

Orange Water and Sewer Authority
Meeting of the Board of Directors
June 9, 2022

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, June 9, 2022, at 6:00 p.m. utilizing Microsoft Teams software.

Board Members attending virtually: Jody Eimers (Chair), Yinka Ayankoya (Vice Chair), John N. Morris (Secretary), Todd BenDor, Bruce Boehm, Raymond (Ray) DuBose, and Kevin Leibel.

OWASA staff attending virtually: Mary Darr, Monica Dodson, Robert Epting, Esq. (Epting and Hackney), Stephanie Glasgow, Wil Lawson, Coleman Olinger, Andrea Orbich, Dan Przybyl, Ruth Rouse, Allison Spinelli, Todd Taylor, Mary Tiger, Stephen Winters, and Richard Wyatt.

Others attending virtually: Barbara Foushee (Carrboro Town Council Member), Meg Holton (UNC), Dennis Kaebisch, and Kelly Satterfield.

Motions

1. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Awarding a Construction Contract for the Rogerson Drive Water Main Replacement Project. (Motion by Ray DuBose, second by Bruce Boehm and the motion unanimously approved.)
2. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Accepting a Low-Interest Loan Offer from the State of North Carolina, and Authorizing Executive Director to Execute and Administer all Related Loan Offer and Acceptance Documents. (Motion by Ray DuBose, second by Bruce Boehm and the motion unanimously approved.)
3. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Approving an Interlocal Agreement for Phase IX of the Triangle Area Water Supply Monitoring Project. (Motion by Ray DuBose, second by Bruce Boehm and the motion unanimously approved.)
4. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Amend Article III of the Orange Water and Sewer Authority Bylaws Regarding Annual Meetings. (Motion by Ray DuBose, second by Bruce Boehm and the motion unanimously approved.)
5. Ray DuBose made a Motion to approve the Minutes of the May 12, 2022, Board of Directors Meeting; second by Bruce Boehm and the Motion was unanimously approved.

6. Ray DuBose made a Motion to approve the Minutes of the May 12, 2022, Closed Session of the OWASA Board of Directors for the Purpose of Discussing a Personnel Matter; second by Bruce Boehm and the Motion was unanimously approved.

7. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Honoring the Service of Yinka Ayankoya to the Carrboro-Chapel Hill-Orange County Community as a Member of the Orange Water and Sewer Authority's Board of Directors. (Motion by John Morris, second by Ray DuBose and the motion was unanimously approved.)

8. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Adopting the Schedule of Rates, Fees, and Charges that go into effect on October 1, 2022. (Motion by Bruce Boehm, second by Ray DuBose and the Motion was unanimously approved.)

9. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Adopting the Annual Budget for Orange Water and Sewer Authority for the Fiscal Year July 1, 2022, through June 30, 2023. (Motion by Bruce Boehm, second by Todd BenDor and the Motion was unanimously approved.)

10. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Approving the Capital Improvements Program and Budget for Fiscal Years 2023-2027. (Motion by Todd BenDor, second by Ray DuBose and the Motion was unanimously approved.)

11. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Capital Project Resolution for Fiscal Year 2023 Infrastructure Improvements. (Motion by Bruce Boehm, second by Kevin Leibel and the Motion was unanimously approved.)

12. BE IT RESOLVED THAT the Board of Directors of the Orange Water and Sewer Authority adopts the Resolution Updating the Schedule of Employee Classification and Authorized Compensation; Adjusting Affected Employees' Compensation to the Minimum of the Pay Range; Authorizing Cost of Labor and Merit Pay Increases for Eligible Employees; Increasing the Employer Contribution Rate to Employees' Deferred Compensation Plan; and Adding Three New Positions to the Schedule of Employee Classification and Authorized Compensation. (Motion by Ray DuBose, second by Todd BenDor and the Motion was unanimously approved.)

13. Ray DuBose made a Motion to authorize staff to include in the Long-Range Water Supply Plan the alternative in which OWASA would invest in the intake and transmission infrastructure proposed by the Western Intake Partnership as the preferred alternative to augment our current water supplies to meet our 50-year water supply needs and proceed with implementation of the Long-Range Water Supply Plan; second by Bruce Boehm and the Motion was unanimously approved.

14. Kevin Leibel made a Motion to elect Bruce Boehm as Chair by acclamation of the Board of Directors; second by Todd BenDor and the Motion was unanimously approved.

15. John Morris made a Motion to elect Todd BenDor as Vice Chair by acclamation of the Board of Directors; second by Jody Eimers and the Motion was unanimously approved.

16. Kevin Leible made a Motion to elect Ray DuBose as Secretary by acclamation of the Board of Directors; second by Bruce Boehm and the Motion was unanimously approved.

* * * * *

Announcements

Chair Jody Eimers announced that due to the ongoing North Carolina State of Emergency, the OWASA Board of Directors held the meeting virtually utilizing Microsoft Teams software. Chair Eimers stated that Board Members, General Counsel, and staff participated in the meeting remotely.

Chair Eimers 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.

Chair Eimers announced that on May 18, 2022, the Chapel Hill Town Council reappointed Bruce Boehm and appointed Pedro Garcia to the OWASA Board of Directors for a term of three years ending on June 30, 2025. Chair Eimers said a new Board Member orientation session will be held on Monday, June 27, 2022, at 1 p.m. in the OWASA Boardroom.

John Morris announced a meeting between the Chapel Hill Town Council OWASA Committee and Chapel Hill Appointees to the OWASA Board on Tuesday, June 28, 2022 at 3:30 p.m. via Zoom to discuss items of mutual interest.

Mary Tiger, Strategic Initiatives Manager, announced a Board Strategic Plan Work Session scheduled for Thursday, June 23, 2022, at 3:00 p.m. via Teams.

Mary Darr, General Manager of Operations, introduced Wil Lawson, OWASA's new Wastewater Treatment and Biosolids Recycling Manager.

Petitions and Requests

Chair Eimers said no petitions or requests were received from the public.

Chair Eimers asked for petitions and requests from the Board and staff; none were provided.

Item One: Review of the Orange County Board of Health Report on Drinking Water Fluoridation

The Board accepted this as an information item.

Item Two: Resolution Awarding a Construction Contract for the Rogerson Drive Water Main Replacement Project

Ray DuBose made a Motion to approve resolution; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 1.

Item Three: Resolution Accepting a Low-Interest Loan Offer from the State of North Carolina, and Authorizing Executive Director to Execute and Administer all Related Loan Offer and Acceptance Documents

Ray DuBose made a Motion to approve resolution; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 2.

Item Four: Resolution Approving an Interlocal Agreement for Phase IX of the Triangle Area Water Supply Monitoring Project

Ray DuBose made a Motion to approve resolution; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 3.

Item Five: Resolution to Amend Article III of the Orange Water and Sewer Authority Bylaws Regarding Annual Meetings

Ray DuBose made a Motion to approve resolution; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 4.

Item Six: Minutes of the May 12, 2022 OWASA Board of Directors Meeting

Ray DuBose made a Motion to approve the Minutes of the May 12, 2022, Board of Directors Meeting; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 5.

Item Seven: Minutes of the May 12, 2022 Closed Session of the OWASA Board of Directors Meeting

Ray DuBose made a Motion to approve the Minutes of the May 12, 2022, Closed Session of the OWASA Board of Directors for the purpose of discussing a personnel matter; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 6.

Item Eight: Resolution Honoring the Service of Yinka Ayankoya to the Carrboro-Chapel Hill-Orange County Community as a Member of the Orange Water and Sewer Authority Board of Directors

Barbara Foushee, Carrboro Town Council Member, read aloud the resolution and expressed appreciation to Yinka Ayankoya for her service as a Member of the OWASA Board of Directors.

John Morris made a Motion to approve the resolution; second by Ray DuBose and the Motion was unanimously approved. Please see Motion 7.

Item Nine: Approval of the Schedule of Rates, Fees and Charges; Annual Budget; Five-Year Capital Improvements Program (CIP); and Cost of Living and Merit Pay Increases

The Board noted that this budget is an investment in OWASA's staff and infrastructure and includes funding for evaluating investing in intake and transmission infrastructure for accessing OWASA's allocation of water from Jordan Lake.

Bruce Boehm made a Motion to adopt the Resolution Adopting the Schedule of Rates, Fees, and Charges that go into effect on October 1, 2022; the Motion was seconded by Ray DuBose and unanimously approved. Please see Motion 8.

Burce Boehm made a Motion to adopt the Resolution Adopting the Annual Budget for Orange Water and Sewer Authority for the Fiscal Year July 1, 2022, through June 30, 2023; the Motion was seconded by Todd BenDor and unanimously approved. Please see Motion 9.

Todd BenDor made a Motion to adopt the Resolution Approving the Capital Improvements Program and Budget for Fiscal Years 2023-2027; the Motion was seconded by Ray DuBose and unanimously approved. Please see Motion 10.

Bruce Boehm made a Motion to adopt the Capital Project Resolution for Fiscal Year 2023 Infrastructure Improvements; the Motion was seconded by Kevin Leibel and unanimously approved. Please see Motion 11.

Ray Dubose made a Motion to adopt the Resolution Updating the Schedule of Employee Classification and Authorized Compensation; Adjusting Affected Employees' Compensation to the Minimum of the Pay Range; Authorizing Cost of Labor and Merit Pay Increases for Eligible Employees; Increasing the Employer Contribution Rate to Employees' Deferred Compensation Plan; and Adding Three New Positions to the Schedule of Employee Classification and Authorized Compensation. The was Motion seconded by Todd BenDor and unanimously approved. Please see Motion 12.

Item Ten: Long-Range Water Supply Plan: Community Engagement Summary and Selection of Jordan Lake Alternative

Todd Taylor (Executive Director) introduced this item and Ruth Rouse (Planning and Development Manager) provided presentation on three Jordan Lake alternatives and an update on the feedback and questions received from the public/stakeholders.

The Board had considerable comments and discussion around the capital costs of the Western Intake Partnership (WIP) investment alternatives and the rate increases associated with them. Staff noted that while the cost analysis presented is useful for the purposes of evaluating the relative cost of the different alternatives, estimates will continue to change throughout the design

phase and until the project is bid and construction is completed. It was noted that the Board will have opportunities to change approaches and choose a different option as more information becomes available. Staff will follow up on other Board questions regarding the projected rate increases needed to pay for the investments to secure access to our Jordan Lake allocation.

Ray DuBose made a Motion to authorize staff to include in the Long-Range Water Supply Plan the alternative in which OWASA would invest in the intake and transmission infrastructure proposed by the Western Intake Partnership as the preferred alternative to augment our current water supplies to meet our 50-year water supply needs and proceed with implementation of the Long-Range Water Supply Plan; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 13.

Item Eleven: Review Board Work Schedule

There were no comments on this item.

Item Twelve: Election of Officers

Robert Epting, General Counsel, provided the Board an overview on how the election of officers will proceed and reminded the Board that the term of the new Board Officers will begin July 1, 2022. Mr. Epting said nominees for the office of Chair, Vice Chair and Secretary, were nominated and seconded by the Board on April 14, 2022, as required in the Bylaws, and no further nominations were allowed.

Mr. Epting said the candidate for Chair of the Board is Bruce Boehm.

Kevin Leibel made a Motion to elect Bruce Boehm as Chair by acclamation of the Board of Directors; second by Todd BenDor and the Motion was unanimously approved. Please see Motion 14.

Mr. Epting said the candidates for Vice Chair of the Board are Todd BenDor and Kevin Leibel.

Kevin Leibel announced he would withdraw his name as a candidate for election as Vice Chair.

Mr. Epting said the remaining candidate for Vice Chair of the Board is Todd BenDor.

John Morris made a Motion to elect Todd BenDor as Vice Chair by acclamation of the Board of Directors; second by Jody Eimers and the Motion was unanimously approved. Please see Motion 15.

Mr. Epting said the candidate for Secretary of the Board is Ray DuBose.

Kevin Liebel made a Motion to elect Ray DuBose as Secretary by acclamation of the Board of Directors; second by Bruce Boehm and the Motion was unanimously approved. Please see Motion 16.

Item Thirteen: Summary of Board Meeting Action Items

Todd Taylor said staff will follow up with additional information on rate impacts of Jordan Lake alternatives.

Item Fourteen: Closed Session

Without objection, the Board of Directors convened in a closed session for the purpose of discussing a personnel matter as provided in N.C. General Statutes 143.318.11(6).

Following the closed session, the Board reconvened in open session, reported no action was taken in the closed session, and the meeting was adjourned at 8:05 p.m.

Respectfully submitted by:



Andrea Orbich

Executive Assistant/Clerk to the Board

Attachments

Resolution Awarding A Construction Contract For Rogerson Drive Water Main Replacement Project

Whereas, there is a need to replace the 6" asbestos concrete water main along Rogerson Drive due to its age and condition; and

Whereas, plans and specifications for the construction of this project have been prepared by CJS Conveyance PLLC; and

Whereas, advertisement to bid was published on the websites of the Greater Diversity News, publishing the advertisement on the websites of the State of North Carolina Interactive Purchasing System (NC IPS) and OWASA, and posting advertisement in multiple plan rooms on April 4, 2022; and

Whereas, after receiving only two bids on the first bid opening date of May 5, 2022 the project was re-bid; and

Whereas, 2 bids were received and opened publicly on May 12, 2022, and Moffat Pipe, Inc. has been determined to be the low responsive, responsible bidder for the project:

Now, Therefore, Be It Resolved:

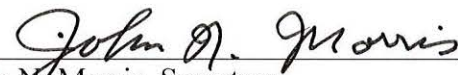
1. That the Orange Water and Sewer Authority Board of Directors awards the construction contract to Moffat Pipe Inc., the low responsive, responsible bidder for the Rogerson Drive Water Main Replacement Project, in accordance with the approved plans and specifications, in the amount of \$2,315,725.00, subject to such change orders as may apply.
2. That the Executive Director be, and hereby is, authorized to execute said contract, subject to prior approval of legal counsel, and to approve and execute change orders and such documents as may be required in connection with the construction contract.

Adopted this 9th day of June 2022.



Jo Leslie Eimers, Chair

Attest:



John N. Morris, Secretary

**Resolution Accepting a Low-Interest Loan Offer from the State of North Carolina, and
Authorizing Executive Director to Execute and Administer all Related Loan Offer and
Acceptance Documents**

Whereas, the Safe Drinking Water Act Amendments of 1996 and the North Carolina Water Infrastructure Fund have authorized the making of loans and/or grants, as applicable, to aid eligible, drinking-water system owners in financing the cost of construction for eligible, drinking-water infrastructure; and

Whereas, the North Carolina Department of Environmental Quality has offered a State Revolving Loan in the amount of \$4,212,500 for the University Lake Permanganate Facility project; and

Whereas, the Orange Water and Sewer Authority intends to construct said project in accordance with the engineering plans and specifications that have been or will have been approved by the North Carolina Public Water Supply Section:

Now, Therefore, Be It Resolved:


1. That the Orange Water and Sewer Authority does hereby accept the State Revolving Loan offer in the amount of \$4,212,500; and
2. That the Orange Water and Sewer Authority does hereby give assurances to the North Carolina Department of Environmental Quality that they will adhere to all applicable items specified in the standard "Conditions" and "Assurances" of the Department's funding offer, awarded in the form of a State Revolving Loan; and
3. That the Orange Water and Sewer Authority Executive Director and successors so titled, is hereby authorized and directed to furnish such information, as the appropriate state agency may request, in connection with such application or the project; to make the Assurances as contained above; and to execute such other documents as may be required in connection with the application; and
4. That the Orange Water and Sewer Authority has complied substantially or will comply substantially with all federal, state and local laws, rules, regulations, and ordinances applicable to the project, and to federal and state grants and loans pertaining thereto.

Adopted this 9th day of June 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary

Resolution Approving an Interlocal Agreement for Phase IX of the Triangle Area Water Supply Monitoring Project

Whereas, on August 18, 1988, several local governments in the Triangle J Council of Governments Region (Region J), entered into an interlocal agreement to establish the Triangle Area Water Supply Water Quality Monitoring Project (hereinafter, the “Monitoring Project”) applicable to certain surface water supplies in Region J; and

Whereas, the local governments participating in the Monitoring Project established a Monitoring Project Steering Committee (hereinafter, the “Committee”) to make technical, financial, and administrative recommendations to the Participants; and

Whereas, the Monitoring Project has been continuously funded through a series of Joint Funding Agreements with the U.S. Geological Survey (hereinafter, the “USGS”) through June 30, 2022, as well as through a series of interlocal agreements; and

Whereas, the Monitoring Project will complete its Phase VIII monitoring program on June 30, 2022; and

Whereas, said Committee has determined that prior Monitoring Project phases met the objectives of measuring water quality conditions and long-term trends in water quality and recommended that additional monitoring be undertaken;

Whereas, the OWASA Board of Directors finds continued participation to be beneficial and does desire to enter into an Interlocal Agreement pursuant to GS 160A-460 *et. seq.* for the purpose of continuing to operate the Monitoring Project for Phase IX; and

Whereas, the primary objectives of the Monitoring Project continue to be to:

1. Supplement existing data on major ions, nutrients, and trace elements to enable determination of long-term water quality trends;
2. Examine the differences in water quality among water supplies within the region, especially differences among smaller upland sources, large multi-purpose reservoirs, and run-of-river supplies;
3. Provide tributary loading data and in-lake data for predictive modeling;
4. Establish a database for constituents of concern in surface waters in the region; and
5. Report results of the monitoring program to governmental officials, the scientific community, and the public.

A. **Whereas**, the objectives for Phase IX of the Monitoring Project are to:

1. Characterize and report water quality monitoring results
 - a. Perform monitoring of major ions, nutrients, suspended sediment, and chlorophyll-a to document water-quality conditions throughout the study area and to extend the existing database that the USGS can use in the future to evaluate loads and trends.

Resolution Approving an Interlocal Agreement for Phase IX of the Triangle Area Water Supply
Monitoring Project

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- b. Monitor the occurrence and distribution of additional parameters of concern to local water suppliers, including bromide and 1,4-dioxane at select sites (see Table 1), and per- and polyfluoroalkyl substances (PFAS) at all sites.
 - c. Summarize project water-quality data collection in annual data release updates comprising all environmental and QA/QC sample results.
2. Characterize regional surface water availability
- a. Provide information on flow conditions in reservoir tributaries by operating a network of ten gaging stations to collect continuous streamflow data. The USGS operates two additional gages at TAWSMP sites; they are funded by the U.S. Army Corps of Engineers rather than TAWSMP partners. All streamflow data will be made publicly available in real-time at <https://waterdata.usgs.gov/nc/nwis/rt>.
3. Develop interpretive science products to disseminate data and scientific findings
- a. Produce a two-page fact sheet directed towards the public that TAWSMP partners can use to communicate the goals and benefits of the project
 - b. Publish a report summarizing the results from phases XIII and IX contaminant sampling (PFAS, 1,4-dioxane, bromide, and chromium).

Whereas, this agreement shall become effective July 1, 2022 and shall continue until the completion of the Monitoring Project, or until June 30, 2027, whichever is earlier, unless otherwise extended; and

Now, Therefore, Be It Resolved by the Board of Directors of the Orange Water and Sewer Authority:

1. That the Board approves and authorizes and directs the Executive Director to sign the Interlocal Agreement for Phase IX of the Triangle Area Water Supply Monitoring Project attached to this resolution.

Adopted this 9th day of June, 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

STATE OF NORTH CAROLINA

COUNTY OF CHATHAM
COUNTY OF DURHAM
COUNTY OF ORANGE
COUNTY OF WAKE

INTERLOCAL AGREEMENT
for
PHASE IX
of the
TRIANGLE AREA WATER SUPPLY MONITORING PROJECT

THIS INTERLOCAL AGREEMENT for PHASE IX of the TRIANGLE AREA WATER SUPPLY MONITORING PROJECT ("Agreement"), also referred to as TAWSMP, is made and entered into by, between and among Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority (hereinafter singularly the "Participants" and collectively "Participants"), to be effective from and after July 1, 2022 ('Effective Date').

WITNESSETH:

WHEREAS, on August 18, 1988, several local governments in the Triangle J Council of Governments Region (Region J), entered into an interlocal agreement to establish the Triangle Area Water Supply Water Quality Monitoring Project (hereinafter, the "Monitoring Project") applicable to certain surface water supplies in Region J; and

WHEREAS, the local governments participating in the Monitoring Project established a Monitoring Project Steering Committee (hereinafter, the "Committee") to make technical, financial, and administrative recommendations to the Participants; and

WHEREAS, the Monitoring Project has been continuously funded through a series of Joint Funding Agreements with the US Geological Survey (hereinafter, the "USGS") through June 30, 2022, as described in Attachment A, as well as through a series of interlocal agreements; and

WHEREAS, the Monitoring Project will complete its Phase VIII monitoring program on June 30, 2022; and

WHEREAS, said Committee has determined that prior Monitoring Project phases met the objectives of measuring water quality conditions and long-term trends in water quality and recommended that additional monitoring be undertaken;

NOW, THEREFORE, the Participants hereto desire to enter into an Interlocal Agreement pursuant to GS 160A-460 *et. seq.* for the purpose of continuing to operate the Monitoring Project. Toward that end, the Participants agree to the following terms and conditions:

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Section 1. Purpose of the Monitoring Project

- A. The primary objectives of the Monitoring Project continue to be to:
1. Supplement existing data on major ions, nutrients, and trace elements to enable determination of long-term water quality trends;
 2. Examine the differences in water quality among water supplies within the region, especially differences among smaller upland sources, large multi-purpose reservoirs, and run-of-river supplies;
 3. Provide tributary loading data and in-lake data for predictive modeling;
 4. Establish a database for constituents of concern in surface waters in the region; and
 5. Report results of the monitoring program to governmental officials, the scientific community, and the public.
- B. The objectives for Phase IX of the Monitoring Project are to:
1. Characterize and report water quality monitoring results
 - a. Perform monitoring of major ions, nutrients, suspended sediment, and chlorophyll-a to document water-quality conditions throughout the study area and to extend the existing database that the USGS can use in the future to evaluate loads and trends.
 - b. Monitor the occurrence and distribution of additional parameters of concern to local water suppliers, including bromide and 1,4-dioxane at select sites (see Table 1), and per- and polyfluoroalkyl substances (PFAS) at all sites.
 - c. Summarize project water-quality data collection in annual data release updates comprising all environmental and QA/QC sample results.
 2. Characterize regional surface water availability
 - a. Provide information on flow conditions in reservoir tributaries by continuing to operate a network of 10 gaging stations for the collection of continuous streamflow data. Note that the USGS operates 2 additional gages at TAWSMP sites; they are funded by the U.S. Army Corps of Engineers rather than TAWSMP partners. All streamflow data will be made publicly available in real time at <https://waterdata.usgs.gov/nc/nwis/rt>.
 3. Develop interpretive science products to disseminate data and scientific findings
 - a. Produce a two-page fact sheet directed towards the public that TAWSMP partners can use to communicate the goals and benefits of the project
 - b. Publish a report summarizing the results from phases XIII and IX contaminant sampling (PFAS, 1,4-dioxane, bromide, and chromium).

Section 2. Roles of the Participants, Managing Agent, and Committee

- A. The role of the Participants is to provide funds for the local portion of the Monitoring Project costs and to appoint representatives to the Committee.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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- B. The Managing Agent is the Triangle J Council of Governments. The role of the Managing Agent is to:
1. Enter into Monitoring Project contracts recommended by the Committee;
 2. Provide overall Monitoring Project management services that will include, but not be limited to, coordination among technical contractors, data management and periodic summaries to the Participants; and
 3. Provide administrative support to the Committee, such as meeting announcements, minutes, billing, and overall accounting.
- C. The role of the Committee is to provide Monitoring Project oversight and to make technical, financial, and administrative recommendations to the Participants. The Committee will consist of one representative, selected by each Participant, each entitled to a single vote. Other individuals from each Participant may attend Committee meetings as necessary; however, only the appointed representatives may vote in person or by proxy.

The Committee's first meeting for Phase IX shall be convened by September 1, 2022 and chaired by the selected Phase IX Committee Chair. This Chair and any other officers will be selected by the Committee from among its members and formally elected during this initial meeting. Officer term length shall coincide with the duration of each Phase; however, officer transitions may occur throughout the Phase, if needed, and must be supported by a majority vote. The Committee may use meetings to adopt any rules or procedures it deems necessary. Proposed Committee by-laws are provided in Attachment D.

The principal charge to the Committee is to oversee the Monitoring Project's timely execution, and to ensure the responsible expenditure of public funds. The Committee shall have authority to modify the Monitoring Project's scope of work; to establish an annual budget; and to establish annual local costs (subject to the Participants' approval in accordance with Section 3). TAWSMP may not acquire any real property pursuant to this Agreement.

The agreement with the Managing Agent attached hereto as Attachments E and F is approved by approval of this Agreement, and the Committee Chair is authorized to enter into the agreement with the Managing Agent on behalf of the Committee and the Participants. All actions by the Committee or the Managing Agent related to the administration or disbursement of monies shall be in accordance with all applicable State statutes and other rules of fiscal control applicable to local governmental units and/or Councils of Governments.

Section 3. Funding of the Project

Participants do hereby enter into this Agreement with the intent of providing funds on an annual basis as necessary for completing the Monitoring Project. Local Costs, as outlined in Attachment B, for the entire five-year Phase IX of the Monitoring Project will not exceed \$2,065,800 for technical services provided by USGS, and \$104,000 for administrative services provided by TJCOG, as outlined in Attachment B. The annual funding support provided by Participants for a

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

five-year period, as shown in Attachment B, or as otherwise necessary to undertake the project as recommended by the Committee, provided, however, the funding level does not exceed the Participants' projected share of annual costs for FY (Fiscal Year) 2023-2027 (July 1, 2022 to June 30, 2027). If the Committee proposes to modify the Monitoring Project such that Total Local Costs exceed \$2,169,800, this Agreement must be amended in writing and signed by all Participants.

Participants' annual Local Costs will be determined on or before March 1 preceding each local fiscal cycle for which funds are to be budgeted. Annual Local Costs will be payable on or before August 31st of the fiscal year for which they are budgeted. Payments will be made to the Managing Agent as herein designated. Failure to pay by August 31st will result in accrual of interest beginning September 1 at a rate of $\frac{3}{4}$ of one percent per month (9% annual; over and above any limits on annual Local Costs).

Section 4. Terms of Agreement

- A. This agreement shall become effective July 1, 2022 and shall continue until the completion of the Monitoring Project, or until June 30, 2027, whichever is earlier, unless otherwise extended.
- B. Participants may withdraw from, or additional units of local government may join, this partnership, effective July 1 of any year, provided they have given formal written notice is delivered to the Monitoring Project Committee Chair **and** the Managing Agent by February 1 of that calendar year. Written notice of withdrawal is deemed sufficient only if it is signed by an individual holding the same position as the signatory of this Agreement. Any Participant wishing to withdraw from the Monitoring Project that has not provided a formal written notice to withdraw by March of that calendar year will be legally required to pay its agreed upon Local Cost, as described in Attachment B.
- C. All matters relating to this Agreement shall be governed by the laws of the State of North Carolina, and venue for any action relating to this Agreement shall be in Durham County Civil Superior Court or the United States District Court for the Middle District of North Carolina.
- D. In consideration of the signing of this Agreement, the Participants hereto for themselves, their agents, officials, and employees and servants agree not to discriminate on any prohibited basis.
- E. The Participants agree that this Agreement is subject to the E-Verify requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and any contractor or subcontractor performing services under this Agreement shall be required to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes.
- F. The Participants by executing this Agreement certify that as of the date of this Agreement they are not on the Final Divestment List as created by the State Treasurer pursuant to North Carolina General Statute 147-86.58 and they are in compliance with the requirements of the Iran Divestment Act and North Carolina General Statute 147-86.60.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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They shall not utilize in the performance of this Agreement any subcontractor that is identified on the Final Divestment List.

- G. This Agreement may only be amended in writing and any amendment must be signed by all Participants.
- H. No Participant shall assign or transfer its interest in this Agreement without the written consent of all other Participants.

From: [Wendy Paschal](#)
To: [Emily Barrett](#)
Subject: Chatham County TAWSMP Signed Contract
Date: Wednesday, June 1, 2022 2:50:40 PM
Attachments: [Scan_20220601_083430.pdf](#)

Emily,

Attached is our signed contract. Please forward a fully executed copy to me for our records.

Thanks,

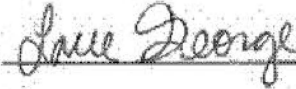
Wendy Paschal

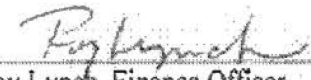
Chatham County Public Utilities
Administrative Officer
964 East St.
PO Box 910
Pittsboro, NC 27312
919.545.8530
wendy.paschal@chathamcountync.gov

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT




Dan LaMontagne, County Manager
Chatham County

ATTEST: 



Roy Lynch, Finance Officer
Chatham County

ATTEST: 

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Bonnie Hammersley

Bonnie B. Hammersley, County Manager
Orange County

ATTEST: *Melissa Allison*

Gary Donaldson

Gary Donaldson, Chief Financial Officer
Orange County

ATTEST: *Melissa Allison*

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Crosby

Catherine Crosby, Town Manager
Town of Apex

ATTEST: *Lisa Raschke*

Certificate of Town of Apex Finance Director

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

Vance Holloman

5/13/2022

Vance Holloman, Finance Director

Date

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

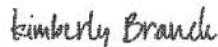


Sean R. Stegall, Town Manager
Town of Cary

ATTEST: Brittany Strickland

Certificate of Town of Cary Finance Director

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.



Kimberly Branch, Finance Director

5/10/2022

Date

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Wanda S. Page

Wanda S. Page, City Manager
City of Durham

Attest:

Ashley Wyatt

Ashley Wyatt
Deputy City Clerk
The City of Durham, NC



Diana Schreiber, City Clerk
City of Durham

ATTEST: _____

ATTEST: _____

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

Tim Flora

Tim Flora, Finance Officer

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Eric Peterson

Eric Peterson, Town Manager
Town of Hillsborough

ATTEST: *Sarah Kimrey*

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.

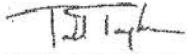
Tiffany Long

Tiffany Long, Finance Director
Town of Hillsborough

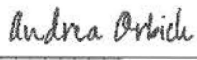
Robert Hornik

Robert Hornik,
Town Attorney

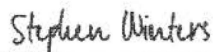
TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT



Todd Taylor, P.E., Executive Director
Orange Water and Sewer Authority

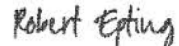
ATTEST:  _____

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act.



Stephen Winters, CPA, Director of Finance
Orange Water and Sewer Authority

Approved as
to Form and
Legality



Robert Epting

OWASA General Counsel

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

ATTACHMENT A

**SUMMARY OF TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
PARTNERSHIP, AUGUST 1988 – JUNE 2022**

Due to reliance on surface water for water supply and the potential impact of growth on the quality of the region's water supply sources, local governments in the region recognize that water quality monitoring is crucial to the protection of the Triangle Area's surface water resources. In 1988, a number of local governments in the six-county region, with assistance from the Triangle J Council of Governments, formed the Triangle Area Water Supply Monitoring Project to systematically evaluate the quality of several water supply sources in the region. With assistance from the US Geological Survey (USGS), the Project has collected and analyzed water quality samples from reservoirs and streams and collected continuous discharge records from streams in the study area for nearly 30 years. These data, along with data collected by the North Carolina Division of Water Resources (DWR) and with data collected as part of a program of the USGS, the US Army Corps of Engineers, and the City of Durham, form a long-term comprehensive database on the quality of many of the area's water supply reservoirs and rivers, and selected tributaries to those water supplies.

In the last 30 years, concerns about water quality of the area's water supplies and the impact of development on reservoir eutrophication and contaminant concentrations have remained prominent, although specific concerns have changed. Monitoring initially focused on determining the occurrence of synthetic organic compounds in the water column and bed sediments; later monitoring and interpretive efforts focused on nutrient and sediment loads and trends. Issues such as the occurrence of disinfection by-products, microbial pathogens, and pharmaceutical and personal care products have also been addressed.

Throughout the history of the Project, the local government partnership has leveraged its local contributions with a major cost share match through a Joint Funding Agreement with the US Geological Survey. Phase I of the Project began with the execution of an interlocal agreement on August 18, 1988. At that time, the local government partners consisted of Chatham County, Orange County, the Town of Apex, the Town of Carrboro, the Town of Cary, the Town of Chapel Hill, the City of Durham, the Town of Hillsborough, the Town of Pittsboro, the City of Raleigh, the City of Sanford, and the Town of Smithfield. Phase I concluded on June 30, 1991.

Phase II of the Project began on July 1, 1991 with the execution of an amendment to the original interlocal agreement. At that time, the local government partners consisted of Chatham County, Orange County, the Town of Apex, the Town of Carrboro, the Town of Cary, the Town of Chapel Hill, the City of Durham, the Town of Hillsborough, the City of Raleigh, the City of Sanford, and the Town of Smithfield. The Town of Pittsboro had left the Project after Phase I. Phase II concluded on June 30, 1995.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

Phase III of the Project began on July 1, 1995 with the execution of an amendment to the original interlocal agreement. At that time, the local government partners consisted of Chatham County, Orange County, the Town of Apex, the Town of Carrboro, the Town of Cary, the Town of Chapel Hill, the City of Durham, the Town of Hillsborough, and the City of Sanford. The City of Raleigh and the Town of Smithfield had left the Project after Phase II. Phase III concluded on June 30, 1999.

During Phase III, the Town of Chapel Hill and the Town of Carrboro agreed that the Orange Water and Sewer Authority would enter into the same interlocal agreement on behalf of the Town of Chapel Hill and the Town of Carrboro to continue the Project from that point forward.

Phase IV of the Project began on July 1, 1999 with the execution of an amendment to the original interlocal agreement. At that time, the local government partners consisted of Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority. The City of Sanford had left the Project after Phase III. Phase IV concluded on June 30, 2003.

Phase V of the Project began on July 1, 2003 with the execution of an amendment to the original interlocal agreement. At that time, the local government partners consisted of Chatham County, Orange County, Wake County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, the Town of Morrisville, and the Orange Water and Sewer Authority. Wake County and the Town of Morrisville had joined the Project for Phase V. Phase V concluded on June 30, 2007. During Phase V, the City of Raleigh rejoined the Project with the execution of a confirmation of understanding effective on July 1, 2005.

Phase VI of the Project began on July 1, 2007 with the execution of a new interlocal agreement. At that time, the local government partnership consisted of Chatham County, Orange County, Wake County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, the City of Raleigh, the Orange Water and Sewer Authority, and the South Granville Water and Sewer Authority. The Town of Cary assumed the cost share and responsibilities of the Town of Morrisville, and the South Granville Water and Sewer Authority joined the Project. The City of Raleigh, Wake County, and the South Granville Water and Sewer Authority withdrew from the Project in the 5th year of Phase VI. Phase VI concluded on June 30, 2012.

Phase VII of the Project began on July 1, 2012 with the execution of a new interlocal agreement. At that time, the local government partnership consisted of Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority. The Town of Cary assumed the cost share and responsibilities of the Town of Morrisville. Phase VII will conclude on June 30, 2017.

Phase VIII of the Project began on July 1, 2017 with the execution of a new interlocal agreement. At that time, the local government partnership consisted of Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority. The Town of Cary assumed the cost share and responsibilities of the Town of Morrisville. Phase VIII concluded on June 30, 2022.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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Phase IX of the Project will begin on July 1, 2022 with the execution of a new interlocal agreement. At that time, the local government partnership will consist of Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority. The Town of Cary will assume the cost share and responsibilities of the Town of Morrisville. Phase IX will conclude on June 30, 2027.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
INTERLOCAL AGREEMENT

ATTACHMENT B

TAWSMP ANNUAL COST SHARES FOR PHASE IX:
FY 2023 – FY 2027 (July 1, 2022 to June 30, 2027)

The total annual Participant cost for Phase IX of the Triangle Area Water Supply Monitoring Project is \$433,960.00, as reflected in Table 1.

Table 1. Annual Participant Cost Share for Phase IX of the Triangle Area Water Supply Monitoring Project by Federal fiscal year (October-September). [TAWSMP, Triangle Area Water Supply Monitoring Project; USGS, U.S. Geological Survey]

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT Yearly Cost Estimate for Phase IX

Project Partners	Reservoir	2018 Raw Water	2019 Raw Water	2020 Raw Water	2018, 2019, 2020	Share of Total Water Use 2020	Base Rate	Variable Rate Cost Share	Annual Cost Share
		Withdrawal ¹	Withdrawal ¹	Withdrawal ¹	Raw Water Withdrawal Average				
		(mgd) ²	(mgd) ²	(mgd) ²	(mgd) ²	Base Cost Percentage ³ Total Yearly Fee ⁴ Divided by 8 or 4 (%)(%)		(1 million base rate)(Yearly Fee)(Share of total water use)	base rate + variable rate
Apex Cary (includes Morrisville) Chatham County (Jordan Water System)	B. Everett Jordan	4.34	4.95	4.81	4.58	7.4%	\$18,273.5	\$22,368	\$38,003
	B. Everett Jordan	19.12	19.31	18.20	18.28	31.0%	\$18,273.5	\$24,363	\$116,658
	B. Everett Jordan	1.83	2.00	1.84	1.82	3.1%	\$18,273.5	\$8,468	\$55,883
Durham	B. Everett Jordan, Tomlinson County, Lake Michale								
	Litt River Reservoir	28.87	29.60	27.25	27.84	44.6%	\$18,273.5	\$130,786	\$162,469
Hillsborough	Eno River, Lake Ben Johnson	1.54	1.58	1.65	1.59	2.6%	\$18,273.5	\$7,775	\$24,049
Orange County	Eno River Corporation Lakes	0.05	0.05	0.05	0.05	0.1%	\$18,273.5	\$280	\$16,634
	Cane Creek Reservoir, Jordan Lake, Intermittent Lake								
Orange Water and Sewer Authority		7.75	8.51	8.25	8.54	11.0%	\$18,273.5	\$33,430	\$69,753
Total					82.06	1.00	\$130,198.00	\$803,772.00	\$433,960

Base Cost Percentage: 33
 Notes:
 1 Raw water withdrawals provided in 2018, 2019, and 2020 in Local Water Supply Plans <https://www.ncwater.org/WUOC/apply/WSP/>
 2 2020 raw water withdrawals from Hillsborough from Maria Stranahan; personal communication
 3 Orange County's Average Annual Daily Water Use is based on the percentage of the Orange-Norance Water System service area. Chris Sand provided the 0.310578 value on 9/29/2021 to Emily Barrett, located within Orange County, as indicated in its 2015 Local Water Supply Plan.
 4 Orange-Norance Water System service area in Orange County = 30%
 5 Triangle Area Water Supply Monitoring Project Cost Share Calculation Based on 10/8/2021 Vote
 6 The 1-Minute Obsolete was "5-mod-3" which is Gasline (W) streamlined (size) report + P&AS for 1 year (DOES include Hillsborough and DOES NOT include Hawn)
 7 There are 8 partners. Cary is the water provider for Morrisville, so pays a greater share of the base rate to reflect that they pay for Cary and Morrisville

The total 5-year USGS project cost is \$3,332,000. The US Geological Survey will provide a thirty-eight percent cost share match of \$1,266,200. The Participant's total five-year cost share is \$2,065,800 plus \$104,000 for five years of TJCOG administration.

The Monitoring Project Participants' total annual cost for Phase VIII is \$413,160, plus \$20,800 for TJCOG services and support. The Monitoring Project Participants' individual annual cost shares are the sum of a base rate and a variable rate. The base rate is thirty percent of the total annual Monitoring Project Participants' cost, which is thirty percent of \$433,960, divided equally among the Monitoring Project Participants. The variable rate is seventy percent of the total annual Monitoring Project Participants' cost, which is seventy percent of \$433,960, multiplied by each Monitoring Project Participants' share of total water use, as calculated by the average raw water withdrawals in 2018, 2019, and 2020, except as noted in the notes for Table 1.

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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ATTACHMENT C

Tables 2, 3, and 4 below, are from the US Geological Survey's *Proposal to the Triangle Area Water Supply Steering Committee for Water Quality Monitoring and Assessment of Selected Streams and Reservoirs in the Triangle Area of North Carolina: Phase IX of the Triangle Area Water Supply Monitoring Project, July 2022 through June 2027*.

Table 2. List of monitoring locations and activities supported by this proposal. [COC, contaminants of concern; USGS, U.S. Geological Survey; NC, North Carolina; USACE, U.S. Army Corps of Engineers; --, not applicable. Site locations are shown in Figure 1.]

Map number	USGS station number	USGS site name	Site type	Relevant water supply	Monitoring type			
					Streamflow	Ambient/bi-monthly	Storm-event	COC sampling
1	0208480275	West Fork Eno Reservoir at Dam near Cedar Grove	Reservoir	West Fork Eno Reservoir, Eno River, Falls Lake	--	USGS	--	PFAS
2	0208524845	Little River Reservoir at Dam near Bahama	Reservoir	Little River Reservoir	--	USGS	--	PFAS
3	02086490	Lake Michie at Dam near Bahama	Reservoir	Lake Michie	--	USGS	--	PFAS
4	0209684980	Cane Creek Reservoir at Dam near White Cross	Reservoir	Cane Creek Reservoir	--	USGS	--	PFAS
5	0209699999	Jordan Lake, Haw River Arm near Hanks Chapel	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
6	0209749990	University Lake at intakes near Chapel Hill	Reservoir	University Lake	--	USGS	--	PFAS
7	0209768310	Jordan Lake at Buoy 12 at Farrington	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
8	0209799150	Jordan Lake above U.S. Highway 64 near Wilsonville	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
9	0209801100	Jordan Lake at Bells Landing near Griffins Crossroad	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
10	02085000	Eno River at Hillsborough	Stream	Eno River, Falls Lake	USGS	USGS	USGS	PFAS
11	02096846	Cane Creek near Orange Grove	Stream	Cane Creek Reservoir	USGS	USGS	USGS	PFAS
12	02097464	Morgan Creek near White Cross	Stream	Jordan Lake	USGS	USGS	USGS	PFAS
13	0209782609	White Oak Creek at mouth near Green Level	Stream	Jordan Lake	USGS	USGS	USGS	Bromide, 1,4-dioxane, PFAS
14	02085070	Eno River near Durham	Stream	Eno River, Falls Lake	USGS	(NCDEQ)	USGS	PFAS
15	0208521324	Little River at SR 1461 near Orange Factory	Stream	Little River Reservoir	USGS	(NCDEQ)	USGS	PFAS
16	02085500	Flat River at Bahama	Stream	Lake Michie	USGS	(NCDEQ)	USGS	PFAS
17	02096960	Haw River near Bynum	Stream	Jordan Lake	(USACE)	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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18	02097314	New Hope Creek near Blands	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS
19	020974195 5	Northeast Creek at SR 1100 near Genlee	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	PFAS
20	02097517	Morgan Creek near Chapel Hill, NC	Stream	Jordan Lake	USGS	(NCDEQ) ²	USGS	Bromide, 1,4-dioxane, PFAS
21	02098198	Haw River below B. Everett Jordan Dam near Moncure	Stream	Jordan Lake	(USACE)	(NCDEQ)	USGS ³	Bromide, 1,4-dioxane, PFAS

¹ Gage funded through separate agreement with agency shown in parentheses

² NCDEQ conducts ambient monitoring at a downstream location (Morgan Creek near Farrington)

³ Streamflow from a nearby gage, USGS site number 02098206 (Haw River near Moncure, NC)

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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Table 3. Annual sampling schedule, by site category, for sites sampled by the U.S. Geological Survey. [X, sampling is conducted at all stream or reservoir sites during this month.]

Type of Sampling	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
4 STREAM SITES (BIMONTHLY)												
Physical properties (temperature, dissolved oxygen, pH, specific conductance, and turbidity), nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹		X		X		X		X		X		X
8 STREAM SITES (STORM RUNOFF ONLY)												
Physical properties, nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹	Maximum of 10 samples per year distributed among all stream sites during periods of runoff and (or) high flow											
9 RESERVOIR SITES (BIMONTHLY)												
Vertical profiles of physical properties; water clarity (secchi depth)		X		X		X		X		X		X
Near-surface: alkalinity, major ions, iron, manganese, 1,4-dioxane, PFAS ¹		X		X		X		X		X		X
Photic-zone vertical-composite: nutrients and chlorophyll <i>a</i>		X		X		X		X		X		X
Near-bottom: nutrients, iron, manganese		X		X		X		X		X		X

¹PFAS sampling will occur during water year 2024 only

Table 4. Water-quality properties, constituents, and analyzing laboratories. [NWIS, National Water Information System; CAS, Chemical Abstracts Service; --, not applicable; °C, degrees Celsius; USGS, U.S. Geological Survey; SAWSC, South Atlantic Water Science Center; NWQL, National Water Quality Laboratory; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; s.u., standard units; NTRU, nephelometric turbidity units; m, meters; µg/L, micrograms per liter; tbd, to be determined.]

Constituent	NWIS codes		CAS number	Detection level (2022)	Reporting level (2022)	Unit	Analyzing entity
	Parameter	Method					
FIELD AND PHYSICAL PROPERTIES							
Water temperature	10	THM01	--	--	0.1	°C	USGS SAWSC (in-field readings)
Dissolved oxygen	300	LUMIN	--	--	0.1	mg/L	
Specific conductance at 25 °C	95	SC001	--	--	1	µS/cm	
pH	400	PROBE	--	--	0.1	pH	
Acid neutralizing capacity	419	TT065	471-34-1	--	5	mg/L	
Turbidity	63676	TS196	--	--	0.1	NTRU	
Secchi depth (reservoirs)	78	SECCH	--	--	0.1	m	
Depth to 1 percent incident light (reservoirs)	85328	--	--	--	0.1	m	USGS Kentucky
Suspended sediment (streams)	80154	various	--	--	1	mg/L	

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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							Sediment Lab
NUTRIENTS AND CHLOROPHYLL							
Nitrogen, ammonia	608	SHC02	7664-41-7	0.02	0.04	mg/L	USGS NWQL
Nitrogen, ammonia + organic	625	KJ008	17778-88-0	0.07	0.14	mg/L	
Nitrogen, nitrite + nitrate	631	RED02	--	0.01	0.02	mg/L	
Phosphorus, orthophosphate	671	PHM01	14265-44-2	0.004	0.008	mg/L	
Phosphorus, total	665	CL021	7723-14-0	0.003	0.006	mg/L	
Chlorophyll a (reservoirs)	70953	FL016	479-61-8	--	0.1	mg/L	USGS NWQL
Pheophytin a (reservoirs)	62360	FL016	603-17-8	--	0.1	mg/L	
MAJOR IONS							
Bromide	71870	IC027	24959-87-9	0.01	0.02	mg/L	USGS NWQL
Calcium	915	PLA11	7440-70-2	0.02	0.04	mg/L	
Chloride	940	IC022	16887-00-6	0.02	0.04	mg/L	
Fluoride	950	IC003	16984-48-8	0.01	0.02	mg/L	
Magnesium	925	PLA11	7439-95-4	0.01	0.02	mg/L	
Potassium	935	PLO03	7440-09-7	0.3	0.6	mg/L	
Silica	955	PLA11	7631-86-9	0.05	0.1	mg/L	
Sodium	930	PLA11	7440-23-5	0.4	0.8	mg/L	
Sulfate	945	IC022	14808-79-8	0.02	0.04	mg/L	
METALS							
Iron (reservoirs)	1045	PLO07	7439-89-6	5	10	mg/L	USGS NWQL
Manganese (reservoirs)	1055	PLO07	7439-96-5	0.2	0.4	mg/L	
ORGANIC COMPOUNDS							
Organic carbon, total	680	COMB9	--	0.7	1.4	mg/L	USGS NWQL
1,4-Dioxane	81582	GM016	123-91-1	0.1	0.2	mg/L	USGS NWQL
PFAS	tbd	tbd	tbd	tbd	tbd	ng/L	tbd

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ATTACHMENT D

MEETING AND DECISION-MAKING BY-LAWS
for the
TRIANGLE AREA WATER SUPPLY MONITORING PROJECT

ARTICLE I- MEETINGS OF THE STEERING COMMITTEE

1. **Meeting Frequency:** Regular quarterly meetings of the Steering Committee shall be held on such date and at such time and place as may be set by the Steering Committee. In addition, the Steering Committee may conduct additional regular meetings at such times and places as the Steering Committee shall determine. All meetings will be held in accordance with North Carolina open meetings statutes.
2. **Notice of Meetings:** Notice of each meeting of the Steering Committee shall be in writing, shall state the place, day, and hour of the meeting and, in the case of a special meeting, shall state the purpose or purposes for which such meeting is called. Each such notice shall be given in accordance with the State of North Carolina's open meetings laws. All notices shall be delivered by email to Steering Committee representatives.
3. **Proxy:** A representative may be represented at any meeting or meetings of the Steering Committee or vote and exercise any other rights at any meeting by proxy or proxies appointed in writing signed by such representative and delivered by email, mail or facsimile to the Managing Agent at the time of such meeting.
4. **Officers:** Per the ILA, the Chair and Vice Chair officers will be selected by the Committee from among its members and formally elected during the kickoff meeting for each Phase. The Vice Chair position will serve as acting Chair in the event of the Chair's absence at any Committee meeting or other affair. Officer term length shall coincide with the duration of each Phase; however, officer transitions may occur throughout the Phase if needed and supported by a majority vote.
4. **Voting:** The action of a simple majority of the representatives present and voting at a meeting at which a quorum (see below) is present shall be the action of the Steering Committee. Each Participant shall be entitled to one (1) representative and one (1) vote on any matter coming before the Steering Committee of the partnership.
 - (a) **Quorum:** A quorum shall consist of at least one-half of the Steering Committee representatives, each one representing a different Participant, present in person or by proxy. A majority of the Steering Committee representatives present at a meeting, whether or not a quorum is present, may adjourn such meeting from time to time until a quorum is present. The Steering Committee may act by consensus or majority vote of the representatives present. Voting may take place by email, by telephone conference, by facsimile, by written ballot, or by vote at a duly called meeting. Once a quorum is present at a meeting, the exiting or abstention of any representative shall not remove

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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such quorum and all business which otherwise could have been conducted at such meeting may continue to be conducted.

- 5. **Rules of Order:** All meetings shall be conducted according to Robert's Rules of Order, newly revised, except as otherwise noted in these by-laws.

ARTICLE II- AMENDMENTS TO BY-LAWS

Amendments to these by-laws may be approved by an affirmative vote of the majority of the Steering Committee, provided written notice of the proposed changes have been provided to all representatives at least thirty (30) days prior to the vote being taken. Amendments shall take effect immediately upon their adoption unless specified otherwise in the amendment.

ARTICLE III- ADOPTION OF BY-LAWS

The TAWSMP Steering Committee has approved these by-laws on the _____ day of _____ in the year _____, by a vote of _____ for to _____ against.

BY:

ATTEST:

Monica Dodson

Andrea Orlich

Monica Dodson, **Orange Water and Sewer Authority**
Orange Water and Sewer Authority

Witness

Sarah Braman

Jamie Revels

Sarah Braman **TAWSMP Chair**
Town of Cary

Witness

David Hardin

Lori Arent

David Hardin
Town of Apex

Witness

Chris Summerlin

[Signature]

Chris Summerlin
Chatham County

Witness

Reginald Hicks

Sydney Miller

Reginald Hicks
City of _____

Witness

Durham

Marie Strandwitz

Joel Lashley

Marie Strandwitz

Witness

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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Town of Hillsborough

Wesley Poole

Wesley Poole
Orange County

Christopher J. Sandt

Witness

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
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ATTACHMENT E

AGREEMENT BETWEEN THE
TRIANGLE AREA WATER SUPPLY MONITORING PROJECT STEERING COMMITTEE
AND
TRIANGLE J COUNCIL OF GOVERNMENTS
REGARDING THE OVERALL MANAGEMENT OF THE
WATER QUALITY MONITORING PROJECT

This Agreement is entered into this 22 day of June, 2022 by and between the Triangle Area Water Supply Monitoring Project Steering Committee, hereinafter called the Committee, and the Triangle J Council of Governments, hereinafter called the Managing Agent.

WHEREAS, Chatham County, Orange County, the Town of Apex, the Town of Cary, the City of Durham, the Town of Hillsborough, and the Orange Water and Sewer Authority (hereinafter called the "Participants") have entered into an Interlocal Agreement effective July 1, 2022 ("Interlocal Agreement") for the purpose of facilitating a water quality monitoring project for the Triangle Area surface water supplies, hereinafter called the "Project;" and

WHEREAS, those counties, municipalities and authorities have created a Steering Committee and empowered the Chair to enter into this agreement.

NOW, THEREFORE, BE IT RESOLVED, that the Committee and Managing Agent hereby mutually agree as follows:

Section 1. Purpose

The purpose of this Agreement is to provide for the overall administration of the Project, as reflected in Attachment F.

Section 2. Scope of Services

The Managing Agent shall perform the tasks necessary for overall Project administration. The Managing Agent will act on the Committee's behalf in all of the Committee's contractual agreements.

The general procedure that will be followed will be one of day-to-day management and oversight of the Project by the Managing Agent, performed within the context of regular consultation with Committee members and other technical advisors and contractors to the Project.

The Managing Agent agrees to provide the services hereinafter set forth:

- A. Collaboration with the Project's technical contractors to review and provide input on products, reports, and other documents, create informational materials, and to relay pertinent information to the Steering Committee and Participants as needed;

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- B. Day to day oversight of the Project's contracts and agreements, ensuring that objectives are achieved and milestones are met according to contract/agreement specifications;
- C. Maintenance of the Project's financial records and other bookkeeping activities, including the collection of local funds committed to the Project and payment of contractors;
- D. Maintenance of records to ensure compliance with all applicable State statutes and other rules of fiscal control applicable to local government units;
- E. Staff support to the Project Steering Committee, including meeting room facilities, announcements, and minutes;
- F. Periodic written and verbal reports of progress toward the Project's overall objectives, as stated in Section 1 of the July 1, 2022 Interlocal Agreement, including quarterly progress reports;
- G. Liaison between the Committee and its technical consultants regarding any modifications that may be needed to better meet those objectives; and
- H. Preparation of a draft Annual Administrative Workplan that will clearly define expectations, deliverables, and schedule milestones for the subsequent fiscal year. A draft Workplan will be provided by the Managing Agent to the Committee for their consideration by April 1 prior to the beginning of the applicable fiscal year.
- I. Participation in any Committee annual performance review of the Managing Agent.
- J. Other staff support services to assist the Committee in its primary charge of overseeing the Project's timely execution and insuring the responsible expenditure of public funds. This will include working with the Committee to expand the Participant base for the Project, the creation and maintenance of an online document sharing portal for all TAWSMP products, reports, and other information, and any other efforts as determined by a vote of the Committee and included in the adopted Annual Administrative Workplan, and which would not detract from providing the services enumerated in Section 2, Parts A through G above.

Section 3. Time of Performance

The services of the Managing Agent will commence on July 1, 2022, and will terminate upon completion of the Project, or on June 30, 2027, whichever is earlier, unless otherwise extended.

Section 4. Compensation

The total compensation to be paid for services outlined in Sections 2 of this Agreement will be \$104,000, payable according to the following schedule unless the Committee invokes by majority vote the Fund Withholding Provision of this section:

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June 30, 2018:	\$20,800
June 30, 2019:	\$20,800
June 30, 2020:	\$20,800
June 30, 2021:	\$20,800
June 30, 2022:	<u>\$20,800</u>
Total	\$104,000

All payments shall be made to the Managing Agent from the annual funding support provided by the Participants in the Project.

The Project Steering Committee may review the performance of the Managing Agent as necessary to ascertain fulfillment of work plan obligations. The Committee may, by majority vote, decide that Managing Agent is deficient in providing one or more services enumerated in Section 2. In making such a determination, the Committee shall provide written notice to Managing Agent specifying:

1. In which of the enumerated services there is a deficiency,
2. The funded activity in the Annual Administrative Work Plan which is deficient and the specific nature of the deficiency,
3. The steps Managing Agent needs to take to remedy the deficiency, and
4. The deadline by which the remedy needs to be achieved.

If, after the deadline, the Committee by majority vote determines that the deficiency has not been satisfactorily remedied, the Committee may withhold ten percent of the Managing Agent's compensation for the Fiscal Year covered by the Annual Administrative Work Plan. In the event that Participants have already paid the total annual compensation for the fiscal year, Managing Agent shall return ten percent of the compensation to each Participant.

Section 5. Suspension or Termination

Either Participant may suspend or terminate this Agreement upon 60 days written notice in whole or in part for cause. Cause shall include the following:

- A. Ineffective or improper use of funds;
- B. Failure to comply with the terms and conditions of this Agreement; and
- C. If for any reason the carrying out of this Agreement is rendered impossible or infeasible, including inability of Participants or any one Participant to provide adequate funding.

If the Committee withholds payment, it shall advise the Managing Agent and specify in writing the actions that must be taken and a reasonable date for compliance as a condition precedent to the resumption of payments. If the Committee or the Managing Agent intends to suspend this Agreement, it shall advise the other Participants and specify in writing the actions that must be taken and a reasonable date of compliance in order to avoid suspension of the Agreement. Upon receipt of notice of termination Managing Agent shall immediately cease all services and meet with the Committee to determine what services, if any, shall be required to bring the Project to a reasonable termination in accordance with the Committee's request.

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Section 6. Access to Records

The Managing Agent shall maintain all official Project records and documents during the Project. The Committee shall have access to any books, documents, papers and records of the Managing Agent, which are pertinent to the execution of this Agreement, for the purpose of making audits, examinations, excerpts and transcriptions.

Section 7. Interest Earned on Committee Revenues

The Managing Agent shall place the interest earned on the revenues received from August 9, 1988 until the end of the Project into a deferred revenue account. This account shall offset expenses in the final year of the Project or shall be applied to unforeseen Project expenses, as determined by the Committee.

Section 8. Additional Terms

- A. This Agreement may only be amended in a writing signed by the Participants.
- B. Managing Agent shall not assign or transfer its interest in, nor delegate its duties under this Agreement.
- C. This Agreement shall be governed by the laws of the State of North Carolina. Any and all suits or actions related to this Agreement shall be brought in Wake County N.C. as defined in Section 4 of the Interlocal Agreement.
- D. The Participants agree that this Agreement is subject to the E-Verify requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and any contractor or subcontractor performing services because of this Agreement shall be required to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes.
- E. The Participants by executing this Agreement certify that as of the date of this Agreement they are not on the Final Divestment List as created by the State Treasurer pursuant to North Carolina General Statute 147-86.58 and they are in compliance with the requirements of the Iran Divestment Act and North Carolina General Statute 147-86.60. They shall not utilize in the performance of this Agreement any subcontractor that is identified on the Final Divestment List.
- F. If any provision of this Agreement is held as a matter of law to be unenforceable, the remainder of this Agreement shall be enforceable without such provision.

By:

Sarah Braman

Sarah Braman, Chair, Triangle Area Water Supply Monitoring Project Steering Committee

By:

Lee Worsley

Lee Worsley, Executive Director, Triangle J Council of Governments

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ATTACHMENT F

TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
PHASE IX: JULY 2022 THROUGH JUNE 2027

Water Quality Monitoring and Assessment of Selected Streams and Reservoirs in the Triangle
Area of North Carolina

Submitted to

**Triangle Area Water Supply Monitoring Project
Steering Committee**

prepared by

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February 2022

BACKGROUND

The Triangle area is a multi-county region located within the upper Cape Fear and Neuse River basins in the Piedmont Physiographic Province of North Carolina (Figure 1). Municipal suppliers obtain raw water from lakes and rivers in the Triangle area. All surface waters in the study area are designated “nutrient sensitive”, meaning these waters are particularly vulnerable to excessive algal growth from elevated nutrient inputs (NCDEQ, 2019). Although some of these streams have high quality water and are designated as such (e.g., the Eno River located in the Neuse River basin), several streams in the Triangle Area Water Supply Monitoring Project (TAW SMP) study area are already impaired as indicated by poor biological integrity, low dissolved oxygen,

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high turbidity, and excessive fecal coliform bacteria. For example, Jordan Lake and University Lake exceed state criteria for phosphorous, nitrogen and chlorophyll-a (NCDEQ, 2018). The region has undergone, and continues to undergo, profound increases in population and land use change, which increases the demand on drinking water supplies. From 2010 to 2020, population in Chatham, Durham, Orange, and Wake Counties increased 21% (from 1,368,231 to 1,649,011 persons), with a projected population increase of another 34% in the same four counties by 2040 (North Carolina Office of State Budget and Management, 2021). This population growth not only increases drinking water demand, but also puts water supplies at risk. Development to accommodate growing populations can increase nutrient and sediment loading, increase wastewater discharge volumes, and may also add contaminant sources, such as industrial facilities, to the landscape.

Recognizing these potential impacts of population growth and landscape change on water-supply quality and quantity, local governments have committed to long-term monitoring and assessment to protect the area's water-supply resources. In 1988, several local governments joined to form the TAWSMP to systematically evaluate the quality of water-supply sources in the region. With cooperative assistance from the U.S. Geological Survey (USGS), the TAWSMP has collected and analyzed water-quality samples from reservoirs and streams and continuous records of streamflow in the study area for over 30 years. Data collected by the TAWSMP, the NCDEQ, and cooperative programs between the USGS and the U.S. Army Corps of Engineers (USACE), the Upper Cape Fear River Basin Association, and numerous city and county governments form a long-term, comprehensive database for streamflow and water quality in the Triangle area. The impact of development on reservoir eutrophication and the need to track contaminants that affect water-supply suitability have been consistent concerns since the project began. The USGS has used project data to quantify trends in water-quality and loads of nutrients and sediment from major tributaries. During previous project phases, pesticides and PCBs, disinfection by-products, microbial pathogens, and U.S. Environmental Protection Agency (USEPA) priority pollutants also were investigated, and a series of USGS reports have been published (e.g., McKee and others, 2021, Giorgino and others, 2007). The sustainability of water supplies depends on water availability as well as water quality; therefore, the 10 streamflow-gaging stations that are supported by this project are extremely valuable to local partners.

PROBLEM

Developmental pressure from population growth in the Triangle area continues to increase demands on surface-water supplies. At the same time, ongoing urbanization, eutrophication of water-supply reservoirs, and potential impacts from a changing climate challenge the long-term sustainability of the region's water supplies. Municipal and county agencies who manage public drinking-water utilities within the Triangle area have an ongoing need for consistent, long-term monitoring and interpretation to ensure the availability and quality of future drinking-water supplies.

Public health concerns regarding emerging contaminants and their impacts on water supplies remains a concern in the region. Bromide, which contribute to the formation of brominated trihalomethanes during the water treatment process, and 1,4-dioxane, an organic solvent that is a probable human carcinogen, were monitored during the previous phase of this project (phase

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XIII, which included water years 2017-2021). This monitoring revealed intermittent elevated levels of 1,4-dioxane in Jordan Lake and its main tributary, the Haw River, and samples above 0.05 mg/L of bromide in Jordan Lake, the Haw River, and two additional tributaries (New Hope Creek and White Oak Creek). Previous monitoring for hexavalent chromium did not reveal any major concerns. There is also growing concern over per- and poly-fluoroalkyl substances (PFAS) in the region, given confirmed sources in upstream municipalities of the Haw River watershed (Nakayama et al. 2007, Sun et al. 2016). These findings support the continued need for contaminant monitoring in the region.

OBJECTIVE

The primary objectives of the TAWSMP are to continue monitoring water quality at a network of 21 water-supply reservoir and stream sites and streamflow at 10 gaging stations, and to provide new information on the occurrence and distribution of contaminants of concern to water suppliers. The USGS proposes to continue to monitor bromide and 1,4-dioxane at sites with previous occurrences, and to conduct a one-year sampling campaign across all sites for PFAS. The long-term monitoring program for conventional water-quality constituents will also continue this phase. Efforts will be made to ensure public awareness and understanding of the project and the quality of water-supply sources in the region through periodic presentations, social media outreach activities, and by maintaining a project web site. Specific objectives proposed for Phase IX of the TAWSMP are:

- 1. Characterize and report water quality monitoring results**
 - a. Perform monitoring of major ions, nutrients, suspended sediment, and chlorophyll-a to document water-quality conditions throughout the study area and to extend the existing database that the USGS can use in the future to evaluate loads and trends.
 - b. Monitor the occurrence and distribution of additional parameters of concern to local water suppliers, including bromide and 1,4-dioxane at select sites (see Table 1), and PFAS at all sites.
 - c. Summarize project water-quality data collection in annual data release updates comprising all environmental and QA/QC sample results.
- 2. Characterize regional surface water availability**
 - a. Provide information on flow conditions in reservoir tributaries by continuing to operate a network of 10 gaging stations for the collection of continuous streamflow data. Note that the USGS operates 2 additional gages at TAWSMP sites; they are funded by the U.S. Army Corps of Engineers rather than TAWSMP partners. All streamflow data will be made publicly available in real time at <https://waterdata.usgs.gov/nc/nwis/rt>.
- 3. Develop interpretive science products to disseminate data and scientific findings**
 - a. Produce a two-page fact sheet directed towards the general public that TAWSMP partners can use to communicate the goals and benefits of the project
 - b. Publish a report summarizing the results from phases XIII and IX contaminant sampling (PFAS, 1,4-dioxane, bromide, and chromium)

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PROJECT SCOPE

The study area for Phase IX includes portions of the Cape Fear River basin upstream from the confluence of the Haw and Deep Rivers (just below Jordan Lake) and the Neuse River basin upstream from Falls Lake (Figure 1). The sampling sites lie within Chatham, Durham, and Orange Counties and represent water-supply sources for Chatham County, Orange County, Orange Water and Sewer Authority, Hillsborough, Durham, Apex, Cary, and Morrisville. Sites are located in a large multipurpose reservoir (Jordan Lake), five upland water-supply reservoirs (West Fork Eno Reservoir, Little River Reservoir, Lake Michie, Cane Creek Reservoir, and University Lake), and selected tributaries.

Phase IX will extend from July 2022 through June 2027. Results will supplement data collected for previous phases of the TAWSMP (Garrett and others, 1994; Childress and Treece, 1996; Childress and Bathala, 1997; Giorgino and others, 2007; 2012; Pfeifle and others, 2014; 2016a; 2016b, Pfeifle and others, 2019; Pfeifle and others, 2021) and USGS/U.S. Army Corps of Engineers cooperative studies of inflows to Jordan and Falls Lakes (Garrett, 1990a; Garrett, 1990b). Project activities also complement the NCDEQ Ambient Monitoring System (accessed on January 3, 2022, at: <http://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/ecosystems-branch/ambient-monitoring-system>).

Figure 1. Location of the Triangle Area Water Supply Monitoring Project study area and sampling sites in North Carolina. Numbers refer to their respective site IDs in Table 1.

RELEVANCE AND BENEFITS

This study advances knowledge of regional hydrology and water-quality in the Triangle area of North Carolina and benefits both the TAWSMP partners as well as the USGS.

Benefits to the TAWSMP partners and regional stakeholders: This study provides policy makers and water-resource managers with objective information essential for protecting drinking-water supplies in an area where growth is stressing availability, quality, and competition for these supplies. Water-quality and quantity information are collected by the USGS using robust sampling and QA/QC procedures to ensure data integrity. Partners can use this information to respond to public concerns about the safety of the region's water supplies and to anticipate potential risks to water quality and quantity. The study complements existing State and local water-quality monitoring activities in the region and will increase knowledge about the presence of bromide, 1,4-dioxane, PFAS, as well as conventional water-quality constituents in these watersheds. Partners can use project streamflow data to support decisions for implementing water-conservation measures. Streamflow information are also used by a wide range of regional stakeholders, including public citizens, academic researchers, the Upper Neuse and Upper Cape Fear River Basin Associations, and by the NCDEQ for developing water-supply allocations and TMDLs.

Benefits to the USGS: The USGS has used previous project data to analyze trends and loads, develop the USGS StreamStats application, and inform SPARROW models. Data from Phase IX could be used to support similar USGS efforts in the future. For example, the addition of PFAS monitoring to this phase supports activities included in the USGS PFAS Strategic Science

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Vision, which includes "...evaluation of the occurrence of PFAS, co-contaminants, water-quality parameters, and explanatory factors in water resources used for drinking water and (or) recreation" (Tokranov and others, 2021). Moreover, the proposed study addresses four Priority Actions outlined in the USGS Water Science Strategy (Evenson and others, 2013):

- Expand and enhance water-resource monitoring networks
- Clarify the linkage between human water use and the water cycle
- Conduct integrated watershed assessment, research, and modeling
- Deliver water data and analyses to the Nation

The project also supports numerous Strategic Actions identified for USGS Water Science (Evenson and others, 2013):

- Seek ways to expand the Nation's understanding of hydrologic resources not only through its own monitoring networks but also through optimizing the use of hydrologic data collected by and through other public agencies
- Commit to long-term data collection at a core set of nationally important surface-water-quality sites that would constitute a national surface-water-quality observation network
- Working through USGS resources and in collaboration with others, expand USGS capabilities to assemble, integrate, and serve information that assists in the assessment of hydrologic data, with the intent of improving the ability to detect trends, draw comparisons between differing hydrologic settings, lessen uncertainty, and improve the description of hydrologic functions
- Provide resources such as observations, analyses of hydroclimatic processes, and analyses of vulnerabilities in water-supply systems that allow resource managers to develop preparedness and response plans
- Provide scientific expertise to assist water providers in making decisions regarding disaster/emergency declarations, water conservation, water transfers, alternative water supplies, and water conservation during extreme or prolonged water shortages
- Develop tools that provide an understanding of how water-quality degradation can affect water supplies and allow managers to detect and respond to emergencies involving water-quality degradation

APPROACH

Phase IX of the TAWSMP is proposed to extend for five years, from July 1, 2022 through June 30, 2027. Conventional water-quality and hydrologic monitoring from Phase VIII will continue, with monitoring of constituents of concern occurring at select sites and/or years. Project components are described below and are numbered to correspond to the specific objectives for Phase IX.

Objective 1. Characterize and report water quality monitoring results

Water-quality monitoring will include bi-monthly sampling at 13 stream and reservoir sites and opportunistic storm-event sampling at eight additional tributary sites (Figure 1, Table 1). Sampling frequency and constituents will vary among the types of sites.

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Bi-monthly Stream and Reservoir Monitoring: Thirteen sites will be sampled six times per year during February, April, June, August, October, and December by the USGS (Figure 1; Tables 1 and 2), including four stream sites and nine reservoir sites. Stream samples generally will be collected as depth- and width-integrated composites. If unusual conditions necessitate the use of alternate sampling methods, those methods will be fully documented. Stream sites will be sampled for physical properties, nutrients, major ions (including bromide), suspended sediment, and 1,4-dioxane (select sites; see Table 1) for five years, and PFAS for one year (Table 2). Specific constituents to be measured are listed in Table 3.

Nine reservoir sites will be sampled six times per year during February, April, June, August, October, and December (Table 2). Dissolved-oxygen concentration, pH, temperature, and specific conductance will be measured at 1-meter intervals throughout the water column. Turbidity, secchi depth, and the depth of one-percent surface light penetration also will be measured as indicators of water clarity. Grab samples from 1 meter below the water surface will be analyzed for alkalinity, major ions (including bromide), iron, manganese, and 1,4-dioxane for all years, and PFAS during water year 2024. Depth-integrated samples for nutrients and chlorophyll *a* will be collected within the euphotic zone (the zone of light penetration, estimated by doubling the secchi-disk depth). Photic-zone composite sampling is consistent with standard operating procedures used by the NCDEQ for lake or reservoir sampling and helps promote inter-agency data comparability. Additional grab samples will be collected from 1 meter above the reservoir bed for analysis of nutrients, iron, and manganese.

Stream Storm-Event Sampling: The USGS will collect up to 10 storm-event runoff samples each year among all project stream sites. Sampling locations will be selected from among the four bimonthly stream sites and eight additional stream sites (Table 1) and will vary among years. These additional sites also are sampled by the NCDEQ as part of the State's Ambient Monitoring System. These data will be useful for understanding constituent concentrations and mass loading during high-flow conditions. Storm-event samples will be analyzed for the same properties and constituents that are analyzed for bi-monthly stream samples (Table 3).

Table 1. List of monitoring locations and activities supported by this proposal. [COC, contaminants of concern; USGS, U.S. Geological Survey; NC, North Carolina; USACE, U.S. Army Corps of Engineers; --, not applicable. Site locations are shown in Figure 1.]

Map number	USGS station number	USGS site name	Site type	Relevant water supply	Monitoring type			
					Streamflow ¹	Ambient/ bi-monthly	Storm-event	COC sampling
1	0208480275	West Fork Eno Reservoir at Dam near Cedar Grove	Reservoir	West Fork Eno Reservoir, Eno River, Falls Lake	--	USGS	--	PFAS
2	0208524845	Little River Reservoir at Dam near Bahama	Reservoir	Little River Reservoir	--	USGS	--	PFAS
3	02086490	Lake Michie at Dam near Bahama	Reservoir	Lake Michie	--	USGS	--	PFAS
4	0209684980	Cane Creek Reservoir at Dam near White Cross	Reservoir	Cane Creek Reservoir	--	USGS	--	PFAS

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5	020969999 9	Jordan Lake, Haw River Arm near Hanks Chapel	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
6	020974999 0	University Lake at intakes near Chapel Hill	Reservoir	University Lake	--	USGS	--	PFAS
7	020976831 0	Jordan Lake at Buoy 12 at Farrington	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
8	020979915 0	Jordan Lake above U.S. Highway 64 near Wilsonville	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
9	020980110 0	Jordan Lake at Bells Landing near Griffins Crossroad	Reservoir	Jordan Lake	--	USGS	--	Bromide, 1,4-dioxane, PFAS
10	02085000	Eno River at Hillsborough	Stream	Eno River, Falls Lake	USGS	USGS	USGS	PFAS
11	02096846	Cane Creek near Orange Grove	Stream	Cane Creek Reservoir	USGS	USGS	USGS	PFAS
12	02097464	Morgan Creek near White Cross	Stream	Jordan Lake	USGS	USGS	USGS	PFAS
13	020978260 9	White Oak Creek at mouth near Green Level	Stream	Jordan Lake	USGS	USGS	USGS	Bromide, 1,4-dioxane, PFAS
14	02085070	Eno River near Durham	Stream	Eno River, Falls Lake	USGS	(NCDEQ)	USGS	PFAS
15	020852132 4	Little River at SR 1461 near Orange Factory	Stream	Little River Reservoir	USGS	(NCDEQ)	USGS	PFAS
16	02085500	Flat River at Bahama	Stream	Lake Michie	USGS	(NCDEQ)	USGS	PFAS
17	02096960	Haw River near Bynum	Stream	Jordan Lake	(USACE)	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS
18	02097314	New Hope Creek near Blands	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS
19	020974195 5	Northeast Creek at SR 1100 near Genlee	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	PFAS
20	02097517	Morgan Creek near Chapel Hill, NC	Stream	Jordan Lake	USGS	(NCDEQ) ²	USGS	Bromide, 1,4-dioxane, PFAS
21	02098198	Haw River below B. Everett Jordan Dam near Moncure	Stream	Jordan Lake	(USACE)	(NCDEQ)	USGS ³	Bromide, 1,4-dioxane, PFAS

¹ Gage funded through separate agreement with agency shown in parentheses

² NCDEQ conducts ambient monitoring at a downstream location (Morgan Creek near Farrington)

³ Streamflow from a nearby gage, USGS site number 02098206 (Haw River near Moncure, NC)

Table 2. Annual sampling schedule, by site category, for sites sampled by the U.S. Geological Survey. [X, sampling is conducted at all stream or reservoir sites during this month.]

Type of Sampling	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
4 STREAM SITES (BIMONTHLY)												
Physical properties (temperature, dissolved oxygen, pH, specific conductance, and turbidity), nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹		X		X		X		X		X		X

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8 STREAM SITES (STORM RUNOFF ONLY)										
Physical properties, nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹	Maximum of 10 samples per year distributed among all stream sites during periods of runoff and (or) high flow									
9 RESERVOIR SITES (BIMONTHLY)										
Vertical profiles of physical properties; water clarity (secchi depth)		X		X		X		X		X
Near-surface: alkalinity, major ions, iron, manganese, 1,4-dioxane, PFAS ¹		X		X		X		X		X
Photic-zone vertical-composite: nutrients and chlorophyll <i>a</i>		X		X		X		X		X
Near-bottom: nutrients, iron, manganese		X		X		X		X		X

¹PFAS sampling will occur during water year 2024 only

Sampling for bromide and 1,4-dioxane: Prior sampling during Phase VIII indicated 1,4-dioxane concentrations were present at or above reporting levels (decreased from 0.35 to 0.20 µg/L on May 19, 2019) at only six sites in the TAWSMP project area: Jordan Lake Haw River Arm near Hanks Chapel, Jordan Lake at Buoy 12 at Farrington, Jordan Lake at Bells Landing near Griffins Crossroad, Jordan Lake above U.S. Highway 64 near Wilsonville, Haw River below B. Everett Jordan Dam near Moncure, and Haw River near Bynum. Similarly, bromide was found to be above a threshold of 0.05 mg/L at only eight sites (the six listed above, as well as New Hope Creek near Blands and White Oak Creek at mouth near Green Level). Sampling for these contaminants of concern will continue during Phase IX at these sites (Table 1) to further quantify levels of bromide and 1,4-dioxane.

Sampling for PFAS: Water samples for analysis of PFAS will be collected during water year 2024 (October 1, 2023 to September 30, 2024). All bi-monthly sites will be sampled for PFAS, and runoff samples will also be analyzed whenever feasible. EPA has established protocols for collecting environmental samples for PFAS analysis in surface water (<https://www.epa.gov/pfas/epa-pfas-drinking-water-laboratory-methods>). The USGS is also developing field protocols for environmental sampling of PFAS (Tokranov and others, 2021). Both resources will be leveraged to establish appropriate sampling protocols, which will also include the collection of additional samples for QA/QC purposes.

Table 3. Water-quality properties, constituents, and analyzing laboratories. [NWIS, National Water Information System; CAS, Chemical Abstracts Service; --, not applicable; °C, degrees Celsius; USGS, U.S. Geological Survey; SAWSC, South Atlantic Water Science Center; NWQL, National Water Quality Laboratory; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; s.u., standard units; NTRU, nephelometric turbidity units; m, meters; µg/L, micrograms per liter; tbd, to be determined.]

Constituent	NWIS codes		CAS number	Detection level (2022)	Reporting level (2022)	Unit	Analyzing entity
	Parameter	Method					
FIELD AND PHYSICAL PROPERTIES							
Water temperature	10	THM01	--	--	0.1	°C	USGS SAWSC (in-field readings)
Dissolved oxygen	300	LUMIN	--	--	0.1	mg/L	
Specific conductance at 25 °C	95	SC001	--	--	1	µS/cm	

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pH	400	PROBE	--	--	0.1	pH	
Acid neutralizing capacity	418	TT065	471-34-1	--	5	mg/L	
Turbidity	63676	TS196	--	--	0.1	NTRU	
Secchi depth (reservoirs)	78	SECCH	--	--	0.1	m	
Depth to 1 percent incident light (reservoirs)	85328	--	--	--	0.1	m	
Suspended sediment (streams)	80154	various	--	--	1	mg/L	USGS Kentucky Sediment Lab
NUTRIENTS AND CHLOROPHYLL							
Nitrogen, ammonia	608	SHC02	7664-41-7	0.02	0.04	mg/L	USGS NWQL
Nitrogen, ammonia + organic	625	KJ008	17778-88-0	0.07	0.14	mg/L	
Nitrogen, nitrite + nitrate	631	RED02	--	0.01	0.02	mg/L	
Phosphorus, orthophosphate	671	PHM01	14265-44-2	0.004	0.008	mg/L	
Phosphorus, total	665	CL021	7723-14-0	0.003	0.006	mg/L	
Chlorophyll <i>a</i> (reservoirs)	70953	FL016	479-61-8	--	0.1	mg/L	USGS NWQL
Pheophytin <i>a</i> (reservoirs)	62360	FL016	603-17-8	--	0.1	mg/L	
MAJOR IONS							
Bromide	71870	IC027	24959-67-9	0.01	0.02	mg/L	USGS NWQL
Calcium	915	PLA11	7440-70-2	0.02	0.04	mg/L	
Chloride	940	IC022	16887-00-6	0.02	0.04	mg/L	
Fluoride	950	IC003	16984-48-8	0.01	0.02	mg/L	
Magnesium	925	PLA11	7439-95-4	0.01	0.02	mg/L	
Potassium	935	PLO03	7440-09-7	0.3	0.6	mg/L	
Silica	955	PLA11	7631-86-9	0.05	0.1	mg/L	
Sodium	930	PLA11	7440-23-5	0.4	0.8	mg/L	
Sulfate	945	IC022	14808-79-8	0.02	0.04	mg/L	
METALS							
Iron (reservoirs)	1045	PLO07	7439-89-6	5	10	mg/L	USGS NWQL
Manganese (reservoirs)	1055	PLO07	7439-96-5	0.2	0.4	mg/L	
ORGANIC COMPOUNDS							
Organic carbon, total	680	COMB9	--	0.7	1.4	mg/L	USGS NWQL
1,4-Dioxane	81582	GM016	123-91-1	0.1	0.2	mg/L	USGS NWQL
PFAS	tbd	tbd	tbd	tbd	tbd	ng/L	tbd

Participating Laboratories: The USGS National Water Quality Laboratory (NWQL) in Denver, Colorado, will be used to analyze nutrients, chlorophyll, major ions, metals, and most organic compounds (total organic carbon and 1,4-dioxane; Table 3). Suspended sediment samples will be analyzed by the USGS Kentucky Sediment Laboratory in Louisville, Kentucky. PFAS will be analyzed either by NWQL or by a contract lab. Lab selection will be based on alignment with EPA's preferred analysis method (either method 537.1, "Determination of Selected Per- and

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Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS”, or method 533, “Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry”), as well as optimized coverage for the analysis of PFAS contaminants listed on EPA’s Fifth Unregulated Contaminant Monitoring Rule (<https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule>).

Objective 2. Characterize regional surface water availability

Streamflow information collected through this project is essential for determining water availability and for characterizing water-quality conditions. Cooperators rely on streamflow data to guide short-term decisions about water-plant operations and implementation of water-conservation measures, as well as for long-term water-supply planning. The USGS previously has used project streamflow data to support analysis of water-quality trends and transport of nutrients and sediment to reservoirs in the study area. The USGS also uses the real-time streamflow data to target storm-event sampling.

The USGS will operate and maintain continuous-record streamflow gaging stations at 10 sites as part of this project (Table 1). Two additional gages on the Haw River currently are funded through separate agreements with the U.S. Army Corps of Engineers (Table 1). The USGS SAWSC Raleigh Field Office will be responsible for operation and maintenance of the project gages, and for processing, quality-assuring, and approving the continuous streamflow data in accordance with USGS policies.

Stage and streamflow data will be collected, processed, and analyzed following procedures in the Quality-Assurance Plan for Surface-Water Activities of the North Carolina District (USGS, 2010b), “Measurement and Computation of Streamflow,” (Rantz and others, 1982), and “Discharge Measurements at Gaging Stations” (Turnipseed and Sauer, 2010). Current (real-time) and historical data for project streamgaging sites are available from the NWIS, at: <http://waterdata.usgs.gov/nc/nwis/>.

Task 3. Develop interpretative science products to disseminate findings

An in-depth analysis of contaminants of emerging concern will be conducted this Phase to better understand the occurrence and distribution of bromide, 1,4-dioxane, PFAS, and chromium. This analysis will use water-quality information collected during Phase VIII (2017-2022) and the first three years of Phase IX sampling, which will include seven years of bromide and 1,4-dioxane sampling (water years 2017-2024); three years of chromium sampling (water years 2017-2019); and one year of PFAS sampling (water year 2024). If warranted, additional water-quality information and streamflow data collected by this project or external organizations (e.g., partners, NCDEQ) may be used in the analysis to better understand spatial and temporal patterns of these constituents, identification of potential sources, and or/fate and transport mechanisms, and therefore would be reported as well. The results from this analysis will be published in a USGS Scientific Investigations Report (SIR) or equivalent report (with accompanying data

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release) and presented at local and/or regional water supply or water-quality monitoring conferences.

To better inform the public of the benefits of this project, the USGS will also prepare and publish an informational Fact Sheet about the TAWSMP that targets a non-scientific audience. The Fact Sheet will describe the project history, objectives, data-collection network, partnering agencies, water-quality concerns, and directions for obtaining USGS data and reports related to the project.

QUALITY ASSURANCE/QUALITY CONTROL

All water-quality activities will be conducted in accordance with established quality-assurance and quality-control (QA/QC) policies and procedures. Water-resource activities of the USGS SAWSC are supported by a series of quality-assurance policy statements and guidelines that describe responsibilities for specific functional elements, including project planning and implementation, equipment calibration and maintenance, data collection and processing, data management and storage, data analysis and interpretation, synthesis, reports preparation and processing, and training. Sample collection and processing will follow procedures outlined in the USGS National Field Manual for the Collection of Water-Quality Data (U. S. Geological Survey, variously dated). A variety of field and equipment blanks and replicate samples will be collected to document potential bias and variability in data that may result during the collection, processing, shipping, and handling of environmental samples. Similar to Phase VIII, a quality-control (QC) sampling schedule will be prepared annually, and will include, at a minimum:

- 2 Raleigh office deionized water blanks (nutrients, ions, metals)
- 1 Reservoir-sampling equipment blank (nutrients, ions, metals, organic compounds)
- 1 Stream-sampling equipment blank (suspended sediment, nutrients, ions, metals, organic compounds)
- 3 Field blanks (suspended sediment, nutrients, chlorophyll *a*, ions, metals, organic compounds)
- 3 Sampling-vehicle (atmospheric) blanks (nutrients, ions, metals, organic compounds)
- 6 Replicate samples (alkalinity, turbidity, suspended sediment, nutrients, chlorophyll *a*, ions, metals, organic compounds)

The USGS South Atlantic Water Science Center (SAWSC) will maintain annual accreditation by the NCDEQ for the collection of field water-quality parameters. Accreditation is based on acceptable analysis of performance testing samples that are obtained from a third-party vendor. The NCDEQ also conducts periodic audits of the SAWSC-Raleigh laboratory.

The NWQL will maintain accreditation by the National Environmental Laboratory Accreditation Program and the NCDEQ. The NWQL adheres to a comprehensive Quality Management System to ensure the quality of its work processes, products, and services (Stevenson, 2013). In addition, analytical performance at the NWQL is continually and independently tracked through the USGS Branch of Quality Systems (BQS) Blind Sample Programs. The project chief will routinely examine BQS control charts and other laboratory QC data, in addition to results for project quality-control samples. NWQL will also maintain accreditation through the NCDEQ annual chlorophyll-*a* round robin, which generally occurs during July.

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Project personnel will review all analytical results. Requests for re-analysis or verification will be made to the respective laboratories when results are in question. USGS data will be entered into the NWIS. Data stored in NWIS also pass through automated quality-control checks of data consistency and are available to members of the TAWSMP Steering Committee and the public online at: <http://waterdata.usgs.gov/nc/nwis/nwis>.

SCIENTIFIC PRODUCTS AND DELIVERABLES

All streamflow and water-quality data collected and analyzed by the USGS during phase IX will be reviewed, approved, and made accessible online through the NWIS. USGS policies for data processing and documentation, technical review, management, and archival will be followed, under the direction of the project chief and with support from the USGS SAWSC Science Quality Assurance Branch and the Assistant Director for Hydrologic Studies in North Carolina. Water-quality environmental and quality assurance analytical results will be also shared annually through a USGS Data Release and through presentations to the Steering committee once data have been approved. A concise, informational Fact Sheet about the project will be prepared for the dissemination to, and by, the TAWSMP partners during 2023. A Scientific Investigations Report (SIR) or equivalent report (and accompanying data release) will be written to summarize the results from the Phase VIII and the first three years of phase IX sampling of contaminants of concern: bromide, 1,4-dioxane, PFAS, and chromium (discontinued in phase VIII). This report will investigate the occurrence and distribution of these contaminants of concern, as well as potential sources and/or fate and transport. Additional water-quality information and streamflow data may be used in the analysis and therefore reported as well. Reports produced by the USGS are peer-reviewed and follow USGS fundamental science practices.

The USGS will provide quarterly summaries of project activities via email to the TAWSMP Steering Committee. In addition, the USGS will present a summary of activities and progress at annual meetings of the Steering Committee and will present findings at conferences and stakeholder meetings throughout the course of the project. The USGS will share information on project sites, activities and studies through various social media outlets and will maintain a web page for the Triangle Area Water Supply Monitoring Project (found here: <https://www.usgs.gov/centers/sawsc/science/triangle-area-nc-water-supply-monitoring>), and will assist TJCOG in their maintenance of their TAWSMP website (e.g., provide content for posting).

TIMELINE

Phase IX of the project is proposed to begin in July 2022 and to be completed in five years (Table 4). Operation of the streamgaging and water-quality data-collection networks and maintenance of the project web pages will continue throughout the duration of Phase IX. Hydrologic and water-quality data collected by the USGS will be reviewed, quality-assured, and published in the USGS National Water Information System on a continuous basis. The USGS will present a summary of project activities to the Steering Committee each year. The USGS will prepare a report summarizing contaminant monitoring, as well as a project Fact Sheet.

Table 4. Proposed timeline for Phase IX of the Triangle Area Water Supply Monitoring Project, July 2022 through June 2027. [Shading indicates work element is active during that quarter.]

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Work element	Federal Fiscal Year and Quarter beginning July 2022																			
	2023				2024				2025				2026				2027			
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Operate streamgaging network																				
Operate water-quality network, including bimonthly and storm-runoff sampling																				
Review and publish streamflow and water-quality data in USGS NWIS																				
Conduct PFAS sampling																				
Conduct analysis and publish contaminant SIR																				
Prepare and publish project fact sheet																				
Maintain project web page																				
Provide quarterly updates to Steering Committee																				
Update data release with annual QAQC and environmental data; present results to TAWSMP																				
Present Phase IX summary and plan next phase																				

PERSONNEL

A senior-level hydrologist will serve as project chief to manage the project, report to the Steering Committee, provide data interpretations, make presentations, and lead report preparation.

Hydrologic technicians in the SAWSC Hydrologic Studies section will conduct water-quality data collection, review, and records management. Hydrologic technicians in the SAWSC Data Section will maintain and operate the project continuous streamflow gages and be responsible for all data-quality checks, under the direction of a supervisory hydrologist. Additional water-quality hydrologists and(or) technicians will assist with data quality assurance and report preparation activities. IT staff will provide database support and assistance with web page maintenance/development. USGS publications staff will provide editorial and technical support for report production.

BUDGET SUMMARY

Funding needed to achieve the project objectives totals \$3,332,000 for the five-year period from July 2022 through July 2027 (Table 5). Funding needs vary among years, but the cooperators will be billed quarterly at a fixed amount of \$ 103,290, for a total of \$ 2,065,800. Funding

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provided by the TAWSMP Steering Committee will be partially matched by the USGS, subject to the availability of cooperative matching funds, for a total of \$ 1,266,2000. Expenses for operating the water-quality and streamgaging networks and producing reports include labor, equipment, supplies, transportation, training, laboratory analyses, and sample shipping. The USGS will maintain ownership of equipment used in the operation and maintenance of these networks.

Table 5. Proposed funding for Phase IX of the Triangle Area Water Supply Monitoring Project by Federal fiscal year (October-September). [TAWSMP, Triangle Area Water Supply Monitoring Project; USGS, U.S. Geological Survey]

Funding Source	Federal fiscal year					2027 (Oct- June)	TOTAL
	2022 (July- Sept)	2023	2024	2025	2026		
USGS share (38%)	\$40,400	\$233,10 0	\$257,10 0	\$246,00 0	\$281,40 0	\$208,200	\$1,266,200
Partner share (62%)	\$65,900	\$380,20 0	\$419,60 0	\$401,40 0	\$459,10 0	\$339,600	\$2,065,800
Total	\$106,300	\$613,30 0	\$676,70 0	\$647,40 0	\$740,50 0	\$547,800	\$3,332,000

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Final Proposal

**TRIANGLE AREA WATER SUPPLY MONITORING PROJECT
PHASE IX: JULY 2022 THROUGH JUNE 2027**

**Water Quality Monitoring and Assessment of Selected Streams and
Reservoirs in the Triangle Area of North Carolina**

Submitted to

**Triangle Area Water Supply Monitoring Project
Steering Committee**

prepared by

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May 2022



BACKGROUND

The Triangle area is a multi-county region located within the upper Cape Fear and Neuse River basins in the Piedmont Physiographic Province of North Carolina (Figure 1). Municipal suppliers obtain raw water from lakes and rivers in the Triangle area. All surface waters in the study area are designated “nutrient sensitive”, meaning these waters are particularly vulnerable to excessive algal growth from elevated nutrient inputs (NCDEQ, 2019). Although some of these streams have high quality water and are designated as such (e.g., the Eno River located in the Neuse River basin), several streams in the Triangle Area Water Supply Monitoring Project (TAWSSMP) study area are already impaired as indicated by poor biological integrity, low dissolved oxygen, high turbidity, and excessive fecal coliform bacteria. For example, Jordan Lake and University Lake exceed state criteria for phosphorous, nitrogen and chlorophyll-a (NCDEQ, 2018).

The region has undergone, and continues to undergo, profound increases in population and land use change, which increases the demand on drinking water supplies. From 2010 to 2020, population in Chatham, Durham, Orange, and Wake Counties increased 21% (from 1,368,231 to 1,649,011 persons), with a projected population increase of another 34% in the same four counties by 2040 (North Carolina Office of State Budget and Management, 2021). This population growth not only increases drinking water demand, but also puts water supplies at risk. Development to accommodate growing populations can increase nutrient and sediment loading, increase wastewater discharge volumes, and may also add contaminant sources, such as industrial facilities, to the landscape.

Recognizing these potential impacts of population growth and landscape change on water-supply quality and quantity, local governments have committed to long-term monitoring and assessment to protect the area's water-supply resources. In 1988, several local governments joined to form the TAWSSMP to systematically evaluate the quality of water-supply sources in the region. With cooperative assistance from the U.S. Geological Survey (USGS), the TAWSSMP has collected and analyzed water-quality samples from reservoirs and streams and continuous records of streamflow in the study area for over 30 years. Data collected by the TAWSSMP, the NCDEQ, and cooperative programs between the USGS and the U.S. Army Corps of Engineers (USACE), the Upper Cape Fear River Basin Association, and numerous city and county governments form a long-term, comprehensive database for streamflow and water quality in the Triangle area.

The impact of development on reservoir eutrophication and the need to track contaminants that affect drinking water-supply suitability have been consistent concerns since the project began. The USGS has used project data to quantify trends in water-quality and loads of nutrients, chlorophyll, and sediment from major tributaries. During previous project phases, pesticides and PCBs, disinfection by-products, microbial pathogens, and U.S. Environmental Protection Agency (USEPA) priority pollutants also were investigated, and a series of USGS reports have been published (e.g., McKee and others, 2021, Giorgino and others, 2007). The sustainability of water supplies depends on water availability as well as water quality; therefore, streamflow monitoring can be extremely valuable to local partners.

PROBLEM

Developmental pressure from population growth in the Triangle area continues to increase demands on surface-water supplies. At the same time, ongoing urbanization, eutrophication of water-supply reservoirs, and potential impacts from a changing climate challenge the long-term sustainability of the region's water supplies. Municipal and county agencies who manage public drinking-water utilities within the Triangle area have an ongoing need for consistent, long-term monitoring and interpretation to ensure the availability and quality of future drinking-water supplies.

Public health concerns regarding emerging contaminants and their impacts on water supplies remains a concern in the region. Bromide, which contributes to the formation of brominated trihalomethanes during the water treatment process, and 1,4-dioxane, an organic solvent that is a probable human carcinogen, were monitored during the previous phase of this project (phase VIII, which included water years 2017-2021; a water year extends from October 1 from the previous year to September 30 of the defined year). This monitoring revealed intermittent elevated levels of 1,4-dioxane in Jordan Lake (sites 5, 7, 8, and 9; Figure 1) and its main tributary, the Haw River (site 17), and samples above 0.05 mg/L of bromide in Jordan Lake, the Haw River, and two additional tributaries (New Hope Creek and White Oak Creek; Pfeifle and others, 2021). Previous monitoring for hexavalent chromium did not reveal any major concerns. There is also growing concern over per- and poly-fluoroalkyl substances (PFAS) in the region, given confirmed sources in upstream municipalities of the Haw River watershed (Nakayama and others, 2007, Sun and others, 2016). These findings support the continued need for contaminant monitoring in the region.

OBJECTIVE

The primary objectives of the TAWSMP are to continue monitoring water quality at a network of 21 water-supply reservoir and stream sites, monitor streamflow at co-located gaging stations at 10 of the stream sites, and to provide new information on the occurrence and distribution of contaminants of concern to water suppliers. The USGS proposes to continue to monitor bromide and 1,4-dioxane at sites with previous occurrences, and to conduct a one-year sampling campaign across all sites for PFAS. The long-term monitoring program for conventional water-quality constituents will also continue during this phase. Efforts will be made to ensure public awareness and understanding of the project and the quality of water-supply sources in the region through periodic presentations, social media outreach activities, and by maintaining a project web site. Specific objectives proposed for Phase IX of the TAWSMP are:

I. Characterize and report water quality monitoring results

- a. Perform monitoring of major ions, nutrients, suspended sediment, and chlorophyll-a to document water-quality conditions throughout the study area and to extend the existing database that the USGS can use in the future to evaluate loads and trends.

- b. Monitor the occurrence and distribution of additional parameters of concern to local water suppliers, including bromide and 1,4-dioxane at select sites (see Table 1), and PFAS at all sites.
 - c. Summarize project water-quality data collection in annual data release updates comprising all environmental and QA/QC sample results. Environmental data will also be available through NWIS.
- 2. Characterize regional surface water availability**
- a. Provide information on flow conditions in reservoir tributaries by continuing to operate a network of 10 gaging stations for the collection of continuous streamflow data. Note that the USGS operates two additional gages at TAWSMP sites (Table 1); they are funded by the U.S. Army Corps of Engineers so are not included in the funding for this proposal. However, the streamflow data from these sites will be used to inform this study. All streamflow data will be made publicly available in real time at <https://waterdata.usgs.gov/nc/nwis/rt>.
- 3. Develop interpretive science products to disseminate data and scientific findings**
- a. Produce a two-page fact sheet directed towards the general public that TAWSMP partners can use to communicate the goals and benefits of the project.
 - b. Publish a report summarizing the results from phases VIII and IX contaminant sampling (PFAS, 1,4-dioxane, bromide, and chromium).

PROJECT SCOPE

The study area for Phase IX includes portions of the Cape Fear River basin upstream from the confluence of the Haw and Deep Rivers (just below Jordan Lake) and the Neuse River basin upstream from Falls Lake (Figure 1). The sampling sites lie within Chatham, Durham, and Orange Counties and represent water-supply sources for Chatham County, Orange County, Orange Water and Sewer Authority, Hillsborough, Durham, Apex, Cary, and Morrisville. Sites are located in a large multipurpose reservoir (Jordan Lake), five upland water-supply reservoirs (West Fork Eno Reservoir, Little River Reservoir, Lake Michie, Cane Creek Reservoir, and University Lake), and selected tributaries.

Phase IX will extend from July 2022 through June 2027. Results will supplement data collected for previous phases of the TAWSMP (Garrett and others, 1994; Childress and Treece, 1996; Childress and Bathala, 1997; Giorgino and others, 2007; 2012; Pfeifle and others, 2014; 2016a; 2016b, Pfeifle and others, 2019; Pfeifle and others, 2021) and USGS/U.S. Army Corps of Engineers cooperative studies of inflows to Jordan and Falls Lakes (Garrett, 1990a; Garrett, 1990b). Project activities also complement the NCDEQ Ambient Monitoring System (accessed on January 3, 2022, at: <http://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/ecosystems-branch/ambient-monitoring-system>).

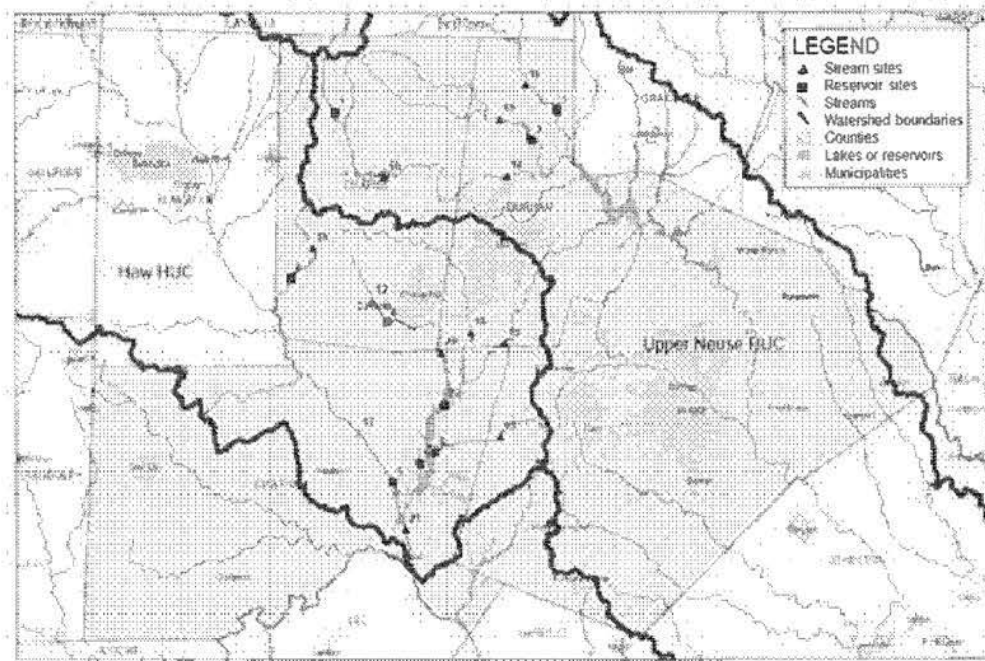


Figure 1. Location of the Triangle Area Water Supply Monitoring Project study area and sampling sites in North Carolina. Numbers refer to their respective site IDs in Table 1. HUC = Hydrological unit code. The Haw HUC comprises the upper Cape Fear river basin.

RELEVANCE AND BENEFITS

This study advances knowledge of regional hydrology and water-quality in the Triangle area of North Carolina and benefits both the TAWSMP partners as well as the USGS.

Benefits to the TAWSMP partners and regional stakeholders: This study provides policy makers and water-resource managers with objective information essential for protecting drinking-water supplies in an area where growth is stressing availability, quality, and competition for these supplies. Water-quality and quantity information are collected by the USGS using robust sampling and QA/QC procedures to ensure data integrity. Partners can use this information to respond to public concerns about the safety of the region's water supplies and to anticipate potential risks to water quality and quantity. The study complements existing State and local water-quality monitoring activities in the region (Table 1) and will increase knowledge about the presence of bromide, 1,4-dioxane, PFAS, as well as conventional water-quality constituents in these watersheds. Partners can use project streamflow data to support decisions for implementing water-conservation measures. Streamflow information are also used by a wide range of regional stakeholders, including public citizens, academic researchers, the Upper Neuse and Upper Cape Fear River Basin Associations, and by the NCDEQ for developing water-supply allocations and TMDLs.

Benefits to the USGS: The USGS has used previous project data to analyze trends and loads, develop the USGS StreamStats application, and inform SPARROW models. Data from Phase IX could be used to support similar USGS efforts in the future. For example, the addition of PFAS monitoring to this phase supports activities included in the USGS PFAS Strategic Science Vision, which includes "...evaluation of the occurrence of PFAS, co-contaminants, water-quality parameters, and explanatory factors in water resources used for drinking water and (or) recreation" (Tokranov and others, 2021). Moreover, the proposed study addresses four Priority Actions outlined in the USGS Water Science Strategy (Evenson and others, 2013):

- Expand and enhance water-resource monitoring networks
- Clarify the linkage between human water use and the water cycle
- Conduct integrated watershed assessment, research, and modeling
- Deliver water data and analyses to the Nation

The project also supports numerous Strategic Actions identified for USGS Water Science (Evenson and others, 2013):

- Seek ways to expand the Nation's understanding of hydrologic resources not only through its own monitoring networks but also through optimizing the use of hydrologic data collected by and through other public agencies
- Commit to long-term data collection at a core set of nationally important surface-water-quality sites that would constitute a national surface-water-quality observation network
- Working through USGS resources and in collaboration with others, expand USGS capabilities to assemble, integrate, and serve information that assists in the assessment of hydrologic data, with the intent of improving the ability to detect trends, draw comparisons between differing hydrologic settings, lessen uncertainty, and improve the description of hydrologic functions
- Provide resources such as observations, analyses of hydroclimatic processes, and analyses of vulnerabilities in water-supply systems that allow resource managers to develop preparedness and response plans
- Provide scientific expertise to assist water providers in making decisions regarding disaster/emergency declarations, water conservation, water transfers, alternative water supplies, and water conservation during extreme or prolonged water shortages
- Develop tools that provide an understanding of how water-quality degradation can affect water supplies and allow managers to detect and respond to emergencies involving water-quality degradation

APPROACH

Phase IX of the TAWSMP is proposed to extend for five years, from July 1, 2022 through June 30, 2027. Conventional water-quality and hydrologic monitoring from Phase VIII will continue, with monitoring of constituents of concern occurring at select sites and/or years. Project components are described below and are numbered to correspond to the specific objectives for Phase IX.

Objective 1. Characterize and report water quality monitoring results

Water-quality monitoring will include bi-monthly sampling at 13 stream and reservoir sites, and opportunistic storm-event sampling at 12 stream sites (Figure 1, Table 1). Sampling frequency and constituents will vary among the types of sites.

Bi-monthly Stream and Reservoir Monitoring: Thirteen sites will be sampled six times per year during February, April, June, August, October, and December by the USGS (Figure 1; Tables 1 and 2), including four stream sites and nine reservoir sites. Stream samples generally will be collected as depth- and width-integrated composites. If unusual conditions necessitate the use of alternate sampling methods, those methods will be fully documented. Stream sites will be sampled for physical properties, nutrients, major ions (including bromide), suspended sediment, and 1,4-dioxane (select sites; see Table 1) for five years, and PFAS for one year (Table 2). Specific constituents to be measured are listed in Table 3. NCDEQ will be conducting bi-monthly sampling at the other eight stream sites listed in Table 1 as part of their ambient sampling program. These data will be useful for broader analyses, but are not considered a part of this proposal.

Nine reservoir sites will be sampled six times per year during February, April, June, August, October, and December (Table 2). Dissolved-oxygen concentration, pH, water temperature, and specific conductance will be measured at 1-meter intervals throughout the water column. Turbidity, secchi depth, and the depth of one-percent surface light penetration also will be measured as indicators of water clarity. Grab samples from 1 meter below the water surface will be analyzed for alkalinity, major ions (including bromide), iron, manganese, and 1,4-dioxane for all years, and PFAS during water year 2024. Depth-integrated samples for nutrients and chlorophyll *a* will be collected within the euphotic zone (the zone of light penetration, estimated by doubling the secchi-disk depth). Photic-zone composite sampling is consistent with standard operating procedures used by the NCDEQ (accessed here: <https://deq.nc.gov/about/divisions/water-resources/water-sciences/intensive-survey-branch-isb>) for lake or reservoir sampling and helps promote inter-agency data comparability. Additional grab samples will be collected from 1 meter above the reservoir bed for analysis of nutrients, iron, and manganese.

Stream Storm-Event Sampling: The USGS will collect up to 10 storm-event runoff samples each year among the 12 project stream sites, which include the four sites targeted for bi-monthly

Table 1. List of monitoring locations and activities supported by this proposal. [COC, contaminants of concern; USGS, U.S. Geological Survey; NC, North Carolina; USACE, U.S. Army Corps of Engineers; ---, not applicable. Site locations are shown in Figure 1.]

Map number	USGS station number	USGS site name	Site type	Relevant water supply	Monitoring type			
					Streamflow ¹	Ambient/ bi-monthly	Storm- event	COC sampling
1	0208480275	West Fork Eno Reservoir at Dam near Cedar Grove	Reservoir	West Fork Eno Reservoir, Eno River, Falls Lake	---	USGS	---	PFAS
2	0208524845	Little River Reservoir at Dam near Bahama	Reservoir	Little River Reservoir	---	USGS	---	PFAS
3	02086490	Lake Michie at Dam near Bahama	Reservoir	Lake Michie	---	USGS	---	PFAS
4	0209684980	Cane Creek Reservoir at Dam near White Cross	Reservoir	Cane Creek Reservoir	---	USGS	---	PFAS
5	0209699999	Jordan Lake, Haw River Arm near Hanks Chapel	Reservoir	Jordan Lake	---	USGS	---	Bromide, 1,4-dioxane, PFAS
6	0209749990	University Lake at intakes near Chapel Hill	Reservoir	University Lake	---	USGS	---	PFAS
7	0209768310	Jordan Lake at Buoy 12 at Farrington	Reservoir	Jordan Lake	---	USGS	---	Bromide, 1,4-dioxane, PFAS
8	0209799150	Jordan Lake above U.S. Highway 64 near Wilsonville	Reservoir	Jordan Lake	---	USGS	---	Bromide, 1,4-dioxane, PFAS
9	0209801100	Jordan Lake at Bells Landing near Griffins Crossroad	Reservoir	Jordan Lake	---	USGS	---	Bromide, 1,4-dioxane, PFAS
10	02085000	Eno River at Hillsborough	Stream	Eno River, Falls Lake	USGS	USGS	USGS	PFAS
11	02096846	Cane Creek near Orange Grove	Stream	Cane Creek Reservoir	USGS	USGS	USGS	PFAS
12	02097464	Morgan Creek near White Cross	Stream	Jordan Lake	USGS	USGS	USGS	PFAS
13	0209782609	White Oak Creek at mouth near Green Level	Stream	Jordan Lake	USGS	USGS	USGS	Bromide, 1,4-dioxane, PFAS
14	02085070	Eno River near Durham	Stream	Eno River, Falls Lake	USGS	(NCDEQ)	USGS	PFAS
15	0208521324	Little River at SR 1461 near Orange Factory	Stream	Little River Reservoir	USGS	(NCDEQ)	USGS	PFAS
16	02085500	Flat River at Bahama	Stream	Lake Michie	USGS	(NCDEQ)	USGS	PFAS
17	02096960	Haw River near Bynum	Stream	Jordan Lake	(USACE) ¹	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS
18	02097314	New Hope Creek near Blands	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS
19	0209741955	Northeast Creek at SR 1100 near Genlee	Stream	Jordan Lake	USGS	(NCDEQ)	USGS	PFAS
20	02097517	Morgan Creek near Chapel Hill, NC	Stream	Jordan Lake	USGS	(NCDEQ) ²	USGS	Bromide, 1,4-dioxane, PFAS
21	02098198	Haw River below B. Everett Jordan Dam near Moncure	Stream	Jordan Lake	(USACE) ^{1,3}	(NCDEQ)	USGS	Bromide, 1,4-dioxane, PFAS

¹ USGS streamflow gage funded through separate agreement with funding agency shown in parentheses

² NCDEQ conducts ambient monitoring at a downstream location (Morgan Creek near Farrington)

³ Streamflow monitored at a nearby gage, USGS site number 02098206 (Haw River near Moncure, NC)

Table 2. Annual sampling schedule, by site category, for sites sampled by the U.S. Geological Survey. [X, sampling is conducted at all stream or reservoir sites during this month.]

Type of Sampling	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
4 STREAM SITES (BIMONTHLY)												
Physical properties (temperature, dissolved oxygen, pH, specific conductance, and turbidity), nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹		X		X		X		X		X		X
8 STREAM SITES (STORM RUNOFF ONLY)												
Physical properties, nutrients, major ions, suspended sediment, 1,4-dioxane, PFAS ¹	Maximum of 10 samples per year distributed among all stream sites during periods of runoff and (or) high flow											
9 RESERVOIR SITES (BIMONTHLY)												
Vertical profiles of physical properties; water clarity (secchi depth)		X		X		X		X		X		X
Near-surface: alkalinity, major ions, iron, manganese, 1,4-dioxane, PFAS ¹		X		X		X		X		X		X
Photic-zone vertical-composite: nutrients and chlorophyll <i>a</i>		X		X		X		X		X		X
Near-bottom: nutrients, iron, manganese		X		X		X		X		X		X

¹PFAS sampling will occur during water year 2024 only

sampling in this proposal, and the eight additional stream sites sampled bi-monthly by the NCDEQ (Table 1). Storm runoff sampling will occur on a rotational basis with an emphasis on fully characterizing water quality at a range of flows at all sites. Data collected for this project, as well as the state-collected data, will be useful for understanding constituent concentrations and mass loading during high-flow conditions. Storm-event samples will be analyzed for the same properties and constituents that are analyzed for bi-monthly stream samples (Table 3).

Sampling for bromide and 1,4-dioxane: Prior sampling during Phase VIII indicated 1,4-dioxane concentrations were present at or above reporting levels (dropping from 0.35 to 0.20 µg/L on May 19, 2019) at only six sites in the TAWSMP project area: Jordan Lake Haw River Arm near Hanks Chapel, Jordan Lake at Buoy 12 at Farrington, Jordan Lake at Bells Landing near Griffins Crossroad, Jordan Lake above U.S. Highway 64 near Wilsonville, Haw River below B. Everett Jordan Dam near Moncure, and Haw River near Bynum. Similarly, bromide was found to be above a threshold of 0.05 mg/L at eight sites (the six listed above, as well as New Hope Creek near Blands and White Oak Creek at mouth near Green Level). Sampling for these contaminants of concern will continue during Phase IX at these sites (Table 1) to further quantify levels of bromide and 1,4-dioxane.

Table 3. Water-quality properties, constituents, and analyzing laboratories. [NWIS, National Water Information System; CAS, Chemical Abstracts Service; --, not applicable; °C, degrees Celsius; USGS, U.S. Geological Survey; SAWSC, South Atlantic Water Science Center; NWQL, National Water Quality Laboratory; mg/L, milligrams per liter; µS/cm, microsiemens per centimeter; s.u., standard units; NTRU, nephelometric turbidity units; m, meters; µg/L, micrograms per liter; tbd, to be determined.]

Constituent	NWIS codes		CAS number	Detection level (2022)	Reporting level (2022)	Unit	Analyzing entity
	Parameter	Method					
FIELD AND PHYSICAL PROPERTIES							
Water temperature	10	THM01	--	--	0.1	°C	USGS SAWSC (in-field readings)
Dissolved oxygen	300	LUMIN	--	--	0.1	mg/L	
Specific conductance at 25 °C	95	SC001	--	--	1	µS/cm	
pH	400	PROBE	--	--	0.1	pH	
Acid neutralizing capacity	419	TT065	471-34-1	--	5	mg/L	
Turbidity	63676	TS196	--	--	0.1	NTRU	
Secchi depth (reservoirs)	78	SECCH	--	--	0.1	m	
Depth to 1 percent incident light (reservoirs)	85328	--	--	--	0.1	m	
Suspended sediment (streams)	80154	various	--	--	1	mg/L	USGS Kentucky Sediment Lab
NUTRIENTS AND CHLOROPHYLL							
Nitrogen, ammonia	608	SHC02	7664-41-7	0.02	0.04	mg/L	USGS NWQL
Nitrogen, ammonia + organic	625	KJ008	17778-88-0	0.07	0.14	mg/L	
Nitrogen, nitrite + nitrate	631	RED02	--	0.01	0.02	mg/L	
Phosphorus, orthophosphate	671	PHM01	14265-44-2	0.004	0.008	mg/L	
Phosphorus, total	665	CL021	7723-14-0	0.003	0.006	mg/L	
Chlorophyll <i>a</i> (reservoirs)	70953	FL016	479-61-8	--	0.1	mg/L	USGS NWQL
Pheophytin <i>a</i> (reservoirs)	62360	FL016	603-17-8	--	0.1	mg/L	
MAJOR IONS							
Bromide	71870	IC027	24959-67-9	0.01	0.02	mg/L	USGS NWQL
Calcium	915	PLA11	7440-70-2	0.02	0.04	mg/L	
Chloride	940	IC022	16887-00-6	0.02	0.04	mg/L	
Fluoride	950	IC003	16984-48-8	0.01	0.02	mg/L	
Magnesium	925	PLA11	7439-95-4	0.01	0.02	mg/L	
Potassium	935	PLO03	7440-09-7	0.3	0.6	mg/L	
Silica	955	PLA11	7631-86-9	0.05	0.1	mg/L	
Sodium	930	PLA11	7440-23-5	0.4	0.8	mg/L	
Sulfate	945	IC022	14808-79-8	0.02	0.04	mg/L	
METALS							
Iron (reservoirs)	1045	PLO07	7439-89-6	5	10	mg/L	USGS NWQL
Manganese (reservoirs)	1055	PLO07	7439-96-5	0.2	0.4	mg/L	
ORGANIC COMPOUNDS							
Organic carbon, total	680	COMB9	--	0.7	1.4	mg/L	USGS NWQL
1,4-Dioxane	81582	GM016	123-91-1	0.1	0.2	mg/L	USGS NWQL
PFAS	tbd	tbd	tbd	tbd	tbd	ng/L	tbd

Sampling for PFAS: Water samples for analysis of PFAS will be collected during water year 2024 (October 1, 2023 to September 30, 2024). All bi-monthly sites will be sampled for PFAS, and storm-event runoff samples will also be analyzed whenever feasible. EPA has established protocols for collecting environmental samples for PFAS analysis in surface water (<https://www.epa.gov/cwa-methods/cwa-analytical-methods-and-polyfluorinated-alkyl-substances-pfas>). The USGS is also developing field protocols for environmental sampling of PFAS (Tokranov and others, 2021). Both resources will be leveraged to establish appropriate sampling protocols, which will also include the collection of additional samples for QA/QC purposes.

Participating Laboratories: The USGS National Water Quality Laboratory (NWQL) in Denver, Colorado, will be used to analyze nutrients, chlorophyll, major ions, metals, and most organic compounds (total organic carbon and 1,4-dioxane; Table 3). Suspended sediment samples will be analyzed by the USGS Kentucky Sediment Laboratory in Louisville, Kentucky. PFAS will be analyzed either by NWQL or by a contract lab. Lab selection will be based on alignment with EPA's preferred analysis method, as well as optimized coverage for the analysis of PFAS contaminants listed on EPA's Fifth Unregulated Contaminant Monitoring Rule (<https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule>).

Objective 2. Characterize regional surface water availability

Streamflow information collected through this project is essential for determining water availability and for characterizing water-quality conditions. Cooperators rely on streamflow data to guide short-term decisions about water-plant operations and implementation of water-conservation measures, as well as for long-term water-supply planning. The USGS previously has used project streamflow data to support analysis of water-quality trends and transport of nutrients and sediment to reservoirs in the study area (Giorgino and others, 2018). The USGS also uses the real-time streamflow data to target storm-event sampling.

The USGS will continue to operate and maintain continuous-record streamflow gaging stations at 10 sites as part of this project (Table 1). Two additional gages on the Haw River currently are funded through separate agreements with the U.S. Army Corps of Engineers (Table 1), and the information will be useful for this study. The USGS SAWSC Raleigh Field Office will continue to be responsible for operation and maintenance of the project gages, and for processing, quality-assuring, and approving the continuous streamflow data in accordance with USGS policies.

Stage and streamflow data will be collected, processed, and analyzed following standard USGS procedures as described "Measurement and Computation of Streamflow," (Rantz and others, 1982), and "Discharge Measurements at Gaging Stations" (Turnipseed and Sauer, 2010). Current (real-time) and historical data for project streamgaging sites are available from the NWIS, at: <http://waterdata.usgs.gov/nc/nwis/>.

Objective 3. Develop interpretative science products to disseminate findings

An in-depth analysis of contaminants of emerging concern will be conducted during this Phase to better understand the occurrence and distribution of bromide, 1,4-dioxane, PFAS, and chromium (collected during phase VIII). This analysis will use water-quality information collected during Phase VIII (2017-2022) and the first three years of Phase IX sampling, which will include seven years of bromide and 1,4-dioxane sampling (water years 2017-2024); three years of chromium sampling (water years 2017-2019); and one year of PFAS sampling (water year 2024). If warranted, additional water-quality information and streamflow data collected by this project or external organizations (e.g., partners, NCDEQ) may be used in the analysis to better understand spatial and temporal patterns of these constituents, identification of potential sources, and/or fate and transport mechanisms, and therefore would be reported as well. The results from this analysis will be published in a USGS Scientific Investigations Report (SIR) or equivalent report (with accompanying data release) and presented at local and/or regional water supply or water-quality monitoring conferences.

To better inform the public of the benefits of this project, the USGS will also prepare and publish an informational Fact Sheet about the TAWSMP that targets a non-scientific audience. The Fact Sheet will describe the project history (from 1985 to current activities), objectives, data-collection network, partnering agencies, water-quality concerns, and directions for obtaining USGS data and reports related to the project. Finally, project staff will report monitoring activity updates quarterly to the TAWSMP steering committee and will update the project webpage.

QUALITY ASSURANCE/QUALITY CONTROL

All water-quality activities will be conducted in accordance with established quality-assurance and quality-control (QA/QC) policies and procedures. Water-resource activities of the USGS SAWSC are supported by a series of quality-assurance policy statements and guidelines that describe responsibilities for specific functional elements, including project planning and implementation, equipment calibration and maintenance, data collection and processing, data management and storage, data analysis and interpretation, synthesis, reports preparation and processing, and training. Sample collection and processing will follow procedures outlined in the USGS National Field Manual for the Collection of Water-Quality Data (U. S. Geological Survey, variously dated). A variety of field and equipment blanks and replicate samples will be collected to document potential bias and variability in data that may result during the collection, processing, shipping, and handling of environmental samples. Similar to Phase VIII, a quality-control (QC) sampling schedule will be prepared annually, and will include, at a minimum:

- 2 Raleigh office deionized water blanks (nutrients, ions, metals)
- 1 Reservoir-sampling equipment blank (nutrients, ions, metals, organic compounds)

- 1 Stream-sampling equipment blank (suspended sediment, nutrients, ions, metals, organic compounds)
- 3 Field blanks (suspended sediment, nutrients, chlorophyll *a*, ions, metals, organic compounds)
- 3 Sampling-vehicle (atmospheric) blanks (nutrients, ions, metals, organic compounds)
- 6 Replicate samples (alkalinity, turbidity, suspended sediment, nutrients, chlorophyll *a*, ions, metals, organic compounds)

The USGS South Atlantic Water Science Center (SAWSC) will maintain annual accreditation by the NCDEQ for the collection of field water-quality parameters. Accreditation is based on acceptable analysis of performance testing samples that are obtained from a third-party vendor. The NCDEQ also conducts periodic audits of the SAWSC-Raleigh laboratory.

The NWQL will maintain accreditation by the National Environmental Laboratory Accreditation Program and the NCDEQ. The NWQL adheres to a comprehensive Quality Management System to ensure the quality of its work processes, products, and services (Stevenson, 2013). In addition, analytical performance at the NWQL is continually and independently tracked through the USGS Branch of Quality Systems (BQS) Blind Sample Programs. The project chief will routinely examine BQS control charts and other laboratory QC data, in addition to results for project quality-control samples. NWQL will also maintain accreditation through the NCDEQ annual chlorophyll-*a* round robin, which generally occurs during July.

Project personnel will review all analytical results. Requests for re-analysis or verification will be made to the respective laboratories when results are in question. USGS data will be entered into the NWIS. Data stored in NWIS also pass through automated quality-control checks of data consistency and are available to members of the TAWSMP Steering Committee and the public online at: <http://waterdata.usgs.gov/nc/nwis/nwis>.

SCIENTIFIC PRODUCTS AND DELIVERABLES

All streamflow and water-quality data collected and analyzed by the USGS during phase IX will be reviewed, approved, and made accessible online through the [NWIS](#). USGS policies for data processing and documentation, technical review, management, and archival will be followed, under the direction of the project chief and with support from the USGS SAWSC Science Quality Assurance Branch and the Assistant Director for Hydrologic Studies in North Carolina.

Water-quality environmental and quality assurance analytical results will be also shared annually through a USGS Data Release and through presentations to the Steering committee once data have been approved. A concise, informational Fact Sheet about the project will be prepared for the dissemination to, and by, the TAWSMP partners during 2023. A Scientific Investigations Report (SIR) or equivalent report (and accompanying data release) will be written to summarize the results from the Phase VIII and the first three years of phase IX sampling of contaminants of

concern: chromium (discontinued in phase VIII), bromide, 1,4-dioxane, and PFAS. This report will investigate the occurrence and distribution of these contaminants of concern, as well as potential sources and/or fate and transport. Additional water-quality information and streamflow data may be used in the analysis and therefore reported as well. Reports produced by the USGS are peer-reviewed and follow USGS fundamental science practices.

The USGS will provide quarterly summaries of project activities via email to the TAWSMP Steering Committee. In addition, the USGS will present a summary of activities and progress at annual meetings of the Steering Committee and will present findings at conferences and stakeholder meetings throughout the course of the project. The USGS will share information on project sites, activities and studies through various social media outlets and will maintain a web page for the Triangle Area Water Supply Monitoring Project (found here: <https://www.usgs.gov/centers/sawsc/science/triangle-area-nc-water-supply-monitoring>), and will provide limited content to TJCOG for their TAWSMP website.

PERSONNEL

A senior-level hydrologist will serve as project chief to manage the project, report to the Steering Committee, provide data interpretations, make presentations, and lead report preparation. Hydrologic technicians in the SAWSC Hydrologic Studies section will conduct water-quality data collection, review, and records management. Hydrologic technicians in the SAWSC Data Section will maintain and operate the project continuous streamflow gages and be responsible for all data-quality checks, under the direction of a supervisory hydrologist. Additional water-quality hydrologists and(or) technicians will assist with data quality assurance and report preparation activities. IT staff will provide database support and assistance with web page maintenance/development. USGS publications staff will provide editorial and technical support for report production.

TIMELINE

Phase IX of the project is proposed to begin in July 2022 and to be completed in five years (Table 4). Operation of the streamgaging and water-quality data-collection networks and maintenance of the project web pages will continue throughout the duration of Phase IX. Hydrologic and water-quality data collected by the USGS will be reviewed, quality-assured, and published in the USGS National Water Information System on a continuous basis. The USGS will present a summary of project activities to the Steering Committee each year. The USGS will prepare a report summarizing contaminant monitoring, as well as a project Fact Sheet.

Table 4. Proposed timeline for Phase IX of the Triangle Area Water Supply Monitoring Project, July 2022 through June 2027. [Shading indicates work element is active during that quarter.]

Work element	Federal Fiscal Year and Quarter beginning July 2022																				
	2023				2024				2025				2026				2027				
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	
Operate streamgaging network																					
Operate water-quality network, including bimonthly and storm-runoff sampling																					
Review and publish streamflow and water-quality data in USGS NWIS																					
Conduct PFAS sampling																					
Conduct analysis and publish contaminant SIR																					
Prepare and publish project fact sheet																					
Maintain project web page																					
Provide quarterly updates to Steering Committee																					
Update data release with annual QAQC and environmental data; present results to TAWSMP																					
Present Phase IX summary and plan next phase																					

BUDGET SUMMARY

Funding needed to achieve the project objectives totals \$3,332,000 for the five-year period from July 2022 through July 2027 (Table 5). Funding needs vary among years, but the cooperators will be billed quarterly at a fixed amount of \$ 103,290, for a total of \$ 2,065,800. Funding provided by the TAWSMP Steering Committee will be partially matched by the USGS, subject to the availability of cooperative matching funds, for a total of \$ 1,266,200. Expenses for operating the water-quality and streamgaging networks and producing reports include labor, equipment, supplies, transportation, training, laboratory analyses, and sample shipping. The USGS will maintain ownership of equipment used in the operation and maintenance of these networks.

Table 5. Proposed funding for Phase IX of the Triangle Area Water Supply Monitoring Project by Federal fiscal year (October-September). [TAWSMMP, Triangle Area Water Supply Monitoring Project; USGS, U.S. Geological Survey]

Funding Source	Federal fiscal year						TOTAL
	2022 (July- Sept)	2023	2024	2025	2026	2027 (Oct- June)	
USGS share (38%)	\$40,400	\$233,100	\$257,100	\$246,000	\$281,400	\$208,200	\$1,266,200
Partner share (62%)	\$65,900	\$380,200	\$419,600	\$401,400	\$459,100	\$339,600	\$2,065,800
Total	\$106,300	\$613,300	\$676,700	\$647,400	\$740,500	\$547,800	\$3,332,000

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**Resolution to Amend Article III of the Orange Water and Sewer Authority Bylaws
Regarding Annual Meetings**

Whereas, the Orange Water and Sewer Authority Board of Directors has determined move the Annual Meeting to the Regular Meeting from the fourth Thursday in September to the Regular Meeting in October (second Thursday of the month):

Now Therefore, Be It Resolved that the Board of Directors of the Orange Water and Sewer Authority:

1. Amend ARTICLE III. MEETINGS, Section 1. ANNUAL MEETINGS, of the Bylaws to read as follows:

ARTICLE III. MEETINGS

1. ANNUAL MEETINGS. Annual meetings of the Authority shall be held at the regular Board Meeting in October on the fourth Thursday in September of each year unless otherwise decided by a majority of the Board and at the hour and place designated in the notice of same. Written notice of the time and place of Annual meetings shall be given by the Secretary or Executive Director by mailing such notice to each Director at his or her regular residential address not less than twenty (20) days prior to the date of such meeting or by email not less than seven (7) days prior to the date of the meeting.

Adopted this the 9th day of June, 2022.



Jo Leslie Eimers, Chair

Attest:



John N. Morris, Secretary

**Resolution Honoring the Service of Yinka Ayankoya to the
Chapel Hill-Carrboro-Orange County Community as a Member of the
Orange Water and Sewer Authority's Board of Directors**

Whereas, Ms. Yinka Ayankoya served on the OWASA Board from July 1, 2016, through June 30, 2022, including service as Secretary of the Board of Directors from July 1, 2017 to June 30, 2018; as Chair of the Board of Directors from July 1, 2018 to June 30, 2019; and as Vice Chair of the Board of Directors from July 1, 2021 to June 30, 2022; and

Whereas, Ms. Ayankoya served on the Board's Community Engagement, Human Resources, and Finance Committees during her service, during which she served as Chair of the Community Engagement Committee from August 2017 to July 2018 and July 2019 to June 2021; and Chair of the Finance Committee from July 2021 to June 2022; and

Whereas, Ms. Ayankoya has earned our gratitude and deserves our continuing respect for her tireless energy, and talents in service to OWASA customers, and we shall certainly miss her quiet but effective direction in leading us by her principled example; and

Whereas, Ms. Ayankoya was a strong proponent for OWASA's diversity and inclusion program, for engaging and listening to customers' interests, and for insisting upon fairness and equity in support of all OWASA employees.

**Now, Therefore, Be It Resolved by the Orange Water and Sewer Authority
Board of Directors:**

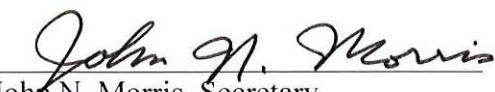
1. That the Board expresses its sincere appreciation and deep gratitude to Yinka Ayankoya for her outstanding service, leadership and stewardship as a Member of the OWASA Board of Directors; and the Board wishes for her much happiness in the years ahead.
2. That this resolution be recorded in the minutes 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 Carrboro.

Adopted and presented this 9th day of June 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary

Resolution Adopting the Schedule of Rates, Fees and Charges Effective October 1, 2022

Whereas, Orange Water and Sewer Authority (OWASA) is empowered by N.C. Gen. Stat. 162A-6(9) to adopt a Schedule of Rates, Fees and Charges, in accordance with the provisions of N.C. Gen. Stat. 162A-9, and consistent with Section 7.04 of OWASA's Amended and Restated Bond Order (Bond Order); and

Whereas, the OWASA Board of Directors held a public hearing on May 12, 2022, on the attached proposed revision to its Schedule of Rates, Fees and Charges, to be effective on or after October 1, 2022, and has determined to adopt and implement the proposed Schedule;

Now, Therefore, Be It Resolved:

1. The attached Schedule of Rates, Fees, and Charges is hereby adopted by the Board of Directors of Orange Water and Sewer Authority and shall be effective on or after October 1, 2022.
2. The Executive Director is hereby authorized and directed to implement the Schedule of Rates, Fees, and Charges.
3. The Executive Director is authorized to receive and consider customer inquiries, requests, and appeals, and to make determinations as may be necessary in the implementation of the Schedule of Rates, Fees and Charges, subject to the right of customers to appeal such determinations to the Board of Directors.
4. The Executive Director is authorized to extend the time for payment or collection, or to suspend, collect, or compromise and settle, sums due OWASA for services rendered, including fees, penalties, disconnections, and other remedies in collection, when necessary to protect the health or safety of customers or OWASA staff during times of epidemic or other emergencies.

Adopted this the 9th day of June 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

APPLICABLE TO ALL BILLINGS AND SERVICES ON OR AFTER OCTOBER 1, 2022.

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Background and Authorization

In providing essential public water, sewer and reclaimed water services to Chapel Hill, Carrboro and portions of southern Orange County, Orange Water and Sewer Authority (OWASA) incurs substantial operating and capital expenses. As a community-owned non-profit public utility, OWASA has no authority to levy taxes, nor does it receive tax revenues from local governments for ongoing operations. OWASA finances its water, sewer and reclaimed water operations and extensive capital improvements almost entirely through customer paid fees and charges.

North Carolina G.S. 162A-9 requires that OWASA's "rates, fees and charges shall be fixed and revised so that the revenues of the Authority, together with any other available funds, will be sufficient at all times" to fund operating and maintenance expenses and to pay the principal and interest on all debt issued or assumed by OWASA. OWASA's rates are established under cost-of-service rate-making methodology. OWASA's customers pay for the cost of providing the services and/or facility capacity required to meet customer demand.

The OWASA Board of Directors has determined that the provisions in this Schedule of Rates, Fees, and Charges are necessary to adequately sustain OWASA's near-term and long-range utility operations. Revenues generated by these rate adjustments will provide OWASA with the financial resources necessary to: (1) fund operating costs; (2) adequately maintain existing water, sewer, and reclaimed water facilities; (3) fully comply with environmental and public health standards; (4) meet debt service requirements; (5) create additional facility capacity to stay abreast of water, reclaimed water and sewer service demand in a growing, dynamic community; and (6) maintain adequate reserves.

All fees go into effect on October 1, 2022.

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

SECTION I: WATER RATES AND FEES

MONTHLY WATER RATES

Water charges are billed monthly at approximately 30-day intervals. Charges are due upon receipt of the bill and become delinquent 25 days after the billing date. Monthly water rates consist of two components: a monthly service charge and a commodity (volume) charge.

Water Service Charge

This charge recovers costs related to certain direct and indirect customer service efforts, meter and lateral maintenance, and capital costs associated with supplying water to the customer's property. Applicable to all metered water accounts, independent of the quantity of water consumed, the monthly charge is based on meter size as follows:

Meter Size	Monthly Charge
5/8"	\$19.17
3/4" Combination Fire and Domestic Service Meter	\$19.83
1"	\$38.53
1" Combination Fire and Domestic Service Meter	\$39.17
1-1/2"	\$83.30
2"	\$125.72
3"	\$258.57
4"	\$422.10
6"	\$919.09
8"	\$1,307.17

Water Irrigation Service Charge

This charge is calculated to recover certain direct and indirect customer service, meter and lateral maintenance, and capital costs associated with supplying water for irrigation through irrigation-only meters. Applicable to all metered irrigation water accounts, regardless of the quantity of water consumed, the monthly charge is based on meter size as follows:

Meter Size	Monthly Charge
5/8"	\$30.71
1"	\$61.38
1-1/2"	\$113.62
2"	\$174.75
3"	\$345.89
4"	\$530.95
6"	\$1,044.46
8"	\$1,660.99

Monthly service charges for compound meter arrangements are based on the largest meter in the grouping. In addition to the applicable charge for the primary meter, existing OWASA-owned sub-meters

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

are billed according to the above schedule. OWASA-owned sub-meters are no longer available, and no additional sub-meters will be installed. Meter readings and service charges for first and final bills are prorated based on days of service.

(NOTE: In accordance with state law, all new in-ground irrigation systems installed on lots platted and recorded in the office of the register of deeds in the county or counties in which the real property is located after July 1, 2009 and supplied by a public drinking water system are required to have a separate meter to measure the volume of water used through the irrigation system.)

Water Commodity Charge

This charge recovers the direct and indirect costs of water supply and treatment, water distribution, general administration and capital costs not recovered by the monthly service charge. This charge is applicable to all water accounts based on meter readings of water consumed. When a billing period includes a change in commodity rates, the charges are prorated based on the ratio of days in the billing period at the old and new rates. Metered monthly consumption will be billed in thousand-gallon increments rounded down to the nearest thousand gallons. Unbilled consumption due to rounding will be carried forward and billed in the month when the next thousand-gallon increment is registered by the meter.

When no meter reading is available due to an inoperative, damaged or inaccessible meter, consumption will be estimated based on prior usage at the location.

Individually Metered Residential Accounts Except Irrigation-only Accounts

Individually metered residential accounts will be billed under an increasing block rate structure designed to encourage efficient water use by applying increasing commodity charges (rate per thousand gallons) to incremental increases in water use.

	Volume of Use (Gallons)	Commodity Rate per 1,000 Gallons
Block 1	1,000 to 2,000	\$3.43
Block 2	3,000 to 5,000	\$8.33
Block 3	6,000 to 10,000	\$10.22
Block 4	11,000 to 15,000	\$14.27
Block 5	All use 16,000 and up	\$25.82

Multi-family Master-metered Residential Accounts

Multi-family master-metered residential accounts have one (or more) OWASA meter that serves more than one residential dwelling. Examples include apartment complexes, duplexes and condominiums. Multi-family master-metered residential accounts shall be charged the following year-round commodity rate.

\$7.39 per thousand gallons

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

Non-residential Accounts Except Irrigation Accounts

To achieve demand reduction during peak water use periods, a seasonal conservation rate structure will be applied to all non-residential accounts other than irrigation-only accounts. A reduced water commodity charge is in effect during lower demand months (October through April), and a higher commodity charge is in effect during high demand months (May through September).

	Rate
Off-peak seasonal rate per 1,000 gallons (October through April)	\$5.43
Peak seasonal rate per 1,000 gallons (May through September)	\$10.32

Irrigation-only Accounts

To promote conservation of water used for irrigation and to achieve greater equity between rates for irrigation-only use and irrigation use through a domestic meter, irrigation-only accounts shall be charged the following year-round commodity rate.

\$11.10 per thousand gallons

WATER COMMODITY SURCHARGES APPLICABLE UNDER WATER SHORTAGE
DECLARATION STAGES

Conservation Water Commodity Charges Under Mandatory Water Use Restrictions

Water commodity charges will be temporarily increased during periods of declared Water Shortages and mandatory water use restrictions regardless of the time of year. These applicable surcharges are summarized in the following table.

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

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

INTERLOCAL WATER TRANSFER CHARGES

The purpose of this charge is to recover costs associated with the provision of supplemental water supply under contractual agreement with other water purveyors. The specific rates to be charged will be negotiated with the other party based upon specific conditions using the cost-of-service rate-making approach and approved by OWASA.

TEMPORARY HYDRANT METER CHARGE

Subject to availability, a Customer may obtain a temporary hydrant meter from OWASA for a period of up to 60 days. A customer may submit a written request to use the hydrant meter for one additional 60-day period but granting said request will be subject to availability and is at OWASA’s sole discretion. Service from a fire hydrant is subject to interruption when the hydrant is needed for fire protection, compliance with water conservation standards, and other applicable law. For situations where temporary water service is needed for a period longer than 120 days, the user can purchase a metering device of a size, make and model specified by OWASA. A service charge, payable in advance, shall be collected for setting and removing the meter.

Service Charge - \$260

In addition, a security deposit shall be required.

Temporary Hydrant Meter Security Deposit
\$1,000

Monthly billings for temporary hydrant meters consist of two charges: (1) a service charge for that size meter, and (2) the seasonal commodity charge, including surcharges where applicable, based on monthly readings of the meter. When the hydrant meter is returned, the security deposit shall be applied to the final bill plus any damages. The Customer is responsible for paying OWASA for damages that exceed the amount of the Security Deposit. Any credit balance will be refunded within thirty (30) days.

WATER SYSTEM DEVELOPMENT FEE

Water system development Fees are calculated to recover a portion of the capital costs of providing water system facility capacity. The system development fee is applicable to each new connection to a water main, regardless of who may have paid for the installation of the water main to which the connection is to be made. For the purpose of system development fees, customer accounts are divided into three categories: (1) Single-family Residential, (2) Multi-family Residential, Individually- metered; and (3) Non-residential. The Non-residential category includes master-metered multi-family customers and all commercial, University, and other institutional accounts. The use of these categories is justified by distinctive patterns of water and sewer consumption.

Property Description	Fee
5/8” Meter or 3/4" Combination Fire and Domestic Service, Single-family Residential:	
<800 square feet	\$620
801-1300 square feet	\$770
1301-1700 square feet	\$864
1701-2400 square feet	\$1,142

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

Property Description	Fee
2401-3100 square feet	\$1,767
3101-3800 square feet	\$2,442
>3800 square feet	\$4,295
1" Meter, Single-Family Residential (all square footages)	\$7,338
5/8" Meter or 3/4" Combination Fire and Domestic Service Meter, Multi-family Residential	\$830
1" Meter, Multi-Family Residential (all square footages)	\$7,338
5/8" Meter or 3/4" Combination Fire and Domestic Service Meter, Non-residential*	\$2,933
1" Meter, Non-residential*	\$7,338
1-1/2" Meter, Multi-Family Residential and Non-residential*	\$14,666
2" Meter, Multi-Family Residential and Non-residential*	\$23,466
3" Meter, Multi-Family Residential and Non-residential*	\$46,933
4" Meter, Multi-Family Residential and Non-residential*	\$73,332
6" Meter, Multi-Family Residential and Non-residential*	\$146,664
8" Meter, Multi-Family Residential and Non-residential*	\$234,663

* Same fee for Irrigation-Only accounts.

A person or party completing a development or re-development project may be eligible to request and receive a credit on the water system development Fees due if their project directly results in the permanent abandonment of previously existing water meters which were connected to residences, buildings or facilities connected to and having a documented demand on the OWASA water system.

If OWASA determines that a credit is due, the amount of the credit shall be based on the current water system development Fees that would apply to the size of the water meters that are permanently abandoned as a direct result of the project. However, the credit due shall not exceed the amount of the water system development Fees that would otherwise apply to the development or re-development project. System development fee credits are not transferrable to any other project or property.

If an existing water meter is removed from service and/or is replaced with a smaller meter, OWASA will not issue any credit or refund to the customer for any previously paid system development fees.

WATER SERVICE AND METER INSTALLATION CHARGE

This charge is to recover costs of extending service from the OWASA distribution system to individual properties and includes the installation of a service connection from the water main to the meter and the setting of the meter to serve the customer's premises, subject to satisfactory easement or license being provided by the applicant. Where a suitable OWASA stub-out for service has been made and is available, the "meter-only" charge shall apply. Customer requested meter/water service relocations shall be performed on a time and materials basis. Complete new and/or additional water service installation and meter-only charges are as follows:

Service Description	Fee
Complete Water Service Installation, 5/8" meter	\$4,030
Complete Water Service Installation, 3/4" Combination Fire and Domestic Service Meter	\$4,390

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

Service Description	Fee
Complete Water Service Installation, 1" meter	\$4,130
Meter Only Installation, 5/8" meter	\$260
Meter Only Installation, 3/4" Combination Fire and Domestic Service Meter	\$570
Meter Only Installation, 1" Combination Fire and Domestic Service Meter	\$630
Meter Only Installation, 1" meter	\$390
Meter Only Installation, 1-1/2" meter	\$640
Meter Only Installation, 1-1/2" Combination Fire and Domestic Service Meter	\$970
Meter Only Installation, 2" meter	\$460
Meter Only Installation, 2" Combination Fire and Domestic Service Meter	\$1,190
Remote Read Box with 5/8" Detector Meter	\$550

Complete installation costs are determined on a time and materials basis for 1-1/2 inch and 2- inch meters. For 3-inch and larger meters, the applicant shall be responsible for providing a meter box or vault constructed to OWASA standards. All meters, regardless of size, shall be purchased from OWASA at cost plus 10%.

Deliver fee for 3-inch and large meters:

Delivery Fee - \$120

A remote read box and 5/8" detector meter shall be required on all private fire protection service connections. The remote read box shall be purchased from OWASA and installed by the applicant. OWASA shall install the 5/8" detector meter at the applicant's expense.

WATER MAIN TAPPING FEE

This charge is for making a tap into an OWASA water main. The tap fee shall be paid in advance of OWASA performing the work, with a minimum of 48-hours advance notice given to OWASA.

The applicant shall be responsible for opening the ditch, providing adequate working clearance at the point of tap, adequately shoring the trench sidewalls, dewatering and such other associated activities as may be needed to provide a suitable and safe condition for OWASA personnel to complete the tap. Additionally, the applicant shall be responsible for providing an appropriate size tapping sleeve and tapping valve, and a backhoe or similar device shall be available on-site for lowering the tapping unit into the ditch line. All permits, bonds and paving shall be the responsibility of the applicant. The charge shall be for time and equipment plus an allowance for overhead, subject to minimum amount.

Minimum Charge \$360

The base fee noted above includes one (1) site visit by OWASA to determine if the applicant is ready for OWASA to perform the tap. A reinspection fee will be charged for each additional site visit required to determine if the water main is accessible and all required material and safety measures are in place. The tap will not be performed until any applicable reinspection fees are paid in full.

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

Tap Reinspection Fee \$120

HYDRAULIC FIRE FLOW TESTING

This charge is calculated to recover the cost of hydrant ‘fire flow’ testing of the water distribution system. Test results provide data to developers and engineers to determine available flows and pressures in the systems they are designing for new developments.

\$190

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

SECTION II: SEWER RATES AND FEES

MONTHLY SEWER RATES

Sewer charges are billed monthly at approximately 30-day intervals. Charges are due upon receipt of the bill and become delinquent 25 days after the billing date. Monthly sewer rates consist of two components: a monthly service charge and a sewer commodity (volume) charge.

Sewer Service Charge

This charge is calculated to recover the direct and indirect customer service, service and inspection maintenance, and capital costs associated with providing sewer service to the customer's property. Meter readings and service charges for first and final bills are prorated based on days of service. Applicable to all sewer accounts, regardless of whether there is a commodity charge, the monthly service charge is based on the size of the meter where sewer usage is measured as follows:

Meter Size	Monthly Charge
5/8" or 3/4" Combination Fire and Domestic Service	\$15.65
1"	\$26.88
1-1/2"	\$46.34
2"	\$70.07
3"	\$132.51
4"	\$202.55
6"	\$371.38
8"	\$633.74

The monthly sewer service charge shall apply to any meter(s) used to directly or indirectly measure the volume of wastewater discharged from a customer's premises, regardless of whether the water source to the customer is from OWASA's drinking water and/or reclaimed water system, or a non-OWASA water source including but not limited to harvested rainwater or groundwater.

Sewer Commodity Charge

This charge is calculated to recover the remaining direct and indirect costs of wastewater treatment and collection, maintenance, inspection, customer service and administration and sewer capital costs not recovered by the monthly service charge. When a billing period includes a change in commodity rates, the charges are prorated based on the ratio of days in the billing period at the old and new rates. Metered monthly consumption will be billed in thousand-gallon increments rounded down to the nearest thousand gallons. Unbilled consumption due to rounding will be carried forward and billed in the month when the next thousand-gallon increment is registered by the meter. This charge is applicable to all accounts receiving sewer service based on the water meter reading, sewer meter reading if applicable, or estimated volume of discharge as determined by OWASA.

The sewer commodity charge is applicable to all customers discharging wastewater into the OWASA sewer system, regardless of whether that discharge results from the customer's use of OWASA's drinking water or reclaimed water, or their use of a non-OWASA water source, including but not limited to harvested rainwater or groundwater.

**ORANGE WATER AND SEWER AUTHORITY
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\$8.45 per thousand gallons

Individually metered residential customers will not be charged for monthly sewer use in excess of 15,000 gallons.

INTERLOCAL WASTEWATER COLLECTION, TREATMENT AND DISPOSAL CHARGES

The purpose of this charge is to recover costs associated with the provision of wastewater collection, treatment and disposal services under contractual agreements with other wastewater service providers. The specific rates to be charged will be negotiated with the other party based upon specific conditions using the cost-of-service rate-making approach and approved by OWASA.

MONTHLY RATES FOR SEWER-ONLY ACCOUNTS

For sewer-only accounts where there is no OWASA meter for directly or indirectly measuring the volume of wastewater discharged by the customer, the monthly sewer service and commodity charges shall be fixed and be the total of:

- (1) a monthly service charge which shall be determined by the water meter size which would be required to supply water service to the property,

plus

- (2) a sewer commodity charge per 1,000 gallons of the estimated volume of wastewater expected to be discharged by the customer (using national engineering standards as the basis); provided however, that in no case shall the billable quantity be less than 4,000 gallons per month.

\$8.45 per 1,000 gallons

For special commercial and industrial customer classifications where the proportion of water consumed to wastewater discharged is extremely large, a metered sewer account may be approved. Metered sewer accounts must also pay the appropriate monthly sewer service charge based on the sewer meter size.

If a customer that has a standard metered water and sewer service (sewer gallons billed are based on the water gallons billed) also discharges wastewater resulting from the use of OWASA reclaimed water, harvested rainwater, groundwater, or sources other than OWASA drinking water, that customer shall be billed a monthly service charge and commodity charges calculated in accordance the *OWASA Rainwater Harvesting Systems Requirements and Charges Policy* for said additional discharge; provided, however, that the minimum threshold for which the charges shall apply is 3,000 gallons per month. For this purpose, such systems serving single-family residential customers are deemed to fall below this threshold, provided there is also a standard metered water and sewer service.

SEWER SYSTEM DEVELOPMENT FEE

The purpose of this fee is to recover a portion of the capital costs of providing sewer system facility capacity. The system development fee is applicable to each new connection to a sewer main, regardless of who may have paid for the installation of the main to which the connection is to be made. For the purpose of the system development fee, customer accounts are divided into three categories: (1) Single-family Residential; (2) Multi-family Residential, Individually-metered; and (3) Non-residential. The Non-residential category includes master-metered Multi-family customers plus all other commercial,

**ORANGE WATER AND SEWER AUTHORITY
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University, and other institutional accounts. The use of these categories is justified by distinctive patterns of water and sewer consumption.

Property Description	Fee
5/8" Meter or 3/4" Combination Fire and Domestic Service, Single-family Residential:	
<800 square feet	\$1,632
801-1300 square feet	\$2,207
1301-1700 square feet	\$2,251
1701-2400 square feet	\$2,391
2401-3100 square feet	\$2,652
3101-3800 square feet	\$2,912
>3800 square feet	\$3,466
1" Meter, Single-Family Residential (all square footages)	\$11,329
5/8" Meter or 3/4" Combination Fire and Domestic Service, Multi-family Residential	\$2,196
1" Meter, Multi-Family Residential (all square footages)	\$11,329
5/8" Meter or 3/4" Combination Fire and Domestic Service, Nonresidential	\$5,673
1" Meter, Nonresidential	\$14,192
1-1/2" Meter, Multi-family Residential and Nonresidential	\$28,366
2" Meter, Multi-family Residential and Nonresidential	\$45,386
3" Meter, Multi-family Residential and Nonresidential	\$90,773
4" Meter, Multi-family Residential and Nonresidential	\$141,832
6" Meter, Multi-family Residential and Nonresidential	\$283,664
8" Meter, Multi-family Residential and Nonresidential	\$453,863

In addition to the sewer system development fee, an excess sewer capacity fee of four percent (4%) of the applicable sewer system development fee shall be charged to recover the costs of excess sewer capacity installed in an area covered by an agreement between OWASA and a developer for credit payments to the constructing developer. This fee shall apply to residential and non-residential customers.

A person or party completing a development or re-development project may be eligible to request and receive a credit on the sewer system development fees due if their project directly results in the permanent abandonment of previously existing water meters and sewer services which were connected to residences, buildings or facilities connected to and having a documented demand on the OWASA sanitary sewer system.

If OWASA determines that a credit is due, the amount of the credit shall be based on the current sewer system development fees that would apply to the size water meters that are permanently abandoned as a direct result of the project. However, the credit due shall not exceed the amount of the sewer system development fees that would otherwise apply to the development or re-development project. System development fee credits are not transferrable to any other project or property.

If an existing water or sewer meter upon which consumption is based is removed from service and/or is replaced with a smaller meter, OWASA will not issue any credit or refund to the customer for any previously paid system development fees.

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SEWER TAP CHARGE

This charge is for making a tap of the applicant's private sewer lateral into the main sewer line or sewer manhole of OWASA. The tap fee must be paid in advance of OWASA performing the work, with a minimum of 48-hours advance notice given to OWASA.

The applicant shall be responsible for opening the ditch, providing adequate working clearance at the point of tap, adequately shoring the trench sidewalls, dewatering and such other associated activities as may be needed to provide a suitable and safe condition for OWASA to connect the service lateral of the applicant into the facilities of OWASA. The minimum charge is based on a standard 4" service tap to the OWASA sewer line. All lines 6" in diameter and larger must be tapped into a manhole. All permits, bonds and pavement repairs are the responsibility of the applicant. The charge shall be for time and equipment plus an allowance for overhead, subject to a minimum.

\$480

The base fee noted above includes one (1) site visit by OWASA to determine if the applicant is ready for OWASA to perform the tap. A reinspection fee will be charged for each additional site visit required to determine if the sewer main is accessible and all required material and safety measures are in place. The tap will not be performed until any applicable reinspection fees are paid in full.

Tap Reinspection Fee \$120

HIGH STRENGTH WASTE SURCHARGE

The purpose of this charge is to recover operation and maintenance costs from customers whose wastewater discharge into the system is in excess of certain parameters for normal strength domestic wastewater as determined by OWASA. Based on local sampling and analysis, normal strength domestic wastewater has been determined to have the following pollutant characteristics.

Normal Strength Domestic Wastewater	
Carbonaceous Biochemical Oxygen Demand (CBOD)	205 mg/l
Suspended Solids (SS)	235 mg/l
Ammonia Nitrogen (NH ₃ -N)	25 mg/l
Phosphorus (P)	6.5 mg/l

High Strength Waste Surcharges shall apply at the following rates to all wastes exceeding the above concentrations:

Carbonaceous Biochemical Oxygen Demand (CBOD)	\$0.56 per pound for all CBOD in excess of 205 mg/l
Suspended Solids (SS)	\$0.68 per pound for all SS in excess of 235 mg/l
Ammonia Nitrogen (NH ₃ -N)	\$3.97 per pound for all NH ₃ -N in excess of 25 mg/l
Phosphorus (P)	\$15.99 per pound for all P excess of 6.5 mg/l

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

SECTION III: RECLAIMED WATER RATES AND CHARGES

MONTHLY RECLAIMED WATER RATES

Reclaimed water (RCW) charges will be billed monthly at approximately 30-day intervals. Charges are due upon receipt of the bill and become delinquent 21 days after the original billing date. Monthly reclaimed water rates consist of two components: a monthly service charge and a commodity (volume) charge.

The University of North Carolina at Chapel Hill (UNC) funded the construction of the first phase of the reclaimed water system, and the methodology for determining reclaimed water charges applicable to UNC is stipulated by a contract between OWASA and UNC. For this reason, reclaimed water charges have been established for two major customer classes: UNC uses, and non-UNC uses. As determined necessary by OWASA, and in accord with OWASA’s contractual obligations to UNC, reclaimed water service to non-UNC customers may be temporarily interrupted to ensure the UNC’s reclaimed water demand can be met from the facilities and capacity paid for by UNC.

Reclaimed Water Service Charge

This fixed monthly charge is calculated to recover direct and indirect costs including but not limited to customer service and billing, meter and lateral maintenance, general and administrative services, and fixed costs associated with supplying reclaimed water to the customer’s property. The Reclaimed Water service charge is applicable to all metered reclaimed water accounts, independent of the quantity of reclaimed water consumed. Meter readings and service charges for first and final bills are prorated based on days of service.

UNC Reclaimed Water Use (covers all UNC reclaimed water uses served by the facilities paid for by UNC) \$24,000 per month.

Non-UNC RCW Customers	
Meter Size	Per Month
5/8”	\$8.37
1”	\$16.74
1.5”	\$30.96
2”	\$47.62

Service charges for non-UNC reclaimed water meters larger than 2” will be determined on a case-by-case basis following an evaluation of the reclaimed water demands of the customer.

Reclaimed Water Commodity Charge

This charge is calculated to recover the direct costs for reclaimed water treatment and distribution and all other direct and indirect costs not recovered by fixed monthly service charges. This charge is applicable to all reclaimed water accounts based on meter readings of reclaimed water consumed.

When a billing period includes a change in commodity rates, the charges are prorated based on the ratio of days in the billing period at the old and new rates. Metered monthly consumption will be billed in thousand-gallon increments rounded down to the nearest thousand gallons. Unbilled consumption due to rounding will be carried forward and billed in the month when the next thousand-gallon increment is

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registered by the meter.

Customer Type	Rate per 1,000 gallons
UNC Accounts	\$0.60
Non-UNC Accounts	\$2.18
Bulk (tanker) Sales	\$0.00

RECLAIMED WATER SYSTEM DEVELOPMENT AND CONNECTION FEES

Reclaimed Water System Development Fees

The purpose of this fee is to recover the capital costs of providing reclaimed water system facility capacity and to fund future expansion of that capacity. Since the University (UNC) has paid to construct the reclaimed water system, UNC will not be required to pay a reclaimed water system development fee for UNC facilities that are connected to and can be served by capacity available in the reclaimed water facilities paid for by the UNC.

Reclaimed water system development fees are applicable to each non-UNC connection to the reclaimed water system, regardless of who may have paid for the installation of the main to which the connection is to be made. Reclaimed water system development fees for non-UNC customers are as follows:

Meter Size	Fee
5/8"	\$1,229
1"	\$3,073
1-1/2"	\$6,146
2"	\$9,833

Reclaimed water system development fees for connections to be served by meters larger than 2 inches shall be determined on a case-by-case basis following an evaluation of the reclaimed water demands of the customer.

Reclaimed Water Service Connection Fees

Reclaimed water service connection fees, including meter installation and meter fees, shall be the same as the fees applicable to potable water system service connections, as specified in Section I of this schedule.

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

SECTION IV: MISCELLANEOUS CHARGES

SERVICE INITIATION FEE

The purpose of this charge is to defray the labor and administrative costs associated with the establishment of a water and/or sewer account. This includes establishing service and account records for billing and is applicable to all accounts.

\$45 per event
\$80 per event, outside of normal business hours of OWASA

RETURNED CHECK CHARGE

Checks or automatic bank drafts made payable to OWASA are accepted as payment on account subject to collection. When a check or bank draft is not honored for payment by the bank or other institution on which it is drawn, a Returned Check Charge will be applied to the customer's account as follows:

Returned Check:	\$25
Dishonored Draft:	\$25

The customer will be notified of the returned check charge and instructed to pay the amount due immediately. Failure to respond within the time allowed will result in disconnection of water service and an additional charge for reconnection. The customer may also be required to pay a security deposit or an additional security deposit.

CHARGE FOR DELINQUENT ACCOUNTS

The purpose of this charge is to offset the costs of special handling of delinquent accounts, which may include, but is not limited to, the disconnection and reconnection of service due to nonpayment of the customer's bill. This charge applies to all accounts scheduled for disconnection for nonpayment and is applicable on or after the specified disconnect date, regardless of whether the service was disconnected or not. Reconnection resulting from disconnection due to nonpayment will be made within 24 hours of receipt of full payment of the balance due plus the delinquency charge and applicable security deposit.

\$45 per event, during OWASA's normal business hours
\$80 per event, outside OWASA's normal business hours

CHARGE FOR TEMPORARY DISCONNECTION/SUBSEQUENT RECONNECTION AT CUSTOMER'S REQUEST

OWASA customers may request to have their service temporarily disconnected and subsequently reconnected. In emergency conditions, there will be no charge to the customer for this service. Additionally, no more than once in any twelve-month period, a customer may request to have their service temporarily disconnected and subsequently reconnected at no charge for routine plumbing system maintenance. For requests to temporarily disconnect and subsequently reconnect service in any situation other than those listed above, the charges listed below will apply.

The purpose of this charge is to recover the cost to temporarily disconnect and subsequently reconnect water service at the request of a customer. In situations where charges apply, the charge may be waived

**ORANGE WATER AND SEWER AUTHORITY
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if the customer provides documentation that a master cutoff valve has been installed within thirty (30) days of the date of the temporary service disconnection.

\$45 per event, during OWASA's normal business hours

\$80 per event, outside OWASA's normal business hours

LATE PAYMENT FEE

This fee is designed to recover a portion of the cost of delinquent payment collection efforts that arise prior to service termination and are not recovered by charges for reconnection of delinquent accounts, and to encourage customers to make timely payments, thereby reducing the overall cost of a delinquent account to the customer base. The late payment fee applies when a customer's account is delinquent as defined above.

Late Payment Fee: For past due balances of \$10.00 or more, \$2.40 plus 0.42% a month (5% APR) of the outstanding balance.

SECURITY DEPOSITS

OWASA requires security deposits from customers to ensure payment of the final bill. To offset administrative costs in handling these monies, no interest is paid on security deposits.

Security deposits shall be required on all accounts other than those of (1) residential customers, whether detached or attached units, who have a satisfactory credit history as determined by a credit check, and (2) local, state and federal governments or agencies thereof. Security deposits shall be required for accounts other than those in (1) and (2) above and shall be \$50 or \$100 depending on credit worthiness for residential customers. All security deposits must be paid at the time application for service is made and in advance of service initiation.

Any residential customer whose service has been disconnected for non-payment of billing charges twice within a six-month period and for whom OWASA does not have a security deposit will be required to pay a \$50 or \$100 deposit depending on credit worthiness prior to reconnection of service.

Non-residential security deposits are required based on credit worthiness and will be computed as one or two times the average monthly bill of the previous customer at the same location over the past calendar year. If there is no previous customer at the service location, the security deposit will be determined by OWASA based on the best information available, such as OWASA's experience with similar types, sizes, etc. of businesses.

Repeated disconnections will require additional security deposits until the customer has accumulated a security deposit balance, which will cover an average of three months' billing charges.

Security deposits may be refunded upon written request after the customer has established a satisfactory payment history for twelve (12) consecutive months. Otherwise, security deposits will be applied to the final bill when a customer's account is terminated with any remaining balance refunded to the customer.

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BULK WASTEWATER CHARGES

Normal Domestic Septage

The purpose of these charges is to recover the costs associated with the service rendered by OWASA to those customers who discharge normal domestic septic tank wastes into the wastewater treatment facilities of OWASA. Applicable to those customers who have an account established at OWASA's Customer Service Office, charges for handling normal domestic septage will be billed to the customer on a monthly basis. The monthly bill will include two components: (1) an administrative charge for special services required to receive this type waste and rendering the monthly bill; and (2) a charge for the treatment of the septage as determined by OWASA. This charge is calculated as follows:

Administrative Charge	\$30 per trip, plus
Volume Charge and High Strength Surcharge	\$182.63 per thousand gallons

Other High Strength Waste

Other wastes may be discharged to OWASA's septage facilities only with prior approval by OWASA and upon OWASA's direct inspection of the actual discharge. The costs associated with these services will be as follows:

- NH₃-N = Ammonia Nitrogen
- CBOD = Carbonaceous Biochemical Oxygen Demand
- TSS = Total Suspended Solids
- P = Phosphorus

Administrative Charge of \$30 per trip, plus Volume and High Strength Surcharge calculated as follows:

As of Oct. 1, 2021
A + B + C + D + E = Calculated Dollars per Thousand Gallons, where:
A = pounds of NH ₃ -N per thousand gallons in waste x \$3.42 per pound
B = pounds of CBOD per thousand gallons in waste x \$0.48 per pound
C = pounds of TSS per thousand gallons in waste x \$0.59 per pound
D = \$7.29 per 1,000 gallons Sewer Commodity Charge
E = pounds of P per thousand gallons in waste x \$13.79 per pound
Waste concentrations shall be determined by OWASA

A + B + C + D + E = Calculated Dollars per Thousand Gallons, where:
A = pounds of NH ₃ -N per thousand gallons in waste x \$3.97 per pound
B = pounds of CBOD per thousand gallons in waste x \$0.56 per pound
C = pounds of TSS per thousand gallons in waste x \$0.68 per pound
D = \$8.45 per 1,000 gallons Sewer Commodity Charge
E = pounds of P per thousand gallons in waste x \$15.99 per pound
Waste concentrations shall be determined by OWASA

**ORANGE WATER AND SEWER AUTHORITY
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TANK SALES OR BULK WATER SALES

The purpose of this charge is to recover the labor and administrative costs associated with the supply of bulk quantities of water to tank trucks or trailers from a metering point on the premises of OWASA. Applicable to all tank or bulk water sales, the following charges apply for each loading.

Administrative Charge	\$25 per trip, plus
Commodity Charge	\$7.86 per thousand gallons or portion thereof

Bulk sales are subject to administrative regulations and controls for protection of the wastewater system and efficient operation. Water tank trucks or trailers are only authorized to withdraw water from locations approved by OWASA and for which adequate usage monitoring measures are provided. Charges for bulk sales are not subject to seasonal adjustments.

DIRECT SALES OF SUPPLIES

Applicable to the direct sale of supplies from inventory to municipalities or contractors, the supplies will be billed at the most recent cost plus a handling charge of 10%.

**ORANGE WATER AND SEWER AUTHORITY
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BOAT RENTAL AND LAKE USE FEES

Fees are applicable to all persons using row boats and canoes on University Lake and Cane Creek Reservoir during scheduled hours of operation as established by OWASA. Boat rental and lake user charges are:

OWASA Customers and Orange County Residents	
Charge for each flat-bottomed boat or canoe rental	\$4.50 for one-half day plus the applicable lake use fee for each person
Trolling motor rental	\$15.00 for one-half day
Kayak rental	\$15.00 for one-half day plus the applicable lake use fee for each person
Private Boat Launching Fee	\$3.50 per boat plus the applicable lake use fee for each person
Lake Use Fee, Under 12 Years Old	\$2.00 per person
Lake Use Fee, 12-64 Years	\$4.50 per person
Lake Use Fee, 65 Years and over	No charge

Individual Season Pass	
Boat or canoe rental	\$82.00 per person. Each additional person pays appropriate lake use fee.
Lake Use Pass – Adult	\$46.00
Boat with trolling motor rental	\$163.00 per person. Each additional person pays appropriate lake use fee.

Group Season Pass	
Boat or canoe rental	\$163.00 (maximum of 3 people per pass.) Each additional person pays appropriate lake use fee.
Boat with trolling motor rental	\$245.00 (maximum of 3 people per pass.) Each additional person pays appropriate lake use fee.

For visitors who are not OWASA Customers or Orange County Residents	
Charge for each flat-bottomed boat or canoe rental	\$8.00 for one-half day plus the applicable lake use fee for each person
Trolling motor rental	\$22.00 for one-half day
Kayak rental	\$20.00 for one-half day plus the applicable lake use fee for each person
Private Boat Launching Fee	\$7.00 per boat plus the applicable lake use fee for each person
Lake Use Fee, Under 12 years old	\$2.50 per person
Lake Use Fee, 12-64 Years	\$5.50 per person
Lake Use Fee, 65 Years and over	\$2.50 per person
UNC Men’s Crew Club and Women’s Rowing Team	By agreement between UNC-Chapel Hill and OWASA

**ORANGE WATER AND SEWER AUTHORITY
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FIELD TEST OF 5/8" METER OR 3/4" COMBINATION FIRE AND DOMESTIC SERVICE METER

Upon a customer's written request, OWASA will conduct a special field test of the customer's 5/8" water meter or 3/4" combination fire and domestic service meter. There will be no charge for testing meters (1) which have not been tested during the past five years, or (2) which are found to be over-registering. Over-registering meters will be replaced by OWASA at no charge to the customer.

If, however, the meter has been tested within the past five years and the results of the meter test indicate proper or under-registering, the customer will be charged:

Meter test - \$80

SHOP TESTING OF METER

Upon a customer's written request, OWASA will conduct a special shop test of water meters that are larger than 3/4 inches. There will be no charge for testing meters (1) which have not been tested during the past five years, or (2) which are found to be over-registering. Over-registering meters will be replaced by OWASA at no charge to the customer.

If, however, the meter has been tested within the past five years and the results of the meter test indicate proper or under-registering, the customer will be charged:

Shop meter test - \$180

FIELD TEST OF LARGE METERS

Upon a customer's written request, OWASA will conduct a special field test of water meters that are larger than 5/8 inches. There will be no charge for testing meters (1) which have not been tested during the past five years, or (2) which are found to be over-registering. Over-registering meters will be replaced by OWASA at no charge to the customer.

If, however, the meter has been tested within the past five years and the results of the meter test indicate proper or under-registering, the customer will be charged a meter test fee based on the actual time and equipment required to complete the field test.

Minimum charge \$380

REINSPECTION FEE

OWASA will initially inspect grease traps, cross connections and water and sewer taps at no cost to the customer. Should a subsequent reinspection be required for any of these fixtures, a fee will apply to each reinspection.

Tap Reinspection Fee \$120

**ORANGE WATER AND SEWER AUTHORITY
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PLAN REVIEW AND CONSTRUCTION OBSERVATION FEES

The purpose of this charge is to recover the operating cost for providing review of construction plans for the extension of water, sewer and non-UNC reclaimed water facilities. The charge also recovers the operating cost for providing field observation, water sampling, laboratory testing, video inspection, pressure testing, etc. associated with the installation of these facilities. The plan review and construction observation fees are applicable to any project which includes extensions of the public water, sewer or non-UNC reclaimed water systems; new services; backflow prevention; or a grease interceptor (or grease trap), regardless of the party which may be undertaking the improvements. The plan review and construction observation fees are applied separately to water, sewer and non-UNC reclaimed water main extensions with a minimum of \$100 each, as shown in the table below.

Service	Plan Review	Construction Observation
Water	\$3.63/lf, minimum \$100	\$3.69/lf, minimum \$100
Sewer	\$3.63/lf, minimum \$100	\$3.69/lf, minimum \$100
Reclaimed Water	\$3.63/lf, minimum \$100	\$3.69/lf, minimum \$100

Fees for Plan Review are due when the engineering drawings are submitted for review. Plans submitted with modifications or changes other than those required by OWASA are subject to a complete second review and payment of additional plan review fees. Fees for Construction Observation are collected prior to OWASA issuing a Permit to Construct. Additional fees for projects which increase in scope (e.g., the number of feet of mains is lengthened after initial fee payment) shall be collected prior to receiving plan approval from OWASA. No refunds will be granted for projects which decrease in scope after fee payment.

A fee is required for any project requiring Partial Certification to place a portion of the project into service before the entire project as designed is completed. Fees shall be paid before the Partial Certification will be submitted to the state.

Partial Certifications - \$225 per additional submittal to the state

A fee will apply to each reinspection or retesting required after the initial testing or sampling event for the component being tested, except fees for Purity Sample Resampling, which begin after the second sampling event. A Contractor who does not cancel an appointment with a minimum of one business hour's advance notice and is not prepared to conduct the test at the scheduled time will be billed a fee for rescheduling. Fees shall be paid before the reinspection or retesting will be scheduled.

Reinspection / Retesting Fees	
Purity Sample Resampling (after second failure)	\$600 plus \$150 per sample location
Water Pressure Retest	\$225 per additional test
Gravity Sewer Air Testing and Flashing Retest	\$75 per section tested
Manhole Vacuum Retest	\$75 per additional test
Rescheduling Fee for Failure to Cancel an Appointment	\$75

**ORANGE WATER AND SEWER AUTHORITY
SCHEDULE OF RATES, FEES, AND CHARGES**

CHARGES FOR MISCELLANEOUS SERVICES

Charges for miscellaneous services provided by OWASA shall be on a time and materials basis and include out-of-pocket expenses, cost of materials and services supplied by third parties, and overhead. Typical applications would be for repair of damages to water and sewer lines by outside parties, relocation of mains, services and meters, special services for billing information, expenses related to spill containment responses, etc.

TRANSFER OF CHARGES

Any unpaid balance from past due charges for water and/or sewer services of terminated accounts or Charges for Miscellaneous Services will be transferred to any available active account(s) through which the customer is receiving services. The payment status of the active account through which the customer is receiving service will be determined by the payment status of transferred accounts.

OWASA may temporarily withhold service from a customer or refuse service to a customer when such a customer (including but not limited to individuals, corporations, or partnerships), owes OWASA any past due balance.

Accounts or portions of accounts, including charges for material or damaged property that are disputed and delinquent fees and delinquent assessment charges, may be submitted to the courts by the Executive Director, upon approval by General Counsel, for collection if such amounts do not exceed \$1,500. For amounts exceeding \$1,500, approval of the Board of Directors shall also be required prior to filing an action for collection.

**Resolution Adopting the Annual Budget For
Orange Water and Sewer Authority (OWASA) for the Fiscal Year
July 1, 2022 Through June 30, 2023**

Whereas, North Carolina G.S. Chapter 159 and Section 7.05 of the Bond Order require that on or before the first day of July in each fiscal year OWASA will adopt a Budget for the ensuing fiscal year;

Whereas, such Budget is to include estimates of revenues of the water, sewer and reclaimed water systems, current operations expenses, interest income, debt service costs, and disbursements from the general fund for capital improvements and equipment purchases; and

Whereas, during the preparation of the Fiscal Year (FY) 2023 Budget, and after holding public hearings on May 12, 2022, concerning the FY 2023 Budget, the Board of Directors determined that it is necessary to increase the rates OWASA charges for monthly water and sewer services by 16% in order to provide sufficient revenues to fund ongoing operations, debt service and the Capital Improvements Program; and;

Now, Therefore, Be It Resolved:

1. That pursuant to the provisions of North Carolina G.S. Chapter 159-13 the attached pages marked 2 through 6 be, and they hereby are, adopted as the official budget of Orange Water and Sewer Authority for the Fiscal Year beginning July 1, 2022 through June 30, 2023.
2. That the appropriations for departments, functions, and projects as shown in the attached budget for the respective purposes and in the respective amounts therein specified are hereby made.
3. That the Executive Director shall administer the budget and is hereby authorized to expend the funds for the purposes set forth therein.

Adopted this 9th day of June 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary

ORANGE WATER AND SEWER AUTHORITY
STATEMENT OF INCOME, EXPENSE AND DEBT SERVICE
(OPERATING)

		FY 2023
		<u>Annual Budget</u>
Operating Revenue		
Water	\$20,206,147	
Sewer	20,776,916	
Reclaimed Water	465,390	
Service Initiation Fee	16,510	
Other	764,215	
Refunds and Adjustments	<u>(107,101)</u>	
Total Operating Revenue		\$42,122,077
Operating Expense		
General and Administrative	9,219,707	
Operations	<u>17,206,487</u>	
Total Operating Expense		<u>26,426,194</u>
Net Operating Income		15,695,883
Non-operating Revenue		
System Development Fees		1,351,674
Interest		<u>3,085</u>
Total Net Income		<u>17,050,642</u>
Debt Service		
Existing		9,010,243
New		<u>1,439,797</u>
Total Debt Service		<u>10,450,040</u>
Net Income Less Debt Service		<u><u>\$6,600,602</u></u>
Debt Coverage Ratio		1.63

**ORANGE WATER AND SEWER AUTHORITY
STATEMENT OF INCOME AND EXPENSE
(CAPITAL/NON-OPERATING)**

		<u>FY 2023 Annual Budget</u>
General Fund		
Resources		
Transfer from Revenue	\$6,600,602	
Annual Income Available for Capital		6,600,602
Transfer from Construction Fund (Bond/Loan Proceeds)		<u>15,329,398</u>
Total Available for Capital		<u>21,930,000</u>
Capital Expenditures		
Project Ordinances		
General Fund Contribution	6,600,602	
Funded by Bond Proceeds	<u>15,329,398</u>	
Total Project Ordinances		21,930,000
Capital Equipment		<u>1,315,374</u>
Total Capital Outlay		<u>23,245,374</u>
Annual General Fund Balance		(1,315,374)
General Fund Beginning Balance		<u>25,085,587</u>
General Fund Ending Balance		23,770,213
Project Funding	872,964	
Reserves		
Rate/Revenue Stabilization	2,047,049	
Capital Improvements	5,600,000	
Working Capital	<u>15,250,200</u>	<u>23,770,213</u>
Unallocated General Fund Balance		<u><u>\$0</u></u>

REVENUE FUND

	Water	Sewer	Total
Fund Balance July 1, 2022			\$0
Receipts			
Operating Revenue			
Customer Billings	\$20,206,147	\$20,776,916	\$40,983,063
Reclaimed Water	465,390	-	465,390
Service Initiation Fee	8,255	8,255	16,510
Other	382,108	382,107	764,215
Refunds and Adjustments	(53,551)	(53,550)	(107,101)
Total Operating Revenue	21,008,349	21,113,728	42,122,077
Non-operating Revenue			
System Development Fees	564,727	786,947	1,351,674
Interest Income	1,543	1,542	3,085
Total Non-operating Revenue	566,270	788,489	1,354,759
Total Receipts	21,574,619	21,902,217	43,476,836
Expenditures			
Current Expense	(14,201,998)	(12,224,196)	(26,426,194)
Debt Service	(5,103,980)	(5,346,060)	(10,450,040)
Total Expenditures	(19,305,978)	(17,570,256)	(36,876,234)
Net Revenue			6,600,602
To General Fund			(6,600,602)
Fund Balance June 30, 2023			\$0
Change in Available Balance			\$0

BOND SERVICE FUND

Fund Balance July 1, 2022		\$0
Receipts		
Transfer from Revenue Fund	\$10,450,040	
Interest	<u> </u>	
Total Receipts		10,450,040
Expenditures		
Debt Service	<u>10,450,040</u>	
Total Expenditures		<u>(10,450,040)</u>
Fund Balance June 30, 2023		<u>\$0</u>
Change in Available Balance		<u><u>\$0</u></u>

GENERAL FUND

Fund Balance July 1, 2022		\$25,085,587
Receipts		
Transfer from Revenue Fund	\$6,600,602	
Transfer from Construction Fund (Bond/Loan Proceeds)	15,329,398	
Interest	-	
Assessments	-	
Grants and Contributions	-	
Total Receipts		21,930,000
Total Balance Before Expenditures		47,015,587
Expenditures		
Capital Equipment/Leases	1,315,374	
Project Resolutions	21,930,000	
Transfer to Revenue Fund	0	
Total Expenditures		(23,245,374)
Fund Balance June 30, 2023		\$23,770,213
Allocation of Fund Balance June 30, 2023		
Project Funding	872,964	
Capital Reserves	22,897,249	
Total Allocation		\$23,770,213
Unallocated General Fund Balance June 30, 2022		\$0
Change in Available Balance		(\$1,315,374)

**Resolution Approving the Capital Improvements Program and Budget
for Fiscal Years 2023-2027**

Whereas, a Five-Year Capital Improvements Program and budget enables Orange Water and Sewer Authority to identify, assess, and project the water and sewer systems' capital projects in an orderly, coordinated, and fiscally sound manner, and to plan for the replacement and repair of existing facilities; and

Whereas, the Capital Improvements Program and budget for Fiscal Years 2023-2027 have been developed by the staff, reviewed by the Board of Directors, and revisions incorporated therein; and

Whereas, a Public Hearing on the Capital Improvements Program was held on May 12, 2022;

Now, Therefore, Be It Resolved:

1. The Board of Directors of Orange Water and Sewer Authority approves the Capital Improvements Program and budget for Fiscal Years 2023-2027 as required by the Financial Management Policy.

2. That the Executive Director be, and is hereby, authorized to administer the planning, studies, design, and financing, and make recommendations to the Board of Directors for award of contracts, as appropriate, for the projects in the Capital Improvements Budget.

3. The Five-Year Capital Improvements Program Budget for Fiscal Years 2023-2027 is as follows:

<u>Fiscal Year</u>	<u>Amount</u>
2023	\$21,930,000
2024	22,214,000
2025	32,375,000
2026	21,662,000
2027	<u>13,083,000</u>
Total	<u>\$111,264,000</u>

Adopted this 9th day of June 2022.


Jo Leslie Eimers, Chair

ATTEST:


John N. Morris, Secretary

**Capital Project Resolution for
Fiscal Year 2023 Infrastructure Improvements**

Whereas, present infrastructure must be maintained and additional infrastructure developed to meet future needs; and

Whereas, Orange Water and Sewer Authority (OWASA) has determined that certain additional infrastructure improvements are needed, including improvements to the water supply system; water treatment and distribution system; wastewater collection, treatment and disposal system; reclaimed water system; and support services facilities; and

Whereas, adequate funds will be available for the completion of these improvements;

Now, Therefore, Be It Resolved:

1. A project fund of \$21,930,000 is hereby established and expenditures therefrom authorized for the following improvements:

Expenditures

Water Supply Improvements:

Jordan Lake Raw Water Supply Allocation	\$10,000
Quarry Reservoir Development	15,000
University Lake Permanganate Facility	3,000,000
Cane Creek Dam Rehabilitation	200,000
Cane Creek Resurfacing	70,000
Western Intake Partnerships Projects	651,000

Subtotal	3,946,000
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Water Treatment and Distribution Improvements:

WTP Belt Filter Press Replacement	2,000,000
Supervisory Control and Data Acquisition (SCADA) Master Plan Recommendations	520,000
WTP Electrical Distribution Improvements	20,000
WTP Clearwell Rehabilitation	180,000
WTP Pulsator and Operator Building Roof and Cane Creek Pump Station Roof Replacements	100,000
Finished Water Pump #4 Motor and Pump Replacement	75,000
Storage Tank PLC Upgrades	100,000
Lead and Copper Rule Revisions Compliance	200,000
Reimbursement for Distribution System Improvements	250,000
Water Distribution System Rehabilitation	1,000,000
Water Main Replacement Program	1,215,000
West Cameron Avenue Water Main Replacement	3,500,000
Distribution System Hydraulic Model	100,000
Jones Ferry Road Water Main Replacements	100,000
Legion Road Water Main	50,000
West Rosemary 12" AC Water Main Replacement	50,000
Group 2 Water Main Replacements (W. Manning Dr. and South Rd.)	50,000
Distribution System Asset Management	30,000

Subtotal	9,540,000
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Wastewater Collection, Treatment and Disposal Improvements:

Gravity Sewer Rehabilitation Program	1,000,000
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Capital Project Resolution for Fiscal Year 2023

Infrastructure Improvements

June 9, 2022

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Bolinwood Interceptor Replacement	2,240,000
Morgan Creek Interceptor Replacement	234,000
East Main Street Sewer Rehabilitation	1,000,000
Collection System On-Call Modeling	20,000
Collection System Asset Management	50,000
Rogerson Drive Force Main and Pump Station Program Services	100,000
Chapel Hill North Pump Station Rehabilitation	600,000
North Lakeshore and Clayton Road Generator Design and Installation	200,000
WWTP Clarifier #4 Conversion	200,000
WWTP Facilities Planning	150,000
WWTP Fermenter Improvements	1,350,000
Biogas Removal System Improvements	250,000
WWTP Digester #3 and #4 Condition Assessments	300,000
WWTP and PS PLC Replacement	100,000
Heat Exchanger for RDTs	60,000
WWTP Digester #3 and #4 Stairwell Safety Improvements	50,000
Biosolids Tank Mixing System Equipment	50,000
Reclaimed Water Valve/Coupling Rehabilitation	490,000

Subtotal 8,444,000

Total Expenditures \$21,930,000

Revenues

Transfers from the General Fund, Bond or Loan Proceeds, and Grants \$21,930,000

2. That supplementary funds will be appropriated in future years for completion of the projects.
3. That this Resolution shall take effect upon its passage.
4. That this Resolution shall be entered in the Minutes of OWASA and within five (5) days after its adoption copies thereof shall be filed with the Finance Officer, the Budget Officer, and the Clerk to the Board of Directors as required by General Statute 159-13.2(d).

Adopted this 9th day of June 2022.


Jo Leslie Eimers, Chair

ATTEST:


John N. Morris, Secretary

**Resolution Updating the Schedule of Employee Classification and Authorized Compensation;
Adjusting Affected Employees' Compensation to the Minimum of the Pay Range; Authorizing Cost
of Labor and Merit Pay Increases for Eligible Employees; Increasing the Employer Contribution
Rate to Employees' Deferred Compensation Plan; and Adding Three New Positions to the Schedule
of Employee Classification and Authorized Compensation**

Whereas, the Orange Water and Sewer Authority (OWASA) maintains a Schedule of Employee Classification and Authorized Compensation which provides the appropriate number of properly classified and compensated employees necessary to efficiently and effectively fulfill the organization's duties and responsibilities; and

Whereas, the Board of Directors has determined that it is reasonable and prudent in achieving and maintaining competitiveness in the market to increase the pay ranges in the Schedule of Employee Classification and Authorized Compensation; and

Whereas, the Board of Directors has determined that it is reasonable and prudent to provide merit increases to provide fair and equitable compensation so that qualified employees may be retained to do the work necessary for the operation of the OWASA service system; and

Whereas, OWASA contributes 3% of employee wages to their deferred compensation accounts; and

Whereas, other local entities similar to OWASA contribute 5% to employee deferred compensation accounts; and

Whereas, the Board of Directors has determined that it is important for OWASA to remain competitive in the employment marketplace; and

Whereas, the Board of Directors has determined that due to the increasing and expanding workload of OWASA's staff, it is necessary to add three new positions to OWASA's Schedule of Employee Classification and Authorized Compensation;

Now Therefore, Be It Resolved:

1. That the Board of Directors hereby approves a 4% cost of labor increase for eligible employees who have earned a Meets Expectations, Exceeds Expectations or Exceptional Performance review rating during the June 2022 annual review process and the Executive Director is directed to adjust and implement the same percentage increase in salary ranges in the Schedule of Employee Classification and Authorized Compensation.
2. That the Board of Directors hereby approves a merit increase to employees earning a performance review rating of Meets Expectations during the June 2022 annual review process by increasing base pay 2.9%.
3. That the Board of Directors hereby approves a merit increase to employees earning a performance review rating of Exceeds Expectations during the June 2022 annual review process by increasing base pay 4.35%.
4. That the Board of Directors hereby approves a merit increase to employees earning a performance review rating of Exceptional during the June 2022 annual review process by increasing base pay 5.80%.

5. That employees whose salaries fall below the minimum amount of the new pay ranges shall be brought up to the minimum of the respective pay range regardless of the performance rating earned.

6. That the pay adjustments will be effective July 4, 2022.

7. That OWASA's contribution to employee deferred retirement accounts shall be increased to 3.5% of wages.

8. That the following three positions be added to OWASA's Schedule of Employee Classification and Authorized Compensation:

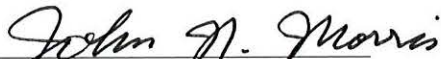
- a. Engineering Associate, Salary Grade 617
- b. Diversity and Inclusion Specialist, Salary Grade 618
- c. Supervisory Control and Data Acquisition Manager, Salary Grade 620

Adopted this 9th day of June 2022.



Jo Leslie Eimers, Chair

ATTEST:



John N. Morris, Secretary