days after the trigger has been reached (assuming storage remains at or below the applicable level). However, OWASA may declare a Water Shortage or Advisory or implement stages before the specific trigger is reached (sooner than the applicable Figure would indicate) if other factors indicate such an action is appropriate or required upon approval by the Board of Directors.

Staff will provide regular informational reports to the Board and community during extended droughts. Other factors that will be considered when determining whether to declare a Water Shortage or Advisory before a specific trigger is reached include but are not be limited to:

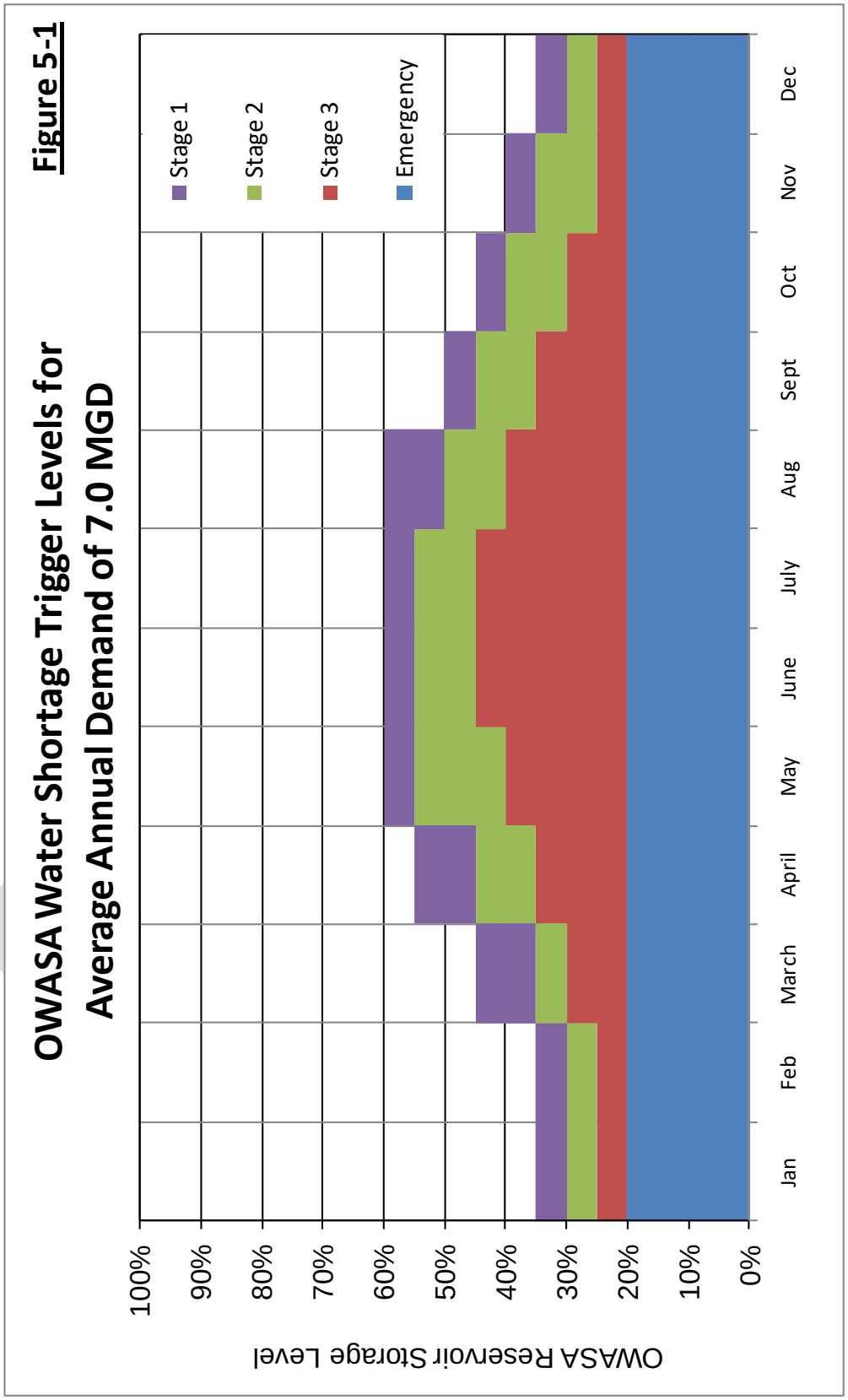
- regional water supply and demand conditions and forecasts;
- likelihood of obtaining raw or finished water from other utilities;
- Drought Advisory issued by the NC Drought Management Advisory Council; and
- long-term weather forecasts.

It is also possible that Water Shortage response stages may not necessarily be implemented sequentially if water supply and/or demand conditions change rapidly.

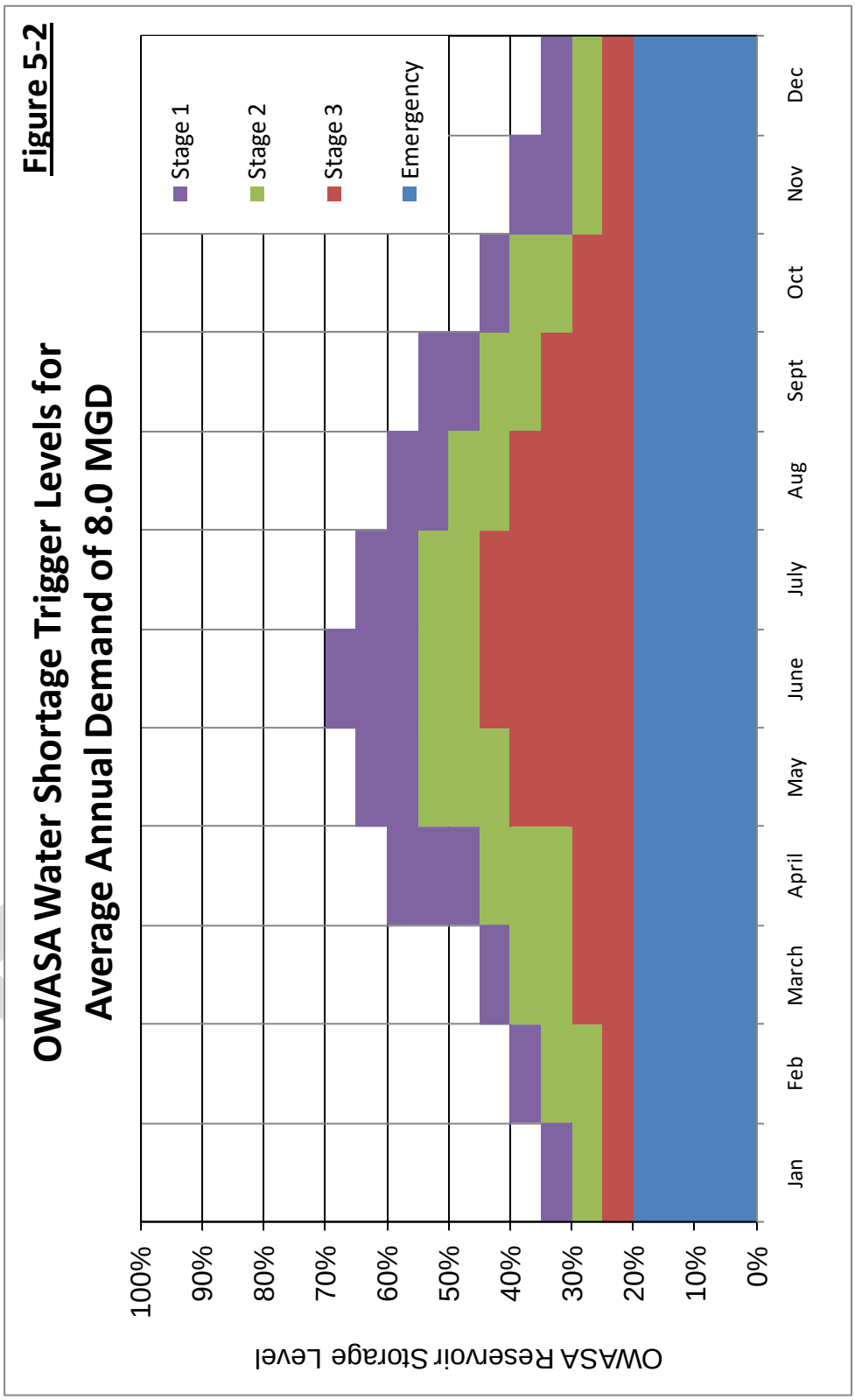
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If and when OWASA determines a Water Shortage stage is in effect, it will clearly explain to its customers and the public the basis for the decision, including the estimated risk that the local water supply could be drawn down to very low levels (at or below 20% of total storage) over the following 12 months.

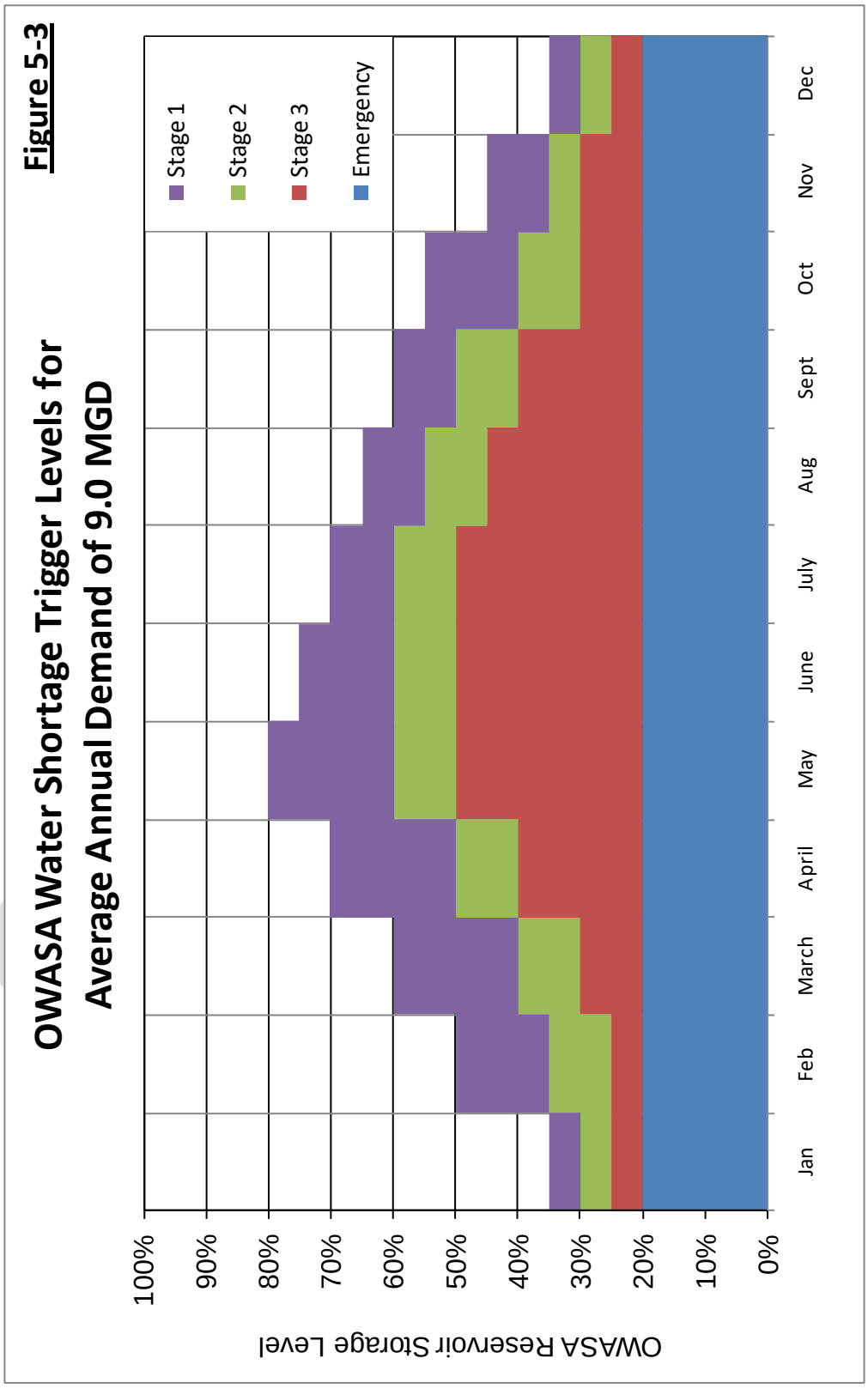
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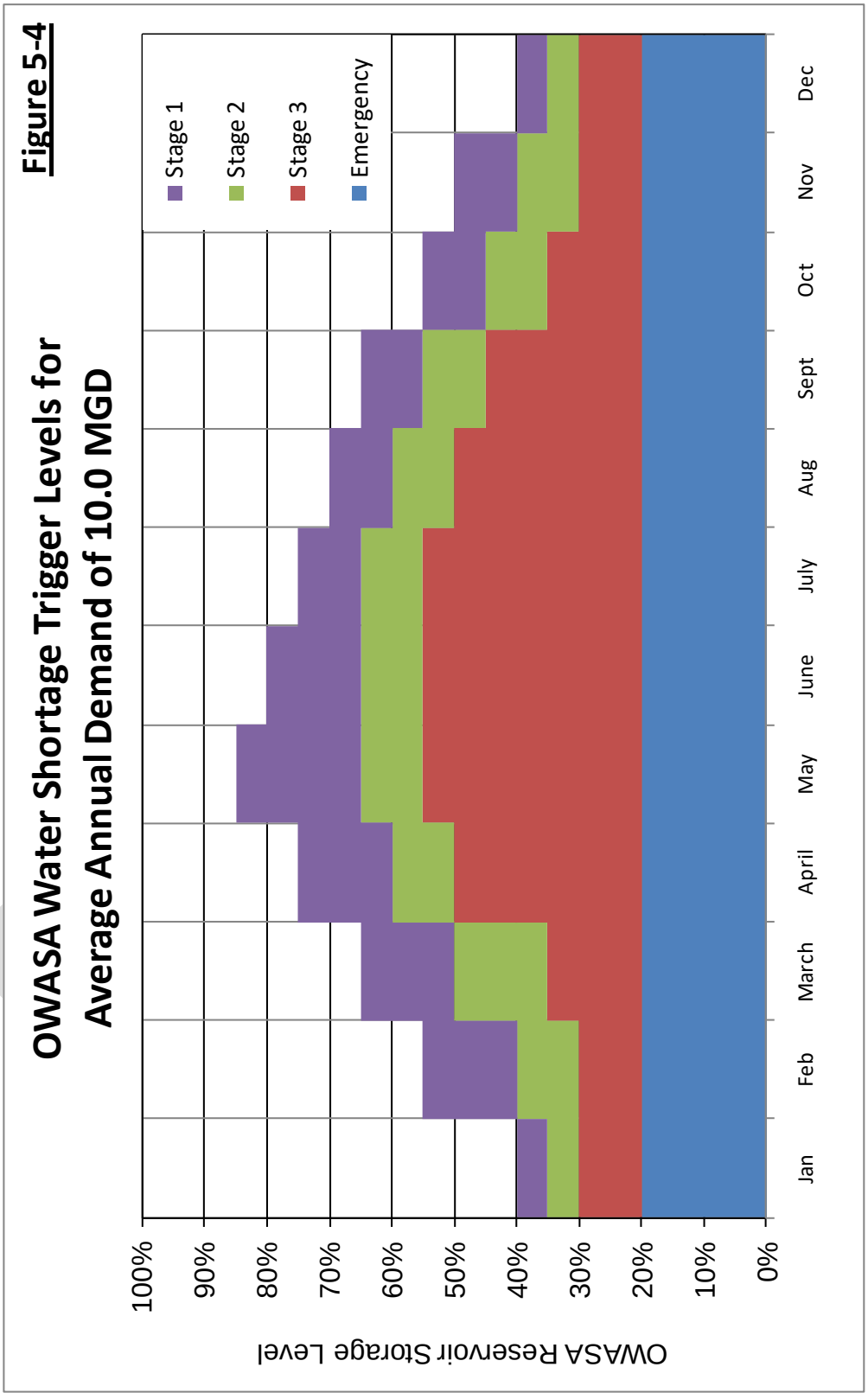
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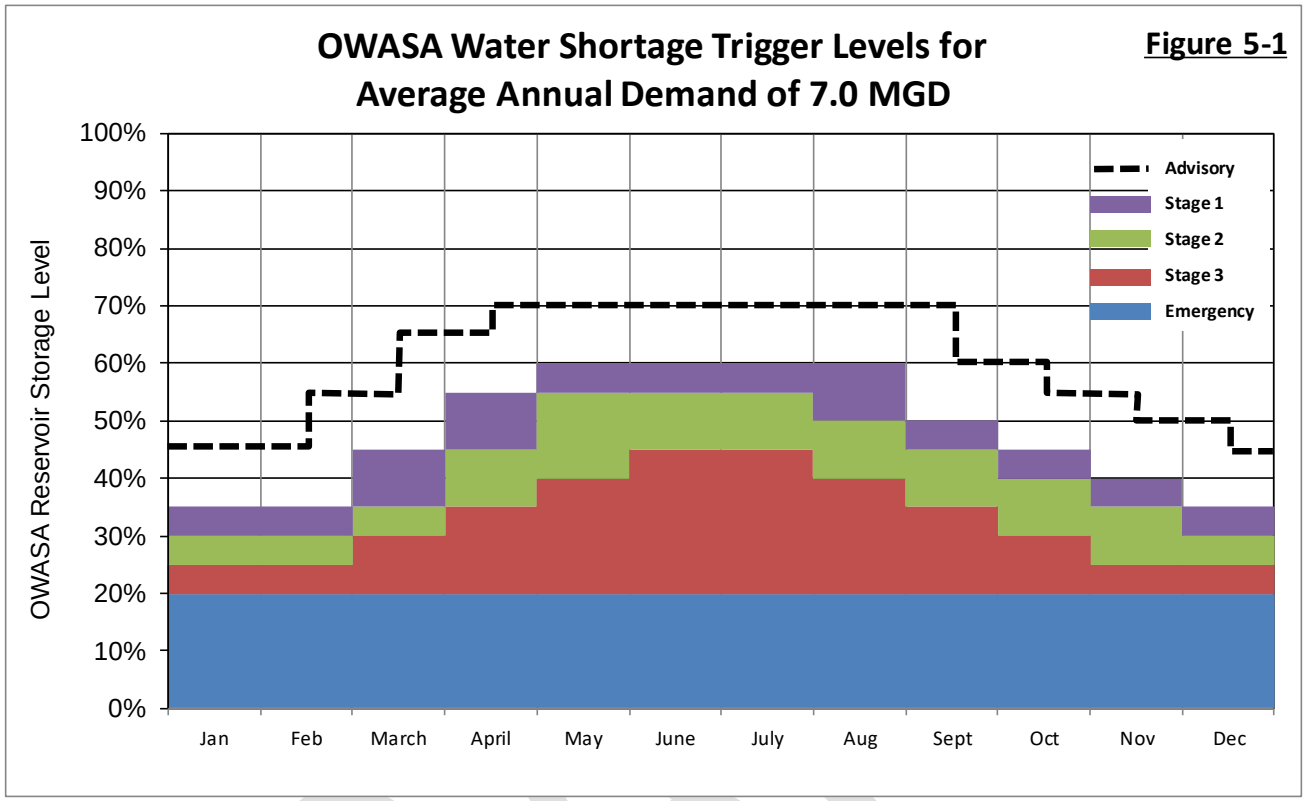


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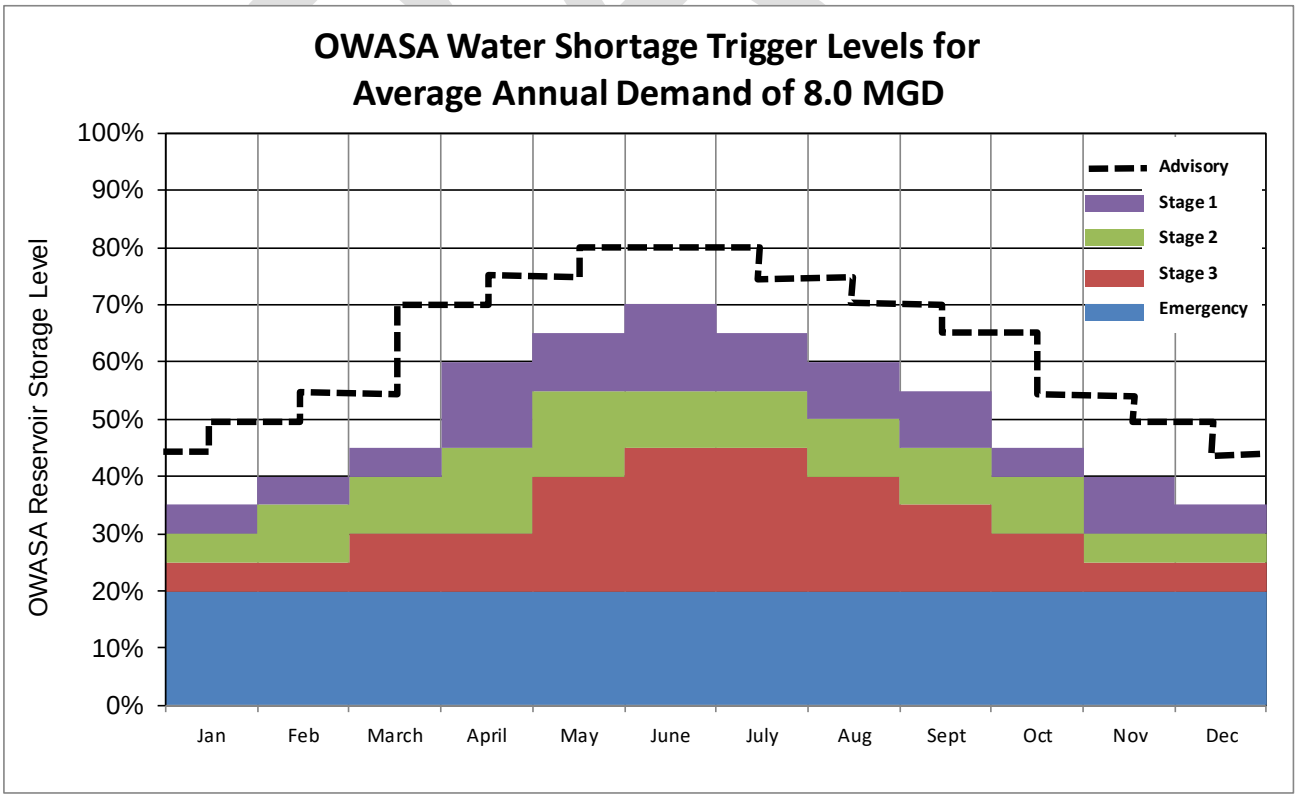


Figure 5-3

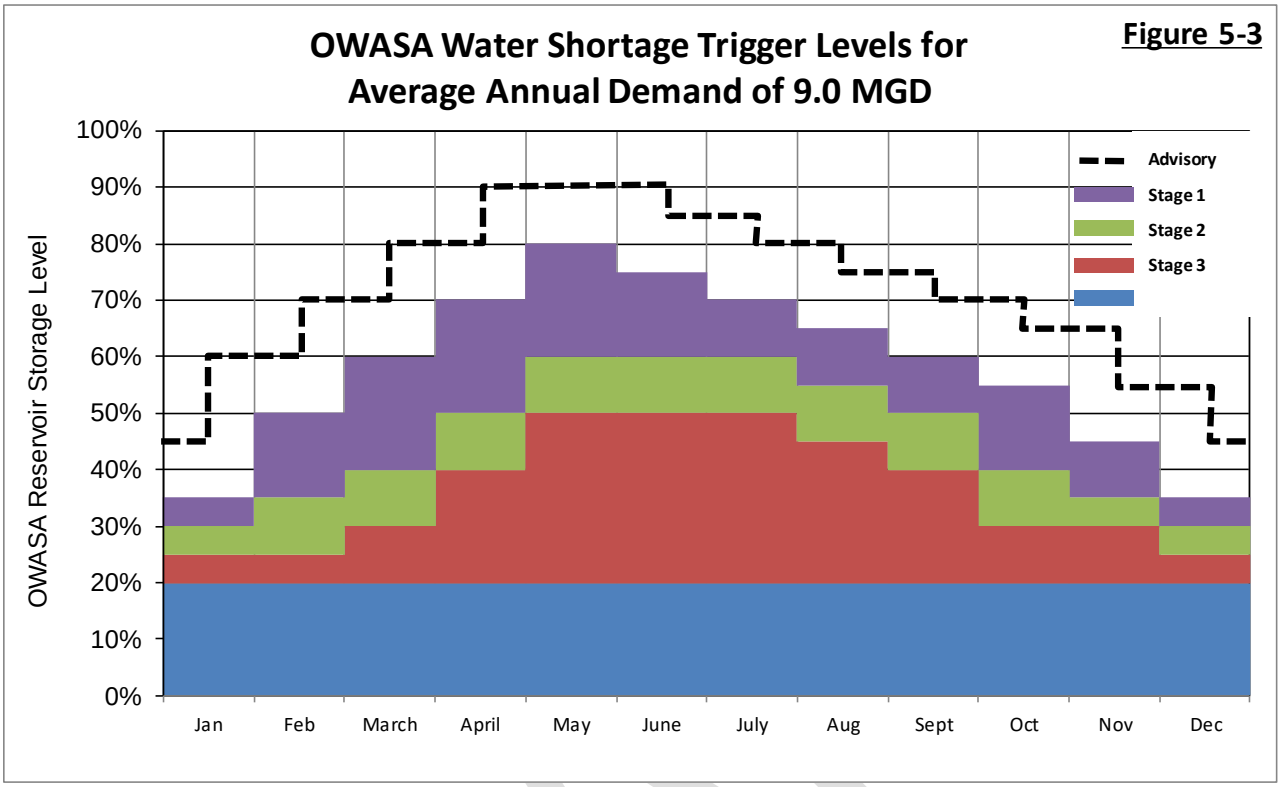
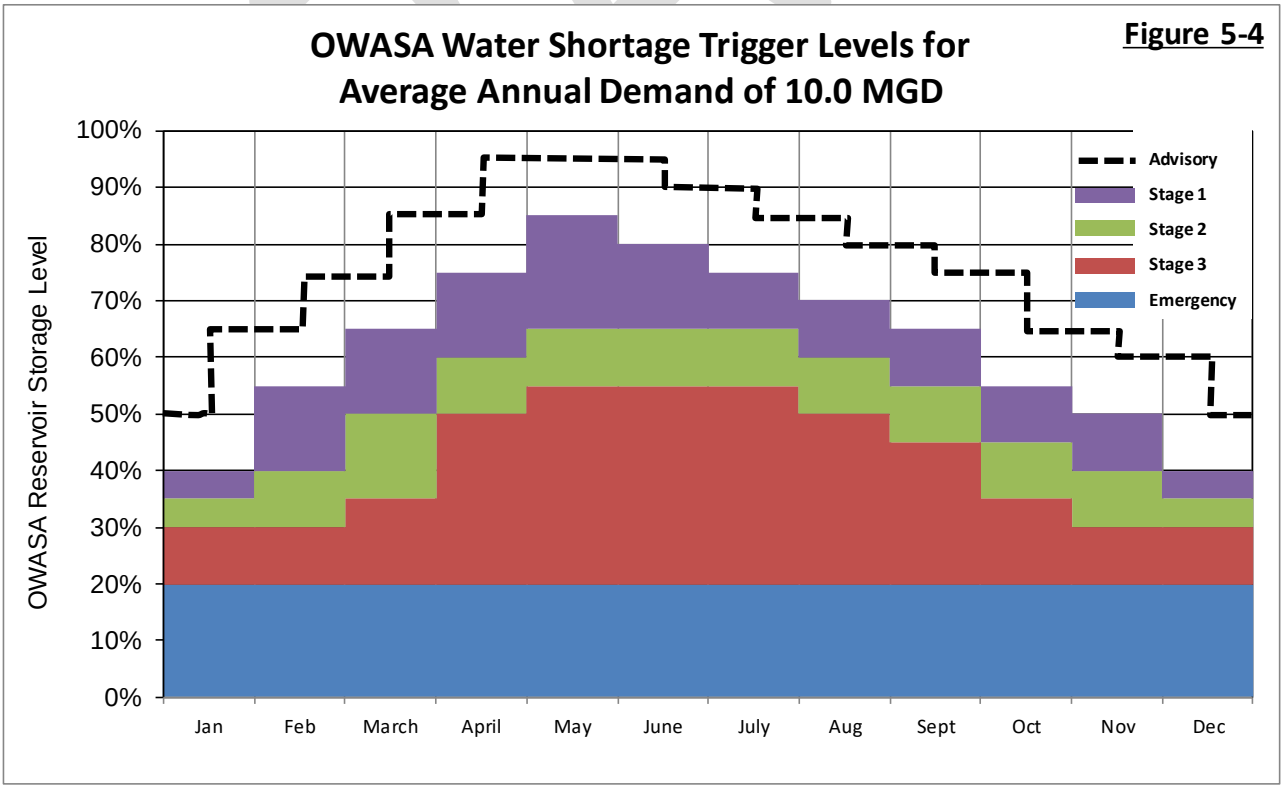


Figure 5-4



Triggers for Rescinding Water Shortage Response Stages During Extended Droughts

For a Water Shortage stage to be rescinded, the water supply storage volume must be at least ten percent (10%) above the specified Water Shortage initiation trigger for the applicable stage. However, OWASA's Executive Director may delay the rescission of a Water Shortage stage depending on water supply and demand conditions, extended weather forecast, regional water supply conditions and outlook, and other factors.

As with initiation, rescission of Water Shortage stages may not always occur sequentially, depending on how quickly supply and/or demand conditions change.

Water Shortage Response Triggers for Operational Emergencies

OWASA may occasionally need to implement mandatory water use restriction to address abnormal operating conditions – other than extended droughts – when current demand cannot be met. Such events include, but are not limited to:

- production problems at the Jones Ferry Road Water Treatment Plant;
- pump, tank, or pipeline failures;
- raw or treated drinking water quality problems;
- planned or unplanned maintenance events; and
- natural disasters.

OWASA may declare a Water Supply Shortage or Emergency whenever customer demand – as averaged over three consecutive days – exceeds 85 percent of OWASA's capability of treating and delivering water. The stage and duration of such a Water Supply Shortage or Emergency shall be guided by the degree to which customer demands approach or exceed OWASA's capacity to meet those demands, and by the degree to which conservation efforts successfully reduce short-term demands.

Operational emergencies are typically characterized by the need for rapid response by OWASA and its customers, and may require major curtailment of water use in a short period of time.

Non-drought water emergencies are unique because of the potential lack of preparation time and the need for immediate and potentially large-scale demand reductions. Because each emergency scenario is different, no single strategy can meet OWASA's needs during all emergency scenarios.

If OWASA's Executive Director determines that an emergency operating condition exists, he/she may implement a Water Shortage response stage and associated mandatory water use restrictions that he/she deems necessary and appropriate given the nature, extent, and expected duration of the emergency condition.

The Water Shortage response stage initially selected may be quickly modified as operating conditions are further assessed and there is a better understanding of the length of time that may be needed to restore normal operating and/or demand conditions.

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SECTION 6.

ENFORCEMENT

OWASA does not have statutory authority to establish water conservation ordinances; therefore, as described in Section 4, it has established Water Conservation Standards applicable to all OWASA customers. The Standards include year-round mandatory water use restrictions as well as a system of increasingly stringent restrictions for different stages of a declared water shortage.

OWASA does not have statutory authority to directly impose civil or criminal penalty provisions for violations of its Conservation Standards. The Standards provide for the temporary disconnection of water service to any customer that repeatedly violates the Standards.

Upon learning of an actual, reported, or suspected violation, OWASA staff will contact the customer by phone, in person, and/or in writing to inform them of:

- ✓ the restrictions in effect;
- ✓ the nature of the actual, reported, or suspected violation;
- ✓ the need for corrective action by the customer; and
- ✓ the potential consequences of continued violations, including temporary disconnection of service for non-compliance with the Standards and the potential for citation by local government law enforcement officers.

In addition to OWASA's authority and approach to enforcing its Standards, the Carrboro, Chapel Hill and Orange County ordinances include civil penalty provisions for violations of their respective conservation ordinances, which, as noted before, are based on the OWASA Standards.

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SECTION 7.

PROCEDURES FOR REVIEW OF VARIANCE REQUESTS

OWASA's Water Conservation Standards allow exemptions only for the following water uses during declared Water Shortages:

- ✓ Public purpose athletic fields and public purpose botanical sites are exempt from certain irrigation restrictions provided that an OWASA-approved site-specific Water Conservation Plan is in place.

- ✓ Car washes are exempt from certain restrictions provided that at least 50% of their water has been recycled, is from a non-potable water source, or is supplied from a well.

(Exemptions from water use restrictions do not include exemptions for water rate surcharges.)

Customers may request a variance from the Water Conservation Standards by submitting a letter or e-mail to OWASA's Executive Director (or designee) specifically describing the nature and reason for the requested variance and the customer's specific plan to reduce water use or to maintain a high level of water use efficiency during the declared shortage.

A decision to approve or deny individual variance requests will be provided to the customer within two weeks of receipt of the request, after careful consideration of the following criteria:

- ✓ purpose and necessity for use of drinking water;
- ✓ social and economic importance/hardship imposed by compliance with the Standards;
- ✓ the prevention of structural damage impact;
- ✓ expected duration of the use for which the variance is requested;
- ✓ expected direct and indirect impact on water demands; and
- ✓ practicality of options for alternative water sources.

Required Water Conservation Plans may be submitted at any time and will be reviewed and either approved or denied by OWASA within six weeks of receipt. To be considered for approval, a Water Conservation Plan must include:

1. Estimated amount of water use per day during both an average winter month and an average summer month for various purposes, including drinking water, basic sanitation, process water, irrigation, and other major uses specific to the customer

2. Description of alternate water sources available

3. Description of existing measures or high-efficiency fixtures in place to reduce water use

4. Measures that could be taken during each Water Shortage Response Stage for which a variance is requested in order to meet the percentage reductions in Table 8-1.

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5. Description of the impact to the customer (e.g. reduced production, reduction of business hours, employment impacts, structural damage, etc.) of meeting the Table 8-1 water use reduction percentages during each Water Shortage Response Stage for which a variance is requested.

6. Proposed alternative measures to be taken during each Water Shortage Response Stage for which a variance is requested, and the resulting expected percentage reduction in water use for the categories listed in item 1, under both average winter and average summer conditions.

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SECTION 8.

EXPECTED AND ACTUAL EFFECTIVENESS OF THIS PLAN

Because OWASA revised its Water Conservation Standards in June 2009 and no drought has occurred subsequent to that date, there is no actual data or experience regarding the effectiveness of these Standards. However, based on customer response to water use restrictions and other measures in place during the 2001-2002 and 2007-2008 droughts, OWASA has the following water use reduction objectives associated with the Water Shortage Response Stages in the Standards:

Table 8-1.

Expected/Targeted Water Use Reductions for OWASA's Water Shortage Stages

Water Shortage Response Stage	Target Reductions Relative to Normal* Water Use
Stage 1	10%
Stage 2	15%
Stage 3	20%
Emergency	To be Determined

* Normal Water Use is the level of customer demands that would be expected to occur during the time of the year that the Water Shortage Response Stage is in effect.

OWASA will periodically evaluate the effectiveness of its Water Shortage response actions through several methods, including but not limited to:

- ✓ comparing actual demand reductions achieved to the objectives of the Water Conservation Standards, as well as demand information for the same period for prior years;
- ✓ monitoring the frequency, severity, and duration of declared Water Shortage conditions;
- ✓ identifying any situations where action should have been taken but was not required under this plan;
- ✓ monitoring the number, type and recurrence of violations of applicable water use restrictions, and any required enforcement actions; and
- ✓ reviewing the inquiries and feedback received from customers during declared Water Shortages.

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SECTION 9.

PUBLIC REVIEW AND COMMENT

In accordance with State law, OWASA's draft 2010 WSRP was issued for public review and comment and all comments received were considered prior to the OWASA Board of Directors' formal approval of the WSRP.

The core components of this Plan – OWASA's Water Conservation Standards, Water Shortage response stages, and associated water use restrictions – were adopted by OWASA in June 2009 following an extensive public review and comment process that included stakeholder meetings, review and comments from local governments and the Chapel Hill–Carrboro Chamber of Commerce, and a formal public hearing. Notice of the proposed Standards and restrictions was provided in the local newspaper and on OWASA's website.

The draft 2010 WSRP was made available for public review and comment for two weeks in advance of final consideration by the OWASA Board of Directors. Public review and comment was invited by:

- ✓ posting the draft on OWASA's website (www.owasa.org);
- ✓ providing copies for public review at OWASA's main office and the Chapel Hill Public Library;
- ✓ providing notice in the local newspaper of the draft plan's availability and the deadline for submitting written and/or verbal comments; and
- ✓ issuing electronic news releases announcing the availability of, and inviting comments on, the draft plan.

OWASA invited interested persons to submit written comments via e-mail or letter, and/or verbal comments at the public meeting when the draft was considered by the OWASA Board of Directors. Following consideration of the public comments, the OWASA Board of Directors formally approved OWASA's WSRP on November 11, 2010 (Appendix D).

The 2015 update of the WSRP included minor updates such as contact information changes. It also included a summary of OWASA's Drought Response Operating Protocol which was approved by the Board of Directors on January 10, 2013, which was developed to align with the 2010 WSRP. The DROP made no modifications to the trigger graphs included in Section 5 of this Plan. This version of the WSRP was presented to the Board at a work session on December 11, 2014 and approved by the Board of Directors along with OWASA's Local Water Supply Plan at its January 22, 2015 meeting (Appendix D).

This update of the WSRP includes minor updates (Table 4-2 is updated to reflect the change in multi-family, master-metered residential rates, the reclassification of our Public Affairs Administrator to Communications and Community Relations Officer, and other minor formatting changes. This version of the WSRP was presented to the Board of Directors at a work session on June 14, 2018 along with OWASA's 2017 Local Water Supply Plan (Appendix D).

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Will summarize meetings to incorporate DROP into WSRP

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SECTION 10.

FUTURE REVIEW AND REVISION OF OWASA'S WSRP

In accordance with State requirements, OWASA will review the local WSRP, and revise it where necessary, as follows:

- ✓ concurrent with the update of OWASA's Local Water Supply Plan as required per NCGS 143-355(l), which occurs a minimum of once every five years;
- ✓ following the rescission of all mandatory water use restrictions that were imposed during an event that required declaration of a Stage 1, Stage 2, Stage 3, or Emergency Water Shortage condition; and/or
- ✓ at any time as deemed necessary to reflect changes in water supply and demand conditions, new information regarding the effectiveness of conservation management practices including the water use restrictions in OWASA's Water Conservation Standards, experience gained with implementation of the plan, and other factors.

Prior to the OWASA Board's final consideration of any proposed major revisions to the local WSRP, OWASA will provide its customers and the public an opportunity to review and comment on the proposed revisions. Information about proposed revisions and requests for comments on such proposals will be provided via OWASA's website, e-mail communications, news releases, notices of availability published in the local newspaper, etc. The draft plan will be available at OWASA's main office building and on our website (www.owasa.org) for public review.

The Executive Director (or designee) will be responsible for initiating all major WSRP updates, and for ensuring that OWASA customers and the public have the opportunity to comment on the plan and any proposed changes prior to final approval by the OWASA Board of Directors.

It has been OWASA's practice to meet with representatives of organizations such as the Chamber of Commerce, green industry, and local governments to receive information, comments, and suggestions regarding the effectiveness of existing water use restrictions and potential changes to those restrictions. OWASA will continue this practice as part of future evaluations and major updates of this plan.

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APPENDIX A

OWASA WATER CONSERVATION STANDARDS

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Orange Water and Sewer Authority
Water Conservation Standards
(Approved March 26, 2009)

Article I – Purpose and Definitions

I. A. Purpose

These Water Conservation Standards are enacted by the Orange Water and Sewer Authority (OWASA) for the purposes of:

1. Reducing the rate of increase in overall water use through year-round water conservation practices that will help maximize the community's existing and planned water supply sources and help reduce seasonal peak day demands that result in the need for costly expansion of water treatment, storage, and transmission facilities. Such year-round practices shall include:

    a. Reducing indoor water waste by encouraging the installation and maintenance of ultra-low flow toilets, faucet aerators, low-flow showerheads and similar devices, as well as other creative and commonsense indoor conservation practices.

    b. Reducing irrigation and irrigation-related water waste without sacrificing landscape quality through the cultivation of lower water use plants; improved landscape design and planting practices; more efficient watering practices; and improved irrigation system design and maintenance.

    c. Increasing the use of non-potable water, as permitted by appropriate public health regulations, for irrigation and other uses that do not require water of potable quality.

2. Providing an orderly process for reducing community-wide water demands during periods of drought or other naturally occurring causes of water shortages.

3. Providing an orderly process for reducing community-wide water demands during periods of water shortages due to natural disaster (other than drought), major OWASA facilities failure, or other unexpected and sudden loss of water supply, treatment, or distribution capacity that constitutes a water supply emergency.

I. B. Definitions

For the purpose of these Standards, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

AUTOMATIC CONTROLLER. A mechanical or electronic device capable of operating an irrigation system and its component valve stations according to a pre-determined schedule of irrigation frequency and duration.

CISTERN. A tank or container, typically located underground, for the storage and subsequent reuse of rainwater collected from rooftops or other impervious surfaces that would have otherwise evaporated or drained off the premises.

DRIP IRRIGATION. The application of irrigation water through drip emitter devices at low pressure, volume, and velocity near or at ground level in order to minimize runoff and evaporative losses. Drip irrigation emitters are typically used for irrigating non-turf vegetation and release water in the range of 0.04 to 0.40 gallons per minute.

EVEN-NUMBERED PROPERTIES. Properties with street addresses that end in even-numbered digits, or other properties so designated for the purposes of these Standards through special arrangements with OWASA.

GRAYWATER. Wastewater removed from household wash basins, bathtubs, or showers. Graywater may only be reused in accordance with practices approved by applicable regulatory agencies.

HAND WATERING. The application of water for irrigation purposes through a hand-held hose or watering container.

HARVESTED WATER. Precipitation or irrigation runoff collected, stored and available for reuse for irrigation purposes.

IRRIGATION SYSTEM. Any permanently installed system of pipes, hoses, or other conveyance devices and appurtenances that provides water to living plant material through spray heads or other emission devices located at, above, or below the ground surface. For the purposes of these Standards, a sprinkler, soaker hose, or other device connected to its water source via a moveable above-ground garden hose is not considered to be an irrigation system.

LANDSCAPE AREA. That portion of a parcel that contains turf or non-turf vegetation.

LOW-PRECIPITATION BUBBLER. An irrigation head which typically operates within six inches of ground level and delivers water at a rate of less than 0.45 gallons per minute within a radius of less than two feet of the head. Low-precipitation bubblers are typically used for irrigating non-turf vegetation.

MICRO SPRAY. The application of irrigation water through small, low volume sprayer heads in order to minimize runoff losses. Micro sprays are typically used for irrigating non-turf vegetation. Individual micro spray heads typically operate less than 12 inches above ground level and typically deliver water in the range of 0.10 to 0.50 gallons per minute within a radius of five feet or less of the head.

MULCH. A protective covering of organic material, such as sawdust, wood chips, compost, or other vegetative matter, spread on the ground to reduce evaporation and increase water retention.

ODD-NUMBERED PROPERTIES. Properties with street addresses that end in odd-numbered digits, or other properties so designated for the purposes of these Standards through special arrangements with OWASA.

OVERALL WATER DEMAND. The total water demand for any given month, as projected by OWASA.

OWASA. The Orange Water and Sewer Authority.

POTABLE WATER. Treated water provided by OWASA that is suitable for drinking, cooking, and other domestic use. Water that is collected indoors in containers from indoor faucets or spigots that would otherwise be discharged into drainpipes while a user awaits the warming of the water for dishwashing, other washing, shaving, bathing, or showering is not considered to be potable water for the purposes of these Standards.

PRECIPITATION RATE. The amount of water applied per unit of time, usually expressed in inches per hour.

PUBLIC PURPOSE ATHLETIC OR RECREATIONAL FIELD. An athletic or recreational field owned or leased by a public or not-for-profit entity and which is (a) operated for the use of the public pursuant to general invitation, and (b) not operated for the purpose of profit. For purposes of this definition, a golf course is not considered to be a public purpose athletic field or recreational field.

PUBLIC PURPOSE BOTANICAL SITE. A landscaped area which is owned or leased by a public or not-for-profit entity in which a variety of plants are grown to be categorized and documented for scientific purposes and/or which may also be open to the public for entertainment and educational purposes.

PUBLIC RIGHT-OF-WAY. The area of land owned or maintained by municipal, county, or state government primarily for the use of the public for the movement of people, goods, vehicles, or storm water. For the purposes of these Standards, the public right-of-way shall include curbs, streets, sidewalks, and storm water drainage inlets, but shall not include adjacent landscaped areas that also may be located within the legally delineated public right-of-way.

RAIN BARREL: A tank or container, typically located on the ground beneath a roof drainage system, that captures and stores rainwater for subsequent reuse.

RAW WATER. Water drawn from a reservoir or other water source before treatment.

RECLAIMED WATER. Highly treated effluent from a wastewater treatment plant that can be safely used for non-potable purposes approved by applicable regulatory agencies.

RUNOFF. Water that is not absorbed by the soil or landscape to which it is applied. Runoff occurs when water is applied too quickly (application rate exceeds infiltration rate), particularly if there is a severe slope. These Standards do not apply to stormwater runoff which is created by natural precipitation rather than human-caused or applied water use.

SERVICE AREA. The geographic area in which OWASA provides or is authorized to provide water and/or sewer service.

SHUT-OFF NOZZLE. A device attached to the end of a hose that completely shuts off the flow, even if left unattended.

SOAKER HOSE. A flexible hose designed to emit a trickle of water along its entire length, either through numerous small-diameter (less than 1/32-inch) perforations or through the permeable material of its composition.

SPRAY IRRIGATION. The application of water to landscaping by means of a device, other than a hand-held hose or watering container, that projects water through the air in the form of small particles or droplets.

SPRINKLER HEAD. A device that projects water through the air in the form of small particles or droplets.

UNDERGROUND SYSTEM. An irrigation system with emitters installed beneath the ground surface.

WATER CONSERVATION PLAN (OWASA-APPROVED). A written document submitted by the owner or operator of a public purpose athletic field, recreational field, and/or a public purpose botanical site and approved by OWASA's Executive Director or his/her designee that specifies the conservation measures and irrigation operating modes that will be employed year-round at those public purpose facilities and the specific practices that will be employed to achieve Stage 1, 2, and 3 Water Shortage conservation goals enumerated in these Standards.

WATER WASTE. The non-beneficial use of OWASA potable water. Non-beneficial uses include but are not restricted to:

a. Landscape water applied in such a manner, rate and/or quantity that it overflows the landscaped area being watered and runs onto adjacent property or public right-of-way; or landscape water applied during periods of rainfall or when soil moisture is already adequate.

b. The use of water for washing vehicles, equipment, or hard surfaces, such as parking lots, aprons, pads, and driveways in such quantities to flow onto adjacent property or the public right-of-way.

c. Water applied in sufficient quantity to cause ponding on impervious surfaces.

d. Water lost through plumbing leaks that can be readily identified and corrected.

WATERING BAG. A container used to hold and slowly dispense water around the base of a tree or shrub. These are commonly called "Gators."

XERISCAPING. An approach to landscape design and maintenance that uses small amounts of water but sustains a traditional look through the proper conditioning of soil, the selection of appropriate drought-tolerant plants, generous use of mulch, efficient use of water, and other proven techniques.

Article II – Water Waste Prohibited, Penalties for Violating Standards

II. A. Water Waste Prohibited

No person, party, or entity shall use, cause, waste, or permit to be wasted any OWASA-supplied potable water in violation of the Standards set out herein.

II. B. Penalties

OWASA may discontinue water service to any customer where, after notice of a prohibited use is delivered to the service address, OWASA-supplied potable water continues to be used or wasted in violation of the Water Conservation Standards set out herein.

Article III – Year-Round Requirements, Policy and Practice

III. A. Exterior Use

1. The following outdoor or exterior use requirements shall apply to all customers using OWASA-supplied potable water:

   a. Spray irrigation shall not occur more than three days per week. Even-numbered properties may be irrigated with spray systems only on Sundays, Wednesdays, and/or Fridays. Odd-numbered properties may be irrigated with spray systems only on Tuesdays, Thursdays, and/or Saturdays. All spray irrigation shall occur only between the hours of 6:00 p.m. and 10:00 a.m., and shall apply no more than one inch of water in any given week. These restrictions shall not apply to properties using underground, drip irrigation, micro spray, low precipitation bubblers, soaker hoses, hand watering, tree or shrub watering bags, or where watering of containerized plants and commercial plant stock in trade is maintained for resale.

b. All irrigation systems shall be equipped with automatic controllers that activate the system according to a desired frequency and duration, and shall also be equipped with rain or soil moisture sensors that will prevent irrigation during periods of rainfall or when there is sufficient moisture in the ground for plant health and survival.

c. All hoses used for hand watering, vehicle washing, or other allowable outdoor uses shall be equipped with shutoff nozzles.

d. No exterior use of OWASA-supplied potable water shall result in the flow of water onto adjacent property or public right-of-way, and all irrigation systems shall be designed and maintained to prevent to the extent practicable water from flowing onto paved or other impervious surfaces.

e. Outdoor water leaks on property or facilities of OWASA customers shall be repaired within ten (10) days of discovery by the customer and/or notification by OWASA.

2. Owners of public purpose athletic fields, recreational fields, and/or public purpose botanical sites shall not be subject to the year-round limitations of III.A.1.a-e if those facilities are operated in compliance with an OWASA-approved Water Conservation Plan that specifies the conservation measures and irrigation operating modes to be employed at that facility year-round and during successive stages of a declared water shortage.

3. Unless superseded by the declaration of a Water Supply Shortage or Emergency, the year-round requirements of III.A.1.a and III.A.1.b above shall not apply to the following:

a. Outdoor irrigation necessary for the establishment of newly sodded or seeded lawns and for the establishment of new non-turf plant materials within the first 45 days of planting, provided that such irrigation occurs only between the hours of 6:00 p.m. and 10:00 a.m.

b. Irrigation necessary for one day only where treatment with an application of chemicals requires immediate watering to preserve an existing landscape or to establish a new landscape, provided that such irrigation occurs only between the hours of 6:00 p.m. and 10:00 a.m.

c. Water used to control dust or to compact soil when alternate methods are not available.

d. Visually supervised operation of watering systems for short periods of time to check system condition and effectiveness.

e. Water used for construction or maintenance activities where the application of water is the appropriate methodology and where no other practical alternative exists.

f. Water used for firefighting, firefighter training, fire hose testing, fire pumper testing, and other emergency situation mitigation purposes.

g. For situations in which there is no practical alternative, OWASA-supplied potable water may be used for other special purposes, such as washing out garbage trucks, cleaning up hazardous or unsanitary materials, etc., or for other purposes necessary to protect public health, safety, and welfare – provided that such water is used in the least quantity needed to accomplish the task.

III. B. Interior Use

1. The following indoor or interior use requirements shall apply to all customers using OWASA-supplied potable water:

   a. Restaurants and dining facilities shall serve water only upon request of the customer.

   b. Hotels, motels, and other facilities providing sleeping accommodations shall change bed linens only upon request of the customer, or upon customer changeover, or every five days for long-term customers.

   c. Indoor water leaks on property or facilities of OWASA customers shall be repaired within ten (10) days of discovery by the customer and/or notification by OWASA.

2. Unless superseded by the declaration of a Water Supply Shortage or Emergency, the year-round requirements of III.B.1. above shall not apply to the following:

   a. Visually supervised operation and flushing of plumbing systems for short periods of time to check system condition and effectiveness.

   b. Water used for construction or maintenance activities where the use of water is the appropriate methodology and where no other practical alternative exists.

III. C. Year-Round Policy and Practice

1. It shall be OWASA's policy and practice to publicize periodically water conservation methods, including but not limited to, methods of conserving water both indoors and outdoors; methods of collecting and storing harvested water in appropriate devices, such as rain barrels and cisterns; as well as information about the availability, feasibility and allowable uses of reclaimed water from OWASA. It shall be OWASA's policy to strongly encourage and promote the following voluntary conservation measures year-round, regardless of water supply conditions:

a. Operate dishwashers and clothes washers only when loaded to their maximum capacity or at water level settings appropriate for the size of the load.

b. Where not otherwise required, install ultra-low flow toilets, tank dams, flow restrictors (aerators) and low-flow showerheads.

c. Repair and maintain plumbing systems to prevent water leaks.

d. Use harvested rainwater and/or reclaimed water for indoor and outdoor purposes where allowable and practical.

Article IV – Determination of a Water Supply Shortage or Emergency

IV. A. Drought Condition Shortage

OWASA's drought response strategy and Water Supply Shortage declarations will be guided primarily by the risk that OWASA's water supplies will decline to 20 percent or less of total storage capacity within the next 12-month period. A Stage One Water Shortage declaration will generally correspond to a two percent (or greater) risk that reservoir levels will decline to 20 percent or less of total storage capacity within the next 12 months; provided, however, that in making such a determination, OWASA will also consider the actual and projected severity of the ongoing drought relative to historical droughts included in OWASA's water supply simulation models; existing and anticipated demand, including expected customer response to water use restrictions; availability of supplemental supplies, including water purchases from neighboring communities; regional water supply conditions, including, but not limited to, the concurrent drought response status of neighboring jurisdictions; guidance or directives from the State of North Carolina; and other elements of reasonable professional judgment and management.

More severe Water Supply Shortage Stages will subsequently be declared if the risk level increases and/or if other factors indicate that further action is needed. Similarly, OWASA will reduce the severity of, or rescind, a Water Supply Shortage declaration as the risk level and related factors improve.

IV. B. Water Treatment, Storage, or Distribution Capacity Shortage

In addition to conditions caused by drought, OWASA may declare a Water Supply Shortage or Emergency whenever customer demand – as averaged over three consecutive days – exceeds 85 percent of OWASA's capability of treating and delivering water. The stage and duration of such a Water Supply Shortage or Emergency shall be guided by the degree to which customer demands approach or exceed OWASA's capacity to meet those demands, and by the degree to which conservation efforts successfully reduce short-term demands.

IV. C. Disasters and Catastrophic Equipment or Plant Failure Shortage

Any other circumstances, including service losses caused by equipment or facility failure, human error, deliberate act, weather, or other natural disaster, which constrain OWASA's water supply, treatment, or distribution capacity to less than that reasonably needed by its customers, shall constitute a Water Supply Shortage up to and including a Water Supply Emergency, requiring immediate action by OWASA.

Article V – Required Actions Under Water Supply Shortage or Emergency Conditions

In the event of a water supply shortage, OWASA shall, using its best professional judgment, determine which of the following stages is the most appropriate response to the estimated level of risk considering factors in IV.A above.

V. A. Stage One (1) Water Shortage

In the event that OWASA declares a Stage One Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations of a Stage One Water Supply Shortage. Upon OWASA's declaration of a Stage One Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by ten (10) percent:

1. Spray irrigation of turf grass using OWASA-supplied potable water shall not occur more than one day per week with a maximum of one-half inch of water applied to plant material in any given week. Odd-numbered properties shall be allowed to spray irrigate only on Tuesdays; even-numbered properties shall be allowed to spray irrigate only on Thursdays. Spray irrigation of turf grass shall occur only between the hours of 6:00 p.m. and 10:00 a.m. Owners of public purpose athletic fields, recreational fields, and/or public purpose botanical sites shall not be subject to the limitations of this subsection V.A.1 if those facilities are operated in compliance with an OWASA-approved Water Conservation Plan.

2. Spray irrigation of non-turf plant materials may occur up to three days per week as provided under the year-round requirements specified in Section III.A.1.a.

3. Irrigation of non-turf plant materials by underground, drip irrigation, micro spray, low precipitation bubblers, soaker hose systems with automatic shutoffs, or by hand held hoses or watering cans may occur at any time or frequency.

Notwithstanding the restrictions specified in Sections V.A.1 through V.A.3, the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage trucks, cleaning up hazardous or other materials. Such uses shall be permitted during declared Water

Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

V. B. Stage Two (2) Water Shortage

In the event that OWASA declares a Stage Two Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations of a Stage Two Water Supply Shortage, if not already issued. Upon OWASA's declaration of a Stage Two Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by fifteen (15) percent:

1. Spray irrigation of turf grass with OWASA-supplied potable water shall not be permitted, except at public purpose athletic and recreational fields and public purpose botanical sites operating under OWASA-approved Water Conservation Plans.

2. Spray irrigation of non-turf plant materials shall not occur more than one day per week according to the schedule specified in Section V.A.1 and in quantities of no more than ½ inch per week, except at public purpose botanical sites operating under OWASA-approved Water Conservation Plans.

3. Irrigation of non-turf plant material by underground, drip irrigation, micro spray, low precipitation bubblers, soaker hose systems with automatic shutoffs, tree or shrub watering bags, or by hand held hoses or watering cans may occur at any time or frequency.

4. No OWASA-supplied potable water shall be used to re-fill ornamental fountains, ponds, and like devices; provided, however, that OWASA water may be used to fill and re-fill bird baths and other backyard-scale facilities used to support wildlife.

5. No OWASA-supplied potable water shall be used for washing vehicles, except at commercial or institutional car washes in which at least 50 percent of the water has either been recycled, is from a non- potable source, or is supplied by a well.

6. No OWASA-supplied potable water shall be used for cleaning or washing exterior building surfaces, decks, or paved areas, such as sidewalks, driveways, roadways, and parking lots. This restriction shall not apply to the cleaning of exterior building surfaces or decks prior to painting or re-painting.

7. No OWASA-supplied potable water shall be used for fire department training or equipment testing unless required by State or Federal regulations.

Notwithstanding the restrictions specified in Sections V.B.1 through V.B.7, the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage trucks, cleaning up hazardous or other materials. Such uses shall be permitted during declared Water

Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

V. C. Stage Three (3) Water Shortage

In the event that OWASA declares a Stage Three Water Shortage, OWASA shall advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners of its declaration and shall request that they issue Proclamations of a Stage Three Water Supply Shortage, if not already issued. Upon OWASA's declaration of a Stage Three Water Shortage, the following actions shall be taken with the goal of reducing overall water demand by twenty (20) percent:

1. The use of OWASA-supplied potable water for heating and/or cooling purposes shall be reduced in all but the most essential facilities to the extent practical in consideration of indoor air quality standards, weather conditions, and health and safety requirements.

2. No OWASA-supplied potable water shall be used for irrigation of turf grass, except for public purpose athletic and/or recreational fields and public purpose botanical sites operating under water conservation plans that have been approved by OWASA's Executive Director or by his/her designee.

3. No OWASA-supplied potable water shall be used for irrigating non-turf plant material unless applied (a) via hand held hoses or watering cans, watering bags, drip irrigation or soaker hoses, or (b) at public purpose botanical sites operating under OWASA-approved Water Conservation Plans.

4. OWASA-supplied potable water may be used to fill, re-fill, or top off swimming pools, or to fill or re-fill bird baths and other backyard-scale facilities used to support wildlife. OWASA supplied potable water shall not be used for any other outdoor purposes, except for emergency fire suppression or other activities necessary to maintain public health, safety, or welfare.

5. No bulk sale of potable OWASA water shall occur except for the wholesale transmission of potable OWASA water to neighboring communities, or for other purposes necessary to maintain public health, safety, or welfare.

6. No OWASA-supplied potable water may be used for washing any vehicles.

7. No OWASA-supplied potable water may be used for pressure washing building exteriors.

8. No OWASA-supplied potable water may be used for fire department training or equipment testing.

Notwithstanding the restrictions specified in Sections V.C.1 through V.C.8, the protection of public health, safety, and welfare may, under special circumstances, require the use of limited amounts of OWASA-supplied potable water for such purposes as washing out garbage trucks,

cleaning up hazardous or other materials. Such uses shall be permitted during declared Water Shortages or Emergencies, provided that other practical alternatives are not available and water is used in the least practical amount.

V. D. Water Supply Emergency

In the event that OWASA declares a Water Supply Emergency, OWASA shall so advise the Mayors of Carrboro and Chapel Hill and the Chair of the Orange County Board of Commissioners and shall request the issuance of a Proclamation of a Water Supply Emergency. In addition to those applicable measures listed above for a Stage Three Water Shortage, the following actions shall be taken upon OWASA's declaration of a Water Supply Emergency:

1. No OWASA-supplied potable water may be used for any outdoor purposes other than emergency fire suppression or other activities necessary to maintain public health, safety, or welfare.

2. No OWASA-supplied potable water shall be used to fill, refill or top off the water level in any private or public purpose swimming pool.

3. No OWASA-supplied potable water shall be used for the flushing or pressure testing of new distribution lines unless that water is returned to the OWASA water supply system through methods approved by OWASA. This restriction shall not apply to the testing of in-building fire control sprinkler systems

4. The use of OWASA-supplied potable water for heating and/or cooling purposes shall be reduced in all but the most essential facilities to the extent practical in consideration of indoor air quality standards, weather conditions, and health and safety requirements.

5. Water service may be discontinued or reduced to designated users or in designated portions of the OWASA service area in order to preserve the availability of water for essential public health and safety requirements, such as fire protection, hospitals, clinics, and other critical community needs.

APPENDIX B

EXAMPLE OF MAILINGS TO CUSTOMERS

As discussed in Section 4 of the WSRP, during a declared Water Shortage OWASA uses several methods to inform its customers of the consideration and implementation of water use restrictions in a shortage, including but not limited to:

- paid media advertising;
- e-mails using our distribution list for local and University officials, customers who have shared their e-mail addresses, etc.;
- news releases (by e-mail);
- reports and announcements in televised and other public meetings of the OWASA Board;
- posters in public facilities such as municipal offices; and
- website postings including water supply/demand/rain data that are updated on weekdays (and e-mailed to interested parties)

Following are examples of two information brochures that OWASA mailed directly to its customers during the 2007/2008 drought, and an example of an ad that was placed in a local newspaper during that drought.

(The water use restrictions and water rate surcharges have been revised since that drought.)

DRAFT

IMPORTANT NOTICE

ADDITIONAL WATER USE RESTRICTIONS IN EFFECT DUE TO STAGE ONE WATER SHORTAGE

IMPORTANTE BOLETÍN INFORMATIVO SOBRE RESTRICCIONES EN EL USO DEL AGUA (NIVEL I); PARA SOLICITAR UNA TRADUCCÍÓN EN ESPAÑOL, LLAME AL 537-4221 O ENVIE UN CORREO ELECTRÓNICO A WEBMASTER@OWASA.ORG.

On September 27th, the OWASA Board of Directors declared a Stage One Water Shortage with the goal of reducing the community's water demand by at least 10%. We request and very much appreciate your help in conserving our drinking water during this extreme drought and throughout the year.

The extended dry weather has resulted in steady declines in our reservoir levels, and there has been essentially no water flow since early August in the creeks and streams that drain to the Cane Creek Reservoir and University Lake. Drinking water demand in September averaged about 11 million gallons per day (MGD), compared to the previously projected demand of about 9.6 MGD for September.

The Stage One mandatory water use restrictions listed below will be in effect until further notice.

Stage One Water Shortage Use Restrictions for OWASA Customers

- **Spray irrigation is limited to one day per week, and is allowed only before 9:00 AM and after 8:00 PM. Irrigation is limited to 1/2 inch per week. At even-numbered addresses, spray irrigation is allowed only on Tuesdays; at odd-numbered addresses, only on Thursdays.** These restrictions do not apply to watering of containerized plants and commercial plants for sale at local nurseries and businesses.
- Spray irrigation is defined as "The application of water to landscaping by means of a device that projects water through the air in the form of small particles or droplets." You can measure irrigation with a small container such as a tuna can. If you have an irrigation system, you may wish to have the control system adjusted and soil and rain sensors checked by a company that installs or maintains irrigation systems.
- Spray irrigation systems are required to have automatic timer systems and rain or soil moisture sensors, and hoses for outdoor use are required to have automatic shut-offs.
- Water waste is prohibited. Water waste includes using so much water that it runs onto adjacent properties or street rights-of-way or causes ponding on impervious surfaces; failing to fix leaks; and irrigation during rainfall or when soil moisture is already adequate.
- **If water use by an individually-metered residential customer or by an individually-metered single family residential irrigation-only customer exceeds an average of 1,000 gallons per day during any monthly billing cycle, OWASA MAY TERMINATE SERVICE.**
- The previous exemption for watering new plants, sod, seeding and reseeding of lawns is no longer in effect. That means the maximum amount of water that can be applied to a new lawn or landscaped area is limited to a total of one-half inch per week.
- Watering with a hand-held hose or watering can or with underground, drip irrigation, micro spray, soaker hose or low precipitation "bubbler" watering systems is allowed on any day of the week and at any time of day, but is limited to the maximum of one-half inch of water per week.
- No OWASA water may be used to re-fill ornamental fountains, ponds, and like devices.
- No OWASA water may be used for routine cleaning or washing of paved areas such as sidewalks, decks, driveways, roadways, or parking lots. (However, pressure cleaning of exterior building surfaces is allowed under the Stage One restrictions.)
- Hotels, motels, etc. shall change bed linens only upon request of the customer, upon customer changeover or every five days for long-term customers.
- Restaurants shall serve water only upon request.

OWASA customers are strongly encouraged to conserve in other ways, such as:

- Taking shorter showers, not letting faucets run unnecessarily, and flushing the toilet only when necessary.
- Installing low-flush toilets and low-flow showerheads and faucet aerators where they are not already in place as required by current plumbing codes.
- Using rain barrels, cisterns, etc. to store rainwater for irrigation and other suitable purposes. Rain barrels are available at some retail outlets and local Boy Scout Troop #42 (telephone: 942-4830).
- Dishwashers and clothes washers should be used only with full loads or with water level settings appropriate for the load size.

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OWASA

400 Jones Ferry Road
Carrboro, NC 27510

IMPORTANT NOTICE: WATER USE RESTRICTIONS

WATER RATE SURCHARGES TO BEGIN IN NOVEMBER FOR HIGH RESIDENTIAL WATER USE (11,000 OR MORE GALLONS PER MONTH)

In addition to declaring the Stage One Water Shortage, the OWASA Board decided that surcharges for high residential water use will go into effect on November 1st. The surcharges are set forth in OWASA's schedule of rates and fees for water and sewer service as approved in June, 2007.

As previously announced, OWASA's new rates effective on October 1st will include increasing block water rates for individually-metered residential customers:

	Volume of Use	Water Rate
Block 1	1 – 2,999 gallons per month	$1.98 per 1,000 gallons
Block 2	3,000 – 5,999 gallons per month	$4.70 per 1,000 gallons
Block 3	6,000 – 10,999 gallons per month	$5.53 per 1,000 gallons
Block 4	11,000 – 15,999 gallons per month	$7.46 per 1,000 gallons
Block 5	16,000 or more gallons per month	$13.05 per 1,000 gallons

(The typical residential OWASA customer uses about 6,000 gallons per month; water use over 10,000 gallons per month is very likely for outdoor purposes such as irrigation)

On November 1st, under the Stage One Water Shortage surcharges, the Block 4 water rate will increase to $11.19 per 1,000 gallons (1.5 times the normal Block 4 rate) and the Block 5 water rate will increase to $26.10 per 1,000 gallons (2 times the normal Block 5 rate). The surcharges are intended to strongly discourage high water use.

During a Stage One Water Shortage, there are no surcharges on water rate blocks 1 through 3 and there are no surcharges for non-residential and multi-family master-metered customers, who will pay seasonal water conservation rates rather than block rates. Additional and higher surcharges would apply if the OWASA Board declares a more severe water shortage.

THANK YOU VERY MUCH FOR YOUR HELP!

We sincerely appreciate your assistance in helping to conserve our essential drinking water supply during this extended drought and throughout the year. We welcome and encourage you to contact us for information about ways to conserve water, or to report actual or possible water leaks, water waste or water use that is not consistent with the conservation requirements.

Your conservation efforts now will help to reduce our community's risk in the event the current drought continues in the months ahead.

TO CONTACT OWASA

Please call us at 968-4421; send e-mail to webmaster@owasa.org; visit our website, www.owasa.org; send a fax to 968-4464 or visit or write to us at 400 Jones Ferry Road, PO Box 366, Carrboro, NC 27510

OWASA is the community-owned, non-profit public water and sewer agency serving the Carrboro-Chapel Hill community.

WATER CONSERVATION:

part of our community's SUSTAINABLE quality of life

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STAGE 2 WATER SHORTAGE DECLARED; WATER USE RESTRICTIONS TIGHTENED

IMPORTANTE BOLETÍN INFORMATIVO SOBRE RESTRICCIONES EN EL USO DEL AGUA (NIVEL 2); PARA SOLICITAR UNA TRADUCCÍÓN EN ESPAÑOL, LLAME AL 537-4221 O ENVIE UN CORREO ELECTRÓNICO A WEBMASTER@OWASA.ORG.

On October 18th, the OWASA Board declared a Stage Two Water Shortage with the goal of reducing water demand by at least 15%. The decision to declare the Stage Two Water Shortage was due to factors including:

As a result of the ongoing exceptional drought, reservoir levels and total water storage on hand have continued to decline and there has been no inflow to OWASA's reservoirs for more than two months.

The U.S. Drought Monitor rates the drought as "Exceptional," and continuation of the drought into 2008 is forecast.

The Cane Creek Reservoir and University Lake, which are the Carrboro-Chapel Hill-southeast Orange County community's primary public water sources, were about 50% full as of October 22, 2007.

Water demand in early and mid-October was well above the Stage One Water Shortage goal of 8.2 million gallons per day or less.

STAGE TWO WATER USE RESTRICTIONS

Spray irrigation with OWASA drinking water is not permitted, except by people regularly engaged in the sale of plants, who are allowed to irrigate their commercial stock in trade.

Irrigation by underground, drip irrigation, micro-spray, low precipitation bubblers, soaker hose systems with automatic shutoffs, or by hand held hoses or watering cans is limited to a maximum of one-half inch of water applied to plant material in any given week.

Water waste, which includes the following, is prohibited.

- Landscape watering applied in such a manner, rate and/or quantity that it overflows the landscaped area being watered and runs onto adjacent property or public right-of-way; or landscape water applied during periods of rainfall or when soil moisture is already adequate.
- The use of water for washing vehicles, equipment, or hard surfaces, such as parking lots, aprons, pads, driveways, or other surfaced areas, in such quantities to flow onto adjacent property or the public right-of-way.
- Water applied in sufficient quantity to cause ponding on impervious surfaces.
- Water lost through plumbing leaks that can be readily identified and corrected.

Water use by individually metered residential customer accounts and by individually metered single-family residential irrigation-only accounts is limited to no more than an average of 800 gallons per day during any monthly billing cycle beginning after the declaration of the Stage Two Water Shortage and ending while such restrictions are still in effect. **OWASA MAY TERMINATE SERVICE FOR WATER USE OVER THE 800 GALLON PER DAY LIMIT.**

Water shall not be used for washing vehicles, except at commercial or institutional car washes where at least 50 percent of the water is recycled.

Water shall not be used for filling or re-filling empty swimming pools. OWASA drinking water may be used to top off operating swimming pools.

Water shall not be used to re-fill ornamental fountains, ponds, and like devices.

Water shall not be used for the routine cleaning or washing of exterior building surfaces, decks or paved areas such as sidewalks, driveways, roadways, and parking lots. This restriction shall not apply to the pressure cleaning of exterior building surfaces or decks before painting or re-painting that is necessary to protect or maintain the physical integrity of the structure.

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OWASA
400 Jones Ferry Road
Carrboro, NC 27510

IMPORTANT NOTICE: STAGE TWO WATER SHORTAGE AND WATER USE RESTRICTIONS

Prsrt First Class
US Postage
PAID
Chapel Hill, NC
Permit #251

(continued from other side)

Restaurants and dining facilities shall serve water only on request of the customer.

Hotels, motels, and other facilities providing sleeping accommodations shall change bed linens only upon request of the customer, or upon customer changeover, or every five days for long-term customers.

The operation of dishwashers and clothes washers only when loaded to their maximum capacity, or at water level settings appropriate for the size of the load being washed; and installation of ultra-low flush toilets, tank dams, faucet aerators and low-flow shower heads are strongly encouraged if not already required.

Water leaks must be repaired within 10 days of notification by OWASA.

STAGE TWO SURCHARGES TO BEGIN IN NOVEMBER FOR HIGH RESIDENTIAL WATER USE

Stage Two surcharges for high water use by individually-metered residential customers will go into effect on November 1st. (Previously, Stage One water surcharges had been approved to go into effect on November 1st.)

OWASA's current block water rates are:

OCTOBER 1 BLOCK WATER RATES

Block 1	1 – 2,999 gallons per month	$1.98 per 1,000 gallons
Block 2	3,000 – 5,999 gallons per month	$4.70 per 1,000 gallons
Block 3	6,000 – 10,999 gallons per month	$5.53 per 1,000 gallons
Block 4	11,000 – 15,999 gallons per month	$7.46 per 1,000 gallons
Block 5	16,000 or more gallons per month	$13.05 per 1,000 gallons

A typical residential OWASA customer uses about 5,500 gallons per month.

ON NOVEMBER 1:

The block 3 water rate will increase to $8.295 per 1,000 gallons.
The block 4 water rate will increase to $14.92 to per 1,000 gallons.
The block 5 water rate will increase to $39.15 per 1,000 gallons.

The surcharges are intended to strongly discourage high water use. During a Stage Two Water Shortage, there are no surcharges on water rate blocks 1 and 2 and there are no surcharges for non-residential and multi-family master-metered customers, who will pay seasonal water conservation rates rather than block rates. Additional and higher surcharges would apply in more severe water shortage conditions.

THANK YOU VERY MUCH FOR YOUR HELP!

We sincerely appreciate your assistance in helping to conserve our essential drinking water supply during this extended drought and throughout the year. We welcome and encourage you to contact us for information about ways to conserve water, or to report actual or possible water leaks, water waste or water use that is not consistent with the conservation requirements. Your conservation efforts now will help to reduce our community's risk in the event the current drought continues in the months ahead.

TO CONTACT OWASA

Please call us at 968-4421; send e-mail to webmaster@owasa.org; visit our website, www.owasa.org; send a fax to 968-4464 or visit or write to us at 400 Jones Ferry Road, PO Box 366, Carrboro, NC 27510.

OWASA is the community-owned, non-profit public water and sewer agency serving the Carrboro-Chapel Hill community.

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THE DROUGHT AND OUR WATER SUPPLIES

How much water do we have now?

As of Thursday, November 29th, our Cane Creek Reservoir, University Lake and Stone Quarry Reservoir were about 47% full with a total of 1.665 billion gallons. Based on average water demand of 7.6 million gallons per day in the last 30 days, we have an estimated 6 to 7 months of supply assuming no rainfall.

Since we have several months of supply on hand, why is conservation important?

- We are in a severe drought as is much of the southeast U.S. and rainfall continues to be well below normal. There is essentially no water flow in the streams and creeks that feed our reservoirs.
- The National Weather Service has forecast that the drought will continue into 2008 due to La Niña conditions in the Pacific.
- Although winter and early spring rains would refill our reservoirs under normal conditions, we cannot assume that will happen in 2008. We need to continue conserving to help ensure that we will have an adequate supply in 2008.

What are the current water use restrictions?

Stage Two restrictions on use of OWASA drinking water include a ban on spray irrigation (except by businesses that regularly sell plants, which may water their inventory). However, we strongly recommend using water only for essential purposes.

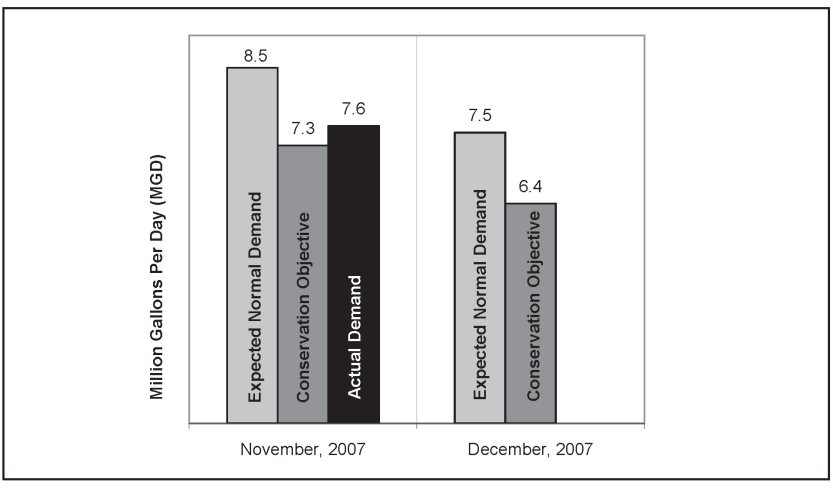
For a complete list of current restrictions or if you have any questions or comments, please contact OWASA at 968-4421 or webmaster@owasa.org, or visit our website, www.owasa.org.

Are water rate surcharges in effect?

Yes. Stage Two water rate surcharges have been in effect since November 1 for water use at or above 6,000 gallons per month at individually-metered residences. The average single-family residential customer in our community uses about 5,500 gallons per month. (The current surcharges do not apply to non-residential customers or master-metered multi-family locations.) For more detailed information, please contact OWASA at 968-4421 or by e-mail to webmaster@owasa.org, or visit our website, www.owasa.org.

What is our present water conservation objective?

Our objective for December is 6.4 million (or fewer) gallons per day or 15% below normal demand for December. Demand in November averaged about 7.6 million gallons per day, so more conservation is needed.



What are the most important conservation opportunities?

- Based on a national study of water use, about 31% of indoor residential water use is for toilet flushing. Therefore, flush less often and reduce an old toilet's flush volume by putting a container of water in the tank or installing a quick-closing flapper available free from OWASA at 400 Jones Ferry Road, Carrboro.

  Consider replacing old toilets with one that uses only 1.28 gallons (a "high efficiency" toilet) or 1.6 gallons (the plumbing code standard since 1994) per flush. Toilets installed before 1980 typically use 5 or more gallons per flush and toilets installed in the 1980s and early 1990s likely use 3.5 gallons per flush. New toilets may pay for themselves in a few years!
- About 25% of indoor residential water use is for clothes washing and 2% is for washing dishes. Wash clothes and dishes only when there is a full load. If you are ready to replace your clothes washer, choose a water- and energy-efficient front-loading model. Water-efficient dishwashers are also available. Please visit the EPA's WaterSense website, www.epa.gov/owm/water-efficiency/pp/het.htm, for information on independently certified water-saving fixtures, appliances, etc.
- Showers and baths account for 21% of indoor residential water use. Take short showers and install water-saving showerheads if you do not already have them. We give away low flow showerheads at our office in Carrboro.
- Faucet use totals about 18% of indoor residential water use. Don't leave the water running when it is not needed while you wash your hands, etc.
- Regularly check plumbing pipes, hoses and fixtures for leaks. Toilets are a very common place for leaks. To check a toilet, put food dye in the tank and do not flush for 15 to 20 minutes. If dye appears in the bowl, there is a leak, probably at the flapper.
- Cease non-essential outdoor use of OWASA drinking water if you have not already.

Questions or comments?

If you have questions or comments, or to report water waste, please call us at 968-4421, send e-mail to webmaster@owasa.org or visit our website, www.owasa.org.

Orange Water and Sewer Authority
400 Jones Ferry Road, Carrboro, NC
968-4421; webmaster@owasa.org; www.owasa.org

WATER CONSERVATION: part of our community's SUSTAINABLE quality of life

~~**APPENDIX C**~~

~~**DROUGHT RESPONSE OPERATING PROTOCOL**~~

DRAFT

DROUGHT RESPONSE OPERATING PROTOCOL
JANUARY 10, 2013

Purpose

To describe the procedures and criteria that OWASA will use for making water supply and demand management decisions during an extended drought, including provisions for public notice of potential Water Supply Shortage declarations, water purchases, and/or use of OWASA's Jordan Lake water supply storage allocation. The protocol outlined below will provide OWASA's customers, local elected boards, and the overall Carrboro-Chapel Hill-UNC community with timely notice of a potential water shortage due to extended drought and the opportunity to reduce water consumption in order to avoid and/or minimize the need for more severe water use restrictions or emergency actions.

The statistically derived drought responses described below were based on the risk of depleting OWASA's existing Cane Creek/University Lake/Quarry Reservoir system to the Emergency Storage level. Those risks do not assume that Jordan Lake is part of OWASA's existing or primary water supply portfolio (University Lake, Cane Creek Reservoir, and Quarry Reservoir); instead, Jordan Lake is only an "insurance policy" for use during extended drought or operational emergencies.

Protocol

1. OWASA shall monitor OWASA's water supply and demand conditions, short-and long-term weather forecasts, regional water supply conditions, and other factors which may affect the risk of a water supply shortage due to drought.

2. The attached graph, which is a modified version of the 7 million gallon per day (mgd) "trigger table"* in OWASA's State-approved *Water Shortage Response Plan*, shall guide OWASA's drought response decisions when raw water demands are at an annual average of 7 mgd. (When annual average demands are greater than 7 mgd, the corresponding trigger table graphs from the *Water Shortage Response Plan* shall be used.) Any drought-related Water Supply Shortage declaration at storage levels above those indicated on the trigger table, and/or any decision to purchase water from a neighboring jurisdiction (and/or to use OWASA's Jordan Lake allocation) during a drought, shall be made only upon approval by the OWASA Board of Directors.

3. OWASA shall declare a Water Shortage Advisory no later than when the total water stored in the reservoirs drops to within 10% of the mandatory Stage 1 trigger. (This Advisory stage is represented by the black dashed line on the attached graph). At or around that time, OWASA will initiate communications with the Carrboro Board of Aldermen, Chapel Hill Town Council, Orange County Board of Commissioners, and the University of North Carolina at Chapel Hill – and shall give public notice to customers and other stakeholders – regarding the likelihood that Stage 1 water use restrictions will go into effect, and that it may be necessary to begin purchasing water from the City of Durham and/or Town of Cary if current drought conditions continue or worsen. OWASA will carefully consider the advice and feedback from the elected boards. The OWASA Board of Directors will continue to exercise its sole responsibility and authority for decisions about water shortage declarations and water purchases, consistent with this Protocol. As in the past, OWASA will expand its standard conservation messaging before declaring the Water Shortage Advisory in order to encourage

* *The graph is based on an average daily raw water demand of 7 mgd. Trigger levels for greater or lesser demands will be correspondingly higher or lower than those depicted here.*

and to give the community as much opportunity as possible to intensify its water saving practices.

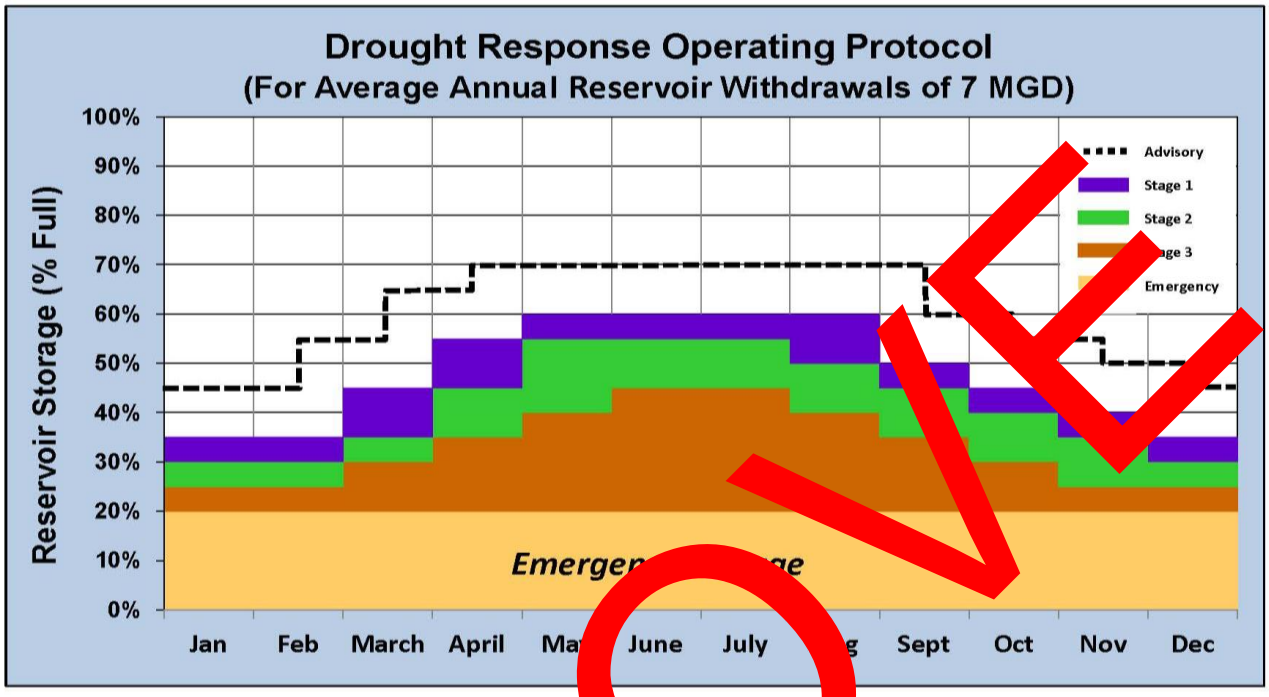
4. When total water storage in OWASA's reservoirs system declines to the purple block on the attached graph, OWASA must declare a Stage 1 Shortage as required by its State-approved *Water Shortage Response Plan*. OWASA may, at its own discretion, initiate Stage 1 use restrictions – with or without corresponding drought rate surcharges – earlier than indicated on the graph, but not later. The OWASA Board may authorize purchases from other utilities and/or obtain water through its Jordan Lake allocation only when total water storage in University Lake, Cane Creek Reservoir, and the Quarry Reservoir is below the Mandatory Stage 1 Shortage trigger, but no sooner. Board approval for such a declaration or purchase decision shall not be required, however, during an operational emergency as determined by OWASA's Executive Director per OWASA's *Water Shortage Response Plan*. Operational emergencies are typically characterized by the need for rapid response and may require the curtailment of water use and/or purchases in a short period of time. Examples of such emergencies include, but are not limited to:

    - Production problems at the Jones Ferry Road Water Treatment Plant
    - Failure of pumps, storage tanks, or pipelines
    - Raw or treated drinking water quality problems
    - Planned or unplanned maintenance events
    - Natural disasters.

5. During an extended drought, OWASA staff will initiate discussions with the Board of Directors regarding the need and timing of commencing water purchases or other prudent actions as total water in storage approaches the mandatory Stage 1 trigger levels shown on the attached graph; however, no purchase or use of OWASA's Jordan Lake allocation shall be made without explicit approval by the Board of Directors (except during Operational Emergencies as described above in Paragraph 4). Restrictions shall, and purchases may, continue until storage returns to levels above the mandatory Stage 1 trigger. Water use restrictions shall continue until storage returns to the "rescission" levels specified in the *Water Supply Shortage Response Plan*.

6. OWASA shall provide regular updates to the community and to the local elected boards throughout the drought as described in Paragraph 3 above. The OWASA Board and staff shall be available to attend meetings of the local governments to provide information about supply and demand conditions and to provide any information or answer questions elected officials may have.

7. The OWASA Board shall review this protocol (a) concurrently with its review of OWASA's State-approved *Water Shortage Response Plan* (as required in conjunction with Local Water Supply Plan updates that must be submitted to the NC Division of Water Resources at least once every five years); (b) following any drought during which mandatory water use restrictions were implemented; and/or (c) at any time deemed necessary to reflect changes in water supply and demand conditions or other new information, such as when the expanded Quarry Reservoir comes on line.



These responses are based on the risk of depletion of OWASA's existing Cane Creek/ University Lake/Quarry Reservoir system to the Emergency Storage level and are consistent with the Response Triggers of OWASA's State-approved Water Shortage Response Plan. Those risks do not consider Jordan Lake to be part of OWASA's existing or primary water supply (University Lake, Cane Creek, and Quarry Reservoirs), only as an "insurance policy" for use during extended drought or emergency conditions.

Water Shortage Advisory: Aggressive public awareness/education effort, including direct communication with Carrboro, Chapel Hill, and Orange County elected boards and the University of North Carolina at Chapel Hill. A Water Shortage Advisory may be intitiated earlier at OWASA's discretion.

Stage 1 Shortage: Mandatory use restrictions -- with or without rate surcharges -- may be intiated earlier at OWASA's discretion, but not later. The OWASA Board may authorize purchases of water from other utilities and/or obtain water through its Jordan Lake allocation only when normal water storage in University Lake, Cane Creek Reservoir, and the Quarry Reservoir is below this Mandatory Stage 1 trigger, but not sooner. Board approval for such a declaration or purchase decision shall not be required, however, during an operational emergency as determined by the Executive Director per OWASA's *Water Shortage Response Plan*.

Stage 2 Shortage: May be intitiated earlier at OWASA's discretion, but not later.

Stage 3 Shortage: May be intitiated earlier at OWASA's discretion, but not later.

Water Supply Emergency: Emergency actions will be taken to obtain supplemental water to ensure the protection of public health, safety and welfare. If Cane Creek/University Lake/Quarry Reservoir storage declines to this level, such actions would likely include the installation of temporary facilities to pump water from the Haw River to the Cane Creek Reservoir.

REMOVE

RESOLUTION ADOPTING A DROUGHT RESPONSE OPERATING PROTOCOL

WHEREAS, OWASA is responsible for providing current and future customers with a reliable, sustainable, and cost-effective supply of high quality drinking water at all times and is committed to making the highest and best use of our local water resources; and

WHEREAS, OWASA's role with respect to growth is explicitly addressed in its *Mission Statement:* "We will manage our responsibilities in a manner consistent and compatible with the adopted growth management policies and land use plans of the Town of Carrboro, the Town of Chapel Hill, and Orange County"; and

WHEREAS, OWASA's water use efficiency, conservation, and reclaimed water programs, which are key components of its sustainable resource management strategy, have successfully and consistently reduced water consumption during the past ten years among all customer groups; and

WHEREAS, notwithstanding these significant community-wide achievements in water use reduction, OWASA's University Lake, Cane Creek, and Quarry Reservoir supplies will be increasingly susceptible to shortages during extended periods of severe drought, especially until the expanded Quarry Reservoir is available in the mid 2030s; and

WHEREAS, it is OWASA's duty to proactively plan and prepare for water supply shortages due to extended periods of severe drought; and

WHEREAS, OWASA's *Water Shortage Response Plan* (November 11, 2010), as approved by the North Carolina Division of Water Resources, includes Response Triggers for a range of supply and demand conditions and describes the actions that OWASA will take during periods of water shortages; and

WHEREAS, community members and elected officials from Carrboro and Chapel Hill have requested clarification of the procedures and criteria that OWASA will use for making water supply and demand management decisions during extended periods of severe drought, including provisions to assure prompt and complete public notice of potential Water Supply Shortage declarations, water purchases, and/or the use of OWASA's Jordan Lake water supply storage allocation.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF ORANGE WATER AND SEWER AUTHORITY THAT:

OWASA shall use the *Drought Response Operating Protocol* text and graph attached hereto as its procedures and criteria for making water supply and demand management decisions during periods of extended drought, including provisions for public notice of potential Water Supply Shortage declarations, water purchases, and/or use of OWASA's Jordan Lake water supply storage allocation.

Adopted this 10th day of January 2013.

Alan E. Rimer, P.E., Chair

ATTEST:

Amy Witsil, Secretary

APPENDIX C~~D~~

RESOLUTIONS APPROVING OWASA'S WATER SHORTAGE RESPONSE PLAN

DRAFT

RESOLUTION APPROVING OWASA'S WATER SHORTAGE RESPONSE PLAN

WHEREAS, North Carolina General Statute 143-355(l) requires that each unit of local government that provides public water services or plans to provide such services shall, either individually or together with other such units of local government, prepare and submit a Water Shortage Response Plan; and

WHEREAS, as required by said statute and in the interest of sound local water supply planning and management, OWASA has developed a Water Shortage Response Plan; and

WHEREAS, the proposed Plan incorporates the Water Conservation Standards approved by OWASA in 2009 following an extensive public input process; and

WHEREAS, the OWASA Board of Directors finds that the Water Shortage Response Plan meets the requirements of North Carolina General Statute 143-355(l) and that said Plan will provide appropriate guidance for the future management of OWASA's water supplies, as well as useful information to the North Carolina Department of Environment and Natural Resources (NCDENR) for the development of a State water supply plan as required by statute;

NOW, THEREFORE, BE IT RESOLVED:

1. The Board of Directors hereby approves and adopts the *OWASA Water Shortage Response Plan* dated November 11, 2010 and attached hereto and made part of this Resolution.

2. The Executive Director shall submit OWASA's plan to NCDENR's Division of Water Resources, and copies shall be provided to the managers of the Town of Carrboro, Town of Chapel Hill, and Orange County.

3. In accordance with State law and sound water resources planning and management practice, the Board of Directors intends that the *OWASA Water Shortage Response Plan* shall be reviewed and revised, as necessary, at least once every five years or as otherwise required by law, to reflect changes in relevant water supply and demand data and projections.

Adopted this 11th day of November, 2010.

Alan Rimer, Vice Chair

ATTEST:

Braxton Foushee, Secretary

RESOLUTION APPROVING OWASA'S 2012 LOCAL WATER SUPPLY PLAN AND WATER SHORTAGE RESPONSE PLAN UPDATE SUBMITTED TO THE NC DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, DIVISION OF WATER RESOURCES

WHEREAS, North Carolina General Statute (NCGS) 143-355(1) requires that each unit of local government that provides public water services or plans to provide such services shall, either individually or together with other such units of local government, prepare and submit a Local Water Supply Plan that must be revised at least once every five years; and,

WHEREAS, 15A NCAC 02E 0.0606 requires each such unit of local government to develop a Water Shortage Response Plan for incorporation into its Local Water Supply Plan; and,

WHEREAS, in March 2013 Orange Water and Sewer Authority (OWASA) staff submitted a draft 2012 Local Water Supply Plan to the Department of Environment and Natural Resources, Division of Water Resources (DWR) in accordance with NCGS 143-355(1); and,

WHEREAS, on November 20, 2014, DWR approved OWASA's 2012 Local Water Supply Plan; and,

WHEREAS, on April 8, 2010 the OWASA Board of Directors adopted a *Long-Range Water Supply Plan, Final Report* (subsequently revised through January 25, 2013) that was developed by OWASA staff and consultants to serve as the Board's principal guide for future water supply policy and investment decisions; and,

WHEREAS, said *Long-Range Water Supply Plan* (as revised through January 25, 2013) is consistent with OWASA's 2012 Local Water Supply Plan originally submitted to DWR in March 2013 (as updated annually through April 2014); and,

WHEREAS, the 2012 Local Water Supply Plan cannot be considered compliant with NCGS 143-355(1) until DWR receives a Resolution of Approval by the OWASA Board of Directors; and

WHEREAS, OWASA submitted and DWR approved OWASA's Water Shortage Response Plan in September 2012; and

WHEREAS, in November 2010, the OWASA Board of Directors approved OWASA's Water Shortage Response Plan; and

WHEREAS, the OWASA Board of Directors adopted a Drought Response Operating Protocol in January 2013 to describe procedures and criteria OWASA will follow for making water supply and demand management decisions; and

WHEREAS, the Drought Response Operating Protocol is consistent with the Water Shortage Response Plan; and

WHEREAS, OWASA would like to update its Water Shortage Response Plan to include the Drought Response Operating Protocol; and

WHEREAS, OWASA desires to update its Water Shortage Response Plan on the same schedule as obtaining a Resolution of Approval for the Local Water Supply Plan by the OWASA Board of Directors and has accordingly updated its Water Shortage Response Plan to include the Drought Response Operating Protocol.

NOW, THEREFORE, BE IT RESOLVED BY THE OWASA BOARD OF DIRECTORS THAT:

1. OWASA's 2012 Local Water Supply Plan as submitted to DWR in March 2013 is hereby approved for the purposes of NCGS 143-355(l) and the OWASA Board intends that this plan shall be revised to reflect changes in relevant data and projections at least once every five years or as otherwise requested by DWR, in accordance with the statute and sound planning practice; and,

2. OWASA's Water Shortage Response Plan as updated in January 2015 is hereby approved for the purposes of NCGS 143-355(l) and the OWASA Board of Directors intends that this plan shall be reviewed and revised as needed, which will be at least once every five years; and,

3. Not inconsistent with the requirements of NCGS 143-355(l) and 15A NCAC 02E 0.0600 OWASA's 2010 *Long-Range Water Supply Plan Final Report* (as revised through January 25, 2013) or its update remains the principal guide for future water supply policy and investment decisions of the Orange Water and Sewer Authority.

Adopted this 22nd day of January, 2015.

John A. Young, Chair

ATTEST:

Heather Payne, Secretary

Resolution Approving OWASA's 2017 Local Water Supply Plan and (Revised) Water Shortage Response Plan as Approved by the NC Department of Environmental Quality, Division of Water Resources

Whereas, North Carolina General Statute (NCGS) 143-355(1) requires that each unit of local government that provides public water services shall, prepare and submit a Local Water Supply Plan, and that such Plans be revised at least once every five years; and

Whereas, NCGS 143-355(l) also requires each such unit of local government to develop a Water Shortage Response Plan for incorporation into its Local Water Supply Plan; and

Whereas, in March 2018 Orange Water and Sewer Authority (OWASA) staff submitted a draft 2017 Local Water Supply Plan to the Department of Environmental Quality, Division of Water Resources (DWR) for its review and approval, in accordance with NCGS 143-355(1); and

Whereas, on April 18, 2018, DWR approved OWASA's 2017 Local Water Supply Plan; and

Whereas, the 2017 Local Water Supply Plan must be approved and adopted by the OWASA Board of Directors after DWR approval in order to be compliant with NCGS 143-355(1); and

Whereas, OWASA has concurrently updated, and DWR has approved, its Water Shortage Response Plan; and

Whereas, OWASA desires to update and obtain approvals for its Water Shortage Response Plan on the same schedule of five-year renewals as that exercised for obtaining updates and approvals for its Local Water Supply Plan, and accordingly, has updated and requested approval of its Water Shortage Response Plan, and DWR has approved this update as of May 2018;

Now, Therefore, Be It Resolved By the OWASA Board of Directors That:

1. OWASA's 2017 draft of its Local Water Supply Plan as approved by DWR in April 2018, is hereby approved and adopted for the purposes of NCGS 143-355(l), and the OWASA Board intends and directs that this plan should be revised to reflect changes in relevant data and projections at least once every five years or as otherwise requested by DWR, in accordance with the statute and sound planning practice.

2. OWASA's Water Shortage Response Plan as approved by DWR in May 2018 is hereby approved and adopted for the purposes of NCGS 143-355(l), and the OWASA Board of Directors intends and directs that this plan shall be reviewed and revised as needed, which will be at least once every five years; or otherwise as requested by DWR, in accordance with the statute and sound planning practice.

Adopted this 14th day of June 2018.

Heather Payne

Heather Payne, Vice Chair

ATTEST:

Yinka Ayankoya

Yinka Ayankoya, Secretary

DROUGHT RESPONSE OPERATING PROTOCOL
JANUARY 10, 2013

Purpose

To describe the procedures and criteria that OWASA will use for making water supply and demand management decisions during an extended drought, including provisions for public notice of potential Water Supply Shortage declarations, water purchases, and/or use of OWASA's Jordan Lake water supply storage allocation. The protocol outlined below will provide OWASA's customers, local elected boards, and the overall Carrboro-Chapel Hill-UNC community with timely notice of a potential water shortage due to extended drought and the opportunity to reduce water consumption in order to avoid and/or minimize the need for more severe water use restrictions or emergency actions.

The statistically derived drought responses described below were based on the risk of depleting OWASA's existing Cane Creek/University Lake/Quarry Reservoir system to the Emergency Storage level. Those risks do not assume that Jordan Lake is part of OWASA's existing or primary water supply portfolio (University Lake, Cane Creek Reservoir, and Quarry Reservoir); instead, Jordan Lake is only an "insurance policy" for use during extended drought or operational emergencies.

Protocol

1. OWASA shall monitor OWASA's water supply and demand conditions, short-and long-term weather forecasts, regional water supply conditions, and other factors which may affect the risk of a water supply shortage due to drought.

2. The attached graph, which is a modified version of the 7 million gallon per day (mgd) "trigger table"* in OWASA's State-approved *Water Shortage Response Plan*, shall guide OWASA's drought response decisions when raw water demands are at an annual average of 7 mgd. (When annual average demands are greater than 7 mgd, the corresponding trigger table graphs from the *Water Shortage Response Plan* shall be used.) Any drought-related Water Supply Shortage declaration at storage levels above those indicated on the trigger table, and/or any decision to purchase water from a neighboring jurisdiction (and/or to use OWASA's Jordan Lake allocation) during a drought, shall be made only upon approval by the OWASA Board of Directors.

3. OWASA shall declare a Water Shortage Advisory no later than when the total water stored in the reservoirs drops to within 10% of the mandatory Stage 1 trigger. (This Advisory stage is represented by the black dashed line on the attached graph). At or around that time, OWASA will initiate communications with the Carrboro Board of Aldermen, Chapel Hill Town Council, Orange County Board of Commissioners, and the University of North Carolina at Chapel Hill – and shall give public notice to customers and other stakeholders – regarding the likelihood that Stage 1 water use restrictions will go into effect, and that it may be necessary to begin purchasing water from the City of Durham and/or Town of Cary if current drought conditions continue or worsen. OWASA will carefully consider the advice and feedback from the elected boards. The OWASA Board of Directors will continue to exercise its sole responsibility and authority for decisions about water shortage declarations and water purchases, consistent with this Protocol. As in the past, OWASA will expand its standard conservation messaging before declaring the Water Shortage Advisory in order to encourage

* *The graph is based on an average daily raw water demand of 7 mgd. Trigger levels for greater or lesser demands will be correspondingly higher or lower than those depicted here.*

and to give the community as much opportunity as possible to intensify its water saving practices.

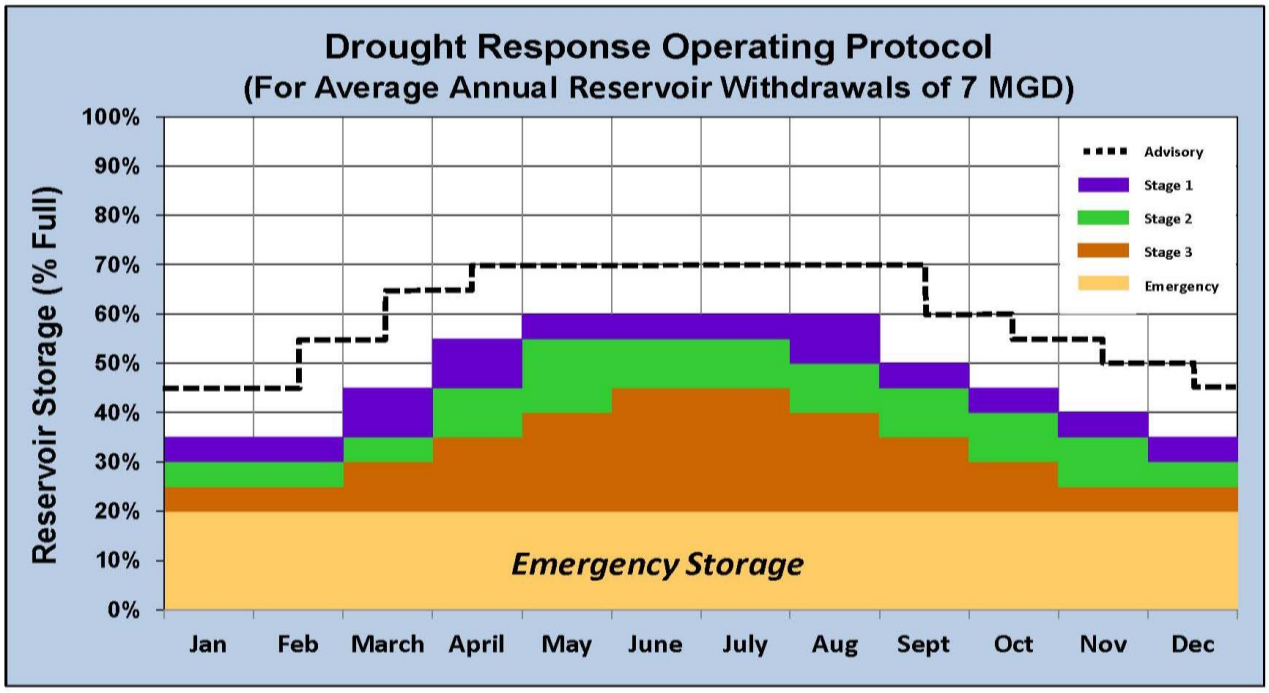
4. When total water storage in OWASA's reservoirs system declines to the purple block on the attached graph, OWASA must declare a Stage 1 Shortage as required by its State-approved *Water Shortage Response Plan*. OWASA may, at its own discretion, initiate Stage 1 use restrictions – with or without corresponding drought rate surcharges – earlier than indicated on the graph, but not later. The OWASA Board may authorize purchases from other utilities and/or obtain water through its Jordan Lake allocation only when total water storage in University Lake, Cane Creek Reservoir, and the Quarry Reservoir is below the Mandatory Stage 1 Shortage trigger, but no sooner. Board approval for such a declaration or purchase decision shall not be required, however, during an operational emergency as determined by OWASA's Executive Director per OWASA's *Water Shortage Response Plan*. Operational emergencies are typically characterized by the need for rapid response and may require the curtailment of water use and/or purchases in a short period of time. Examples of such emergencies include, but are not limited to:

    - Production problems at the Jones Ferry Road Water Treatment Plant
    - Failure of pumps, storage tanks, or pipelines
    - Raw or treated drinking water quality problems
    - Planned or unplanned maintenance events
    - Natural disasters.

5. During an extended drought, OWASA staff will initiate discussions with the Board of Directors regarding the need and timing of commencing water purchases or other prudent actions as total water in storage approaches the mandatory Stage 1 trigger levels shown on the attached graph; however, no purchase or use of OWASA's Jordan Lake allocation shall be made without explicit approval by the Board of Directors (except during Operational Emergencies as described above in Paragraph 4). Restrictions shall, and purchases may, continue until storage returns to levels above the mandatory Stage 1 trigger. Water use restrictions shall continue until storage returns to the "rescission" levels specified in the *Water Supply Shortage Response Plan*.

6. OWASA shall provide regular updates to the community and to the local elected boards throughout the drought as described in Paragraph 3 above. The OWASA Board and staff shall be available to attend meetings of the local governments to provide information about supply and demand conditions and to provide any information or answer questions elected officials may have.

7. The OWASA Board shall review this protocol (a) concurrently with its review of OWASA's State-approved *Water Shortage Response Plan* (as required in conjunction with Local Water Supply Plan updates that must be submitted to the NC Division of Water Resources at least once every five years); (b) following any drought during which mandatory water use restrictions were implemented; and/or (c) at any time deemed necessary to reflect changes in water supply and demand conditions or other new information, such as when the expanded Quarry Reservoir comes on line.



These responses are based on the risk of depleting OWASA's existing Cane Creek/ University Lake/Quarry Reservoir system to the Emergency Storage level and are consistent with the Response Triggers of OWASA's State-approved Water Shortage Response Plan. Those risks do not consider Jordan Lake to be part of OWASA's existing or primary water supply (University Lake, Cane Creek, and Quarry Reservoirs), but only as an "insurance policy" for use during extended drought or emergency conditions.

Water Shortage Advisory: Aggressive public awareness/education effort, including direct communication with the Carrboro, Chapel Hill, and Orange County elected boards and the University of North Carolina at Chapel Hill. A Water Shortage Advisory may be intitiated earlier at OWASA's discretion.

Stage 1 Shortage: Mandatory use restrictions -- with or without rate surcharges -- may be intitiated earlier at OWASA's discretion, but not later. The OWASA Board may authorize purchases of water from other utilities and/or obtain water through its Jordan Lake allocation only when total water storage in University Lake, Cane Creek Reservoir, and the Quarry Reservoir is below this Mandatory Stage 1 trigger, but not sooner. Board approval for such a declaration or purchase decision shall not be required, however, during an operational emergency as determined by the Executive Director per OWASA's *Water Shortage Response Plan.*

Stage 2 Shortage: May be intitiated earlier at OWASA's discretion, but not later.

Stage 3 Shortage: May be intitiated earlier at OWASA's discretion, but not later.

Water Supply Emergency: Emergency actions will be taken to obtain supplemental water to ensure the protection of public health, safety and welfare. If Cane Creek/University Lake/Quarry Reservoir storage declines to this level, such actions would likely include the installation of temporary facilities to pump water from the Haw River to the Cane Creek Reservoir.

BACKGROUND ON OWASA'S WATER SHORTAGE RESPONSE PLAN

In accordance with North Carolina General Statute 143-355(l) and North Carolina Administrative Code 15A NCAC 02E .0607, OWASA has a state-approved Water Shortage Response Plan (WSRP, Attachment 1). Our WSRP includes triggers (water supply storage and demand conditions) for implementing water shortage response stages during droughts based on the risk to our water supply.

Reservoir Optimization Model

Our drought stages are based on water supply risk modeled in a tool referred to as a Reservoir Optimization Model.

Our Key "20 Percent Remaining" Water Storage Threshold

Running out of water is not an acceptable basis for real-world planning and management decisions. All models and projections are uncertain, and it is essential that we incorporate some margin-of-safety into our water supply plans and drought response strategy. Therefore, we have built into our models the requirement that our minimum total water storage will not drop below 20 percent. We based this threshold on the expected amount of time (2 to 3 months) we would need to implement emergency water supply augmentation measures (such as temporarily withdrawing water from the Haw River to supplement the supply available from Cane Creek Reservoir). This reserve supply now meets approximately 100 days of raw water needs based on current demands.

Mandatory Water Shortage Response Triggers

OWASA's water shortage triggers were established to generally correspond to increasing levels of risk that useable storage will drop to 20 percent or less over the next twelve months based on the Reservoir Optimization Model. The model uses a mass balance approach that accounts for changes in storage based on the amount of water coming in (such as rainfall, flow from tributaries, and runoff) and water going out (such as water demands, water over dams, evaporation, and downstream flow releases). In addition to assumed hydrologic factors included in the model, our level of risk is also impacted by the following factors:

- Average annual day demand – as our raw water demands increase, so does our level of risk for a given level of storage
- Time of year – in the late fall, winter, and early spring, when inflows are typically higher and withdrawals are typically lower, reservoir storage can drop to relatively lower levels before the risk of dropping to 20 percent storage or below during the next 12 months is significant. From late spring through early fall, when inflows are lower and demand is higher, the level of risk for the same average annual demand increases.

Figure 1 shows the trigger table from our WSRP for an annual average demand of 7 mgd. This is the model that we are currently using based on daily demands. As shown by the graph, we can have lower storage in our reservoirs during winter months than in summer, which illustrates the

lower risk of running out of water during the winter than in summer. In comparison, Figure 2 illustrates the trigger table for an annual average demand of 10 mgd; water shortages must be declared when remaining storage is higher than the triggers shown for the 7 mgd demand scenario in Figure 1. For example, a Stage 1 water shortage is needed when storage is at 85 percent at 10 mgd of demand in May, but our supply can get down to 60 percent under 7 mgd of demand in May.

Figure 1: Water Shortage Triggers at 7 MGD Annual Average Demand

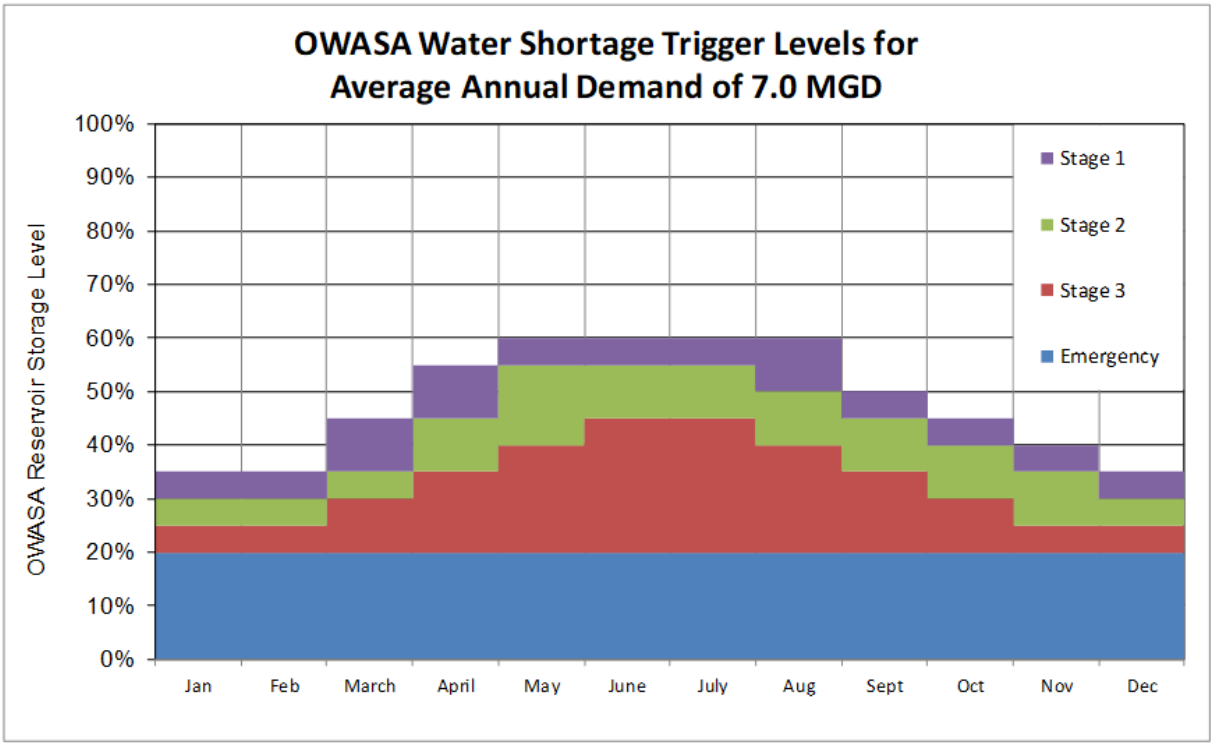
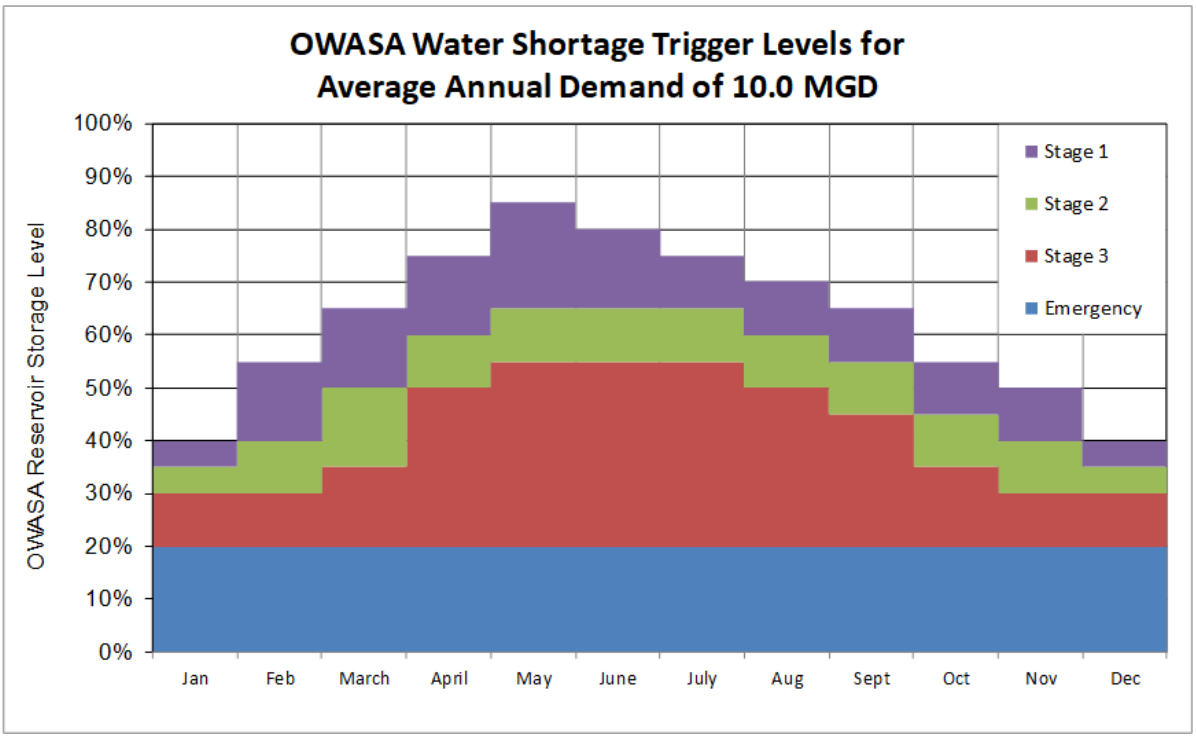
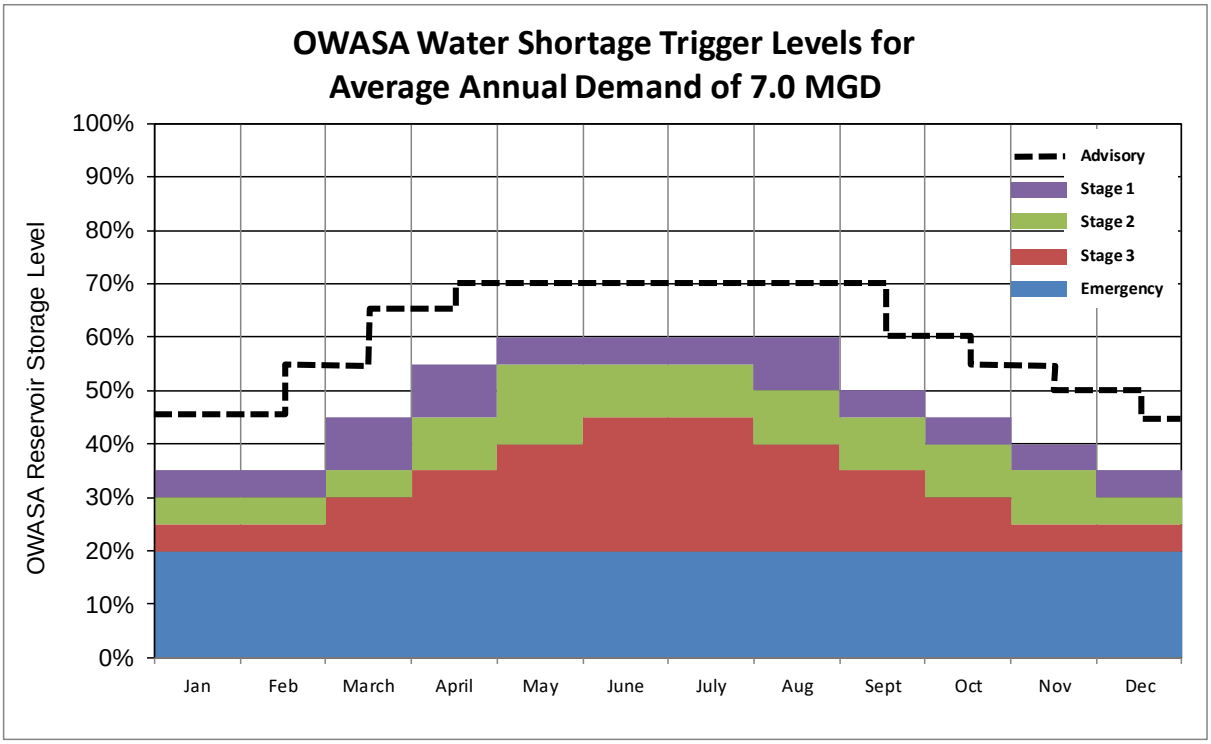


Figure 2: Water Shortage Triggers at 10 MGD Annual Average Demand



OWASA's DROP also includes an advisory stage which is declared when our water storage is within 10 percent of the Stage 1 water shortage; Figure 3 illustrates the advisory for the average annual demand of 7 mgd. During the advisory stage, OWASA proactively engages with the community and informs customers that our water supply storage is at risk and requests voluntary conservation measures.

Figure 3: DROP Water Shortage Advisory Thresholds at 7 MGD Annual Average Demand



Water Use Restrictions

Our WSRP requires that we declare the appropriate water shortage stage within 5 days of reaching the thresholds shown in Figures 1 and 2. The Executive Director has the authority to declare these water shortage stages. Each response stage has a corresponding set of mandatory water use restrictions (Table 1) and water rate drought surcharges (Table 2) that apply when the specified trigger is reached.

Table 1: Summary of Key Conservation Standards for OWASA Drinking Water

Effective June, 2009

Water Use	Year-Round	Stage 1	Stage 2	Stage 3	Emergency
Spray Irrigation of **Turf / Grass** (on designated days of the week as noted)	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	1 day per week, up to 1/2 inch per week, 6 pm - 10 am only ** Odd Addresses: Tues. Even Addresses: Thurs.	X**	X**	X
Spray Irrigation of **Non-Turf Plant Materials** (on designated days of the week as noted)	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	3 days per week, up to 1 inch per week, 6 pm - 10 am only ** Odd Addresses: Tu/Th/Sat Even Addresses: Sun/W/F	1 day per week, up to 1/2 inch per week, 6 pm - 10 am only ** Odd Addresses: Tues. Even Addresses: Thurs.	X***	X
Drip irrigation, underground drip emitters, soaker hose, hand-watering, and other non-spray methods allowed *at any time* or frequency	✓	✓	✓	✓	X
Washing of Building Exteriors **Before Painting**	✓	✓	✓	X	X
General Cleaning of Building Exteriors, Paved Areas, Etc.	✓	✓	X	X	X
Filling, Refilling, or Topping Off Ornamental Ponds, Fountains, etc.	✓	✓	X	X	X
Vehicle Washing	✓	✓	Only at commercial or institutional facilities where at least 50% of the water is being recycled, or is from a non-potable source or well	X	X
Filling, Refilling, or Topping Off of Swimming Pools and Backyard-Scale Facilities to Support Wildlife	✓	✓	✓	✓	X
Flushing or Pressure Testing New Water Lines	✓	✓	✓	✓	Only if captured and returned to system

Year-Round Requirements, Regardless of Water Shortage Condition

> Automatic controllers and rainfall or soil moisture sensors required on all irrigation systems
> "Wasteful" water use* prohibited at all times
> Water leaks must be repaired within 10 days of discovery and/or notification by OWASA
> Water may be served in restaurants and other dining facilities only at customer's request
> Hotel/motel linens may only be changed upon customer changeover, every 5 days, or upon customer request

Symbols and Notes

✓ *Water use is allowed.*

X *Water use is not allowed.*

** *Restrictions may not apply to public purpose athletic fields, recreational fields, or public purpose botanical sites operated in compliance with OWASA-approved Water Conservation Plans.*

*** *Restrictions may not apply to public purpose botanical sites operated in compliance with OWASA-approved Water Conservation Plans.*

Table 2: Water Rate Surcharges in Declared Water Shortages

Individually-Metered Residential						Multi-family Master-metered Residential	Non-Residential and Irrigation-Only
Block:	Res. Block 1	Res. Block 2	Res. Block 3	Res. Block 4	Res. Block 5		
Use Level: (gallons)	1,000 to 2,000	3,000 to 5,000	6,000 to 10,000	11,000 to 15,000	16,000 and up		
Stage 1	No surcharge	No surcharge	1.25 times normal Block 3 rate	1.5 times normal Block 4 rate	2 times normal Block 5 rate	1.15 times year-round rate	1.15 times seasonal and irrigation-only rate
Stage 2	No surcharge	1.25 times normal Block 2 rate	1.5 times normal Block 3 rate	2 times normal Block 4 rate	3 times normal Block 5 rate	1.25 times year-round rate	1.25 times seasonal and irrigation-only rate
Stage 3 and Emergency	No surcharge	1.5 times normal Block 2 rate	2 times normal Block 3 rate	3 times normal Block 4 rate	4 times normal Block 5 rate	1.5 times year-round rate	1.5 times seasonal and irrigation-only rate

Calculating OWASA's Water Rates with Water Shortage Surcharges in Effect

Based on the water rates in effect as of October 1, 2020 (and which will be revised at the discretion of the OWASA Board of Directors), here are a couple illustrations of how OWASA's water rates change when water rate surcharges are in effect.

Example 1: The Block 3 water rate for individually-metered residences is $8.39 per 1,000 gallons of water use (use between 6,000 and 10,000 gallons). When the Stage 1 water rate surcharge is in effect, the Block 3 rate would increase to $10.49 per 1,000 gallons (an increase of 25%).

Example 2: The Peak Season (May – September) water rate for all non-residential and non-irrigation customers is $8.47 per 1,000 gallons of water use. Under Stage 3 surcharges, the Peak Season water rate would increase to $12.71 per 1,000 gallons (an increase of 50%).

Triggers for Rescinding Water Shortage Stages

The WSRP also includes triggers for rescinding the water shortage stages; the water supply storage volume must be at least 10 percent above the specified water shortage initiation trigger for the applicable stage. The Executive Director may delay the rescission depending on water supply and demand conditions, the extended weather forecast, regional supply conditions, and other factors.

Agenda Item 6:

Consideration of an Amendment to the Water and Sewer Management, Planning and Boundary Agreement

Purpose:

To respond to a petition to amend the Water and Sewer Management, Planning and Boundary Agreement to include lots on Bayberry Drive in the Hunt's Reserve Neighborhood.

Background:

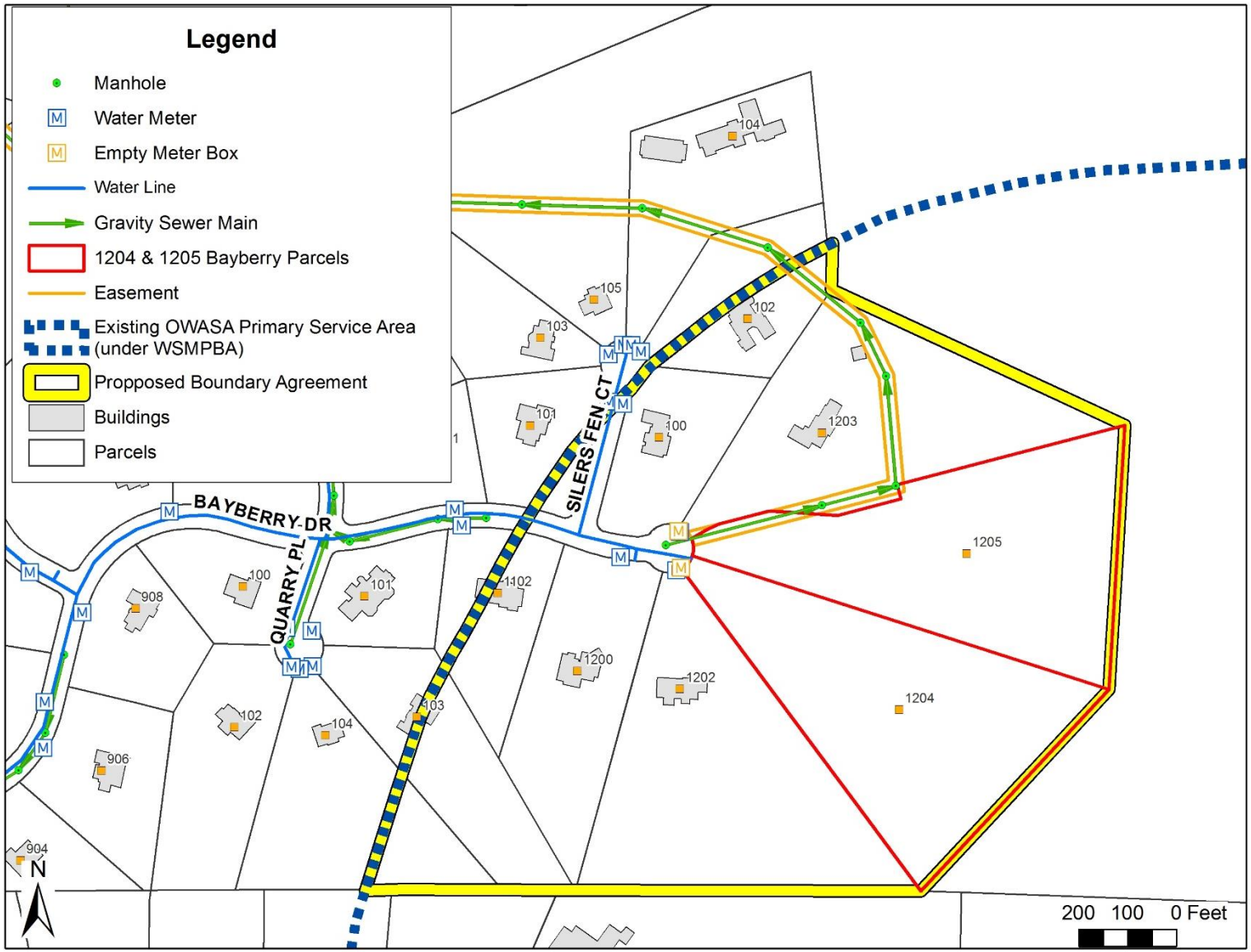
The Water and Sewer Management, Planning and Boundary Agreement (WSMPBA) was signed in 2001 by the Town of Carrboro, Town of Chapel Hill, Town of Hillsborough, Orange County and OWASA to identify those areas in the County which would be served by water and sewer and which utility would provide those services. Changes to the WSMPBA require the approval of each of the five parties to the Agreement. The WSMPBA provides a comprehensive county-wide system of utility service areas upon which the signatory entities can rely when making decisions concerning land use, annexation, zoning, and growth management. OWASA staff rely on the Agreement to determine whether we can provide water and sewer service to a given parcel when asked by the community.

The WSMPBA includes two tiers of utility service areas:

1. Primary Service Area – these are areas where service is currently provided or might reasonably be provided in the future. When asked if water and sewer service can be provided, OWASA staff would answer "yes" to that question based on the WSMPBA (may be other reasons such as the need for a utility line extension, where we may not be able to currently serve that parcel).
2. Long-Term Interest Area – these are areas where public water and sewer service is not anticipated to be made, but designates which utility would serve the area if there was an adverse public health condition as defined in the WSMPBA.

On February 27, 2020, the OWASA Board of Directors received a petition (Attachment 1) made on behalf of the owners of two undeveloped lots – 1204 and 1205 Bayberry Drive in the Hunt's Reserve neighborhood to include their lots in the OWASA Primary Service Area as defined under WSMPBA. The two undeveloped lots lie within the Town of Chapel Hill's jurisdiction. Water and sewer service has been provided to all other lots in the Hunt's Reserve neighborhood since 1997 (pre-WSMPBA). Meter boxes were installed for these undeveloped lots, and a sewer line and easement exists on one of the undeveloped lots. Figure 1 illustrates the area.

Figure 1: Area of Proposed Primary Service Area Amendment



This portion of the primary service area identified in WSMPBA generally follows a ridge line and was meant to exclude any property that could not be served by gravity sewer. However, the boundary is not based on a topographic survey and therefore does not have a high degree of accuracy. OWASA staff have reviewed data, and it is feasible to provide water and sewer service to all lots in the Hunt's Reserve subdivision.

Proposed Boundary Amendment:

Staff from all five parties of the WSMPBA met to discuss the petition and a recommended amendment to the boundary. Staff determined the following:

- Including the two vacant lots in OWASA's primary service area would provide consistent water and sewer policy for all lots within the Hunt's Reserve Subdivision;
- The existing primary service area includes nine other lots that are either fully or partially outside the service boundary; these nine lots receive water and sewer service.
- Following parcel lines rather than the ridge line would support the potential for future home additions and accessory dwelling units on the 11 lots (9 developed and 2 undeveloped) that fall fully or partially outside the current primary service boundary.

Thus staff recommend that the boundary be modified to follow parcel boundary lines and include all lots with frontage on Bayberry Drive, Silers Fen Court, and Quarry Place. The total proposed area for the amendment is 31.88 acres.

Process to Amend the WSMPBA:

Since the lots lie within the Town of Chapel Hill's jurisdiction, the Town of Chapel Hill's Council considered the amendment first and approved it on October 28, 2020. Other governing bodies are scheduled to consider the amendment on the following dates:

- Town of Hillsborough – November 9, 2020
- Town of Carrboro – November 10, 2020
- Orange County – November 17, 2020

Staff and General Counsel Recommendation:

Staff and General Counsel recommend the Board adopt the resolution amending the Water and Sewer Management, Planning and Boundary Agreement.

Information:

Attachment 1: Petition on Behalf of Frank Baumgartner and Rachel Sumney
Attachment 2: Resolution Amending the Water and Sewer Management, Planning and Boundary Agreement

P.M. Dubbeling, PLLC

210 North Columbia Street
Chapel Hill, NC 27514

Kaitlin O'Connor
Phone: 919-635-6005
Fax: 919-404-7074
kaitlin.oconnor@pmdubbeling.com

14 February 2020

Petition for Approval to Hook Up Existing Water and Sewer Lines at 1204 and 1205 Bayberry Lane in Chapel Hill

Chapel Hill residents Frank Baumgartner and Rachel Sumney petition Orange County Water and Sewer Authority ("OWASA") to provide water and sewer services to 1204 and 1205 Bayberry Drive in Chapel Hill. This petition is made for the following reasons:

Background

Frank Baumgartner and Rachel Sumney own lots located in the Hunt's Reserve neighborhood in Chapel Hill – Lots 1204 and 1205 respectively on the attached map. Attachment 1. As part of the initial development in the late 1990's, water and sewer lines were laid to all the lots in Hunt's Reserve, including 1204 and 1205 Bayberry Lane. At that time, the entirety of Hunt's Reserve was located within the OWASA service boundary and it was understood that all of the lots would have water and sewer service provided by OWASA.

In 2001, Orange County, OWASA, and the Towns of Chapel Hill, Hillsborough, and Carrboro entered into a Water and Sewer Management, Planning, and Boundary Agreement ("WSMPBA"). The WSMPBA set the OWASA primary service boundary so that it runs down the middle of Hunt's Reserve. Attachment 1. As shown on the map, lots 100, 1200, 1202, 1204, 1205, and 1203 lie outside the current boundary. At that time,

development of lots 100, 1200, 1202, and 1203 had already begun and water and sewer services were provided to those lots despite their lying outside the new boundary – leaving 1204 and 1205 with water and sewer lines laid, but without actual water and sewer service.

Ms. Sumney bought her lot prior to 2001 and always understood that it would be provided water and sewer service. She did not find out that it was now outside the OWASA service boundary until she recently began to prepare the lot for sale. Mr. Baumgartner bought his lot more recently, but also was unaware that the lot did not currently have water and sewer service as this did not become apparent during the standard pre-purchase procedures. He only became aware of this in speaking with Ms. Sumney.

Petition

Under the WSMPBA, service to the lots at 1204 and 1205 Bayberry Lane may only be turned on with the approval of each party to the WSMPBA. Attachment 2 at page 2. This petition asks for such approval from OWASA. Permission of the other parties is being sought simultaneously.

Service to 1204 and 1205 Bayberry Lane comes at no additional cost to any party to the WSMPBA that will not be fully recouped from fees paid by the residents. There are existing water and sewer lines that only require "hook up." Each of the other lots in the subdivision is currently provided service and, at the time Mr. Baumgartner and Ms. Sumney purchased these lots, they did so with the understanding that the lots would also be within OWASA's service boundary. Mr. Baumgartner and Ms. Sumney only became aware that the lots were now outside the boundary when Ms. Sumney prepared to sell and develop her lot.

1204 and 1205 Bayberry Lane are in a very rare if not unique situation – water and sewer lines have already been laid and service was anticipated prior to the change in

boundaries in 2001. By accepting this petition, no party runs the risk of creating a precedent whereby other properties currently outside the OWASA boundary have a rightful claim to service. OWASA is only being asked to turn on service through already existing lines. Conversely, providing services to 1204 and 1205 Bayberry Lane does not provide grounds for expanding other services areas in Orange County. Again, these lines have already been laid and the only thing needed is permission to utilize them. Providing services to 1204 and 1205 Bayberry Lane will not negatively impact any party or subvert the purpose of the WSMPBA.

Conclusion

Mr. Baumgartner and Ms. Sumney respectfully request that OWASA approve this Petition by stating that it has no objection to OWASA providing services to 1204 and 1205 Bayberry Drive in Chapel Hill.

Should any member of OWASA have any questions, I can be reached at the email or phone number below.

This the 14th day of February, 2020.

Kaitlin O'Connor for Paul Dubbeling

Paul M. Dubbeling
P.M. Dubbeling, PLLC
210 North Columbia Street
Chapel Hill, NC 27514
Phone: 919-635-6005
Fax: 919-404-7074
paul.dubbeling@pmdubbeling.com
Attorney for Mr. Baumgarter and Ms. Sumney

AFFIDAVIT OF FRANK BAUMGARTNER

I, Frank Baumgartner, have reviewed the contents of the attached Petition for Approval to Hook Up Existing Water and Sewer Lines at 1204 and 1205 Bayberry Lane in Chapel Hill. The contents of the Petition are true and accurate to the best of my information and belief.

This the 14 day of February 2020.

Frank Baumgartner

STATE OF NORTH CAROLINA
COUNTY OF ORANGE

Sworn and subscribed to before me by Frank Baumgartner this 14 day of February 2020.

Kaitlin O'Connor
Notary Public
My Commission Expires 9/22/24

Kaitlin O'Connor
NOTARY PUBLIC
Durham County, NC
My Commission Expires September 22, 2024

AFFIDAVIT OF RACHEL SUMNEY

I, Rachel Sumney, have reviewed the contents of the attached Petition for Approval to Hook Up Existing Water and Sewer Lines at 1204 and 1205 Bayberry Lane in Chapel Hill. The contents of the Petition are true and accurate to the best of my information and belief.

This the 14th day of February 2020.

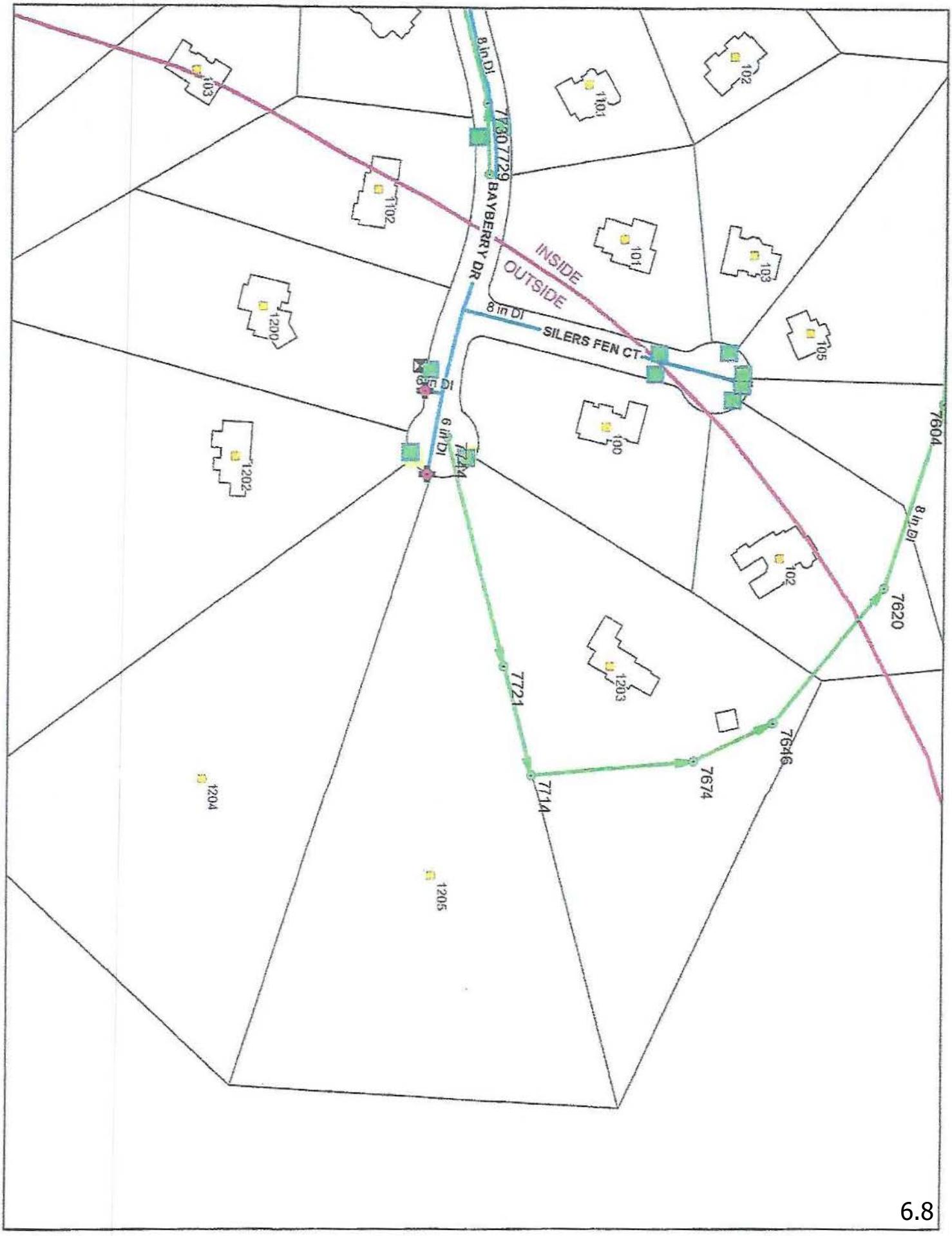
Rachel Sumney

STATE OF NORTH CAROLINA
COUNTY OF ORANGE

Sworn and subscribed to before me by Rachel Sumney this 14 day of February 2020.

Kaitlin O'Connor
Notary Public
My Commission Expires 9/22/24

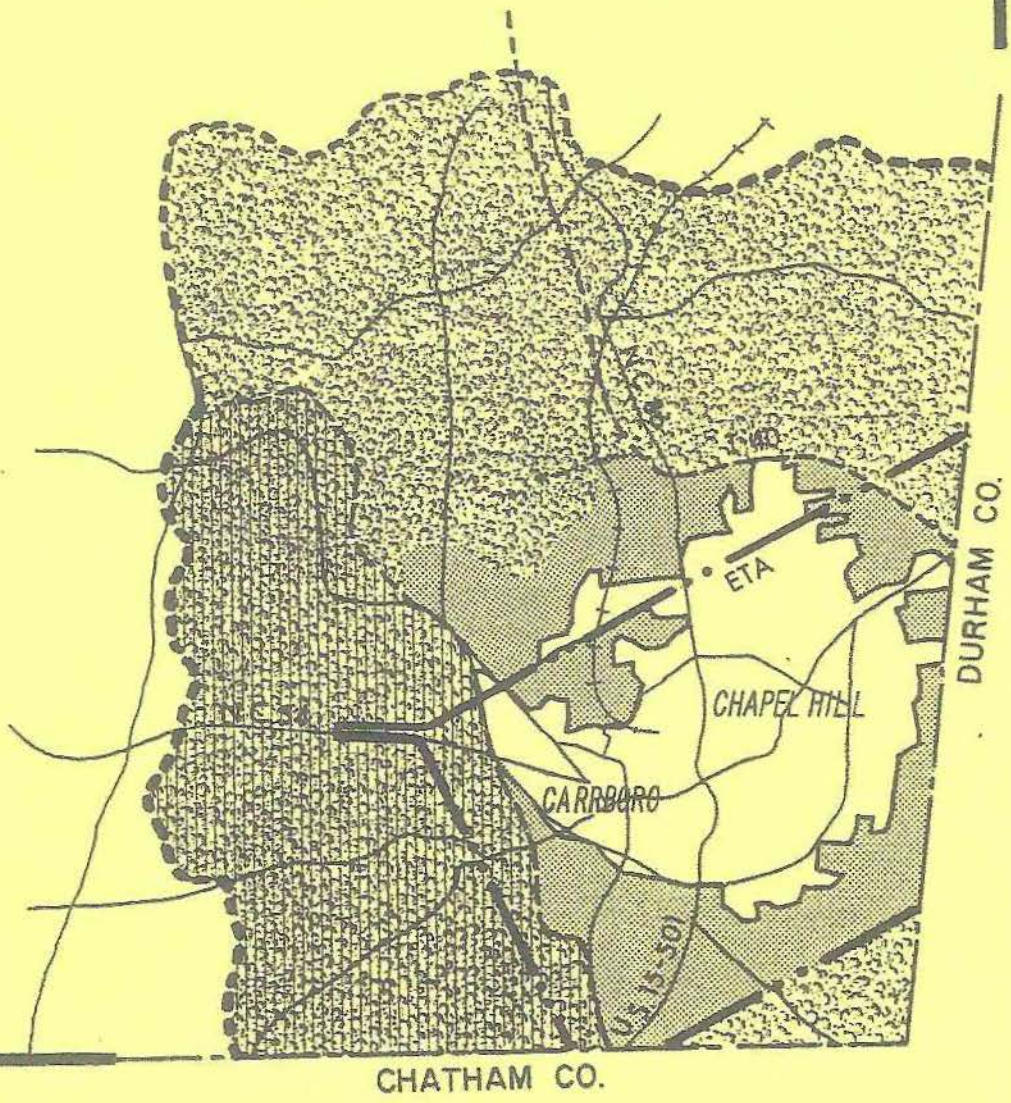
Kaitlin O'Connor
NOTARY PUBLIC
Durham County, NC
My Commission Expires September 22, 2024



Attachment 1

ORANGE COUNTY - CHAPEL HILL - CARRBORO

JOINT PLANNING
LAND USE PLAN



Legend:

- URBAN
- TRANSITION
- RURAL BUFFER
- WATERSHED

October, 1986

Adopted 10-13-86
Amended 8-16-88
9-6-88
4-2-90
2-3-92 (effective 2/24/92)
2-1-93
2-2-99
8-20-02
6-24-03
10-1-03

Amended 6/9/14
6/17/14
4/7/15
12/7/15

6.9

Attachment 2

Exhibit B

WATER AND SEWER MANAGEMENT, PLANNING AND BOUNDARY AGREEMENT

THIS AGREEMENT, made and entered into this 3rd day of December, 2001, by and between the COUNTY OF ORANGE, a political subdivision of the State of North Carolina; the TOWN OF CARRBORO, the TOWN OF CHAPEL HILL, and the TOWN OF HILLSBOROUGH, municipal corporations duly created and existing under the laws of North Carolina; and the ORANGE WATER AND SEWER AUTHORITY, a public water and sewer authority duly created and existing under Chapter 162A, Article 1 of the North Carolina General Statutes.

WITNESSETH:

In consideration of mutual benefits regarding the definition of water and sewer service boundaries and the management and planning thereof, the parties to this agreement hereby mutually agree as follows:

I. PREAMBLE

A. Charge to the Water and Sewer Boundary Task Force

Since the mid-1980's, several attempts to define water and sewer service boundaries for Orange County and the municipalities of Chapel Hill, Carrboro and Hillsborough have been undertaken. In 1994, a Task Force was formed consisting of elected officials from Carrboro, Chapel Hill, Hillsborough and Orange County, as well as two members of the Orange Water and Sewer Authority Board of Directors. The charge to the Water and Sewer Service Boundary Task Force is attached as Appendix B.

B. Purpose of Water and Sewer Boundary Agreement

1. To provide a comprehensive, County-wide system of service areas for future utility development and interest areas for dealing with private water and wastewater system problems in areas without public water and sewer service.

2. To complement growth management objectives, land use plans and annexation plans in existing agreements, such as the Orange County-Chapel Hill-Carrboro Joint Planning Agreement and Joint Planning Area Land Use Plan

3. To resolve in advance and preclude future conflicts about future service areas and annexation areas.

4. To provide for predictable long-range water and sewer capital improvement planning and financing.

5. To provide for limitations on water and sewer service in certain areas, as defined.

II. HOW THE AGREEMENT WORKS

A. Effective Date of the Agreement

This agreement shall become effective upon execution by all of the parties and signature by the chief elected or appointed official.

B. Term of Agreement

This agreement shall remain in effect for ten (10) years from its execution, and shall be renewable as provided in the following subsection.

C. Procedure for renewal

At the end of each ten year term, the agreement shall renew automatically, unless written notice is provided of intent to withdraw as noted in subsection E below.

D. Procedure for proposing and acting on changes in agreement including boundaries

1. Any change to the agreement (including boundaries) requires approval of all parties to the agreement.

Resolution of the Board of Directors of Orange Water and Sewer Authority Approving Amendments to the Water and Sewer Management, Planning, and Boundary Agreement

Whereas, in 2001, Town of Carrboro, Town of Chapel Hill, Town of Hillsborough, Orange County, and OWASA adopted a Water and Sewer Management, Planning and Boundary Agreement ("Agreement"); and

Whereas, the Agreement was last amended on October 6, 2020; and

Whereas, P.M. Dubbeling, PLLC submitted a petition to the OWASA Board of Directors on February 27, 2020 on behalf of Chapel Hill residents Frank Baumgartner and Rachel Sumney requesting that the Town allow OWASA to provide water and sewer services to 1204 and 1205 Bayberry Drive in Chapel Hill; and

Whereas, the two lots in question are immediately adjacent to other residential lots that receive OWASA services, and are located on the eastern side of the Hunt's Reserve neighborhood which is predominately located in the "OWASA Primary Service Area" as defined in the Agreement; and

Whereas, OWASA staff have advised that from an engineering perspective, it is feasible to provide water and sewer service to all lots in the Hunt's Reserve neighborhood; and

Whereas, in order to provide consistent water and sewer policy for all lots in the Hunt's Reserve neighborhood the Town of Chapel Hill Council approved the request to include all lots and portions of lots accessed via Bayberry Drive within the boundary of the OWASA Primary Service Area on October 28, 2020; and

Whereas, eleven lots or portions of lots accessed via the eastern end of Bayberry Drive, constituting a total area of approximately 31.88 acres, are currently designated as "OWASA Long-Term Interest Area" in the Agreement; and

Whereas, amendments to the Agreement require the approval of all signatories to the Agreement; and

Now, Therefore, Be It Resolved:

1. That the Orange Water and Sewer Authority Board of Directors hereby approves amendments to Appendix A of the Agreement to designate approximately 31.88 acres in the southeast Chapel Hill area as additional "Primary Service Area" as shown on the map attached hereto.

Adopted this the 12th day of November 2020.

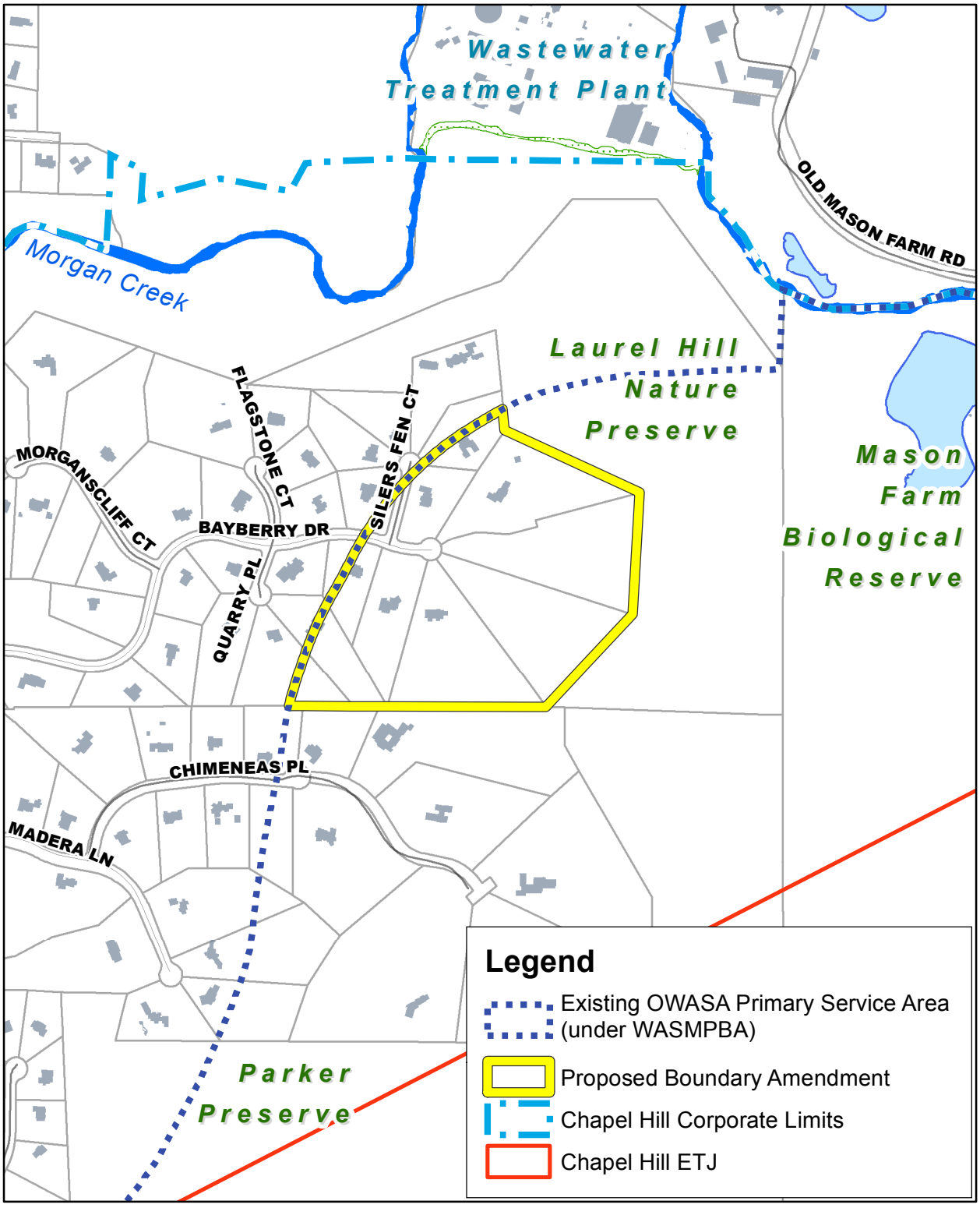
_____
Raymond E. DuBose, P.E., Chair

ATTEST:

_____
Jo Leslie Eimers, Secretary

Proposed WASMPBA Boundary Amendment Map

Orange Co. PIN(s):
9797182425 (portion); 9797184466 (portion); 9797185863 (portion); 9797187741; 9797196038 (portion); 9797198078; 9797280531; 9797283600; 9797285945; 9797290337 (portion); 9797293252



N

0 0.05 0.1 0.2 Miles

Map Created: 10-07-20
Planning Department

Agenda Item 7

Determine Process for Selecting Audit Firm for Fiscal Year 2021

Background

General Statute 159-34 requires Orange Water and Sewer Authority to have its accounts audited by an independent auditor after the close of each fiscal year. OWASA must prepare and publish an annual financial report in conjunction with its annual audit. The auditor's conclusions are to be set out in a report in the form of an opinion and comments relating to the financial statements. The auditor must be approved by, and reports to, the Board of Directors, and is engaged through a contract executed by the Board Chair and the Finance Officer.

Our practice has been to issue a request for proposals (RFP) for auditing services every three years and the audit for FY 2020 (the one just concluded) was the third year of our most recent arrangement with Martin Starnes and Associates. The firm has been our independent auditor since FY 2011; through three rounds of going through the RFP process, the Board and staff have rated the firm significantly higher than the other RFP respondents in relevant expertise and experience working with municipalities and organizations like OWASA.

The following outlines the process we went through three years ago:

- Staff prepared and issued an RFP.
- Staff distributed the RFP through many channels and took extra steps to attempt to attract responses from minority- and women-owned business enterprises. (Martin Starnes is a woman-owned business.)
- Staff evaluated the seven responses received and chose three firms for in-person interviews/presentations.
- The three firms selected made presentations to and responded to questions from an interview panel comprised of three staff and two Board members.
- The interview panel unanimously chose Martin Starnes and Associates.
- The Finance Committee did not meet on this topic. The interview panel made its recommendation, and the Board approved hiring the firm at a Board Work Session.

Staff Recommendation

Staff recommends that we extend our arrangement with Martin Starnes and Associates for one additional year and reconsider issuing an RFP for the FY 2022 audit. Martin Starnes and Associates has offered to perform the FY 2021 audit for the same fee as charged for FY 2020 ($32,650).

Due to their experience with OWASA, Martin Starnes and Associates knows our challenges, operations, and financial history and condition and they are well-positioned to conduct an efficient and effective audit. Given the uncertainties and challenges resulting from the pandemic, we think OWASA can benefit from continuing our relationship with Martin Starnes through FY 2021. Precedent exists for this approach; the Board chose it for the FY 2014 audit.

If staff's recommendation is accepted, the Board will be asked to approve a resolution awarding the audit contract to Martin Starnes and Associates at the January 14 Board Work Session.

Action Requested

Approve staff's recommendation to extend our arrangement with Martin Starnes and Associates for one additional year and reconsider issuing an RFP for the FY 2022 audit.

Agenda Item 8:

Review Board Work Schedule

Purpose:

a) Request(s) by Board Committees, Board Members, Counsel and Staff
b) December 10, 2020 Virtual Board Work Session
c) January 14, 2021 Virtual Board Work Session
d) Review 12 Month Board Meeting Schedule
e) Review Pending Key Staff Action Items

Information:

- Draft agenda for the virtual December 10, 2020 meeting
- Draft agenda for the virtual January 14, 2021 meeting
- 12 Month Board Meeting Schedule
- Pending Key Staff Action Items from Board Meetings

Agenda
Virtual Work Session of the OWASA Board of Directors
Thursday, December 10, 2020, 6:00 P.M.

Due to COVID-19 public health concerns, the Orange Water and Sewer Authority (OWASA) Board of Directors is conducting this meeting virtually utilizing Microsoft Teams software. Board Members, General Counsel and staff will be participating in the meeting remotely.

The Board of Directors appreciates and invites the public to attend and observe its virtual meetings online. Public comment is invited via written materials, ideally submitted at least two days in advance of the meeting to the Board of Directors by sending an email to board_and_leadership@owasa.org or via US Postal Service (Clerk to the Board, 400 Jones Ferry Road, Carrboro, NC 27510). Public comments are also invited during the Board Meeting via telephone, and you will need to be available to call-in during the meeting. Please contact the Clerk to the Board at aorbich@owasa.org or 919-537-4217 to make arrangements by 3:00 p.m. the day of the meeting.

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.
   - Update on the November 19, 2020 Orange County Climate Council Meeting
b. Announcements by Board Members
c. Announcements by Staff
d. Additional Comments, Suggestions, and Information Items by Board Members (Chair)

Consent Agenda

Action

1. Minutes of the November 12, 2020 Virtual Work Session of the Board of Directors (Andrea Orbich)
2. Minutes of the November 12, 2020 Closed Session of the Board of Directors for the Purpose of Discussing a Personnel Matter (Jody Eimers)

Regular Agenda

Discussion

3. (Tentative) Long-Range Water Supply Plan - Drought Response Operating Protocol (Ruth Rouse)
4. (Tentative) Sewer Use Ordinance and Sewer Policy Updates to Align with House Bill 873 (Jessica Godreau)
5. Distribution System Key Performance Indicators (Vishnu Gangadharan)
6. Draft Approach to Develop OWASA's New Strategic Plan (Todd Taylor/Mary Tiger)

DRAFT

7. Review Board Work Schedule
    a. Request(s) by Board Committees, Board Members and Staff (Ray DuBose)
    b. January 14, 2021 Work Session (Todd Taylor)
    c. January 28, 2021 Meeting (Todd Taylor)
    d. 12 Month Board Meeting Schedule (Todd Taylor)
    e. Pending Key Staff Action Items (Todd Taylor)
    f. Action Items Reoccurring Every 3 to 5+ Years

Summary of Work Session Items

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

DRAFT

Agenda
Work Session of the OWASA Board of Directors
Thursday, January 14, 2021, 6:00 P.M.

Due to COVID-19 public health concerns, the Orange Water and Sewer Authority (OWASA) Board of Directors is conducting this meeting virtually utilizing Microsoft Teams software. Board Members, General Counsel and staff will be participating in the meeting remotely.

The Board of Directors appreciates and invites the public to attend and observe its virtual meetings online. Public comment is invited via written materials, ideally submitted at least two days in advance of the meeting to the Board of Directors by sending an email to board_and_leadership@owasa.org or via US Postal Service (Clerk to the Board, 400 Jones Ferry Road, Carrboro, NC 27510). Public comments are also invited during the Board Meeting via telephone, and you will need to be available to call-in during the meeting. Please contact the Clerk to the Board at aorbich@owasa.org or 919-537-4217 to make arrangements by 3:00 p.m. the day of the meeting.

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
c. Announcements by Staff
d. Additional Comments, Suggestions, and Information Items by Board Members (Chair)

Consent Agenda

Information and Reports

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

Action

2. (Tentative) Resolution Awarding an Audit Contract and Authorizing Chair of the Board of Directors and the Finance Officer to Execute Said Contract (Stephen Winters)
3. Minutes of the December 10, 2020 Virtual Work Session of the Board of Directors (Andrea Orbich)

Regular Agenda

Discussion

4. Update on Employee Health and Dental Insurance for Fiscal Year 2022 (Stephanie Glasgow/Ellen Tucker, Gallagher)
5. Diversity and Inclusion Program Update (September – December 2020) (Stephanie Glasgow)
6. Review Board Work Schedule

DRAFT

a. Request(s) by Board Committees, Board Members and Staff (Ray DuBose)
b. January 28, 2021 Board Meeting (Todd Taylor)
c. February 11, 2021 Work Session (Todd Taylor)
d. 12 Month Board Meeting Schedule (Todd Taylor)
e. Pending Key Staff Action Items (Todd Taylor)

Summary of Work Session Items

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

Closed Session

8. The Board of Directors will Meet in Closed Session for the Purpose of Discussing a Personnel Matter, as provided in N.C. General Statutes 143.318.11(6) (Jody Eimers)

DRAFT

OWASA Board of Directors – 12 Month Board Meeting Schedule (November 6, 2020)

Month	Board Meetings		Committee Meetings & Other Board Items
	Work Session	Business Meeting	
November 2020	**Annual Update of the Energy Management Plan** (↻) **LRWSP – Drought Response Operating Protocol** Response to Petition to Modify WSMPBA Boundary Discuss One Year Extension of Audit Engagement Resolution Honoring the Service of Ruchir Vora 11/12/2020	*Holiday – no meeting*	*Possible welcome of new Board member(s)*
December 2020	Discuss Draft Plan for Developing Strategic Plan **(Tentative) LRWSP – Drought Response Operating Protocol** (Tentative) Sewer Use Ordinance and Sewer Policy Updates to Align with House Bill 873 Distribution System Key Performance Indicators 12/10/2020	*Holiday – no meeting*	*Possible welcome of new Board member(s)*
January 2021	(Tentative) Appoint Audit Firm (↻) Employee Health and Dental Insurance Update for FY 22 (↻) D&I Update (↻) CS – Check-in on ED Performance (w/o ED) 1/14/2021	Annual Lakes Recreation Report (↻) CIP Semiannual Report (↻) Q2 Financial Report (↻) Discuss FY 22 Budget Calendar, Planning Assumptions, and New Budget Format (↻) 1/28/2021	*Meeting between the CHTC OWASA Committee & Chapel Hill Appointees to the BOD (TBD)*
February 2021	Department Managers FY 22 Budget Presentations (↻) Affordability Outreach Program Update (↻) CS – Prepare for GC Interim Review 2/11/2021	CS – GC Interim Review (↻) 2/25/2021	
March 2021	FY 22 Draft Budget and Rates (↻) 3/11/2021	Set date for Public Hearings – FY 22 Budget & Rates (↻) 3/25/2021	
April 2021	Review Employee Health and Dental Insurance Renewals (↻) FY 22 Draft Budget and Rate Adjustment (↻) BOD Eligible for Nominations to Election as Board Officers (include Officer descriptions) (↻) Planning for BOD Self-Assessment (↻) CS – Prepare for ED Interim Review (↻) 4/8/2021	Q3 Financial Report (↻) FY 22 Draft Budget and Rates Adjustment Information and Authorize Staff to Publish Proposed Rates (↻) CS – ED Interim Review (↻) 4/22/2021	
May 2021	**(Tentative) LRWSP – Guiding Principles for Jordan Lake Alternatives** (↻) Approve Employee Health and Dental Insurance Renewals 5/13/2021	Public Hearings – FY 22 Budget and Rates (↻) 5/27/2021	*(Tentative) BOD Self-Assessment in Special Meeting*
June 2021	**(Tentative) LRWSP – Guiding Principles for Jordan Lake Alternatives** (↻) (↻) Approve FY 22 Budget and Rates Election of Officers 6/10/2021	TBD 6/24/2021	*(Tentative) BOD Self-Assessment in Special Meeting*
July 2021	D&I Update (↻) 7/8/2021	TBD 7/22/2021	

Current and Pending Key Projects and Strategic Initiatives– in **bold**

OWASA Board of Directors – 12 Month Board Meeting Schedule (November 6, 2020)

Month	Board Meetings		Committee Meetings & Other Board Items
	Work Session	Business Meeting	
August 2021	CS – Prepare for GC Annual Review ↻ 8/12/2021	Preliminary 12 Month Financial Report ↻ CIP Semiannual Report ↻ CS – GC Annual Review ↻ 8/26/2021	
September 2021	Annual Report on Disposal of Surplus Personal Property ↻ EEO/Affirmative Action Report and D&I Update ↻ 9/9/2021	Annual Report and Financial Audit ↻ Approve GC Engagement ↻ (Annual Meeting of the BOD) 9/23/2021	
October 2021	CS – Prepare for ED Annual Review 10/14/2021	**Strategic Trends Report** ↻ Reliability and Resiliency Improvements Update CS – ED Annual Performance Review ↻ 10/28/2021	

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.

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 Forest Management.
- Water Conservation Plan will be prepared concurrent with update of the Long-Range Water Supply Plan.
- Update of Strategic Plan. On October 24, 2019, the Board and staff agreed to begin updating the Strategic Plan in FY 2021.

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:

↻	Recurring agenda item (generally these are "required" items)	AV/AMI	Agua Vista/Advanced Metering Infrastructure
		BOCC	Board of County Commissioners

OWASA Board of Directors – 12 Month Board Meeting Schedule (November 6, 2020)

BOD	Board of Directors
CE	Community Engagement
CEP	Community Engagement Plan
CHTC	Chapel Hill Town Council
CIP	Capital Improvements Program
COLA	Cost of Labor Adjustment
CS	Closed Session of the Board
CTC	Carrboro Town Council
CY	Calendar Year
D&I	Diversity and Inclusion
ED	Executive Director
EEO	Equal Employment Opportunity
EPA	Environmental Protection Agency
FY	Fiscal Year
GC	General Counsel
HR	Human Resources
JLP	Jordan Lake Partnership
KPI	Key Performance Indicator
LRWSP	Long-Range Water Supply Plan
MOA	Memorandum of Agreement
MWBE	Minority/Women-owned Business Enterprises
MST	Mountains-to-Sea Trail
MFMM	Multi-Family Master Meter
NCDOT	North Carolina Department of Transportation
NRTS	Natural Resources and Technical Services
OC	Orange County
Q	Quarter
RFP	Request for Proposals
SRF	State Revolving Fund
SOW	Scope of Work
TBD	To Be Determined
WTP	Water Treatment Plant
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.	10-22-2020	Consider in 2021 Reliability and Resiliency (R&R) Improvements Update: comparison to best-in-class R&R practices (highlight what practices are not currently being pursued and why) and raw water intake R&R evaluation.	10-28-2021	Darr	Complete – noted in the October 22, 2020 Minutes for reference in 2021 report
2.	10-22-2020	Look for opportunities to use special meeting when appropriate and strategically schedule more discussion items in work sessions.	NA	DuBose Taylor	Ongoing
3.	10-22-2020	Prepare a 360° Board Assessment for leadership staff.	TBD	Boehm Orbich Taylor	Draft in progress
4.	10-22-22	Add reoccurring item for Board Self-Assessment as a special meeting.	TBD	Orbich	Complete – added to the 12 Month Schedule
5.	10-8-2020	Develop summary of strategic and key initiatives.	TBD	Taylor Tiger	Complete - Our website hosts links to our detailed plans of strategic and key initiatives; Summary of these initiatives will be folded into strategic planning process
6.	10-8-2020	Consider in 2021 Strategic Trends Report: including information in RCW technology section on direct potable reuse; summarizing USGS/NOAA/NASA study on remote sensing to evaluate algal blooms; and including information about impact of climate change on WWTP capacity and integrity.	10-28-2021	Rouse	Complete – added to the 12 Month Schedule
7.	10-8-2020	Set up AWIA information session for interested Board Members.	NA	Spinelli	Complete – email sent on 10-23-2020
8.	9-24-2020	Provide update via email to the Board regarding possible funding for the Teer Road West Forest Management Plan in FY2021.	NA	Loflin	Complete - email sent on 10-22-2020
9.	9-24-2020	Provide information via email on additional invasive species control on all managed tracts.	NA	Riley	Complete – email sent on 10-28-2020

Pending Key Staff Action Items from Board Meetings

No.	Date	Action Item	Target Board Meeting Date	Person(s) Responsible	Status
10.	9-24-2020	Provide an update on condition assessment efforts.	10-28-2021	Spinelli	Complete – added to the 12 Month Schedule
11.	9-24-2020	Evaluate options to update the Water Main Break KPI (internal and external metrics) and provide a recommendation to the Board.	12-10-2020	Gangadharan	Complete – added to the 12 Month Schedule
12.	9-24-2020	Provide an update on water main prioritization initiatives.	10-28-2021	Gangadharan	Complete – added to the 12 Month Schedule
13.	9-10-2020	Document the Board's promotion of D&I in consideration of appointments by local governments.	NA	DuBose Taylor	Complete – new statement sent to local government and added to OWASA's website.

Agenda Item 9:

Resolution Honoring the Service of Ruchir Vora to the Carrboro- Chapel Hill-Orange County Community as a Member of the Orange Water and Sewer Authority's Board of Directors

Background:

Since inception of Orange Water and Sewer Authority, the Board of Directors has adopted Resolutions of Appreciation for the service of a retiring member of the Board.

The adopted resolution would be specially printed for presentation to Ruchir Vora.

Staff Recommendation:

Adopt the Resolution Honoring the Service of Ruchir Vora to the Carrboro- Chapel Hill-Orange County Community as a Member of the Orange Water and Sewer Authority's Board of Directors.

Resolution Honoring the Service of Ruchir Vora to the Chapel Hill-Carrboro-Orange County Community as a Member of the Orange Water and Sewer Authority's Board of Directors

Whereas, Mr. Ruchir Vora served on the OWASA Board from August 28, 2014, through November 30, 2020, including service as Vice Chair of the Board of Directors from March 1, 2019, to June 30, 2020**;** and

Whereas, Mr. Vora served on the Board's Community Engagement, Finance, Human Resources and Natural Resources and Technical Services Committees during his service, during which he served as Chair of the Community Engagement Committee from September 2015 to August 2017 and July 2018 to July 2019; and

Whereas, Mr. Vora gave freely of his time, energy, and talents in serving OWASA customers with dedication, insight and compassion; and

Whereas, Mr. Vora was a strong proponent for engaging customers, safety and sustainable management and use of resources, and he cared deeply about and advocated for the OWASA employees; and

Now, Therefore, Be It Resolved by the Orange Water and Sewer Authority Board of Directors:

1. That the Board expresses its sincere appreciation and deep gratitude to Ruchir Vora for his outstanding service, leadership and stewardship as a Member of the OWASA Board of Directors; and the Board wishes for him much happiness in the years ahead.

2. That this resolution be recorded in the minutes of the OWASA Board of Directors and be part of the permanent records of OWASA, and that a copy of this resolution be transmitted to the Town of Chapel Hill.

Adopted and presented this 12th day of November 2020.

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Raymond E. DuBose, P.E., Chair

ATTEST:

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Jo Leslie Eimers, Secretary