



FLUVANNA COUNTY BOARD OF SUPERVISORS

REGULAR MEETING AGENDA

Circuit Courtroom, Fluvanna Courts Building

72 Main Street, Palmyra, VA 22963

June 18, 2025 at 6:00 pm

TAB	AGENDA ITEMS
1 - CALL TO ORDER	
2 - PLEDGE OF ALLEGIANCE AND MOMENT OF SILENCE	
3 – ADOPTION OF AGENDA	
4 – COUNTY ADMINISTRATOR’S REPORT	
5 – PUBLIC COMMENTS #1 (5 minutes each)	
6 – APPOINTMENTS	
A	Board, Commission, and Committee Appointments – Eric Dahl, County Administrator
7 – PRESENTATIONS (normally not to exceed 10 minutes each)	
B	Fork Union Water Supply System Preliminary Engineering Report – Brett Heim, Dewberry Engineers
C	James River Water Authority Update – Eric Dahl, County Administrator
D	James River Water Authority Fluvanna Citizen Representative – Eric Dahl, County Administrator
8 – ACTION MATTERS	
E	Authorization to Advertise State-funded Bonuses for Registrar’s Office, Electoral Board – Dan Whitten, County Attorney
F	Board of Supervisors Salary – Eric Dahl, County Administrator
9 – PUBLIC HEARING	
G	Public Hearing an Ordinance Amendment to Amend §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15 regarding the Food and Beverage Tax – Dan Whitten, County Attorney
H	ZTA 25:05 – Amendment to the Fluvanna County Zoning Ordinance by adding §§ 22-1-3 to identify the County’s GIS Map as the official zoning map of Fluvanna County – Jason Overstreet, Senior Planner
10 – CONSENT AGENDA	
I	Minutes of May 21, 2025 – Caitlin Solis, Clerk to the Board
J	Minutes of June 4, 2025 – Caitlin Solis, Clerk to the Board
K	FY25 Voluntary Contributions – Theresa McAllister, Management Analyst
L	Environmental Monitoring and Reporting Services for County Landfill – Dan Whitten, County Attorney
11 – UNFINISHED BUSINESS	
TBD	
12 – NEW BUSINESS	
TBD	

Fluvanna County is committed to providing an excellent quality of life for our citizens and businesses through the efficient delivery of core services and programs, while preserving the unique identity and rural character of the County.

13 – PUBLIC COMMENTS #2 (5 minutes each)

14 – CLOSED MEETING

TBD

15 – ADJOURN



County Administrator Review

PLEDGE OF ALLEGIANCE

I pledge allegiance, to the flag,
of the United States of America,
and to the Republic for which it stands,
one nation, under God, indivisible,
with liberty and justice for all.

GENERAL RULES OF ORDER

1. It shall be the duty of the Chairman to maintain order and decorum at meetings. The Chairman shall speak to points of order in preference to all other members.
2. In maintaining decorum and propriety of conduct, the Chairman shall not be challenged and no debate shall be allowed until after the Chairman declares that order has been restored. In the event the Board wishes to debate the matter of the disorder or the bringing of order; the regular business may be suspended by vote of the Board to discuss the matter.
3. No member or citizen shall be allowed to use defamatory or abusive language directed at any member of the Board or other person, to create excessive noise, or in any way incite persons to use such tactics. The Chair shall be the judge of such breaches, however, the Board may by majority vote of the Board members present and voting to overrule the judgment of the Chair.
4. When a person engages in such breaches, the Chairman shall order the person's removal from the building, or may order the person to stand silent, or may, if necessary, order the person removed from the County property.

RULES OF PROCEDURE FOR PUBLIC HEARINGS

1. PURPOSE
 - The purpose of a public hearing is to receive testimony from the public on certain resolutions, ordinances or amendments prior to taking action.
 - A hearing is not a dialogue or debate. Its express purpose is to receive additional facts, comments and opinion on subject items.
2. SPEAKERS
 - Speakers should approach the lectern so they may be visible and audible to the Board.
 - Each speaker should clearly state his/her name and address.
 - All comments should be directed to the Board.
 - All questions should be directed to the Chairman. Members of the Board are not expected to respond to questions, and response to questions shall be made at the Chairman's discretion.
 - Speakers are encouraged to contact staff regarding unresolved concerns or to receive additional information.
 - Speakers with questions are encouraged to call County staff prior to the public hearing.
 - Speakers should be brief and avoid repetition of previously presented comments.
3. ACTION
 - At the conclusion of the public hearing on each item, the Chairman will close the public hearing.
 - The Board will proceed with its deliberation and will act on or formally postpone action on such item prior to proceeding to other agenda items.
 - Further public comment after the public hearing has been closed generally will not be permitted.

Fluvanna County is committed to providing an excellent quality of life for our citizens and businesses through the efficient delivery of core services and programs, while preserving the unique identity and rural character of the County.

FLUVANNA COUNTY BOARD OF SUPERVISORS
BCC APPOINTMENTS STAFF REPORT

TAB A

MEETING DATE:	June 18, 2025			
AGENDA TITLE:	Board, Commission, and Committee Appointments			
MOTION:	I move the Board of Supervisors approve the following Board, Commission, or Committee appointment(s):			
Board/Commission/Committee		Candidates <i>(I) indicates incumbent</i>	Term Start	Term End
JABA Board of Directors – Fluvanna County Representative		Wanda Armstrong (I) Patti Reynard	July 1, 2025	6/30/2027
Library Board of Trustees (LBOT) – At-Large		David Harlow (I) Alice Owens Carla Hawks Lee Deborah Silvers Marilyn B. Austin Patti Reynard	July 1, 2025	6/30/2029
Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative		Charles Haden Thomas Parrish David Harlow Patti Reynard Wanda Armstrong	6/11/2025	6/30/2026
Parks and Recreation Advisory Board (RAB) – At-Large Parks and Recreation Advisory Board (RAB) – At-Large Parks and Recreation Advisory Board (RAB) – At-Large Parks and Recreation Advisory Board (RAB) – At-Large Parks and Recreation Advisory Board (RAB) – At-Large		Jon Bishop Larson (I) Nelson Cook Jr. (I) Raghvendra Singh (I) Walter Hussey (I) Ben Shaw Emily Tatton Gerri Russell Laryssa Smith Patricia Beers Block Patti Reynard	July 1, 2025	6/30/2028

BCC VACANCIES AND APPLICANTS

BCC Interest	Applicant	Type	District	Current BCC Appointments / Other Notes
<ul style="list-style-type: none"> JABA Board of Directors – Fluvanna County Representative Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative 	Wanda Armstrong (I)	Reappt/Appt	Fork Union	Incumbent seeking reappointment to the JABA Board of Directors.
<ul style="list-style-type: none"> JABA Board of Directors – Fluvanna County Representative Library Board of Trustees (LBOT) – At-Large Parks and Recreation Advisory Board (RAB) – At-Large Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative 	Patti Reynard	Appt	Palmyra	
<ul style="list-style-type: none"> Library Board of Trustees (LBOT) – At-Large Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative 	David Harlow (I)	Reappt/Appt	Fork Union	Incumbent seeking reappointment to the LBOT.
Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative	Charles Haden-Thomas Parrish	Appt	Fork Union	Currently serving on Library Board of Trustees, Social Services Board, and elected to the Thomas Jefferson Soil and Water Conservation District Board
Parks and Recreation Advisory Board (RAB) – At-Large	Jon Bishop Larson (I)	Reappt	Fork Union	Incumbent seeking reappointment.
Parks and Recreation Advisory Board (RAB) – At-Large	Nelson Cook Jr. (I)	Reappt	Columbia	Incumbent seeking reappointment. Also Serving on the Board of Equalization.
Parks and Recreation Advisory Board (RAB) – At-Large	Raghvendra Singh (I)	Reappt	Rivanna	Incumbent seeking reappointment. Also serving on Economic Development Authority
Parks and Recreation Advisory Board (RAB) – At-Large	Walter Hussey (I)	Reappt	Columbia	Incumbent seeking reappointment.
Parks and Recreation Advisory Board (RAB) – At-Large	Ben Shaw	Appt	Columbia	
Parks and Recreation Advisory Board (RAB) – At-Large	Emily Tatton	Appt	Palmyra	
Parks and Recreation Advisory Board (RAB) – At-Large	Gerri Russell	Appt	Fork union	
Parks and Recreation Advisory Board (RAB) – At-Large	Laryssa Smith	Appt	Columbia	

DISCUSSION:	<ul style="list-style-type: none"> • JABA Board of Directors – Fluvanna County Representative – one term available to begin July 1, 2025 and end June 30, 2027. • Library Board of Trustees (LBOT) – At-Large Position – one term available to begin July 1, 2025 and end June 30, 2029. • Piedmont Virginia Community College Board (PVCC) – Fluvanna Citizen Representative – one unexpired term available to begin immediately, and end June 30, 2026. • Parks and Recreation Advisory Board (RAB) – At-Large Position – five terms available to begin July 1, 2025 and end June 30, 2028.
ENCLOSURES:	Candidate Applications



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Patti Reynard	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input checked="" type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): See Attached	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: None	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Volunteer Coach, AAU basketball team representing Fluvanna (Fluvanna Hurricanes), volunteer coach for Parks and Rec. Basketball, soccer.	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: I believe I can make a positive difference in many ways and area of the county, for which I can not do in a 5 min. Public comment setting.	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
6. This requirement shall apply to all boards, commissions, or committees listed on the attached application form, provided however, that if State or County Ordinance addresses attendance requirements in an alternative manner, such law shall prevail.

**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
X	Agricultural/Forestral District Advisory Committee	X	Finance Board	X	Piedmont Virginia Community College (PVCC) Board
X	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)	X	Planning Commission (PC)
X	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee	X	Region Ten Community Services Board
X	Building Code of Appeals Board	X	James River Water Authority (JRWA)	X	Rivanna River Basin Commission
X	Central Virginia Regional Jail (CVRJ) Authority	X	JAUNT Board	X	Social Services Board
X	Columbia Task Force (CARE)	X	Jefferson Area Board of Aging (JABA) Advisory Council	X	Thomas Jefferson Planning District Commission (TJPDC)
X	Community Policy & Management Team (CPMT)	X	Jefferson Area Board of Aging (JABA) Board of Directors	X	Thomas Jefferson Water Resources Protection Foundation
X	Economic Development Authority (EDA)	X	Library Board of Trustees		
X	Economic Develop. & Tourism Advisory Council (EDTAC)	X	Monticello Area Community Action Agency (MACAA)		
X	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Patti Reynard		Date 2-25-2025	
Mailing Address (including City, State, & ZIP) 3531 Union Mills Rd Troy, VA		Physical Address (if different)	
Years Lived in Fluvanna 62	Phone # <div style="background-color: black; width: 100px; height: 1.2em;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 1.2em;"></div>

Office Use Only

Application Received On:	02-24-2025	Application Received By: Leontyne Peck
Acknowledgement Sent:	02-25-2025	
Renewal Date:		Remarks:
Renewal Date:		
Renewal Date:		
Renewal Date:		

EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience.):

Experienced Simulation Technology Specialist Sr. (CHSOS), and technical minded person with exceptional client and management skills. Action oriented with strong desire to accomplish positive results. I have proven ability to communicate effectively at all levels. Committed to accomplishing all tasks at hand. I am interested in an opportunity to leverage my technology, managerial and leadership skills. Motivated to improve tasks and processes through automation, simplification, and integration. Dedicated to providing professional, proficient and effective results within a team environment.

I have managed and implemented many cost saving projects throughout my career with the University of Virginia, such as an inventory control management system. Another very effective project that I initiated and administered was a scheduling system that has been expanded as a result of its effectiveness. I managed the scheduling server for the cross platform client based applications and provide support for all users with the staff that I managed. I successfully completed an online Web Applications Developer Certification in 2015 to expand my technical background. While working as a Simulation Technology Specialist Sr., I completed an online Human Physiology course through UC Berkeley to enhance my understanding of human anatomy, which made programming human patient simulators vital signs for more realistic scenarios. I also completed my Certified Healthcare Simulations Operations Specialist certifications exam in 2017. I designed a human patient simulation procedure to further improve patient safety outcomes for the clinical skills nursing students simulation experience.

SKILLS:

- Project Management
- Training and development
- Client-focused
- Quick learner
- Microsoft Office
- Computer proficient
- Budgeting
- Billing
- Vendor Certified
- High level of mechanical aptitude
- Dedicated to providing professional, proficient and effective results.

- Proficiency in LLEAP & Uni
- Results-oriented
- File/records maintenance
- Financial records and processing
- Contract negotiation/review/drafting

- Inventory Controls Management
- Creative Problem Solving
- Operations management
- Proven experience in managing and developing automated processes to improve efficiency and reduce costs.

EXPERENCES

Consulting - Experiential Leadership Development Lab – Research Collection/Training: University of Virginia Darden School of Business August 2018 – As Needed

- o Set up BioPac physiology wearable recording devices and software collection system.
- o Research, investigate and recommend other analytical integratable solutions to share physiological data with faculty and students in a secure environment.
- o Arrange vendor demos as it applied to the integration of lab/BioPac software applications.
- o Train others to connect BioPac devices to participants, and operate data collection software.

Simulation Technology Specialist Senior: The Clinical Skills Learning Center, School of Nursing at the University of Virginia. August 2015 – April 2018
(Hourly position working 1500 hrs. per yr – averaging 3-4 days a week most weeks)

- o Managed and facilitated training of UVa School of Nursing Simulation staff.
- o Collaborated with content experts and faculty on design and development of medical simulations.
- o Programmed medical simulator scenarios to run in simulation environment. Configured simulation scenarios environment.
- o Performed preventative maintenance and trouble shoot simulators and task trainers.
- o Designed and developed educational realism through repurposing and modifying materials to work with simulations.
- o Used all available technology to improve, automate, integrate and streamline simulation whenever possible.
- o Worked closely with center director and vendors to prepare and facilitate purchase orders for human patient simulators, task trainers, and other educational equipment and materials.
- o Use of my strong technical and innovative skills has proven to enhance and streamline simulation experiences for the University of Virginia School of Nursing Learners.
- o Designed a simulated educational process to improve patient safety and outcomes through clinical simulation experiences.

Educational Support Specialist: The Medical Simulation Center, School of Medicine

University of Virginia July 2010 – June 2015

(Salaried Full Time Position with full benefits 40 hrs per week)

- o Administrative / technical professional offering versatile office management and technical support skills and proficiency in Microsoft Windows and Apple platforms.
- o Managed and monitored financial reporting, budget activity, and billing via the University's Oracle financial accounting infrastructure.
- o Prepare, run, and tear down elaborate multi-learner, multi-device simulation scenarios.

- o Design, build, and improvise fixtures and environments to enhance the realism of simulation scenarios.
- o Repurpose and adapt older equipment for educational simulation activities. Maintained functionality of simulators well past warranty expiration.
- o Implemented an inventory controls system
- o Managed and maintained inventory annual audit and day-to-day activity

Office Manager: Office of Medical Education, School of Medicine

University of Virginia 1990 – June 2010

Salaried Full Time Position with full benefits 40 hrs per week)

- o Managed office accounts/budgets via the Oracle Finance application.
- o Analyzed and prepared financial logs and reports
- o Managed faculty and staff information including staff time sheets and student wages in Oracle system.
- o Processed Equipment Trust Funds (ETF) orders and all other purchase orders and completed vouchers in Oracle system in timely manner.
- o Coordinated and processed the necessary paperwork required by the University of Virginia for wage, classified and faculty employees in the Office of Medical Education.
- o Administered Sponsored Research Compliance Coordinator, responsible for ensuring that the following tasks are completed within your Org.: 1) Effort Reporting, 2) Annual and per proposal Conflict of Interest disclosure process management, and 3) Financial Stewardship.
- o Managed and facilitated software & hardware upgrades and installation for the Office of Medical Education faculty and staff.
- o Trained, supported and advised colleagues in the use of different software packages.
- o Coordinated computer equipment and other office purchases.
- o Supervised scheduling of classrooms and auditoriums throughout the School of Medicine.
- o Trained as a Local Support Partner for the Office of Medical Education and other subdivisions of the School of Medicine.
- o Coordinated and maintained the Mini-Med School registration database, assist with coordination of program activities.
- o Designed and created Mini-Med School brochures and certificates.
- o Created, updated, and maintained the Mini-Med School web page.
- o Facilitated the collection of the LCME annual survey data, compiled the data, and submitted by

required deadline date.

- o Maintain and updated exam scanning system.
- o Scheduling Software Administrator & Computer Support/Training
- o Evaluated, recommended, installed, & upgraded computer software on individual computers for the Office of Medical Education.
- o Managed and facilitated software & hardware upgrades and installation for the Office of Medical Education.
- o Administrator of the cross platform scheduling system.
- o Configure computers for network connectivity.
- o Diagnosed & troubleshoot communication & compatibility problems between computers, network clients and network servers.
- o Provided technical support and training to network clients and computer users.

Office Support Specialist: Alderman Library

University of Virginia 1985 – 1990

Salaried Full Time Position with full benefits 40 hrs per week

- o Performed multifaceted clerical tasks including data entry, filing, and records management.
- o Coordinated and automated the Periodicals and Serials missing publication issues claims process.
- o Assisted the Video cataloguer with data collection project.

CURRENT OR PRIOR EXPERIENCE ON BOARDS/COMMISSIONS/COMMITTEES: None

CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups-please provide dates):

Volunteer Coach, AAU basketball team representing Fluvanna (Fluvanna Hurricanes), volunteer coach for Parks and Rec. Basketball, soccer.

REASONS FOR WANTING TO SERVICE FLUVANNA COUNTY:

I believe I can make a positive difference in many ways and area of the county, for which I can not do in a 5 min. Public comment setting.



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

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Name: Wanda Armstrong	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): : Leading data collection, review, and staffing. Preparing financial reports showing the status of expenditures of funds, resource distribution, program priorities and funding requirements. Creating reports, briefings, and written recommendations that support decisions whether to continue, conduct deep-dives, or discontinue programs. Establishing business rules, performance management and roles and responsibilities of the investors/stakeholders. Developing and maintaining plans that identify techniques of work processes. Developing administrative procedures ensuring compliance with policies. Streamlining internal processes for consistency in organization functions.	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Church Kitchen Committee Church Usher Board	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Fluvanna Leadership Development Program - September 2022 - present	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: Believe being a member of the JABA Board will increase awareness of senior and community needs as well as increase my knowledge of organization/agency programs that can support the needs of the community and enhance my ability to be of service to the residents of Fluvanna County.	

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(Approved June 17, 2015)

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4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
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**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board	X	Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority	X	JAUNT Board		Social Services Board
	Columbia Task Force (CARE)	X	Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDCC)
	Community Policy & Management Team (CPMT)	X	Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)		Parks & Recreation Advisory Board (RAB)		

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In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i>		Date	
Wanda Armstrong		November 28, 2023	
Mailing Address (including City, State, & ZIP)		Physical Address (if different)	
323 Thessalonias Road RR651 Bremo Bluff, 23022			
Years Lived in Fluvanna	Phone #	Alternate Phone #	Email Address
20			
Office Use Only			
Application Received On:	11-28-2023	Application Received By:	
Acknowledgement Sent:		Leontyne Peck	
Renewal Date:		Remarks:	
Renewal Date:		application confirmed via telephone with Caitlin Solis	
Renewal Date:			
Renewal Date:			



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

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Name: Carla Hawks Lee	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input checked="" type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): See Resume I have been a professional academic librarian for 30 years. CV attached	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: None for the County	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Cunningham United Methodist Church Sunday School teacher, 2007 - present Sunday School superintendent, 2011 - 2017 Lay Leader, 2017-2018	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: I am particularly interested in serving on the Library Board of Trustees. I have a long professional background with libraries, but have been a user of public libraries all of my life. I am a member of the American Library Association and am passionate about the role that the public library plays in the community. I strongly feel that if you think a community institution is important, you should give your time and energy to making sure it succeeds	

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ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
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	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)	X	Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)		Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

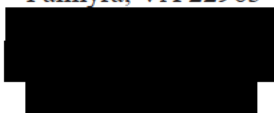
By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i>		Date	
Carla Hawks Lee		May 2, 2022	
Mailing Address (including City, State, & ZIP)		Physical Address (if different)	
16 Axle Tree Road Palmyra, VA 22963			
Years Lived in Fluvanna	Phone #	Alternate Phone #	Email Address
17			
Office Use Only			
Application Received On:	5-2-22	Application Received By: Leontyne Peck	
Acknowledgement Sent:	5-2-22		
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Carla H. Lee

16 Axle Tree Road
Palmyra, VA 22963



Education

University of Michigan, M.I.L.S., 1992

Certificate of completion of University Library Associates Program

Michigan State University, B.A., 1990

Major: English

Minors: Physical Sciences and Education

Experience

Deputy University Library, 2017 - present

Interim Senior Director, Harrison Small Research Center – 2016 - 2017

Senior Director, Collections Access & Discovery 2014-2015

Director, Collection Initiatives, 2012-2014

University Library

University of Virginia

Senior Leadership Team

- Provide strategic direction for the Libraries on a variety of topics, including management structure, organization design, staffing needs, budget requests, and priority setting
- Co-lead collections-focused section of organizational redesign, which led to the production of the report “The University Library Entering its Third Century and informed the organization redesign
- Completed project reviewing all position descriptions in the organization and adjusting compensation accordingly

Management

- Oversee and set budget and direction for a variety of units over this period, including Interlibrary Services, Collection Management, Digital Production, Acquisitions, Shelf Maintenance, Off-site shelving, Mary and David Harrison Institute for American History, Literature and American Culture, and the Albert & Shirley Small Special Collections.

Collections Steering Group / Collection Budgeting

- Allocate and track \$10 million budget for University library system, including fundamental rethinking of allocation methods in 2015, intended to provide greater flexibility, streamline process and better address interdisciplinary needs
- Convene policy discussions on a variety of topics, including gift books, subject librarian reporting and off-site shelving retention.
- Analyze data for multiple projects, including: use data to identify best use of resources; collection data to project spaces needs and assess impacts of proposed Alderman refresh; financial data to support budget requests and reports
- With Jim Self, initiated Catalog Veracity Project, a two-pronged assessment of accuracy of collection representation in the catalog. Intended to assess the level

of confidence with which we could participate in sharing agreements, the project also led to an improved method for calculating our collection size

2013 Elsevier Renewal for Consortial group

- Led a group of collection development officers from throughout the state, to provide the lead negotiator supporting data, including use data and library journal retention preference data, compiled across institution and analyzed to determine most critical resources to include in negotiation. Upon completion of negotiations, worked with the same group to develop a new cost-sharing formula to more fairly balance payments across institutions.
- Organized and participated in Dean and Director-level meetings to prepare for negotiations

Director, Science, Engineering and Education Services, 2007-2012

Head, Collections and Services, Brown Science & Engineering Library 2006 – 2007

Librarian, Collections and Digital Services, Brown Science & Engineering Library 2005 – 2006

University of Virginia

Collection Management

- Analyzed data on Safari electronic books package to assess needs for seat and use of specific titles
- Serve as subject specialist for the Biomedical Engineering Department
- Chair the Selectors' Meeting Agenda Team

Digital Services and Projects

- Planned and carried out collaborative venture with ITC's Research Computing Services Center to create the Research Computing Lab, which included merging the staff and services from the two locations as well as the configuration of lab and office space.
- Created new services focused on data management, including UVA participation in creation of the DMPTool
- Coordinated the Digital Herbarium Project. This project has developed from a pilot project to a production level project. Project is now part of the Notes from Nature project, a crowd-sourced metadata transcription project on Zooniverse.
- Coordinated the McCormick Observatory Plate Stacks project, including a tour of the Plate Stacks for the wider University Library community. This project has led to web-based catalog of the plates. Future plans include attaching digitized surrogates of the plates to the catalog records.

Management

- Oversaw daily operations of the Science and Engineering Libraries, a unit consisting of six libraries, and twenty full time employees
- Wrote wage, OTPS and major budget requests for Research Computing Lab and Science and Engineering Libraries
- Oversaw positions requests and hiring processes
- Oversaw a unit of 20 staff members, including faculty and classified staff
- Coordinate user space issues, include: Chemistry Library planning; Biology/Psychology recarpeting; Coffee Shop planning; and Brown Library seating redesign

Web Design

- Lead Information Access Interfaces Project to work with a consultant to redesign the pages to access vendor indexes and databases. Led to the current suite of pages, which include an A to Z list, subject pages, and Find@UVa.
- Participated in Joint Managers' Retreat on the Online Library Environment

- Serve on the Online Library Environment Steering committee and act as leader of OLE User Requirements.

Committees

Library

- VIVA Steering Committee Representative (2012 – 2015)
 - Blue Sky Subcommittee (2013)
 - Balanced Scorecard Subcommittee (2013)
- Collections Steering Group (2006 – 2014), Chair, (2008 – 2014)
- Serials Solutions – AMS and Article Linker Implementation (2007-2008)
- Search Committee, Director of Digital Scholarship Services (2007)
- Search Committee, Associate University Librarian for Public Services and Collections (2006)
- Festival of the Book (2006)
- Web Redesign Taskforce (2006)
- Day of Caring participant (2005 – 2015)
- Imaging Group (2005 – 2006)
- Triad Discussion AV Support (2006)

External

- Non-Tenure Track Faculty Taskforce (2013-2015)
- Scholar's Trust Steering Committee (2011- 2015), Co-chair, (2014 – 2015)

Head, Science Library, 1998 – 2005

Science Librarian, 1992 – 1998

Loyola University Chicago

Collection Management

- Act as Science Collection Development Coordinator (1998 – 2005)
- Serve as bibliographer and liaison to the department of Physics, School of Nursing and Science Reference (current), as well as the departments of Biology, Chemistry, Natural Sciences, Math and Computer Sciences(past)
- Maintain approval plan, initiate firm and standing orders, evaluate gifts and recommend journals for purchase
- Facilitate faculty participation in journal cancellation projects and other special projects
- Evaluate library collection in support of program review and accreditation processes
- Serve on Electronic Resources Committee; evaluate and recommend large electronic resources for purchase

Reference

- Served as coordinator of Reference and Online Services
- Provide reference services for a variety of print and electronic resources
- Designed and implemented training for non-librarian reference staff

User Education

- Design and present instruction in support of specific courses
- Present a twice-yearly seminar on Chemical Information for department faculty, graduate and undergraduate students

- Design and implement and End User Training Program for faculty and graduate students, using the STN and Dialog Instructional Programs
- Teach various Internet training classes as part of ongoing program in conjunction with Information Technologies Department

Management

- Supervise and evaluate 5 FTE (2 librarians and 3 professional staff)
- Oversee operations of Science Library serving the departments of Biology, Chemistry, Computer Science, Mathematics, Natural Sciences, Physics, Psychology, and the School of Nursing
- Manage departmental budget of ~\$100,000, including operations and student salaries
- Participate in strategic planning initiatives
- Develop and pursue marketing programs, including Experience Chicago Science (student tours of local science museums) and Late Night Café (extended final exam hours program)

Web Architecture & Design

- Chair of Library Web Team 1998 – present
- Oversaw redesign of Library's web presence and move to new server (<http://libraries.luc.edu>)
- Worked with the committee to design Cold Fusion generated pages for electronic resources, staff information, and subject guides
- Developed new model for shared web design in libraries to provide more opportunities for web design, while maintaining design standards
- Co-created Dialog search forms for ISI citation databases and accompanying search wizard
- Created Dialog search form for Food Sciences and Technology Abstracts

Committees

University Wide

- Faculty Council Subcommittee on Information Technology (2000 – present)
 - Chair, Faculty Incentives Subcommittee (2002)
 - Academic Software Subcommittee (2002)
- Information Technology University Policy Committee (2000 – present)
- Provost Search Committee (2002)
- Campus Wide Information Systems Committee (1994 – 2000)
 - “Good Faith” Subcommittee (1996)
 - Data Integrity Subcommittee (1995 - 1997)
 - Web Education Subcommittee (1996 – 1997)
- Science and Faith Presentation Committee, Office of Faith and Culture (1993 – 1994)
- Faculty Advisor, Science Fiction Club (1996 - 1999)

Libraries

- OpenURL Resolver Review & Implementation Committees (2004)
- Approval and Book Vendor Review Committee (2002)
- Strategic Planning Committee (2000, 2002)
 - Chair, Collection Development Subcommittee (2002)
- OPAC Design Group for Endeavor Implementation (2000)

- NetLibrary Evaluation Committee (2000)
- Chair, Electronic Reserves Committee (2000 – present)
- Head of Systems Search Committee (2000)
- Ovid/SiteSearch Committee (2000)
- Electronic Resources Committee (1999 – present)
- Integrated Library System Selection, Acquisitions Subcommittee(1999)
- Chair, Science Librarian Search Committee (1999, 2000, 2003)
- Chair, Printing Cost Recovery Team (1999)
- Display Committee (1992 – 1997)
- Systems Support Team (1992 – 1995)
- Science Library Grand Opening Committee (1993)
- Bibliographer’s Manual Subcommittee (1992 - 1996, 1999 – 2002)

Consultant (2000 – 2009)

Odyssey Information Solutions, Ypsilanti, MI

- Provide research, business analysis, information architecture and design.
- Produced an extensive non-technical glossary of medical terms
- Conducted statistical research into the golf and golf equipment industries
- Designed user interface for CD-ROM accompanying textbook
- Created index for textbooks on diabetic patient education

University Library Associate, 1990-1992

Natural Science Library, University of Michigan

- Provide assistance with print, online and CD-ROM resources serving the biology, geology, and natural resources departments
- Design and present bibliographic instruction
- Prepare handouts and other instructional materials
- Evaluate gifts for inclusion in the collection

Computer Science Lab Monitor, 1991-1992

School of Information and Library Studies, University of Michigan

Library Student Assistant, 1987-1990

Director’s Office, Michigan State University Libraries

Professional Development

American Library Association	2009 - present
Listserv Manager	
Chief Collection Development Officers	2013 - present
Science & Technology Section	
Hot Topics Discussion Group	2009 - 2011
Special Libraries Association	1991 – 2014
Chair, Affirmative Action Committee,	
Michigan Chapter	1992
Membership Committee	
Biological Sciences Division	1994 – 1997

Public Relations Committee	
Sci-Tech Division	1993 – 1994
Awards Committee	
Sci-Tech Division	1996 – 2000
Chair	1997 – 1998
Chair, Publications Committee	2006 – 2007
Biological Sciences Division	
Treasurer	2007 – 2010
Virginia Chapter	
American Chemical Society	1994 – 1996, 2001 – 2005
Membership Committee,	
Chemical Information Division	1994 – 1996
Educause Annual Meeting	2001 – 2003
Grant-seeking Workshop, Loyola University Chicago	2000
ARL/OLMS New Manager Training Workshop	2000
Voyager User Group Meeting	2000
Digital Archives of Science & Engineering Resources	2005 – 2006
DLF Meeting	2005
Assessment Conference	2006
Pisgah Astronomical Research Institute	
Astronomical Plates Conference	2007
iLead, UVA Leadership training	2008-2009
International Association of Science and	
Technology University Libraries	2014

Awards

Sigma Xi Certificate of Recognition for outstanding service in support of research scientists, Loyola University Chicago Chapter, 1993

Presentations

“E-reserves & Copyright,” LUC Faculty Workshops (2002)
 “Chemical Information Sources on the Internet,” American Chemical Society Continuing Education session, Chicago Chapter (1999)
 “Introduction to Computers” & “Internet Skills” Instructor, Emeritus Connection Program, Loyola University Chicago (1997-1999)
 “Preserving Virginia’s Botanical Heritage,” Reunions Weekend (2006)
 “Collaboration,” PIC Brown Bag Series (2007)
 “Library Collections: Using Data to Inform Decisions”, Invited Talk, Brown University, (2011)
 Tolson, Donna, Carla H. Lee, Larry Goldstein, Holly Robertson, and Todd Burks. “Prioritizing Resources Allocation: Learn from the University Library Process.” Presented at the Quality CORE Network Series, University of Virginia, October 16, 2019.
<https://organizationalexcellence.virginia.edu/event/2516>.

Publications

- Baumgart, S., & Lee, C. H. (2006). Bioethics. In L. Ackerson (Ed.), *Literature Search Strategies for Interdisciplinary Research: A Sourcebook For Scientists and Engineers* (pp. 75-84). Lanham, Md.: Scarecrow Press.
- Blanton-Kent, B., Lee, C. H., & O'Bryant, F. (2006). IEEE/IEE Electronic Library. *Issues in Science & Technology Librarianship*, (46), 1.
- Buchanan, K. A., Lee, C. H., & Lohman, C. C. (2009). Bold Decisions: Service & Resource Model Changes in an Academic Library. ACRL/VLA Conference, Williamsburg, VA.
- Hawks, C., Michigan Univ., A. A., & Others, A. (1990). Is There a Foreign Language Barrier in Engineering Research? (ED337044).
- Hunter, C., Lake, S., Lee, C., & Sallans, A. (2010). A Case Study in the Evolution of Digital Services for Science and Engineering Libraries. *Journal of Library Administration*, 50(4), 335-347.
doi:10.1080/01930821003667005
- Jensen, K. & Lee, C.H., (2015). Rapid Collections Surveying with Book Traces @ UVa. Proceeding of the Charleston Library Conference. In Press.
- Lake, S., Lee, C. H., & Sallans, A. (2008). A Case Study in the Evolution of Digital Services for Science and Engineering Libraries. Paper presented at the ARL-CNI Fall Forum, Arlington, VA. Retrieved from <http://www.arl.org/resources/pubs/fallforumproceedings/forum08proceedings.shtml>
- Lee, C. H. and Mandernach, M. (2009). Communication and Collection Accountability through Clusters: Case Studies from Two Institutions. Proceedings of the Charleston Library Conference. <http://dx.doi.org/10.5703/1288284314772>
- Lee, C. H., and Morton, T. "It Can't Stay Here... : Print Collection Management During a Major Renovation." Webinar presented at the Where Does It Live? Storing Collections On and Off Campus: Part One | NISO website, Webinar, December 11, 2019.
<https://www.niso.org/events/2019/12/where-does-it-live-storing-collections-and-campus-part-one>.
- Lee, C. (2009). The Immortal Life of Henrietta Lacks. Book Review. *Library Journal*, 134(20), 130-131.
- Lee, C. (2008). The Secret Pulse of Time: Making Sense of Life's Scariest Commodity. *Library Journal*, 133(1), 128-129.
- Lee, C. H. (2007). Present at the Future: From Evolution to Nanotechnology, Candid and Controversial Conversations on Science and Nature. Book Review. *Library Journal*, 132(15), 82-83.
- Lee, C. H. (2011). The Best American Science Writing 2011. *Library Journal*, 136(16), 96-97.
- Lee, C. H. (2011). New: Understanding Our Need for Novelty and Change. *Library Journal*, 136(19), 91-91.

Reviewer for E-Streams (available at <http://www.e-streams.com>)
Volunteer Abstractor for ABC-Clio (1996-2000, 2006 - 2009)



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Deborah Silvers	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input checked="" type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): See resume attached	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Current Volunteer History - Vice President for the Friends of the Fluvanna Library, Inc.; Education and Volunteer Programs at Thomas Jefferson's Foundation, Monticello; The Family Heart Foundation advocate and lobbyist; Several social committees at Lake Monticello Prior Volunteer History - Womenheart Champion and Lobbyist (retired in 2024 after 17 years); The Literacy Volunteers of America; Alternative Education Coordinator; Friends of the New London Public Library board member; New London Women's Club President and board member	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): See resume attached	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: As a library patron and acting board member of The Friends of the Fluvanna Library Inc., I want to support and advocate for the mission of community partnerships through services and programs at public libraries.	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
6. This requirement shall apply to all boards, commissions, or committees listed on the attached application form, provided however, that if State or County Ordinance addresses attendance requirements in an alternative manner, such law shall prevail.

**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)	X	Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)		Parks & Recreation Advisory Board (RAB)		

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Applicant's Signature Deborah Silvers		Date 5/10/2025	
Mailing Address (including City, State, & ZIP) 28 Maplevale Drive Palmyra, VA 22963		Physical Address (if different)	
Years Lived in Fluvanna 2	Phone # <div style="background-color: black; width: 100px; height: 1.2em;"></div>	Alternate Phone #	Email Address
Office Use Only			
Application Received On:	5/10/2025	Application Received By:	
Acknowledgement Sent:	5/13/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Deborah Silvers

28 Maplevale Drive
Palmyra, VA 22963

Summary/Objective

Self-directed, experienced volunteer in community libraries and nonprofit organizations seeking an opportunity to join the Fluvanna County Library Board. As a library patron and acting board member of The Friends of the Fluvanna Library, I continue to support and advocate for the mission of community partnerships through services and programs at public libraries.

Skills

- Board and grant writing experience
- Non-for-profit experience across city, county, state and federal levels
- Successful implementation & coordination of strategic initiatives
- Results-oriented leader who excels in end-to-end programming
- Solid foundation built on a work history in the educational field
- Strong collaborator who works across diverse teams

Current Volunteer History

- Vice President for the Friends of the Fluvanna Library, Inc.
- Education and Volunteer Programs at Thomas Jefferson's Foundation, Monticello
- The Family Heart Foundation advocate and lobbyist
- Several social committees at Lake Monticello

Prior Volunteer History

- Womenheart Champion and Lobbyist (retired in 2024 after 17 years)
- The Literacy Volunteers of America
- Alternative Education Coordinator
- Friends of the New London Public Library board member
- New London Women's Club President and board member

Education

Mount Scenario College – *Bachelor of Science*

Broadfield Social Studies 6-12; Psychology and Sociology



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Name: David Chesly Harlow	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): See attached	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: See attached	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): See attached	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: To be more involved in the county that I have grown up in and to do my part to give back to Fluvanna county as a whole	

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ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board	X	Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)	X	Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council	X	Thomas Jefferson Planning District Commission (TJPDC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)	X	Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
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Applicant's Signature <i>(Typing name below serves as digital signature)</i> David C. Harlow			Date 10-26-2022	
Mailing Address (including City, State, & ZIP) 400 Rosewood Drive Scottsville, VA 24590			Physical Address (if different)	
Years Lived in Fluvanna 30	Phone # [REDACTED]	Alternate Phone #	Email Address [REDACTED]	
Office Use Only				
Application Received On:		Application Received By:		
10-26-2022		Leontyne Peck		
Acknowledgement Sent:				
10-27-2022				
Renewal Date:		Remarks:		
Renewal Date:				
Renewal Date:				
Renewal Date:				

DAVID HARLOW

SUMMARY OF QUALIFICATIONS

Dedicated and accomplished healthcare professional with a strong background in healthcare management and leadership. Possessing a comprehensive understanding of the complex healthcare landscape, I have consistently demonstrated the ability to effectively navigate and drive positive change in dynamic healthcare environments proven success in overseeing and optimizing operational efficiency, quality improvement, and patient satisfaction. Adept at strategic planning, resource allocation, and team development, resulting in enhancing organizational performance and financial outcomes. Excellent communication and interpersonal skills enable effective collaboration with multidisciplinary teams, stakeholders, and external partners. Committed to delivering exceptional healthcare services while adhering to regulatory requirements and promoting a culture of continuous improvement. Bringing a solid record of accomplishment of achieving results and a passion for advancing healthcare delivery.

EDUCATION

Master of Business Administration (MBA) December 2024
Johns Hopkins University Carey Business School Baltimore, MD

- **Concentration:** Health Administration, Public and Private Sector Leadership, and Entrepreneurship, Innovation, and Technology

Doctor of Philosophy (PhD) in Education May 2022
Liberty University Lynchburg, VA

- **Concentration:** Organizational Leadership

Master of Arts (MA) in Human Services Counseling Sept 2018
Liberty University Lynchburg, VA

- **Concentration:** Health & Wellness

Bachelor of Science (BS) in Health Sciences May 2015
James Madison University Harrisonburg, VA

- **Concentration:** Pre-Medicine Concentration

Associates of Applied Science (AAS) July 2013
Piedmont Virginia Community College Charlottesville, VA

CERTIFICATIONS

Health Care Economics December 2023
Harvard University – Harvard Business School Boston, MA

Python for Managers October 2023
Columbia University – Columbia Business School New York, NY

LEADERSHIP EXPERIENCE

Student Panelist – Academic Ethics Board September 2023 – December 2024
The Johns Hopkins University Baltimore, MD - Remote

- **Purpose:** Collaborate with 3 faculty members and 3 student panelists per hearing to hear cases on academic integrity concerns and render verdicts, thoughts, and opinions on the topics

Fluvanna Leadership Development Program August 2023 – March 2024

- **Purpose:** Developmental leadership program to provide tools to be more engaged and effective in local government within Fluvanna County. Some of the education provided reviews county ordinances, non-profit growth, school board and county administrator collaboration, in addition to Board of Supervisor support and networking.

DAVID HARLOW

Council Member

December 2022 – June 2025

Library Board of Trustees

Palmyra, VA

- **Purpose:** Acts as a governing board for the Fluvanna County Library. Employ a competent and qualified library director. Determine the mission, goals, and objectives of the library and adopt written policies governing the library. Ensure that the library has a long-range planning process that considers the library's strengths and weaknesses and can be implemented and evaluated. Be familiar with local, state, and federal library laws; actively support pending library legislation. Establish, support, and participate in a planned public relations program.
- **Affecting Legislation:** Established by the County Board of Supervisors according to the County Code, Section 2-6-2, adopted by the Fluvanna County Board of Supervisors on June 17, 1998.

Healthy Workplace Committee

May 2023 – September 2023

UVA Health

Member

- **Purpose:** Committee of 40 established to promote and support healthy workplace policy and procedures and address stressors in the workplace throughout all of UVA Health. Those supported by the work include both employees and subsequent patient care at UVA Health. My role is to serve the committee and to provide feedback relating to education, member involvement, and engagement throughout the entire UVA Health system.

Secretary for ACHE; CVHEG chapter

January 2023 – January 2024

- **Purpose:** My role is to participate in board meetings and other designated events to provide administrative support for both the Board of Directors and the supporting member population. This is in addition to any other needs as designated by the President of CVHEG. I also assisted in yearly budget creation and appointment.
 - **Oversight Role:** Advisory Committee member

Membership Committee Director for ACHE; CVHEG chapter

January 2022 – January 2023

- **Purpose:** My role is to coordinate with the board for CVHEG to lead initiatives to increase membership and to continue to build up mentorship program and spread understanding and engagement for both CVHEG and ACHE.

Membership Committee Assistant Director for CVHEG

January 2021 – January 2022

- **Purpose:** My role is to assist in coordination with the board for CVHEG to increase membership and to lead initiatives to continue to build up mentorship program and spread understanding and engagement for both CVHEG and ACHE.

TEACHING EXPERIENCE

Center for Excellence in Teaching and Learning Faculty Fellow

January 2024 – December 2026

Piedmont Virginia Community College

Charlottesville, VA

- **Purpose:**
 - Act as a liaison with your academic division, department, and unit colleagues to identify professional development needs and goals.
 - Work with the director of the CETL and other Faculty Fellows to develop and facilitate workshops and training sessions to support faculty in adopting effective teaching practices.
 - Provide one-on-one consultations and coaching for faculty.

Adjunct Instructor

December 2023 – present

**Ohio University; Russ College of Engineering & Technology
Master of Science in Project Management Program (MSPM)**

Athens, OH

DAVID HARLOW

- Courses – Project Management/Undergraduate and Graduate

Adjunct Professor

University of Denver; University College

**April 2023 – present
Denver, CO**

- Courses – Healthcare Management and Health Informatics/Undergraduate and Graduate
 - HINF 4010 – Health Informatics Communication – Winter 2024
 - This course focuses on the core skills of healthcare informatics communication such as knowing your audience and how this relates to health informatics specifically. The student will contextualize the role of informatics and Health Informatics/IT in healthcare and the health industry through course projects. Students learn to use communication tools to design communication strategies for informatics, IT, and clinical professionals to achieve success in Health Informatics/IT projects. Through this process, students learn to bridge gaps between Health Informatics/IT professionals, clinicians, and health leaders.
 - HINF 4650 - Project Management – Summer 2023
 - Create strategies to manage the complexity inherent in large-scale projects. Also, relate project scope to cost, time, and resource requirement. Lastly, develop procurement plans and assess project contracts.

Adjunct Professor

Piedmont Virginia Community College

**July 2022 – present
Charlottesville, VA**

- Courses
 - HLT 130 Nutrition and Diet Therapy
 - Introduces the basic principles of good nutrition. Studies nutrients, their sources and functions, and basic requirements for individuals. Includes a brief introduction to diet therapy.

PROFESSIONAL BACKGROUND AND MANAGERIAL HISTORY

Data Analytics Project Manager

September 2023 - Present

State of Virginia - Department of Medical Assistance Services (DMAS)

Richmond, VA

- One of four members in the Healthcare Analytics Division to be given a leadership role
- Contribute to key deliverables necessary to meet the HAD's mission to empower data-driven decision making across the agency.
- Responsible for providing HAD with guidance and support to help meet the strategic goals of HAD, and participate on projects related to cost, coverage, quality, and utilization trends as assigned by the Director.
- Participated in the development of key deliverables necessary to acquire and transform data into meaningful and useful information to fulfill project deliverables.
- The scope of work also includes research, strategic planning, team building, and program design activities.
- Lead project management activities from end-to-end including developing and maintaining project plans with clear milestones, clearly and consistently communicating status updates, and coordinating and supporting project implementation.
- Worked with executive level management staff, program staff, and key stakeholders as appropriate.
- Managed incoming data requests from internal and external requesters, including supporting Freedom of Information Act (FOIA) requests, coordinating and managing new and existing data sharing agreements, and serving as point of contact for data requests from the General Assembly (GA).
- Served as Contract Administrator of the data warehouse vendor, coordinate and manage SQL, data warehouse, and Tableau training for the Agency and facilitate routine meetings for updates to the Agency's data warehouse, SAS, and other analytic tools.

DAVID HARLOW

Program Coordinator/Data Analytics Liaison

University of Virginia Health System – Population Health

April 2021 – September 2023

Charlottesville, VA

- Coordinates data feeds for all Population Health programs (IHM, BPCI-A, Medicare Advantage, Medicine HOME, Virginia at HOME, Cystectomy Program, Bariatric Patient Program)
- Partnered with UVA data scientists to assist in ROI template creation for Population Health programs to identify patient populations with high readmissions and to gather financial information on the impact that was being felt in the health system
- Partnered to create Tableau dashboard for UVA Health to track and monitor SDOH inputs
- Manages day-to-day operations of assisting both advocates, advocacy manager, and program director with daily operational needs
- Initiates any new build request for Population Health from initial inquiry to full project completion
- Liaison for contracted departmental hires to assist in establishing relationships and programmatic evolution (Signify Health and Locus Health)
- Assists in the training of new hires in the Population Health Department
- Collaborates with other project coordinator to report data and logistic reports to director on COVID clinic operations at UVA Health, in addition to supporting all COVID clinic data and operations for both student COVID numbers as well as emergent emergency room (ED) patient numbers also

Sample of projects for Population Health

- *Collaborated with CompassRose project rollout system-wide at UVA Health*
- *Implemented leadership and management strategies relating to Cystectomy and Bariatric projects*
- *Partnered with UVA PMO office for UniteUs Implementation across UVA Health*
- *Granted leadership role for SDOH rainbow wheel implementation across ambulatory clinics, both primary care and specialty clinics*
- *Created program auditing guidelines for all programs to look at areas for improvement post implementation*

Patient Advocate

University of Virginia Health System – Population Health

May 2019 – April 2021

Charlottesville, VA,

- Readmission and social determinant of health (SDoH) program at UVA Health that works with patients for 30 days to assign services to make sure unwarranted readmissions do not occur
- Reports directly to department director and project coordinator on new hire training progression
- Assists with new hire trainings and conducts audits on team members for workflow continuity
- Selected by department manager and project coordinator to expand scope of role due to extensive knowledge, proficiency, and understanding of departmental needs

Unit Coordinator

The Bridgeline Place

April 2017 – May 2019

Charlottesville, VA,

- Worked in a non-profit clubhouse model with members who had brain injuries (traumatic and non-traumatic)
- Coordinated kitchen and household supportive goals for members to work on in yearly blocks
- Wrote and supported Individualized Care Plans to make sure members were supported in terms of the goals they want to work on for that given year
- Lead a support group comprised of 7-13 members to discuss supportive techniques with counseling aspects. Some leadership skills used was motivational interviewing and active listening
- Coordinated non-profit safety goals and promoted leadership skills relating to specific rules and regulations the organization was bound by

Conductor

Norfolk Southern Railroad

January 2017 – March 2017

Baltimore, MD,

DAVID HARLOW

- Received training in McDonough, GA to work in an active railyard assembling train orders to be driven up to east coast
- Received orders every shift on priority trains to assemble and be ready for operation
- Communicated with the yardmaster and trainmaster to promote a safe work environment both for myself and the engineer on shift
- After the closing of every shift, my duty was to make sure safety and communication was given in hand-off to next conductor coming on shift

Carpenter

May 2015– January 2017
Charlottesville, VA,

Duprey's Fine Floors

- Lead or co-lead a wide portfolio of projects that focused on hardwood flooring install, refurbishing and general maintenance at some of the most historic real estate in Charlottesville
- Quickly worked up to gaining the trust of the owner to carry out projects with minimal supervision
- Coordinated with other business owners/ building foremen to complete projects within the needed scheduled timeframe
- Projects include The University of Virginia Rotunda, both Range and Lawn rooms at The University of Virginia, Ednam Forest, Farmington, and downtown Charlottesville commercial space, some out of area work as well (focusing in the Richmond area)
- Recognized by business owner for strong dependability and leadership skills leading to the assigning of independent work in a detail-critical environment

Dollar General

February 2011 – July 2013
Palmyra, VA,

Cashier/Stocker (part-time)

- Operated as both a cashier and a stocker for the store
- Was a part of a highly functioning store that resulted us being consulted with other locations to improve their operations due to our efficiency and high ranking across the division
- Quickly worked my way to being one of the more leadership focused employees to be able to do work that was not necessarily outlined in my job description

CONSULTING EXPERIENCE

Johns Hopkins Graduate Consulting Club

September 2023 – December 2024

Director of Education

Remote

- **Purpose:** My role was to direct and provide leadership for members of the Johns Hopkins Graduate Consulting Club by creating educational materials and events to allow students to gain exposure to consulting firms. I directly collaborated with consulting firms to bring them to the club for our members to participate.
 - **Presentations given to members.**
 - October 27 – "Healthcare Consulting: Conversations from the Outside Looking in"
 - 50 individuals signed up to participate in the event

Johns Hopkins Graduate Consulting Club

August 2022 – April 2023

Member

Remote

- **Purpose:** My role was to work alongside five other business student to complete a market analysis for climate change and microbiology innovation: A partnership between the American Society for Microbiology (ASM) and the Johns Hopkins Graduate Consulting Club.
 - **Deliverables for the group:**
 - A comprehensive report
 - A PowerPoint Slide Deck
 - A presentation to key senior ASM leaders to discuss the findings of the report

ADDITIONAL ORGANIZATIONS/ASSOCIATIONS

The University of Virginia Colonnade Club

2023

DAVID HARLOW

American Society of Microbiology	2023
Johns Hopkins Graduate Consulting Club	2023 - 2024
Membership American College of Medical Practice Executives	2022 - present
Member Virginia Hospital & Healthcare Association	2022 - present
Kappa Delta Pi International Honor Society	2021 - 2022
American College of Healthcare Executives	2020 – present
Healthcare Financial Management Association	2020 – present
Central Virginia Healthcare Executive Group (CVHEG)	2020 – present
Council on Undergraduate Research Liberty University Affiliation	2020
Omega Nu Lambda Honor Society Member	2019 – 2020
Brain Injury Association of America	2018 – 2019
American Counseling Association	2018
Institute for Healthcare Improvement (James Madison University Chapter)	2013 - 2015

PUBLICATIONS

May 2022. The perceived benefit that positive intervention plays in the development of students enrolled in e-learning curriculum: A transcendental phenomenological study of the experience of online education.

LICENSES AND CREDENTIALS

Certified Business Consultant	
• Six Sigma Global Institute: 88489208	December 2023
Fellow of the Healthcare Financial Management Association (FHFMA)	
• Healthcare Financial Management Association	July 2023
Project Management Professional (PMP)	
• Project Management Institute: 3421905	February 2023
Certified Revenue Cycle Representative (CRCR)	
• Healthcare Financial Management Association	January 2023
Dare to Lead	
• Brene Brown: Dare to Lead Program	December 2022
Lean Six Sigma Black Belt	
• Six Sigma Global Institute: 53884735	June 2022
Certified Healthcare Financial Professional (CHFP)	
• Healthcare Financial Management Association	August 2022
Applied Suicide Intervention Skills Training	
• LivingWorks	November 2019
NCBH Adult Mental Health First Aid	
• National Council for Community Behavioral Healthcare	August 2019 – August 2022

TECHNICAL SKILLS

DAVID HARLOW

- **Software:** Adobe Photoshop, Adobe Illustrator, EPIC EMR, Python, Microsoft Office, Mendeley, Java, Zoom, Google Suite, SPSS, SAS, MMIS, MES, MS Project, SharePoint, SQL, JIRA, Tableau, AnyLogic, SmartSheets, Teradata Studio, Handshake, Qualtrics, Cardinal
- **Written communication:** Technical reporting, editing, fact checking, proofreading, scholarly writing, technical writing, project management, data analysis, research writing, agile, lean, scrum methodology
- **Certifications:** CPR/AED



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Charles Haden Thomas Parrish	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provides dates of education and experience. You may also provide a resume/CV.): Resume Attached	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Fluvanna County Public Library Board of Trustees, At-Large, June 2022 - Present Parks and Recreation Advisory Board (RAB), Youth Representative, 2013-2014. Thomas Jefferson Soil & Water Conservation District Board, Elected Fluvanna Representative, January 2024 - Present.	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Resume Attached	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: As a school counselor at the high school I work closely with Piedmont Virginia Community College and I have many students who are dual enrolled with PVCC and/or plan to attend PVCC after high school. I see everyday the benefits that PVCC provides to the students in our community, and I also see changes that I would like to advocate for. For one example, PVCC previously provided a part-time career coach to each of the area high schools who was able to come to the school every day and work with students interested in PVCC, either for dual enrollment or full post-secondary enrollment. Two years ago, PVCC restructured their approach and eliminated that position. In it's place, they've created a Outreach & Admissions Representative position, who only comes to our school once a week. Our representative is great, he is responsive and well-informed, but the capacity of the new position does not meet the needs of our students in the same way that the previous position met student's needs when it existed. Without being on the PVCC Board, I do not know what factors led to the restructuring, or if it would be possible to bring the new position closer to the previous position, but this is the type of issue I would advocate for on the board if given the opportunity. I think it would be helpful and productive to have a secondary school educator on the PVCC board so that they can help give voice to the current and future student experience, and I would be honored to serve Fluvanna and PVCC in that way.	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
6. This requirement shall apply to all boards, commissions, or committees listed on the attached application form, provided however, that if State or County Ordinance addresses attendance requirements in an alternative manner, such law shall prevail.

**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board	X	Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)		Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Charles Haden Thomas Parrish		Date 5/13/2025	
Mailing Address (including City, State, & ZIP) 4514 Ruritan Lake Road, Palmyra, Va 22963		Physical Address (if different)	
Years Lived in Fluvanna 29	Phone # <div style="background-color: black; width: 100px; height: 20px;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 20px;"></div>
Office Use Only			
Application Received On:	5/13/2025	Application Received By:	
Acknowledgement Sent:	5/13/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Charles “Haden” Thomas Parrish

[REDACTED] | 4514 Ruritan Lake Road, Palmyra, Va 22963

EDUCATION

Vanderbilt University, Peabody College – Nashville, TN

August 2020 - May 2022

- *Master of Education: Human Development Counseling, School Counseling Track*
- *School Counseling Intern: Waverly-Belmont Elementary School; Two Rivers Middle School; Hillsboro High School* – maintained a weekly or bi-weekly caseload of 8-10 students in addition to supporting the school counselor with other counseling or administrative responsibilities. Facilitated an 8 student 10-week eighth-grade anxiety small group

The University of Virginia – Charlottesville, VA

August 2014 - May 2018

- *Bachelor of Arts: African American and African Studies; Sociology*

Fluvanna County Leadership Development Program – Fluvanna County, Va

2013-2014; 2019-2020

- *Class 11 & 17 Student* - a program to educate citizens about Fluvanna County and the issues and challenges it faces; to prepare its citizens for involvement; and to encourage their participation in keeping Fluvanna a desirable place to live and work

Meriwether Lewis Institute for Civic Leadership – Charlottesville, Va

January 2015 – May 2018

- *2018 Fellow; Vice President of Student Affairs Intern*
- A University of Virginia fellowship that brings together a diverse cohort of 25 students together for a two-and-a-half-year program to nourish lifelong leadership

PROFESSIONAL EXPERIENCE

Fluvanna County High School - School Counselor

July 2022 - Present

- Caseload of ~240 students, responsible for each student’s mental, emotional, academic and post-secondary development
- Member of the school leadership team and the emergency management team
- Work one-on-one with students who are in crisis to deescalate and return to class when appropriate
- Conduct risk assessments with students experiencing suicidal ideation and consult on threat assessments when there is a threat of harm
- Consult and communicate with all stakeholders regarding student success plans
- Interpret objective data to classroom teachers, parents, and students
- Arrange case conferences involving all stakeholders and coordinate the efforts of all specialists working on a case.
- Assist with identifying students with special needs
- Evaluate eligibility and coordinate team to implement and review Section 504 Plans
- Acquaint teachers and families with psychological personnel and services available
- Act as the liaison between school and community agencies in working with students
- Maintain accurate and up-to-date permanent record folders

Virginia College Advising Corps - College Advisor

July 2018 – May 2020

- *A joint venture of The University of Virginia and the College Advising Corps and is an AmeriCorps program*
- *College Advisor at Fluvanna County High School*
- Cultivated productive working relationships with school administrators, counselors, and teachers to promote a college-going culture at Fluvanna County High School
- Counseled one-on-one with 100% of graduating seniors and many underclassmen to find their “best match” post-secondary plans, complete applications, and discuss financial aid applications and resources

Office of Housing and Residential Experience, Vanderbilt University – Nashville, TN

August 2020- May 2022

- *Graduate Building Manager (Assistantship)* – supervised one of the Quarantine & Isolation dorms during the COVID-19 Pandemic that quarantined and isolated undergraduate residents and protected the broader community
- *Graduate Area Coordinator (Assistantship)* – work with 19 Resident Advisors to oversee and support two Residential Colleges

RELEVANT COMMUNITY SERVICE EXPERIENCE

Thomas Jefferson Soil & Water Conservation District Board of Directors

January 2024 - Present

- *Elected to represent Fluvanna County on the 12 person Conservation District Board of Directors (non-salaried position)*
- *Education and Water Resources Committee and Agriculture Committee Advisory Director*
- The Conservation District is a self-governed subdivision of the State, and is comprised of Fluvanna, Louisa, Nelson and Albemarle Counties, as well as the City of Charlottesville
- TJSWCD is one of the largest SWCDs in Virginia, with a population of over 227,000 residents and covering an area of about 1,984 square miles
- TJSWCD works in partnership with the five member localities to support local conservation programs, and to bring state and federal conservation programs and resources to each community

- Tadpole Land & Trail Conservancy** **February 2020 – Present**
- *Chairman* - Lead and represent the Board of Directors of the nonprofit corporation in achieving the organization's purposes in a manner that respects the natural environment and the ecologically sound use of land and natural resources
 - Devoted to preserving and protecting natural ecosystems and wildlife habitats
 - Educate the public on issues related to the environment and protection of natural resources
 - Provide outdoor educational and recreational opportunities to the public

- Farm Bureau Board of Directors** **January 2024 - Present**
- *Scholarship Committee Chair* – set criteria for application and coordinate selection of recipients
 - Serving 5th term on the board as of 2024, the board's bylaws only allows for two consecutive terms.
 - Create and advocate for grassroots policy proposals to address issues faced on Fluvanna's farms and benefit local agriculturalists
 - Organize community events to promote agricultural education and show appreciation for Fluvanna's farmers

- Fluvanna County Leadership Development Program Steering Committee** **August 2022 - Present**
- Contribute to the development of the program, recruit new students, and organize weekly or biweekly education class sessions regarding the attributes and functions of Fluvanna County over the course of the six month program
 - Coordinated the Agricultural Businesses session showcasing the successes and challenges of Fluvanna's farmers and their Agri-Businesses

- Fluvanna County Public Library Board of Trustees** **June 2022 - Present**
- Member of the governing board for the Fluvanna County Library
 - Determine the mission and goals and objectives of the library, and adopt written policies governing the library
 - Ensure that the Library has a long-range planning process that considers the library's strengths and weaknesses, and can be implemented and evaluated

- Fluvanna County Historical Society Board of Directors** **January 2024 - Present**
- *Palmyra Representative*
 - Contribute to the protection, preservation, and promotion the rich history of Fluvanna County
 - Engage the community in educational opportunities to expand awareness of and contribution to the county's history

- Fluvanna Christian Service Society** **February 2023 - Present**
- *At-large Member, Executive Committee*
 - Coordinate with local faith organizations to provide short-term emergency assistance for Fluvanna families who are in need of financial assistance for food or utility bills.
 - Partner with the Monticello Area Community Action Agency (MACAA) to make available a food pantry for qualifying area residents as well as MACCA's other rural outreach initiatives.

- Fluvanna County Historic Preservation Advisory Group** **March - November 2022**
- Advisory Committee to the Fluvanna County Planning Commission on topics of Historic Preservation
 - Presentation of final report of recommended actions to the Planning Commission

PROFESSIONAL DEVELOPMENT & MEMBERSHIPS

- American School Counselor Association - Professional Member** **August 2020- Present**
- Virginia School Counselor Association - Professional Member** **August 2020- Present**
- Americorps - Service Member** **July 2018 -May 2020**
- Virginia College Access Network - Member** **September 2018-May 2020**
- National College Advising Corps - Member** **September 2018- May 2020**
- Virginia Conflict of Interests Act Training Certification** **January, 2024**
- Virginia Freedom of Information Act Training Certification** **January, 2024**

AWARDS & HONORS

- Superintendent's Award for Outstanding Staff Member, Fluvanna County Public Schools** **May 2024**
- Each year, the Superintendent awards one student, teacher,, and community member at graduation
- Superintendent's Award for Outstanding Community Member, Fluvanna County Public Schools** **May 2019**
- Madison House Volunteer of the Year, University of Virginia** **April 2018**
- Madison House is an umbrella organization with 22 volunteer programs and 4,296 student volunteers
- Superintendent's Award for Outstanding Student, Fluvanna County Public Schools** **May 2014**



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County of Fluvanna

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Name: Ben Shaw	Election <input checked="" type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
<p>EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.):</p> <p>Key Qualifications - Diverse stakeholder engagement at local, state and federal government and nonprofit level., Military cultural competency analysis and training development, Regular keynote presenter to agency/stakeholder audiences, to include, Virginia Congressional delegations</p> <p>Core Competencies - Human services program management, Partnership development, Extensive public speaking, Strategic and policy analysis and response, Standard Operating, Procedure development, Remote program oversight</p> <p>Education - Master in Public Policy & Management University of Pittsburgh, Master in Public Administration Liberty University, Master in Management Liberty University, Bachelor in Plant Biology Virginia Tech</p>	
<p>CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES:</p> <p>At term end on EDTAC (3yr appointment)</p>	
<p>CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates):</p> <p>Civic - American Legion (2004-present), VFW (lifetime member) (2004-present), Disabled American Veterans (lifetime member) (2007-present), Freemasons (2015-present)</p> <p>Religious - Church: Calvary Chapel Fluvanna (2018-present)</p>	
<p>REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY:</p> <p>This is home, we raise our children here, we are regularly engaged in recreation in the county ourselves and want the same for others (and an optimized and safe experience for as many groups/demographics as possible). We have enjoyed watching (and experiencing) recreation opportunities increase in the county and I hope to positively contribute to that. We have engaged with virtually every activity offered at Pleasant Grove, as well as other Parks and Rec services throughout the county.</p>	

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(Approved June 17, 2015)

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	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPD)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

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In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Benjamin Yates Shaw		Date 5/14/2025	
Mailing Address (including City, State, & ZIP) 4608 Venable Rd. Kents Store, VA 23084		Physical Address (if different)	
Years Lived in Fluvanna 15	Phone # <div style="background-color: black; width: 100px; height: 20px;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 20px;"></div>
Office Use Only			
Application Received On:	5/14/2025	Application Received By:	
Acknowledgement Sent:	5/15/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Ben Shaw
Kents Store, VA | [REDACTED]

A solution-focused, excellent communicator with ten years of leadership experience in state government and first-hand familiarity in military culture, offering ongoing policy and strategic input influencing program and agency trajectory

KEY QUALIFICATIONS

- Diverse stakeholder engagement at local, state and federal government and nonprofit level.
- Military cultural competency analysis and training development
- Regular keynote presenter to agency/stakeholder audiences, to include Virginia Congressional delegations

CORE COMPETENCIES

- | | |
|-------------------------------------|--|
| • Human services program management | • response |
| • Partnership development | • Standard Operating Procedure development |
| • Extensive public speaking | • Remote program oversight |
| • Strategic and policy analysis and | |

EDUCATION & CERTIFICATION

Master in Public Policy & Management | University of Pittsburgh
Master in Public Administration | Liberty University
Project Management Professional (PMP®) | #2207102, Exp: April 2024

RECENT EMPLOYMENT EXPERIENCE

Regional Director, Central. Virginia Dept. of Veterans Services (2015-present)

- Lead a geographically dispersed, multi-disciplinary team of 13 staff across 7 sites, overseeing all personnel, administrative and supervisory responsibilities.
- Direct and monitor non-clinical case management for over 100 active clients, ensuring customer service, documentation, outcomes and related provider outreach in accordance with best practices, business need and agency policy.
- Interpret agency regulations, apply and reconcile client small dollar financial interventions totaling nearly \$200k per fiscal year, produce real-time budget reports, proposals.
- Oversee business case development, hiring and training of all new team employees
- Provide ongoing strategic and policy input to ensure program/agency alignment with target population needs/changes
- Direct continuous environmental analysis and program adjustment to resource changes/scarcity

Regional Coordinator, Virginia Dept. of Veterans Services (2013-2015)

Ben Shaw
Kents Store, VA | [REDACTED]

- Serve as key liaison between agency program leaders and grantee Community Services Boards, ensuring annual budget analysis and needs projections, end of year budget reconciliation and ongoing grant monitoring.
- Lead a geographically dispersed, multi-disciplinary team of 7 staff (when fully staffed) overseeing all personnel, administrative and supervisory responsibilities.
- Direct and monitor non-clinical case management for over 50 active clients, ensuring customer service, documentation, outcomes and related provider outreach in accordance with best practices, business need and agency policy.
- Interpret agency regulations, apply and reconcile client small dollar financial interventions totaling nearly \$50k per fiscal year
- Oversee business case development, hiring and training of all new team employees
- Provide ongoing strategic and policy input to ensure program/agency alignment with target population needs/changes

Combat Journalist (2009-2010)

- Embedded with US Army ISAF, Logar province, Afghanistan, providing photographic and written human interest articles to small, Virginia-based newspaper.
- Embedded with US Army MNF, northern provinces, Iraq, providing photographic and written human interest articles to small, Virginia-based newspaper.

United States Marine Corps Infantry (2003-2007)

- Foreign weapons instructor – MNF-West, Habbaniyah
- Squad leader (and other roles), Wpns Co, Combined Anti-Armor, BLT 1/2, 22 MEU, 24 MEU



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Emily Tatton	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input checked="" type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): I am currently a state approvals specialist for Imagine Learning- an online education company. I work with state departments of education around the country to gain approval for educational products and to maintain reporting for student data. (March 2022-present) Prior to my current position, I taught at Trevilians Elementary school in Louisa county from 2012-2022. I graduated from the University of Mary Washington with a bachelor of science in psychology in 2011 and I completed my masters degree in elementary education in 2012, also from UMW.	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: At Trevilians, I served as a member of various groups of educators. At Mary Washington I served in the student senate and was the chair of the buildings and grounds committee.	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): None.	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: I have lived in Fluvanna since 2021 and I plan on staying here and raising my daughter. As a former educator and mom, I seek to serve the families of Fluvanna county and hope to expand the offerings of parks and recreation. I love seeing the strong ties that this community has and I believe that I can be a voice to other families and bring a new level of communication to our neighbors.	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

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2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
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5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
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**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Emily Tatton		Date 4/30/2025	
Mailing Address (including City, State, & ZIP) 27 Haversack Road Palmyra, VA 22063		Physical Address (if different)	
Years Lived in Fluvanna 4	Phone # <div style="background-color: black; width: 100px; height: 1.2em;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 1.2em;"></div>
Office Use Only			
Application Received On:	4/30/2025	Application Received By:	
Acknowledgement Sent:	5/1/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Emily Tatton



EXPERIENCE

Imagine Learning- *State Approvals Specialist*

March 2023-Current

- Managed state submissions of reading and math materials
- Completed projects independently and across teams
- Maintained records of projects and tasks
- Tracked legislation regarding instruction in multiple states
- Ensured compliance with state regulations, RFPs, and other requirements
- Responsible for reporting teacher and student data as required by state legislation
- Maintained communication with multiple Departments of Education across the United States
- Handled documentation containing sensitive information and ensured its safe keeping

Louisa County Public Schools- *Classroom Teacher*

August 2012- March 2023

- Mentored new and experienced teachers in curriculum and organizational structure
- Implemented and followed detailed schedules to ensure timeliness of projects and collaboration
- Organized projects of a variety of scales including; school wide events, community outreach, grade-level programs, and daily affairs
- Monitored data on a regular basis including student learning trajectories over the course of a year and individualized support plans
- Planned, prepared and maintained documentation including individualized education plans and goal-oriented plans for each student
- Assisted in developing countywide timelines to ensure state learning standards were met
- Communicated with administration, parents and other stakeholders
- Coordinated with multiple teams to ensure continuity of instruction
- Facilitated professional development for colleagues

TECHNOLOGY

- Fluent in SmartSheet, Microsoft 365, Google Suite
- Level 1 Google Certified Educator
- Developed and delivered instruction remotely and in person, while implementing a multitude of technologies

EDUCATION

University of Mary Washington - *Masters of Science in Elementary Education*

University of Mary Washington - *B.S Psychology*

Coursera- *Google Project Management Certificate*



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

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Name: Geri Russell	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): I have a Bachelors of Science in Accounting. I've been on many committees over the years at the Charlottesville Association of Realtors. I'm very knowledgeable about Fluvanna County and have gone through the Leadership program when I first moved into the County.	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Prior President of the Board for the Fluvanna SPCA. I'm currently the Treasurer on this board.	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Treasurer of the Board for the Fluvanna County SPCA Recent recipient of the Good Neighbor Award for the Charlottesville Association of Realtors.	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: I am proud to live in Fluvanna and want to help in its future.	

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**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDCC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

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In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature Gerri Russell		(Typing name below serves as digital signature)		Date 5-7-2022	
Mailing Address (including City, State, & ZIP) 864 Rivanna Woods Drive, Fork Union, VA 23055				Physical Address (if different)	
Years Lived in Fluvanna 6	Phone # [REDACTED]	Alternate Phone #	Email Address [REDACTED]		
Office Use Only					
Application Received On: 5-7-2022		Application Received By: Caitlin Solis			
Acknowledgement Sent: 5-9-2022					
Renewal Date:		Remarks: Spoke to Ms. Russell on 12-18-2023 she asked to be removed from consideration from the Planning Commission and to update her application to include the Parks and Rec Advisory Board - CGS			
Renewal Date:					
Renewal Date:					
Renewal Date:					



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Name: Jon Bishop Larson		Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other	
Mailing Address (including City, State, & ZIP) P.O. Box 185 Fork Union, VA 23055		Physical Address (if different) 84 Arbor Lane # 5 Fork Union, VA 2055	
Years Lived in Fluvanna 4	Cell Phone – preferred? [REDACTED]	Home Phone – preferred?	Email [REDACTED]
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provides dates of education and experience.): B.S. University of Alabama - Sports Fitness Management *Resume also in folder			
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: 8 year member of USA Swimming's National Disability Committee (2012-2020) 15+ year member of San Diego Swimming and Mid Atlantic Swimming (LSC's) Board of Directors in many various positions (1992-2017) Member of VISAA Swimming subcommittee on developing			
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): member Fluvanna County Republican Committee (2020-current).			
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: Very interest in helping maximize potential for recreational activities. I have always specialized in aquatic sports (30+ years) but also have experience with disabled athletes.			
Applicants are considered as vacancies occur and your application will be kept on file for three years. Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age or disability in employment or the provision of services. Submit by email (clerk@fluvannacounty.org) or mail to: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963 By signing below you are indicating that you have read and understand the attached Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.			
Applicant's Signature Jon B. Larson		Date 4-20-2021	

PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES ON WHICH YOU WISH TO SERVE.

X	Board, Commission, Committee
	Agricultural/Forestral District Advisory Committee
	Board of Equalization (BOE)
	Board of Zoning Appeals (BZA)
	Building Code of Appeals Board
	Central Virginia Regional Jail (CVRJ) Authority
	Columbia Task Force (CARE)
	Community Policy & Management Team (CPMT)
	Economic Development Authority (EDA)
	Economic Develop. & Tourism Advisory Council (EDTAC)
	Family Assessment and Planning Team (FAPT)
	Finance Board
	Fluvanna Partnership for Aging Committee (FPA)
	Fork Union Sanitary District (FUSD) Advisory Committee
	James River Water Authority (JRWA)
	JAUNT Board

X	Board, Commission, Committee (cont.)
	Jefferson Area Board of Aging (JABA) Advisory Council
	Jefferson Area Board of Aging (JABA) Board of Directors
	Library Board of Trustees
	Monticello Area Community Action Agency (MACAA)
	Palmyra Area Revitalization Committee (PARC)
X	Parks & Recreation Advisory Board (RAB)
	Piedmont Virginia Community College (PVCC) Board
	Planning Commission
	Region Ten Community Services Board
	Rivanna River Basin Commission
	Social Services Board
	Thomas Jefferson Planning District Commission (TJPDC)
	Thomas Jefferson Water Resources Protection Foundation
	Youth Advisory Council (YAC)
	OTHER:

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

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Office Use Only		
Application Received On:		Application Received By:
Acknowledgement Sent:		
Renewal Date:		Remarks:
Renewal Date:		
Renewal Date:		
Renewal Date:		

Jon Larson

P.O. Box 185, Fork Union, VA 23055, [REDACTED]

SUMMARY OF ACCOMPLISHMENTS

Swimming Coach/ Aquatic Director/ Program Coordinator

- Over 30 years of coaching experience with a proven track record on improving athlete performance and building programs to a higher competitive level.
- Successful at establishing a positive, enriching environment for student-athletes of all ability levels including Olympic Trial qualifiers, Big 10 Conference Champions, National Age Group record holder, several PIAA State High School Champions, VISAA State Champion and a bronze medalist in the London Paralympics.
- Extensive experience in aquatic programming and pool management (Certified Pool Operator)
- Long-time active Board Member in local LSC (Local Swim Committee) and committee member of National USA Swimming committee.
- Qualified Meet Director for large USA Swimming invitationals as well as college and high school dual meets.

EDUCATION

University of Alabama • Tuscaloosa, Alabama

B.S., Sports Fitness Management

WORK EXPERIENCE

Fork Union Military Academy • Fork Union, VA

2017 to Present

Aquatic Director/ Head Swim Coach

- Schedule, design and implement all workouts throughout the entire school year. Coordinate the competition schedule with the Athletic Director.
- Oversee all activities and operations related to the Estes Aquatic Center including routine maintenance, operations and pool cleaning, Conduct and evaluate water testing. Order chemicals and pool supplies as needed. Arrange major maintenance with FUMA crew or outside vendors/contractors.
- Coordinate all rental groups, by updating contracts, scheduling time and ensuring building access prior to group, and that facility is secure after group.
- Supervise and coordinate diving coach and assistant coach to assure all training groups are covered.
- Attend all Virginia Swimming (USA Swimming LSC) meetings and act as a delegate to the National USAS Convention. Also attend all VISAA Swim meetings.
- Schedule hours for cadets and staff and ensure lifeguards are present. Provide proficiency tests for cadets.
- Produce an estimated yearly budget for the Aquatic Center and Swimming teams and work with the school CFO to assure budgets are being met.

Emmaus Aquatic Club • Emmaus, PA

2009 to 2017

Head Swimming Coach/ CEO

- Responsible for all aspects of the year-round USA Swimming program, including the hiring and supervising of all coaches, set training schedules, construct and run workouts for senior-level swimmers. Ensured that team website was current and accurate. Construct each season's meet schedule and compile all entries and submit to meet hosts.
- Administrated the pool management business by calculating bids, authoring contracts and facilitate communication with all property managers. Also, regularly tested water chemistry and added various chemicals to assure water balance.
- Oversee the EMAC facility (25m outdoor swim club). Manage all maintenance issues, assist with inspections, renovation projects and assist in grounds-keeping. Stock snack bar, order chemicals and assist with lifeguard training and scheduling.
- Responsible for designing policies and procedures for the SwimAmerica lesson program and ensure all needed resources were available to lesson coordinator.
- Reported to the Board of Directors on a monthly basis with all matters pertaining to EMAC at scheduled Board meetings.

Freedom High School • Bethlehem, PA

2013 to 2017

Head Swimming Coach

- Responsible for all activities which includes, coordinating workout and meet schedules with Athletic Director, hiring and supervising assistant coaches.
- Oversee team website and responsible for communications to all athletes and families.
- Construct and implement daily workouts as well as produce dual meet lineups and entries.
- Prepare facility for all hosted dual meets including all timing system computers, printers and hardware.
- Attend all school athletic functions including departmental, booster-club, parent board meetings as well as signing ceremonies and banquets.

Penn State University • University Park, PA

2006 to 2008

Assistant Swimming Coach

- Planned and directed daily workouts for the middle-distance training group, or implemented workouts as directed by Head Coach.
- Coordinated all travel for PSU Swimming including arranging flights, hotels, ground transportation, catered meals, dispersing per diem.
- Responsible for maintaining team database, submitting meet entries using Hy-Tek Team Manager.
- Assisted in recruitment of prospective student-athletes and coordinating campus visits.
- Assisted swim camps by coaching workouts, filming and analyzing technique and supervising campers 24 hours/day.

Penn State University • University Park, PA

11/1996 to 8/2006

Pool Coordinator/Program Director

- Acted as Assistant Aquatic Director for all matters pertaining to the facility.
- Responsible for directing all aquatic programs such as the year-round competitive program (Penn State Aquatics), Aquacise, Masters swimming, Diving and Lessons.
- Designed and implemented daily workouts for Senior-level swimmers in the age group training program. Supervised and scheduled coaches for younger training groups. Also, supervised aquacise instructors as well as hiring and overseeing lesson instructors.
- Acted as Meet Director for all Penn State varsity dual meets and invitationals as well as assisting in hosting the PIAA State High School Championships.

Big Cat Aquatics •State College, PA

1996 to 2006

Head Swimming Coach

- Responsible for all activities associated with this year-round USA Swimming competitive team. Duties included designing each season's competitive schedule, work with facility managers, vendors, and the LSC to schedule meets.
- Attended all meets as well as scheduled assistant coaches for meets. Arranged all travel needs for team-travel meets.
- Acted as Meet Director for all hosted meets (college and club).
- Team included multiple Sectional Champions, Jr National, National and Olympic Trial qualifiers, PIAA State Champions and a National Age Group record holder.

University of Alabama •Tuscaloosa, AL

2/1986 to 6/1989

Assistant Swimming Coach

- Responsible for designing and implementing daily workouts for middle distance training group.
- Assisted in recruiting of prospective student-athletes including coordinating on-campus recruit visits.
- Responsible for performing anthropometric measurements (blood lactate testing) and preparing reports for Head Coach

LICENSES AND CERTIFICATIONS

Life-Member-Coach •USA Swimming

Coach Member •National Interscholastic Swimming Coaches Association

Lifeguard Instructor •American Red Cross •9/2019

Certified Pool Operator •National Swimming Pool Federation.

PROFESSIONAL AFFILIATIONS

Member- National Disability Committee •USA Swimming •1/2013 to 12/2020

Member - Travel Fund and Tech Planning Committees •Middle Atlantic Swimming •2006 to 2017

Member- Technical Planning Committee •Eastern Zone Swimming •2014 to 2017

Chairman - Senior Committee •Middle Atlantic Swimming •2011 to 2017

Chairman - Age Group Committee •Middle Atlantic Swimming •2006 to 2008

HONORS AND AWARDS

Athletics Hall of Fame Inductee •Freedom High School •Bethlehem, PA •2017

Coach of the Year •Middle Atlantic Swimming •New Castle, DE

Coach of The Year •San Diego/ Imperial Swimming •San Diego, CA

REFERENCES

Available upon request



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

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Name: Laryssa Smith	Election <input checked="" type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): Several leadership roles including Executive Director (non-profit organizations in Charlottesville and Memphis, TN), Corporate Director (healthcare setting) and Director of Food and Nutrition Services for public education district located in Manassas, VA. Most of my experience is in health, nutrition, food security and wellness within non-profit, private and public settings. MA Health Studies - Univ of Alabama (2007) Dietetic Internship - Indiana University (2002) BS Nutrition & Dietetics - Messiah College (1999) Registered Dietitian through the CDR Certified Health Education Specialist through NCHCEC	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: JABA Advisory Council - 2024 HOA (Stonecrest Village - Winchester, VA) - 2019-2021 Experience working with governing boards as the ED of the organization	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Attend Crosslife Church in Charlottesville, VA	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: Since moving to Fluvanna Co approximately two years ago, my husband and I have committed to supporting and serving our local community and neighbors. Whether it is a commitment to buying local when we can, donating to local charities, responsibly enjoying the outdoor beauty of our parks and recreation areas, or through my professional roles, it has been a priority of ours to engage with and give back to the area we call home. Fluvanna County offers many services, organizations and businesses that help our residents thrive. We also offer beautiful places for individuals and families to make memories and enjoy creation. I want to help educate others on what our county has to offer, as well as come alongside those working and living in our neighborhoods and towns. If there are creative and sustainable ways to make positive change for our county to continue growing and thriving, then I would be honored to be a part of that experience.	

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**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)	X	Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee	X	Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
X	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPDCC)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
X	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Laryssa J Smith		Date 5/1/2025	
Mailing Address (including City, State, & ZIP) 32 DEROSA CT PALMYRA, VA 22963		Physical Address (if different)	
Years Lived in Fluvanna 2	Phone # [REDACTED]	Alternate Phone #	Email Address [REDACTED]
Office Use Only			
Application Received On:	5/1/2025	Application Received By:	
Acknowledgement Sent:	5/1/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Executive Director

Driving program growth and community impact through collaborative leadership.

Executive leader and change agent who builds and leads high-performance nonprofit programs. Oversee multimillion-dollar budgets and partner with senior executives to create strategic plans. Develop and implement training programs for internal and partner teams. Foster work cultures based on accountability, trust, and generosity. Drive strategy alignment between stakeholders with diverse priorities. Track record of excellence working with non-profit, public, and private organizations.

Career Highlights:

- ✓ Turned around and scaled \$8M food access program serving appx. 41,000 children per week.
- ✓ Dramatically improved audit results for multi-site programs in healthcare and non-profit spaces.
- ✓ Built robust compliance organization for healthcare facility with 700 beds.



CORE COMPETENCIES

P&L Responsibility | Program Management | Operations | Change Management | Compliance and Reporting
Strategic Planning | Cost Control | Budgets | Vendor Contracts | Training Programs | Process Improvement | KPIs
Analytics | Cross-Functional Teams | Stakeholders and Partners | Customer Service | Coaching and Mentoring

"Laryssa is an exemplary leader who communicates effectively at numerous echelons in the organizational chain. She is a genuine problem solver, always readily available when issues, both minute and complex, arise." ~Margarita Alatorre, Encore Healthcare

PROFESSIONAL EXPERIENCE

Local Food Hub, Inc – Charlottesville, VA Executive Director | 08/2023 – 07/2024

Responsible for \$1M budget for a food system non-profit that supports small, independent, and BIPOC farmers, along with providing fresh food access to under-served, at-risk communities. Managed P&L responsibilities, evaluated comprehensive program functions, and directed operations including federal, corporate, and local foundation grant management; fundraising; staff recruitment; vendor contacts and program outcomes. Cultivated partner relationships, managed vendor and contractor relationships, and engaged with local organizational leaders. Conducted on-going strategic assessment of processes, implementing revamps for improved resource utilization. Reported to the governing Board of Directors, collaborated with the Executive Committee on leadership initiatives, board recruitment and financial decision-making. Assisted in the transition and dissolution of the organization, ensuring a smooth winding down of operations and compliance with all legal and financial requirements..

- *Served as a transitional change agent to reset organizational priorities, evaluate long-term financial viability, and assess programmatic impact.*
- *Provided operational guidance and recommendations to Board of Directors to enhance community programming and improve cash flow.*
- *Streamlined internal operations resulting in a 20% reduction in overall expenses.*
- *Spearheaded revision process of comprehensive strategic plan to better define the organization's identity, capacity, and donor impact.*

YMCA of Memphis & the Mid-South – Memphis, TN**Executive Director/Vice President of Nutrition Services | 07/2021 – 11/2022**

Held P&L responsibility for nutrition services program with \$8M budget serving appx. 41,000 children per week. Led organization of 60+ to manage all program functions, including operations, compliance, fundraising, marketing, logistics, and finance. Built and managed partner relationships. Represented program in the media and interacted with public officials. Negotiated and managed vendor contracts. Assessed and revamped processes and procedures. Generated and delivered reports to government and private stakeholders. Presented to CFO, CEO, and Board of Directors. Created training programs for internal and partner teams. Identified and took advantage of grants and other fundraising opportunities.

- *Transformed underperforming program into most successful YMCA program in US. Scaled operations from 20,000-41,000 meals per week within one year.*
- *Increased revenue 230% by establishing OKRs, defining vision for revenue outcomes, expanding geographical service location, and forming new community partnerships.*
- *Reduced program deficiencies from \$3M to less than \$2000 in one year by developing SOPs, documentation processes, and training programs to support both internal teams and partner organizations.*
- *Leveraged Salesforce to increase customer service response rate from 33% to 97%, enabling identification and resolution of ongoing service issues.*
- *Grew program funding sources from 60% YMCA-funded to 5% YMCA-funded while growing budget by building and managing relationships with grantors, donors, and government agencies.*

Medical Facilities of America – Roanoke, VA**Corporate Dietitian | 01/2018 – 06/2021**

Oversaw nutrition services across 5 facilities with appx. 700 beds. Acted as strategic advisor for dietitians, food service managers, and facility administrators. Evaluated and streamlined operations to improve efficiency and performance. Led training and onboarding for new dietitians. Liaised between employees in the field and corporate teams. Assessed and ensured compliance with KPIs and legal requirements, including clinician vetting requirements, documentation protocols, and monthly budget goals. Provided clinical assessment and nutrition therapy to patients as needed. Trained, mentored, and inspired teams in remote environment.

- *Improved compliance rating from 50% to 98% and decreased customer complaints by 32% by overhauling processes and procedures.*
- *Streamlined audit and documentation processes to improve compliance.*
- *Set goals/KPIs and defined roles and responsibilities.*
- *Initiated weekly business reviews and daily staff huddles to optimize communication.*
- *Created and revamped training modules for staff members.*
- *Reviewed and ensured clinical competence for all staff members.*

Manassas City Public Schools – Manassas, VA**Director, Food and Nutrition Services | 04/2013 – 07/2017**

Held responsibility for \$6M food and nutrition services program for public school district with 7,500 students. Served on school district executive cabinet and led strategic planning initiatives. Reviewed and ensured compliance with legal requirements. Partnered closely with school principals to obtain feedback and buy-in. Conceptualized and launched strategic initiatives to drive compliance and participation. Built and managed relationships with stakeholders and partners.

- *Achieved 100% deficiency-free audits throughout tenure. Overhauled cafeteria menu and revamped training programs to ensure alignment with Healthy, Hunger-Free Kids Act of 2010.*
- *Expanded participation 300% by training staff to interact with students in the lunch lines, launching marketing programs to expand community awareness, and implementing mobile application to streamline program services.*
- *Earned Food for Thought Award from First Lady of Virginia and Certificate of Excellence from Superintendent.*

Encore Healthcare – Columbia, MD**Corporate Director of Nutrition Services | 09/2011 – 12/2012**

Oversaw nutrition services programs across 25 long-term care facilities and nursing homes for healthcare start-up. Led organization of 35 cross-functional team members. Created and implemented staff training programs. Vetted credentials of dietitians. Participated in development of operational business plans. Identified and leveraged opportunities to improve patient outcomes, compliance results, and program efficiency. Established and streamlined operational policies and protocols. Implemented software programs to optimize operations. Reported to Vice President of Operations.

- *Improved client satisfaction and reduced costs by transforming corporate menu program to create consistency, decrease length of cycle menu, and utilizing vendor incentives.*

Early Experience:

Clinical Nutrition / Patient Services Manager, Compass Group (Hospital based)

Regional Director of Nutrition Services, Consulate Healthcare

Clinical Dietitian, Medical Facilities of America

CREDENTIALS | EDUCATION**Registered Dietitian | Certified Health Education Specialist**

Master of Arts (MA) in Health Studies | *University of Alabama* | Tuscaloosa, AL

Dietetic Internship | *Indiana University–Purdue University Indianapolis (IUPUI)* | Indianapolis, IN

Bachelor of Science (BS) in Nutrition and Dietetics, cum laude | *Messiah College* | Grantham, PA



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Name: Nelson H Cook Jr		Election <input checked="" type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other	
Mailing Address (including City, State, & ZIP) 5056 Venable Road Kents Store, VA 23084		Physical Address (if different)	
Years Lived in Fluvanna 1 Month	Cell Phone – preferred? [REDACTED]	Home Phone – preferred?	Email [REDACTED]
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience.): Currently director of preconstruction for construction company in Richmond Past chief estimator in Seattle, WA (2010 to 2020) Past US Navy SeaBee (1992 to 1997)			
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Chairman of Junior Builders Exchange (Rochester, NY) 2006 to 2008			
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Deacon Board Chairman, Puyallup Community Baptist Church (2015 to 2019)			
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: We are new to the county and I would like to serve our new community.			
Applicants are considered as vacancies occur and your application will be kept on file for three years. Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age or disability in employment or the provision of services. Submit by email (clerk@fluvannacounty.org) or mail to: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963 By signing below you are indicating that you have read and understand the attached Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.			
Applicant's Signature <i>(Typing name below serves as digital signature)</i>		Date 8/28/2020	

PLEASE INDICATE BELOW ANY BOARDS, COMMISSIONS, OR COMMITTEES ON WHICH YOU WISH TO SERVE.

X	Board, Commission, Committee
	Agricultural/Forestral District Advisory Committee
	Audit Committee
X	Board of Equalization (BOE)
X	Board of Zoning Appeals (BZA)
X	Building Code of Appeals Board
	Central Virginia Regional Jail (CVRJ) Authority
X	Columbia Task Force (CARE)
	Community Policy & Management Team (CPMT)
	Economic Development Authority (EDA)
	Economic Develop. & Tourism Advisory Council (EDTAC)
	Family Assessment and Planning Team (FAPT)
X	Finance Board
	Fluvanna Partnership for Aging Committee
	Fork Union Sanitary District (FUSD) Advisory Committee
	James River Water Authority (JRWA)
	JAUNT Board

X	Board, Commission, Committee (cont.)
	Jefferson Area Board of Aging (JABA) Advisory Council
	Jefferson Area Board of Aging (JABA) Board of Directors
	Library Board of Trustees
	Monticello Area Community Action Agency (MACAA)
	Palmyra Area Revitalization Committee (PARC)
X	Parks & Recreation Advisory Board
	Piedmont Virginia Community College (PVCC) Board
	Planning Commission
	Region Ten Community Services Board
	Rivanna River Basin Commission
	Social Services Board
	Thomas Jefferson Planning District Commission (TJPDCC)
	Thomas Jefferson Water Resources Protection Foundation
	Youth Advisory Council (YAC)
	OTHER:

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
6. This requirement shall apply to all boards, commissions, or committees listed on the attached application form, provided however, that if State or County Ordinance addresses attendance requirements in an alternative manner, such law shall prevail.

Office Use Only		
Application Received On:		Application Received By:
Acknowledgement Sent:		
Renewal Date:		Remarks:
Renewal Date:		
Renewal Date:		
Renewal Date:		

NELSON H COOK JR, LEED AP, ASSOC DBIA

PROFESSIONAL PROFILE

My experience has covered many delivery methods as well as project types. I have been responsible for management oversight as well as hands-on for all phases of a construction project estimate. Including coordinating estimators, subcontractors, and material vendors. I have a proven track record of ensuring estimates are completed on schedule and with accuracy.

- Excellent client facing skills to confirm goals are met and relationships maintained.
- Capable of effectively reviewing estimates for pricing, risks and take-offs.
- Diligent communication and coordination skills to allow for a total team "buy-in" approach during the preconstruction process.
- Exceptional ability in bid package development to reduce risk and provide complete analysis.
- Proven design management and leadership skills to safeguard all stakeholder's needs.
- Skilled at assessing current training and processes to ensure continuous improvement of personnel and procedures.
- Ability to analyze subcontractor and supplier proposals for thorough and complete project approach.
- Demonstrated leadership in both the preconstruction process and business wide.

PROFESSIONAL ACHIEVEMENTS

- Preconstruction Director leading team of 6 handling the preconstruction process for revenue greater than 300 million per year.
- Instituted project hand-off to ensure operations has complete and detailed information helping to ensure project goals are met.
- Established a historical cost data capture system to better predict project costs during client interactions and cost studies.
- Lead Estimator for progressive design build at International Arrivals Facility. Project measures over 500,000 sqft with a budget in excess of \$500,000,000.
- Awarded quarterly "Best Purchasing Process" for region while purchasing 16 trade packages with a value in excess of \$75,000,000.
- Standardized model-based take-off organization to allow for efficient evaluation of design changes allowing for quicker response and ability to better manage design decision process.
- Developed basis of design template for multi-family fixtures and finishes to allow for communicating level of quality to both subcontractors and client.
- Awarded 4.4 million in contracts from Aug '13 to Aug '14, an increase of over 200% from previous year.
- Built and maintained database thus reducing time expended for 2D take off by over 50%.
- Lead estimator for 135 million dollars negotiated GMP multifamily high rise.
- Lead estimator for reroofing project more than 900,000 sqft for major aerospace manufacturing company.
- Lead estimator for 14 million dollar negotiated GMP multifamily concrete/wood multifamily mid-rise construction.
- Standardized subcontractor "table sheets" to reduce tabulation and evaluation errors. Reduction was approximately 20%.

SKILLS

- Proficient in Sage 300 “Timberline” estimating software
- Associate DBIA
- LEED Accredited Professional
- Highly skilled in digital take-off software including On-Screen Takeoff and PlanSwift
- Administrator for Assemble Systems (model-based takeoff)
- Proficient user of Autodesk BIM 360

WORK HISTORY

DIRECTOR OF PRECONSTRUCTION, BREEDEN CONSTRUCTION, RICHMOND VA

July 2020 - Present

CHIEF ESTIMATOR, KATERRA/UEB BUILDERS, SEATTLE WA

October 2018 – July 2020

SENIOR ESTIMATOR, CLARK CONSTRUCTION GROUP, SEATTLE WA

September 2015 – October 2018

LEAD ESTIMATOR, ALUTIIQ LLC, TACOMA WA

August 2013 – September 2015

SENIOR ESTIMATOR, PCL CONSTRUCTION, BELLEVUE, WA

January 2012 – August 2013

SENIOR ESTIMATOR, ABSHER CONSTRUCTION, PUYALLUP, WA

October 2010 – January 2012

CHIEF ESTIMATOR, LECHASE CONSTRUCTION SERVICES LLC, ROCHESTER, NY

January 1999 - October 2010

PROJECT MANAGER / ESTIMATOR, ALLIED BUILDERS INC, BROCKPORT, NY

January 1996 - January 1999

ESTIMATOR, THE BELL CORPORATION, ROCHESTER, NY

January 1992 - January 1996

BUILDER, UNITED STATES NAVY, VARIOUS LOCATIONS

January 1987 - January 1992

EDUCATION

UNITED STATES NAVY “A” SCHOOL

Graduated technical school with a 3.8 evaluation and 3rd in a class of 60.

NORTH TONAWANDA HIGH SCHOOL

High school diploma

REFERENCES

AVAILABLE UPON REQUEST



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Patricia M Beers Block	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input checked="" type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provides dates of education and experience. You may also provide a resume/CV.): Please see attached document	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Please see attached document	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Please see attached document	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: Please see attached document	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

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	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

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In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature <i>(Typing name below serves as digital signature)</i> Patricia M Beers Block			Date 4/12/2025
Mailing Address (including City, State, & ZIP) 103 Island Hill Road Palmyra			Physical Address (if different)
Years Lived in Fluvanna 3	Phone # <div style="background-color: black; width: 100px; height: 1.2em;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 1.2em;"></div>
Office Use Only			
Application Received On:	4/12/2025	Application Received By:	
Acknowledgement Sent:	4/12/2025	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

Name, degree, and credentials: Patricia M. Beers Block, M.D.Ed, BS, BS

E-mail address: [REDACTED]

Recent Position (title): Lecturer, Rutgers The State University of New Jersey

Work Experience

Ms Beers Block's most recent employment was as an adjunct assistant professor and later, full time lecturer from 2010 through 2020 for Rutgers University, Biomedical and Health Sciences, School of Health Related Professions, developing and presenting courses for the School's Masters degree program in Clinical Trials Management. She also served as academic advisor for students in the Clinical Trial Science Trial Management specialty track, and for those students enrolled in the program's Capstone course. Ms. Beers Block left this position during the covid epidemic.

From February 2010-12, Ms. Beers Block served full time as Vice President of Regulatory Policy within the Regulatory Compliance Team for at Medidata Solutions Worldwide, a clinical research data management software company. In this capacity, Pat assisted Medidata in its understanding of local and international regulations related to GCP and electronic data capture. Pat served as a representative of Medidata to the DIA Program Committee charged with the writing and editing of its publication entitled "Computerized Systems in Clinical Research: Current Data Quality and Data Integrity Concepts" (published in 2011).

Prior to joining Medidata, Ms. Beers Block held increasingly more responsible positions during her career with the U.S. Food and Drug Administration (FDA). Starting as a field investigator in New Jersey, she had positions in multiple District offices as an Investigator, and Supervisory Investigator, Upon transferring to the FDA Center for Drug Evaluation and Research (CDER) in Maryland, she served as a Compliance Officer, and as the Office of Generic Drugs (OGD) Generic Drug Approvals Manager. Ms. Beers Block held the position as an Expert Consumer Safety Officer in the FDA Office of the Commissioner, engaging in national and international activities that relate to the conduct of clinical research on new drug products in humans.

During her tenure with FDA, Pat acquired extensive knowledge of the regulations, policies, inspectional program, and regulatory review process governing investigational drugs and drug development/manufacturing. Highlights of Ms. Beers Block's FDA career included serving as the Part 11 co-chair from 2009-2010; coordinating the development and publication of FDA's guidances entitled "Computerized Systems Used in Clinical Investigations", and the "Statement of the Investigator (FDA Form 1572)"; and developing and presenting training programs on conducting clinical research in humans, and developing clinical research policies to regulatory authorities throughout the world (Costa Rico, Viet Nam, China, United Kingdom).. Ms. Beers Block served as the Quality Assurance representative for U.S. FDA's Institutional Review Board (IRB), conducting training programs for FDA staff, and investigations on behalf of the IRB while working in the Office of the Commissioner.

Ms. Beers Block is presently retired from full-time employment.

Education

Ms. Beers Block graduated with honors from Rutgers University with a BS in Biological Sciences, from the University of Maryland University College with a BS in Computer Management and Information Science, and from the University of Maryland with a Masters degree in Distance Education. Ms. Beers Block is a lifetime member of the Phi Kappa Phi Honor Society.

Awards

Ms. Beers Block received the *Distinguished Career Service Award* from FDA upon her retirement. This supplements the many awards she received throughout her career for outstanding service to FDA.

Ms. Beers Block was certified by the Society of Clinical Research Associates (SOCRA) as a Clinical Research Professional (CCRP), and served as a Director on the SOCRA Board of Directors from 2015-2018, and Secretary of the SOCRA Board of Directors from 2018-2020. Ms. Beers Block continues to present workshops at SOCRA's Annual Conference, a conference that regularly provides up to date regulatory information to over 1,000 attendees, SOCRA is a professional organization that has over 15,000 members whose interests focus on conducting clinical research in humans in a legally compliant manner.

Volunteer Activities

Ms. Beers Block continues to be a regular contributor to programs developed by the Society of Clinical Research Associates (SOCRA), contributing to its annual program that typically enrolls over 1000 attendees..

She volunteered to serve as Treasurer for the Anne Arundel Beekeepers Association (AABA) from 2013-2016. She was a beekeeper from 2010-2022. .

Ms. Beers Block is currently certified as a Charlottesville Area Tree Steward (CATS) and is an active volunteer in the maintenance of Charlottesville area tree canopy through tree planting, tree pruning, and participates in tree educational walks for this organization.

She organized and manages an "Adopt a Spot" volunteer group from the Island Hill community that helps to maintain the Brush Arbor trail and the Burke Heights Loop trail in Fluvanna's Pleasant Grove Park;

Ms. Beers Block is a graduate of the Fluvanna Leadership Development Program (FLDP, Class of 21), a current FLDP Steering Committee Representative, and a Board Representative for the Fluvanna Leadership Alumni Group (FLAG). Her work on the FLDP Steering Committee includes helping with the annual training program offered by FLDP as well as serving as a mentor for FLDP students engaged in a unique class project that will enhance Fluvanna County in some manner.

She serves as an assistant trainer at AKC dog training courses (Rally) offered at the Richmond Dog Obedience Club (RDOC) in Henrico VA (2023 to the present) and regularly volunteers to support Rally and Obedience Trials that are offered by RDOC throughout the year. In December 2025, Ms. Beers Block will serve as the Rally Trial Chairperson for the trial offered by RDOC at that time. ,

Ms. Beers Block developed and presented information at the monthly in-person Star Gazing program that was offered at Pleasant Grove Park from 2023-2024. Due to erratic weather patterns and the

inability to star gaze in open field at the front of PGP, this program was temporarily halted. In the meantime, she authors the “Star Gazing in Fluvanna” article that is published monthly in the Fluvanna Review community paper, This activity started in Dec 2023 and has continued throughout 2024 and 2025.

She is a current member of the Island Hill Board of Directors, serving on the Island Hill Architectural Review Board. Submissions for exterior structural modifications from residents within this community are reviewed, evaluated under the IH Property Owners Association Bylaws, and approved/denied based on compliance with the community bylaw requirements.

Ms. Beers Block completed the Fluvanna Masters Gardener (FMG) program in April and now serves as an intern for the Fluvanna chapter. Upon completing 50 service hours with FMG, she will become an official Fluvanna Master Gardener. To this end, Ms. Beers Block has engaged in internship projects including working in the Butterfly Garden at Pleasant Grove Park, volunteering for the FMG Continuing Education programs offered at the Fluvanna Public Schools, and participating in the Fluvanna Library Help Desk project. Her internship is planned to be completed at the end of 2025.

REASONS FOR WANTING TO SERVICE FLUVANNA COUNTY:

I am interested in serving on the Fluvanna Parks and Recreation Advisory Board for a number of reasons, the most important being my desire to serve in an advisory capacity and as an active member in development, implementation, and refinement of these various projects. Since moving to Fluvanna County in 2022, I have found the Pleasant Grove Park to be a real treasure within Fluvanna County that offers many exciting opportunities for activities such as horseback riding, trail walks, trail maintenance, sporting events, historic buildings and treasures, live music programs, carnivals, and the great County fair that are loved by both county and VA residents and visitors alike. Beyond Pleasant Grove Park, Parks and Rec successfully manages the community center and a variety of sporting fields throughout the County, bringing fun activities to county residents of all ages.

I would be honored to contribute to the continuing success of these programs and activities, as well as contribute to future projects that might arise. Through my career and volunteer activities, I have worked to enhance my leadership abilities, and hope that these skills might be of use to the County in my service to the Parks and Rec Advisory Board.

My aspirations are to provide more of my time to ongoing projects and collaborate with the Advisory Board and Fluvanna residents in the creation of new projects and activities which will enhance residents and visitors' enjoyment of all of the County Parks and Rec facilities and programs. Being a member of the Advisory Board will enable me to serve Fluvanna county in a manner that meets these aspirations.



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Raghvendra Singh	Election <input type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input checked="" type="checkbox"/> Rivanna <input type="checkbox"/> Other
<p>EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.):</p> <p>From 6/1989 through 4/2019 I have worked in US Department of Agriculture (Farmers Home Administration/ Farm Service Agency. I have worked from county office through national office, as assistant county supervisor, county supervisor, Farm Loan Manager and National Manager. I have implemented farm loan programs to many counties in New Jersey and Virginia including Fluvanna County. In national office I have implemented GIS program, Freedom to eFile act, and Government paper elimination act. Since 2001 through 2019, I was national manager for eAuthentication and eFile.</p> <p>Education: BS Honors Agriculture 1977 Kanpur University, UP India MBA 1986 University of New Haven, CT USA I have completed many government sponsored courses related to management, Agriculture Development, Conservation</p>	
<p>CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES:</p> <p>In US Department of Agriculture, I was member of many Committees including EEO, Strategic Planning, E-Government Etc.</p> <p>I am also a member of the Economic Development Authority and a Member of the Fluvanna County Rotary Club.</p>	
<p>CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates):</p> <p>I advise agriculture colleges in education matters in India. I manage Kulbaskar Astram Degree Collage, Krish Sansar, Agriculture Graduate web sites to disseminate ag information to public.</p>	
<p>REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY:</p> <p>I have invested most of my life to serve public; I want to continue public service to my home county.</p>	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
6. This requirement shall apply to all boards, commissions, or committees listed on the attached application form, provided however, that if State or County Ordinance addresses attendance requirements in an alternative manner, such law shall prevail.

**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
X	Agricultural/Forestral District Advisory Committee	X	Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)	X	Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council	X	Thomas Jefferson Planning District Commission (TJPDC)
X	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
X	Economic Development Authority (EDA)		Library Board of Trustees		Comprehensive Plan - Historic Preservation
X	Economic Develop. & Tourism Advisory Council (EDTAC)	X	Monticello Area Community Action Agency (MACAA)	X	Comprehensive Plan - Rural Preservation
	Family Assessment and Planning Team (FAPT) – Parent/Family Rep & Vendor Rep	X	Parks & Recreation Advisory Board (RAB)		Comprehensive Plan - Housing
					Comprehensive Plan - Economic Development

Submit by email (clerk@fluvannacounty.org) or mail to:

County of Fluvanna, Attention: Clerk, Board of Supervisors, PO Box 540, Palmyra, VA 22963

By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature Raghvendra Singh		Date March 30, 2021	
Mailing Address (including City, State, & ZIP) 5 Barkley Ln Palmyra, VA 22963		Physical Address (if different)	
Years Lived in Fluvanna 25	Phone # <div style="background-color: black; width: 100px; height: 20px;"></div>	Alternate Phone #	Email Address <div style="background-color: black; width: 150px; height: 20px;"></div>

Office Use Only

Application Received On:	12/30/2024	Application Received By: Margie Bamford
Acknowledgement Sent:		Remarks:
Renewal Date:		
Renewal Date:		
Renewal Date:		
Renewal Date:		



APPLICATION TO SERVE ON BOARDS/COMMISSION/COMMITTEES

County of Fluvanna

Applicants are considered as vacancies occur and your application will be kept on file for three years.

Fluvanna County does not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in employment or the provision of services. Before completing the application, please review the membership requirements for the Board, Commission, or Committee for which you are interested. Applicants who do not meet membership requirements will not be put forward for consideration.

Name: Walter Hussey	Election <input checked="" type="checkbox"/> Columbia <input type="checkbox"/> Cunningham <input type="checkbox"/> Fork Union District: <input type="checkbox"/> Palmyra <input type="checkbox"/> Rivanna <input type="checkbox"/> Other
EXPERIENCE/PROFESSIONAL EXPERTISE/EDUCATION (Please provide dates of education and experience. You may also provide a resume/CV.): BS in Physics and Math 1970 Certified Master Gardener (2013), Master Naturalist (2014), Charlottesville Area Tree Steward (2017) Deputy Chief Engineer, etc. NASA (2002- 2007) Engineering Director, Nuclear Submarines, etc US Navy (1986 - 2002)	
CURRENT OR PRIOR SERVICE ON BOARDS/COMMISSIONS/OR COMMITTEES: Parks and Recreation Advisory Board	
CIVIC ACTIVITIES AND MEMBERSHIPS (Roles with fraternal, business, church, or social groups – please provide dates): Fluvanna Master Gardeners (2014 - Present) Rivanna Master Naturalists (2015 - Present) Charlottesville Area Tree Stewards (2017 - Present) Cunningham UMC, Finance Chair (204 - Present)	
REASON(S) FOR WANTING TO SERVE FLUVANNA COUNTY: Continue work begun in 2014 to make Pleasant Grove Park a Natural Experience for our citizens and visitors by advising Fluvanna Parks on nature programs and experiences including trails, wildlife meadows, hikes, summer activities, monthly hikes, etc	

Fluvanna County Board, Committee, and Commission Attendance Policy

(Approved June 17, 2015)

1. BCC members shall attend at least two-thirds of all scheduled meetings in each calendar year while serving.
2. The Chairperson of the board, commission, or committee shall notify the Clerk to the Board of Supervisors of any absences exceeding this policy.
3. The Clerk shall report these findings to the Board of Supervisors, typically in closed session.
4. Appointees who do not meet the attendance requirement without a valid reason(s) may be deemed to have rendered an implied resignation of that appointment.
5. The Board may choose to accept the resignation and appoint another person to fill the appointed position. The Board may also override the implied resignation and extend the appointment, if extenuating circumstances so dictate.
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**PLEASE INDICATE BELOW THE BOARDS, COMMISSIONS, OR COMMITTEES (BCC)
ON WHICH YOU WISH TO SERVE.**

X	BCC	X	BCC	X	BCC
	Agricultural/Forestral District Advisory Committee		Finance Board		Piedmont Virginia Community College (PVCC) Board
	Board of Equalization (BOE)		Fluvanna Partnership for Aging Committee (FPA)		Planning Commission (PC)
	Board of Zoning Appeals (BZA)		Fork Union Sanitary District (FUSD) Advisory Committee		Region Ten Community Services Board
	Building Code of Appeals Board		James River Water Authority (JRWA)		Rivanna River Basin Commission
	Central Virginia Regional Jail (CVRJ) Authority		JAUNT Board		Social Services Board
	Columbia Task Force (CARE)		Jefferson Area Board of Aging (JABA) Advisory Council		Thomas Jefferson Planning District Commission (TJPD)
	Community Policy & Management Team (CPMT)		Jefferson Area Board of Aging (JABA) Board of Directors		Thomas Jefferson Water Resources Protection Foundation
	Economic Development Authority (EDA)		Library Board of Trustees		
	Economic Develop. & Tourism Advisory Council (EDTAC)		Monticello Area Community Action Agency (MACAA)		
	Family Assessment and Planning Team (FAPT)	X	Parks & Recreation Advisory Board (RAB)		

Submit by email (clerk@fluvannacounty.org) or mail to:

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By signing below you are indicating that you have read and understand the Fluvanna County BCC Attendance Policy and that you agree to abide by the Bylaws of any Board, Commission, or Committee to which you may be appointed.

In accordance with Virginia Code §2.2-3705.1, by submitting this application, it is presumed that you are providing your personal contact information to be used for communicating with the County, and unless otherwise indicated by you, your personal contact information will not be shared publicly.

Applicant's Signature WDHussey <i>(Typing name below serves as digital signature)</i>		Date 5-9-2022	
Mailing Address (including City, State, & ZIP) 334 Bybee Estates Ln Palmyra, VA 22963		Physical Address (if different)	
Years Lived in Fluvanna 10	Phone # [REDACTED]	Alternate Phone #	Email Address [REDACTED]
Office Use Only			
Application Received On:	5-9-2022	Application Received By:	
Acknowledgement Sent:	5-9-2022	Caitlin Solis	
Renewal Date:		Remarks:	
Renewal Date:			
Renewal Date:			
Renewal Date:			

FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT

TAB B

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Fork Union Water Supply System Preliminary Engineering Report				
MOTION(s):	N/A				
BOS WORKPLAN?	Yes	No	If yes, list item(s):	C9	
	X				
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
			X		
STAFF CONTACT(S):	Eric Dahl, County Administrator and Matt Mitchell, Utility System Manager				
PRESENTER(S):	Brett Heim, Dewberry Engineers				
RECOMMENDATION:	Approve				
TIMING:	Routine				
DISCUSSION:	<ul style="list-style-type: none"> Virginia Electric and Power Company (VEPCO) received a Special Use Permit (SUP) and Conditional Rezoning approval on June 25, 2021 to construct a lined sanitary landfill in order to dispose of the Coal Combustion Residuals (CCR) on the property adjacent to the former Bremono Power Station, which could affect existing ground water wells within a 1.5 mile radius of the Power Station, including two Fork Union Sanitary District (FUSD) wells and private wells. Because of the potential impact to the use of FUSD public water system wells, Fluvanna County will need to construct a new water supply system and allow the affected areas to access this system if they choose to. As part of the SUP and Conditional Rezoning approval, VEPCO proffered \$47,148,330 for these water supply improvements. The raw water source for this new Fork Union Water Supply System will come from the County's portion of water from the James River Water Authority system. The County entered into a project agreement with our engineers Dewberry to begin the water supply system evaluation with a Preliminary Engineering Report, which will evaluate and provide recommendations for a proposed water system to provide a safe and reliable potable water source for residents and businesses within FUSD. This presentation will summarize of the findings of the Preliminary Engineering Report, discuss the Value Engineering Executive Summary to review cost saving measures to meet the Dominion Energy proffer amount of \$47M and discuss next steps. 				
FISCAL IMPACT:	N/A				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				

ENCLOSURES:	<ul style="list-style-type: none">• Fork Union Water Supply System Preliminary Engineering Report• Addendum to the Fork Union Water Supply System Preliminary Engineering Report				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
					X

REFERENCE NO.

FORK UNION WATER SUPPLY SYSTEM

Preliminary Engineering Report

MAY 2025



SUBMITTED BY
Dewberry Engineers Inc.
4805 Lake Brook Drive, Suite 200
Glen Allen, VA 23060
804.205.3346

SUBMITTED TO
Fluvanna County
P.O. Box 540
132 Main Street
Palmyra, VA 22963
434.591.1910

FINAL

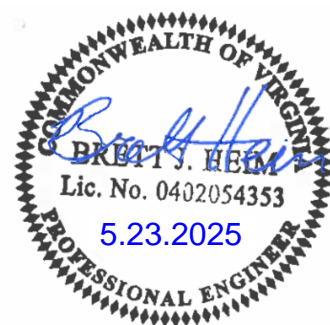


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Appendix B – Water Treatment Conceptual Figures

Appendix C - Chemical Feed Calculations

Appendix D - Finished Water Pump Selections

Appendix E - Raw Water Pump Station Pump Selections

Appendix F - Raw Water Pump Station Conceptual Figures

Appendix G – Elevated Water Storage Tank Conceptual Figures

Appendix H - Opinion of Probable Construction Costs

Appendix I – Net Present Worth Cost Analysis

Appendix J – PFAS Sampling & Testing Results

Appendix K – VDH Comment & Responses

1. Introduction

1.1 Project Background

In July 2021, the Virginia Electric and Power Company (VEPCO) received a Special Use Permit (SUP) and Conditional Rezoning approval to construct a lined sanitary landfill for disposal of Coal Combustion Residuals (CCR) on the property adjacent to the Bremono Power Station located in Southern Fluvanna County, Virginia. This disposal of CCR will affect existing ground water wells within a 1.5-mile radius of the landfill, including any existing private wells and two (2) existing public well facilities located within Fluvanna County's (County) Fork Union Sanitation District (FUSD). In order to mitigate the effects of CCR disposal within this 1.5-mile radius, the County wants to construct a new water supply system that will provide a safe and reliable drinking water source for residents and businesses within this area. As part of the SUP and Conditional Rezoning approval, VEPCO proffered funds for these water system improvements. The location of the new landfill and the affected 1.5-mile area is shown in **Figure 1.1**.

1.2 Proposed System Components

The new water supply system will pull water from the James River by connecting to the James River Water Authority (JRWA) raw water main, which is currently under construction and is expected to be complete in 2026. Once connected to the JRWA raw water main, the proposed water supply system will include the following components:

- Raw Water Pump Station (RWPS) and 1-million-gallon (MG) Raw Water Ground Storage Tank (GST)
- Raw Water Transmission Main from the RWPS to the new Water Treatment Plant (WTP)
- 1.0 million gallon per day (MGD) WTP, expandable to 1.5 MGD
- Finished Water Distribution Mains, including serving areas within the 1.5 mile buffer area
- 0.5 MG Elevated Water Storage Tank (EST)

1.3 Preliminary Engineering Report Purpose

The County contracted with Dewberry Engineers Inc. (Dewberry) to evaluate and provide recommendations for the proposed supply water system and to prepare a Preliminary Engineering Report (PER) to summarize the results of the evaluation. The scope of work included the following:

- New Water Treatment Plant
 - Obtain and evaluate raw water quality data of the James River at the withdrawal location.
 - Determine treatability goals and evaluate options for treatment processes for the new WTP based on the raw water quality data.
 - Collect raw water samples from the JRWA raw water withdrawal location and complete bench scale testing to determine effectiveness of various treatment processes.
 - Develop preliminary process flow diagrams, process calculations, and conceptual site layouts for each treatment process.
 - Provide preliminary equipment selection and sizing for each treatment process.
 - Identify potential locations for the WTP site.
 - Evaluate residuals disposal options for each treatment process and WTP site option.
 - Develop an opinion of probable construction costs (OPCC) and life cycle cost estimate.
- Raw and Finished Water Distribution System
 - Determine preliminary size and configuration of the connection to the JRWA raw water main, raw water storage tank, booster station and transmission main for each treatment plant location alternative.
 - Determine preliminary size and configuration of the high service pump station at the WTP and finished water transmission main for each treatment plant location alternative.
 - Evaluate potential locations for the EST and evaluate distribution main sizing, water age and quality, domestic pressures and fire flow availability for each location.
 - Provide recommendations on how to combine the proposed new water system into the existing FUSD water distribution system.
 - Develop an OPCC and life cycle cost estimate for the raw and finished water systems

2. Existing Facilities

The existing FUSD water system (Permit No. 2065300) serves primarily residential customers but also includes some commercial and industrial customers and is permitted for 370,400 gpd. The existing water distribution system, shown in **Figure 2.1**, consists of the following components:

- Six (6) public groundwater well facilities with a permitted capacity of 370,400 gpd
- Two (2) elevated storage tanks (total capacity of 0.41 MG)
- Two (2) water treatment facilities for iron and manganese removal (Omohundro and Morris)
- Approximately 26 miles of primarily PVC waterlines, ranging in size from 4 inch to 8 inch

2.1 Existing Well Facilities

The existing FUSD water system includes six (6) public groundwater well facilities with a permitted capacity of 370,400 gpd. The Carysbrook well has been taken out of service due to poor groundwater quality. The six (6) wells that are in service are:

- Bremono Well
- Melton Well
- Morris Well
- Omohundro Well
- Owens Well
- West Bottom Well

Each well and pumping facility is controlled by the water elevation in the Omohundro EST. The design flow or permitted well yield, equivalent residential connection (ERC), and design head for each facility is outlined in **Table 2.1** below based on the January 1999 Virginia Department of Health (VDH) Engineering Description Sheet (EDS).

Table 2.1 Existing FUSD Well and Pumping Facilities

Facility Name	Design Flow or Well Yield ¹ (gpm)	ERCs	Design Head (ft)
Bremno	30	60	120
Melton	64	128	Unknown
Morris	165	330	200
Omohundro	123	246	150
Owens	45	90	150
West Bottom	36	72	175
TOTAL	463	926	-

¹The lower of the design flow or well yield governs.

The system is permitted based on the assumption of 400 gpd per ERC for a total of 370,400 gpd.

2.2 Elevated Storage Tanks

As outlined above, the existing FUSD water system includes two (2) elevated storage tanks. These tanks are located at two of the existing well facilities. **Table 2.2** below summarizes the existing ESTs in the FUSD water distribution system.

Table 2.2 Existing FUSD Elevated Storage Tanks

Tank	Tank Type	Capacity (gal)	Tank Height (ft)	Overflow HGL (ft)
Omohundro	Mutli-Column Steel	310,000	92	584
Weber City	Mutli-Column Steel	100,000	92	584

2.3 Existing System

The existing FUSD water distribution system consists of approximately 23.7 miles of waterlines inside the FUSD boundary ranging in size from 4 inches to 8 inches. FUSD and Carysbrook are connected through a 6-in PVC pipeline running for approximately 2.5 miles extending outside of the FUSD boundary. Most of the pipe within the existing system is between 40 and 55 years old and is primarily made up of PVC pipe.

2.4 Existing System Evaluation

The current FUSD system operates as one pressure zone and has a maximum daily demand (MDD) of approximately 295,000 gpd. **Figure 2.2** shows the existing system peak hour demand (PHD) system pressures. Existing system pressure range from 47 psi to over 110 psi. **Figure 2.3** shows the existing system available fire flow. Existing available fire flow ranges from under 200 gpm at the ends of the system to over 1,000 gpm near the elevated tanks.

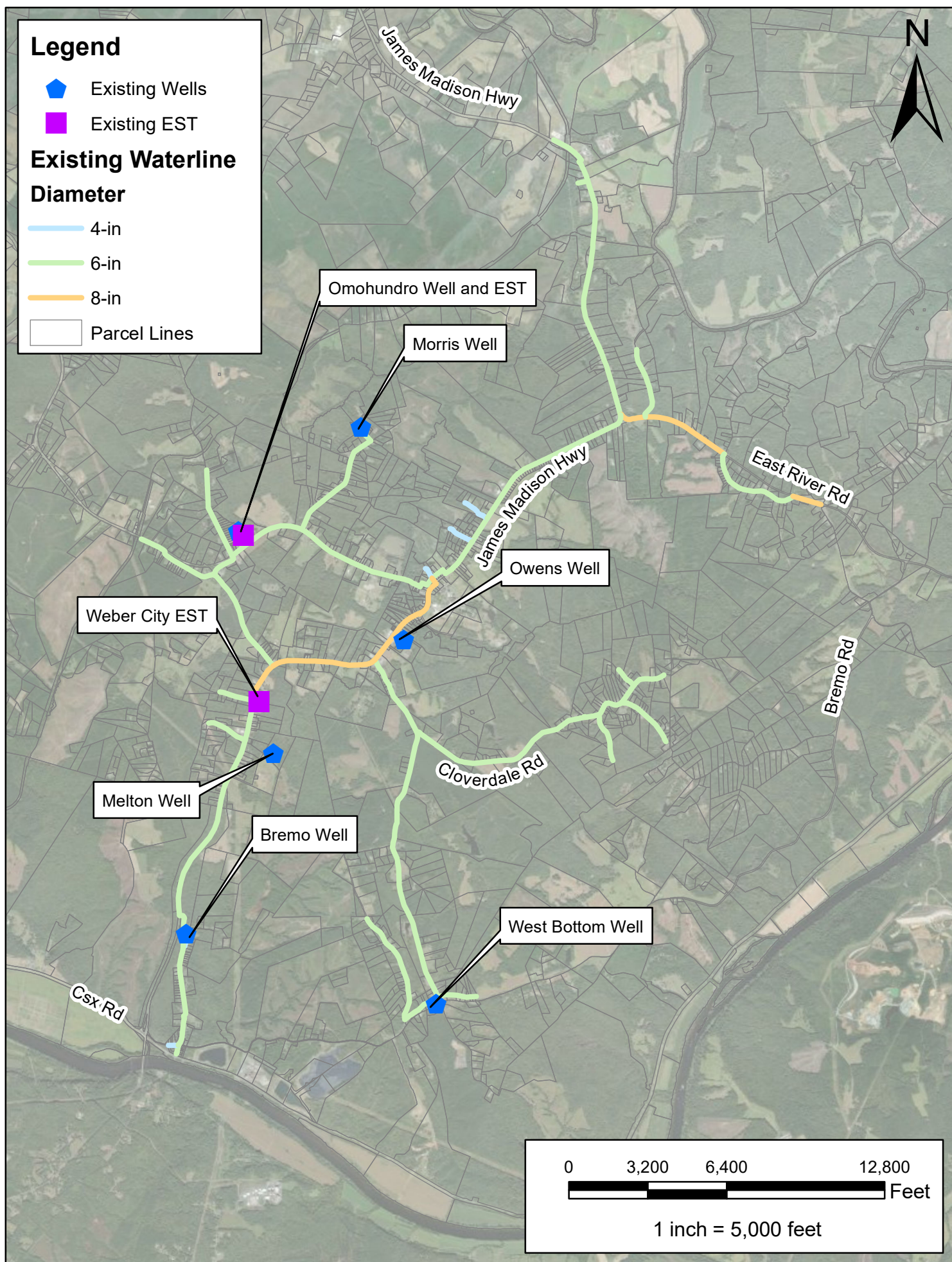


Figure 2.1 - Existing FUSD Water Supply System

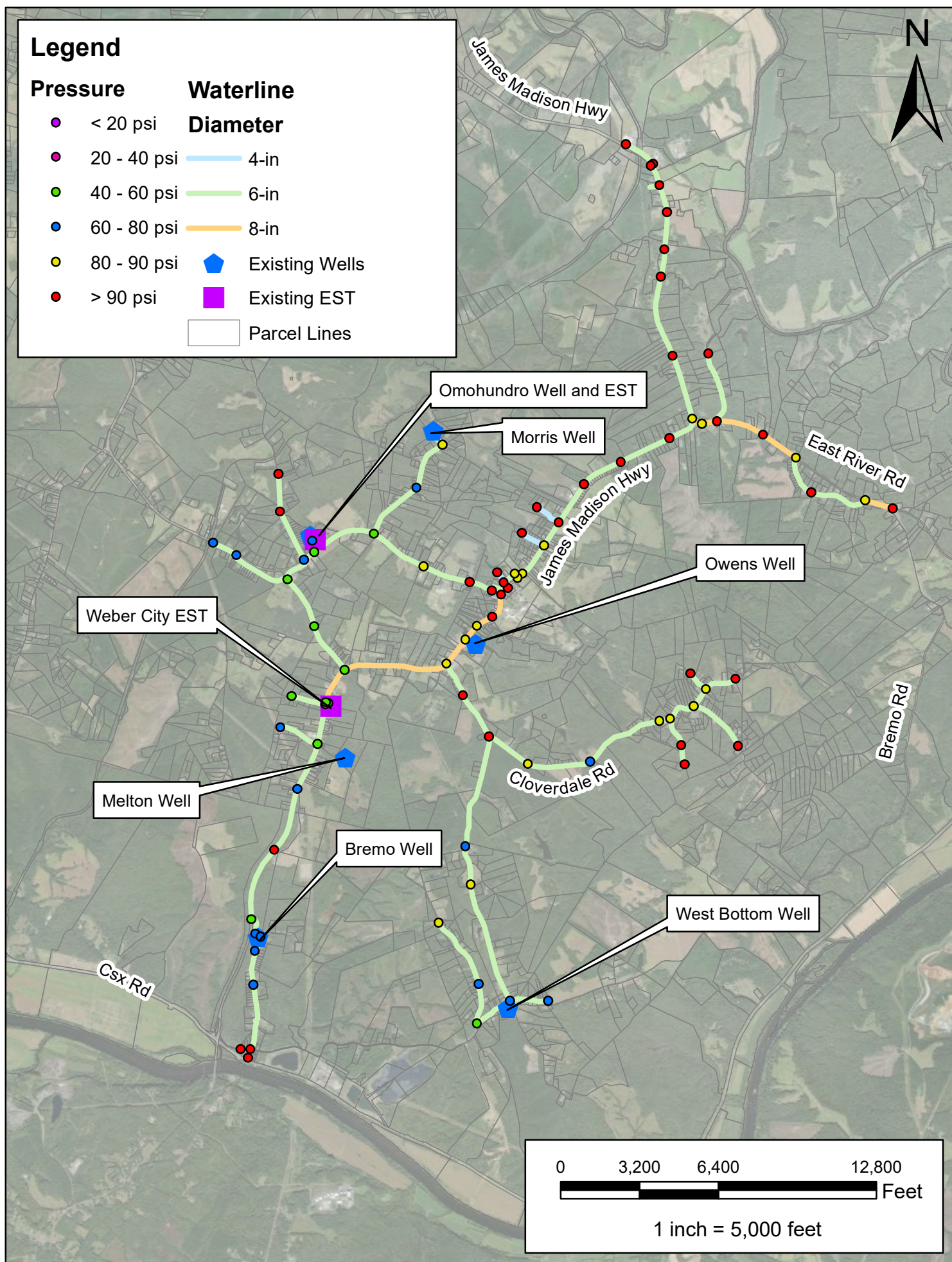


Figure 2.2 - Existing Peak Hour Demand System Pressures

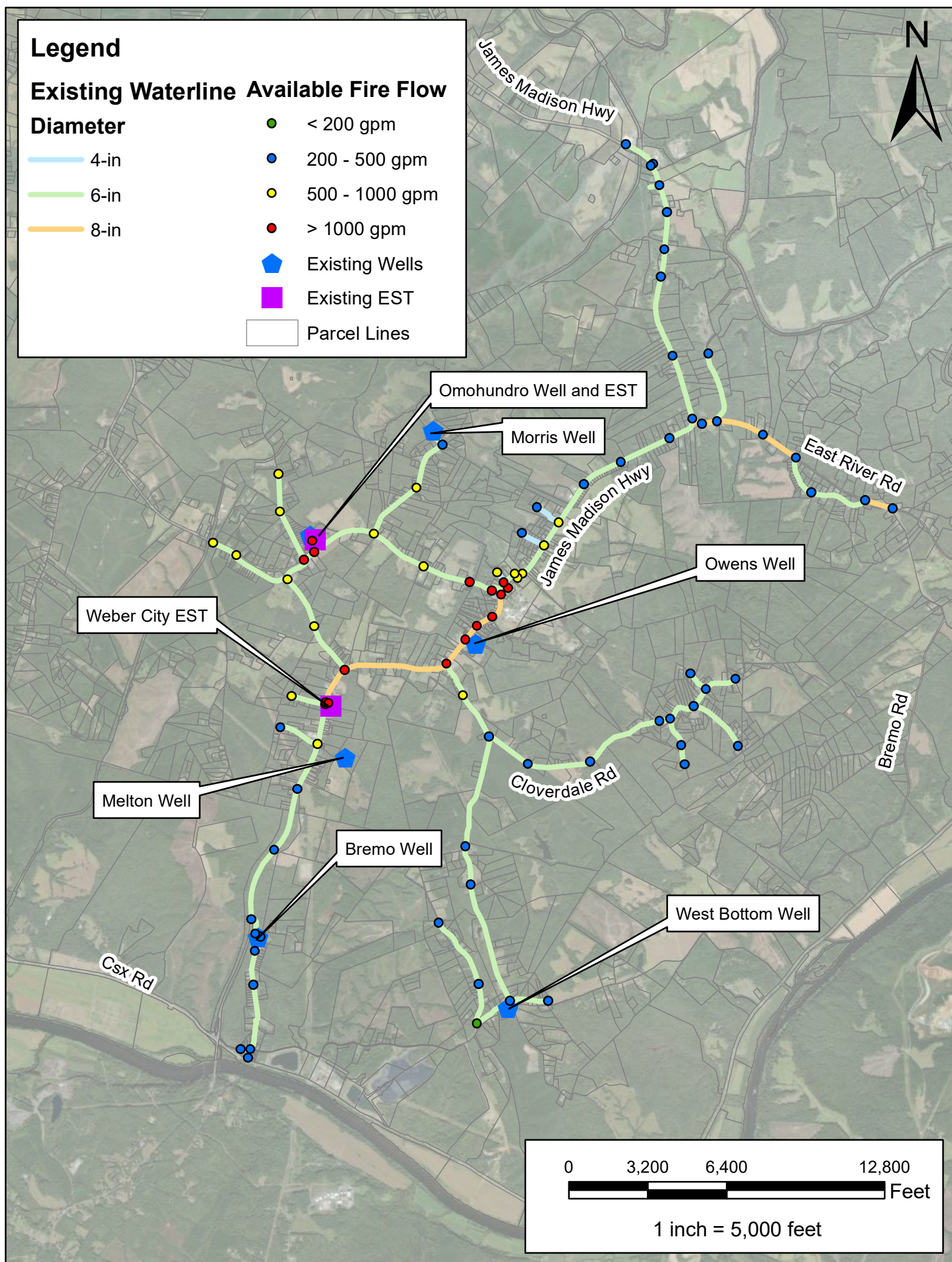


Figure 2.3 - Existing System Available Fire Flow

3. Future Water Demands

The 2022 Fluvanna County Utility Master Plan (UMP) outlined the anticipated future demand projections for the FUSD. In order to properly size each component of the proposed upgrades to the Fork Union water supply system, these demand projections were updated to include demands from the new connections within the 1.5-mile radius affected by the VEPCO CCR landfill. 148 new connections were added at 350 gpd per residence (consistent with the 2022 UMP) for a total of 51,800 gpd of added average daily demand. The existing and future system demands are shown in **Table 3.1** below.

Table 3.1 Existing and Future FUSD System Demands

Demand Scenario	Added ADD (gpd)	Cumulative ADD (gpd)	Cumulative MDD (gpd)
Existing Demand	135,759	135,759	271,518
New Connections within 1.5-mile Radius	51,800	187,559	375,118
0 – 5 Year Anticipated Residential Buildout	101,063	288,622	577,244
5 – 10 Year Anticipated Buildout	33,030	321,652	643,304
Industrial Demand	856,696	1,178,348	1,500,000

A maximum day peaking factor of 2.0 was used to calculate the maximum daily demand for each time step. The County is interested in industrial growth in the area and plans to set aside excess WTP capacity for industrial uses. The WTP is anticipated to have an ultimate design capacity of 1.5 MGD. After the 5 – 10-year anticipated buildout this allows for an additional 856,696 gpd of capacity. The maximum day peaking factor was not applied to this industrial demand. A map showing the future demand locations for each timestep as well as new water users that are currently on private wells is shown in **Figure 3.1**.

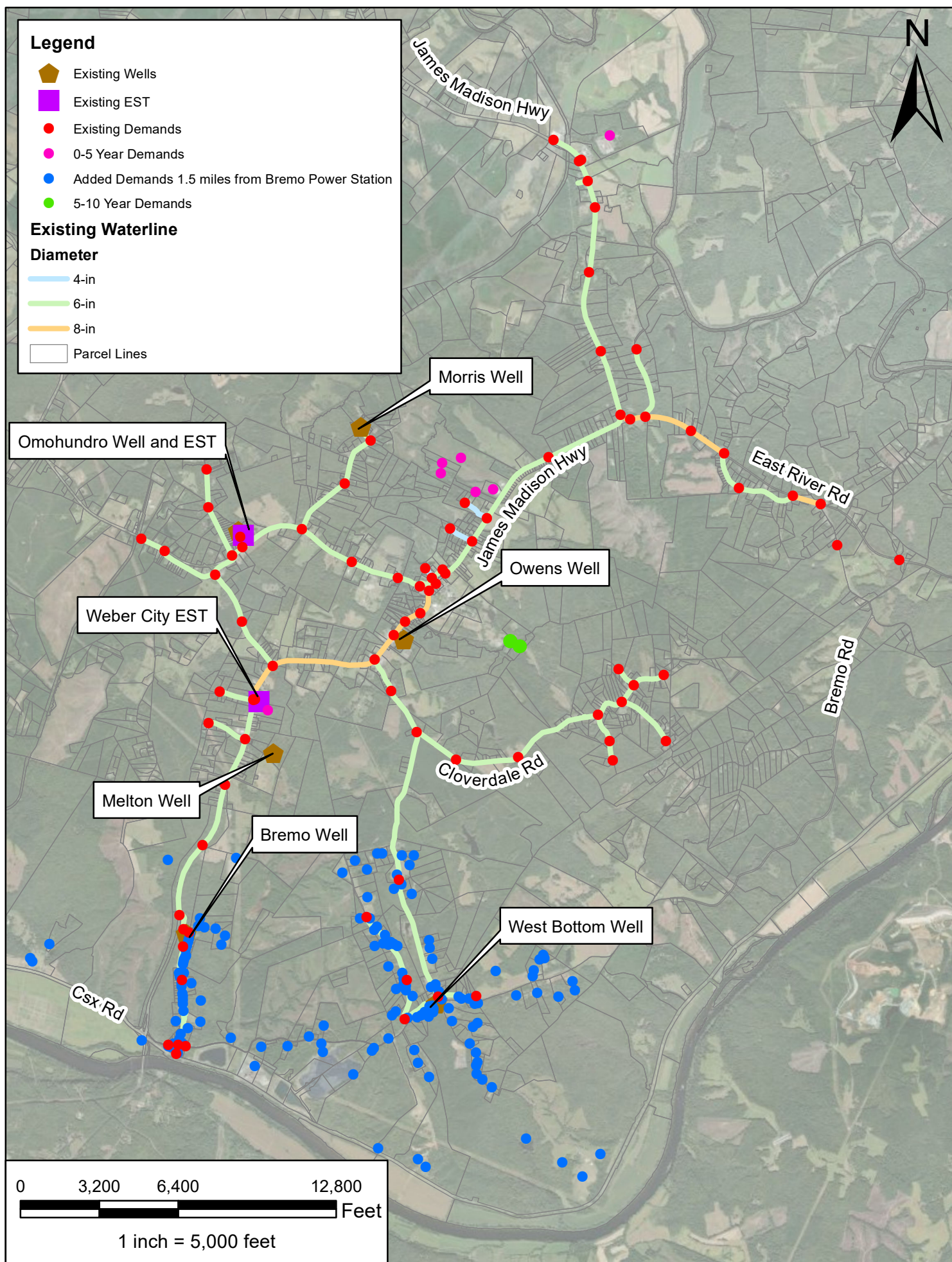


Figure 3.1 - Demand Locations (by timestep)

4. Raw Water Quality Data

The proposed FUSD raw water distribution system will pump surface water from the James River through the JRWA raw water transmission main that is currently under construction. In order to evaluate the raw water quality for the proposed Fork Union water supply system, Dewberry collected and reviewed raw water quality data from the County and other municipalities with surface water treatment facilities nearby. The raw water data collected for the evaluation included 2 years (2022-2023) of data from the following facilities:

- Omohundro Well Facility
- Morris Well Facility
- Department of Corrections James River WTP
- Henrico County WTP
- USGS James River Cartersville Gauge

The evaluation of raw water quality was limited by the available data and parameters measured at each of these facilities. The parameters evaluated for the raw water at the proposed intake point included the following:

- pH
- Temperature (°C)
- Turbidity (NTU)
- Total Organic Carbon (TOC) (mg/L)
- Alkalinity (mg/L)
- Hardness (mg/L)
- Iron (mg/L)
- Manganese (mg/L)

The data for each parameter listed above was collected and evaluated to determine contaminant levels in the source water which dictated which treatment processes and chemical dosages are required at RWPS and WTP. The data for each parameter is summarized in the graphs shown in **Figure 4.1** through **Figure 4.6**.

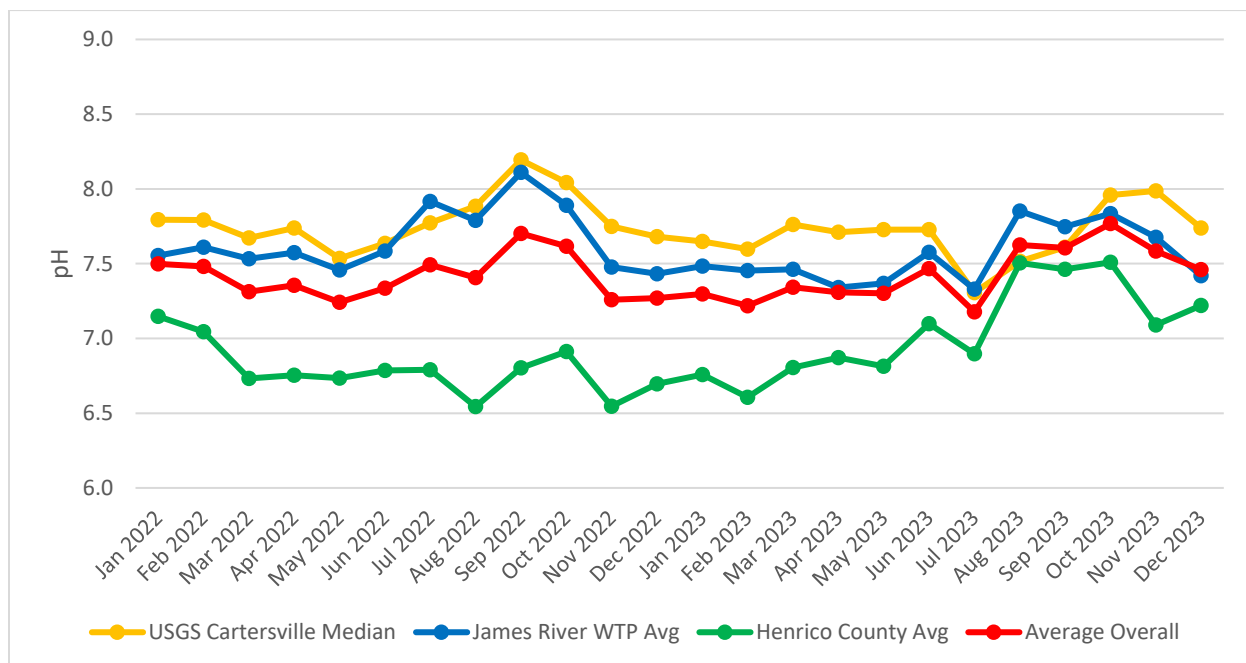


Figure 4.1 Raw Water Quality Graph – pH

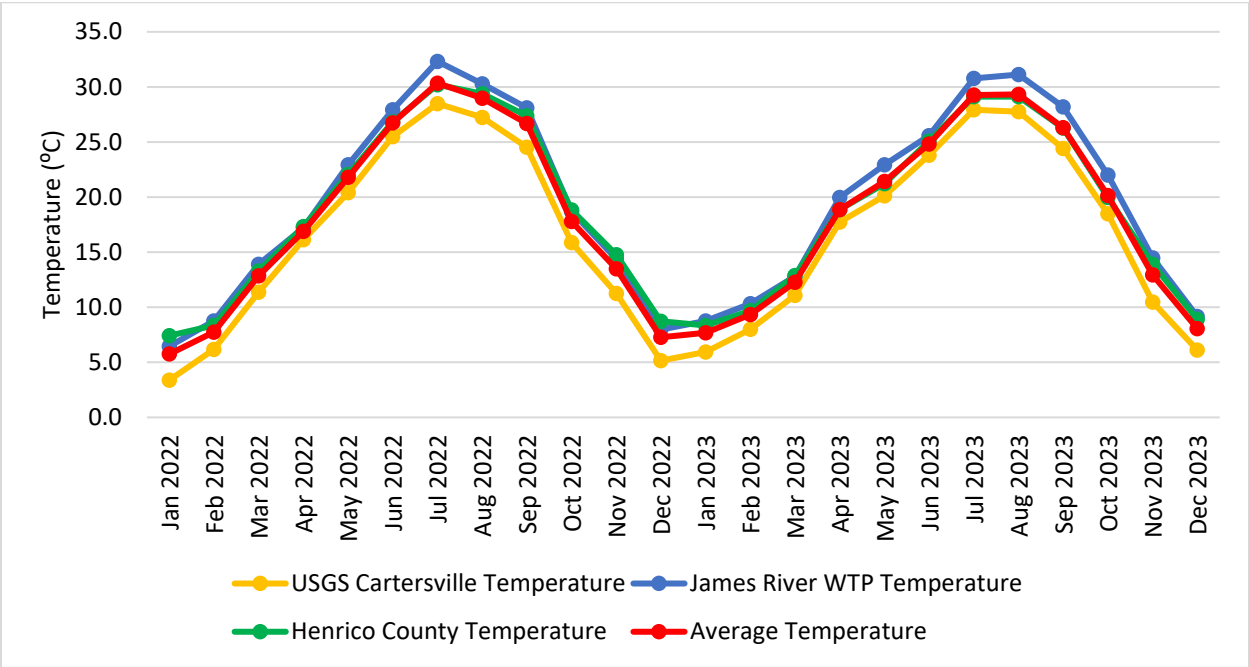


Figure 4.2 Raw Water Quality Graph – Temperature

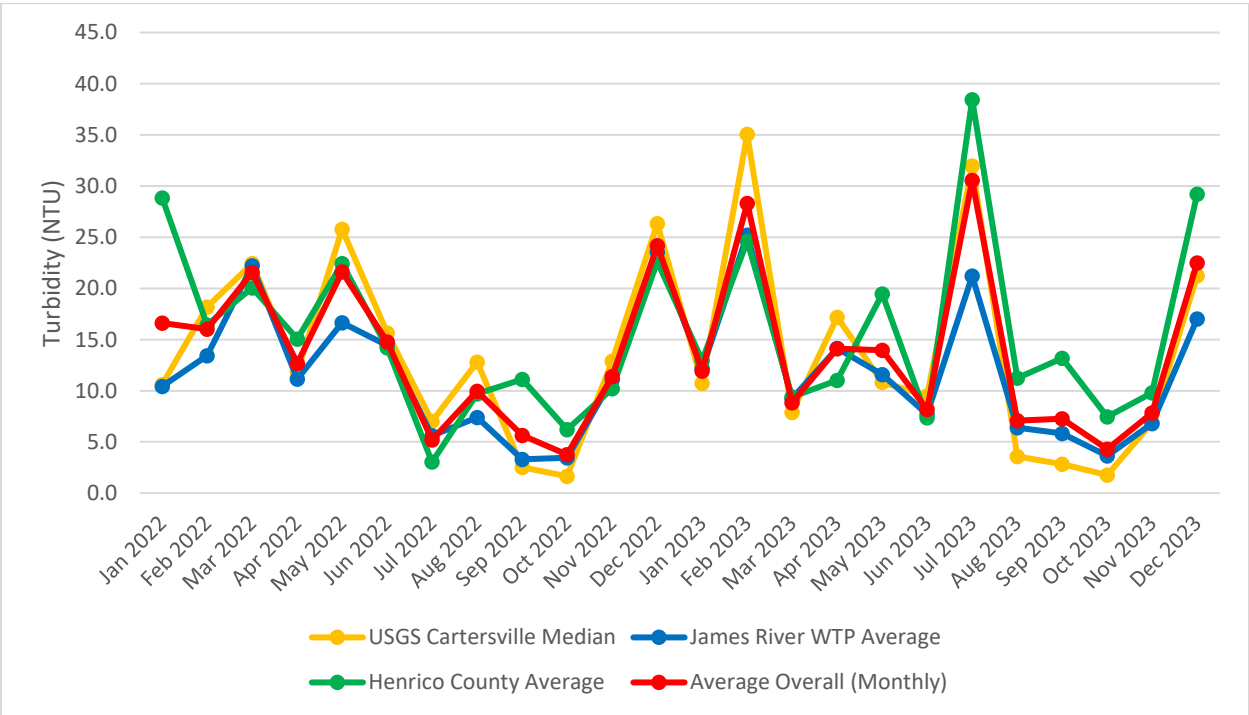


Figure 4.3 Raw Water Quality Graph – Turbidity

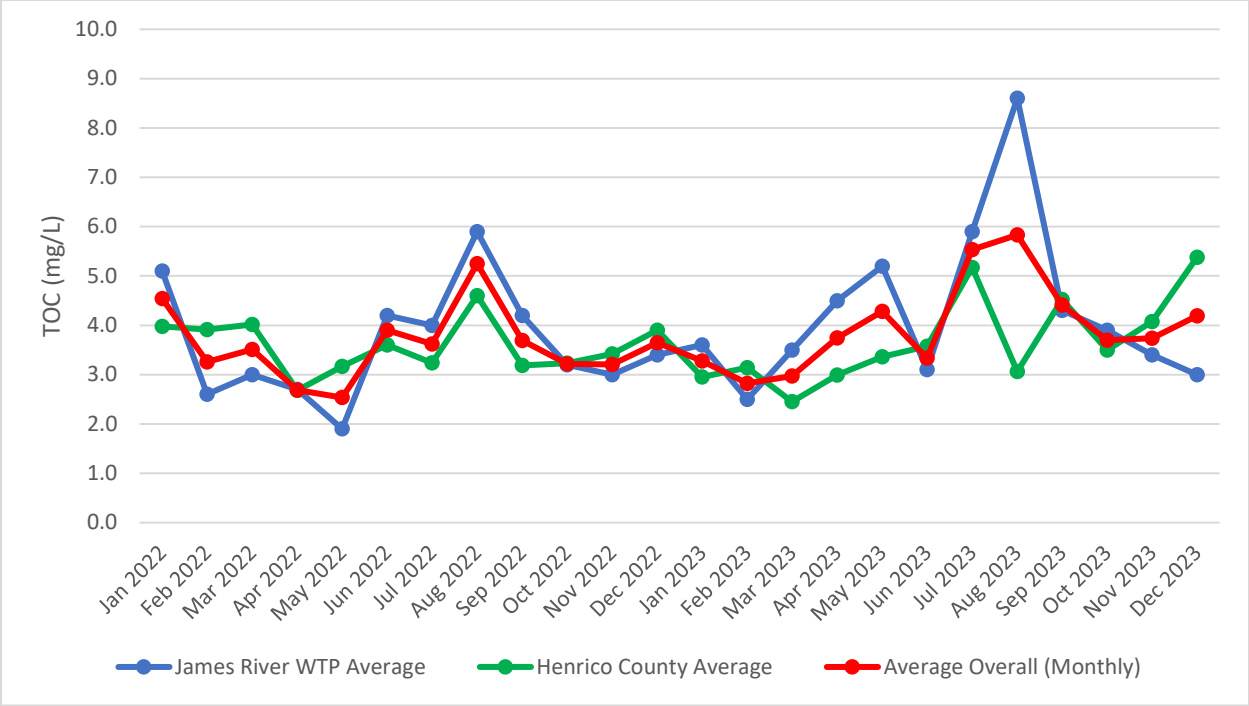


Figure 4.4 Raw Water Quality Graph – TOC

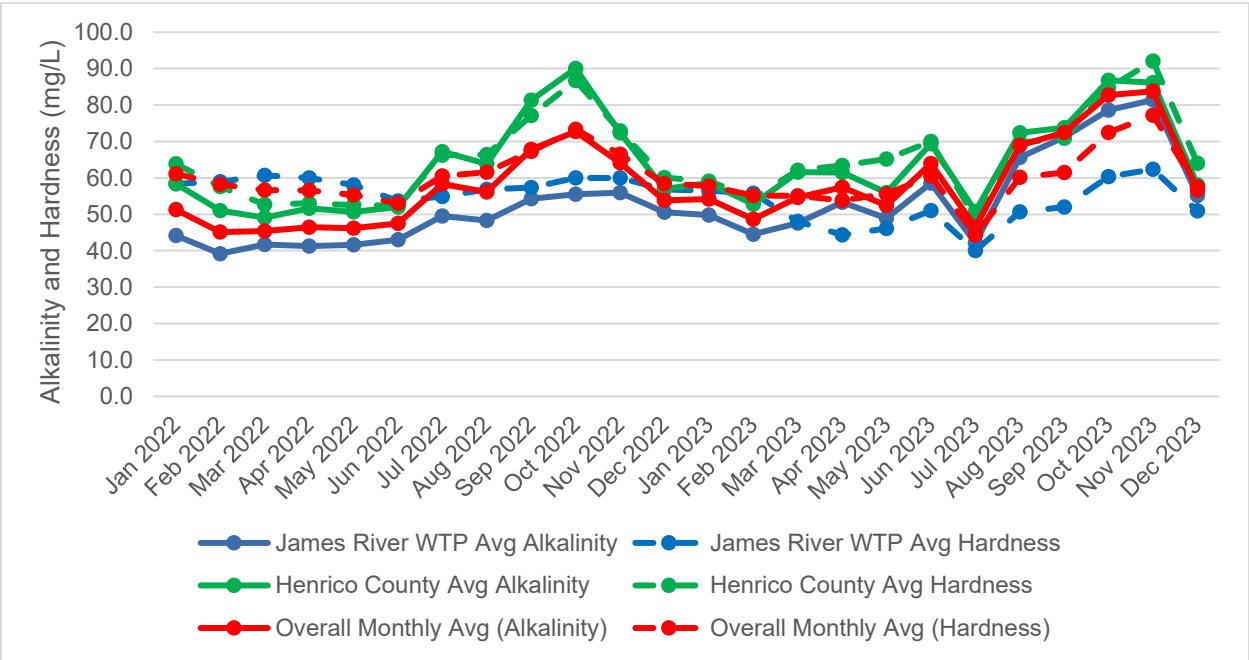


Figure 4.5 Raw Water Quality Graph – Alkalinity and Hardness

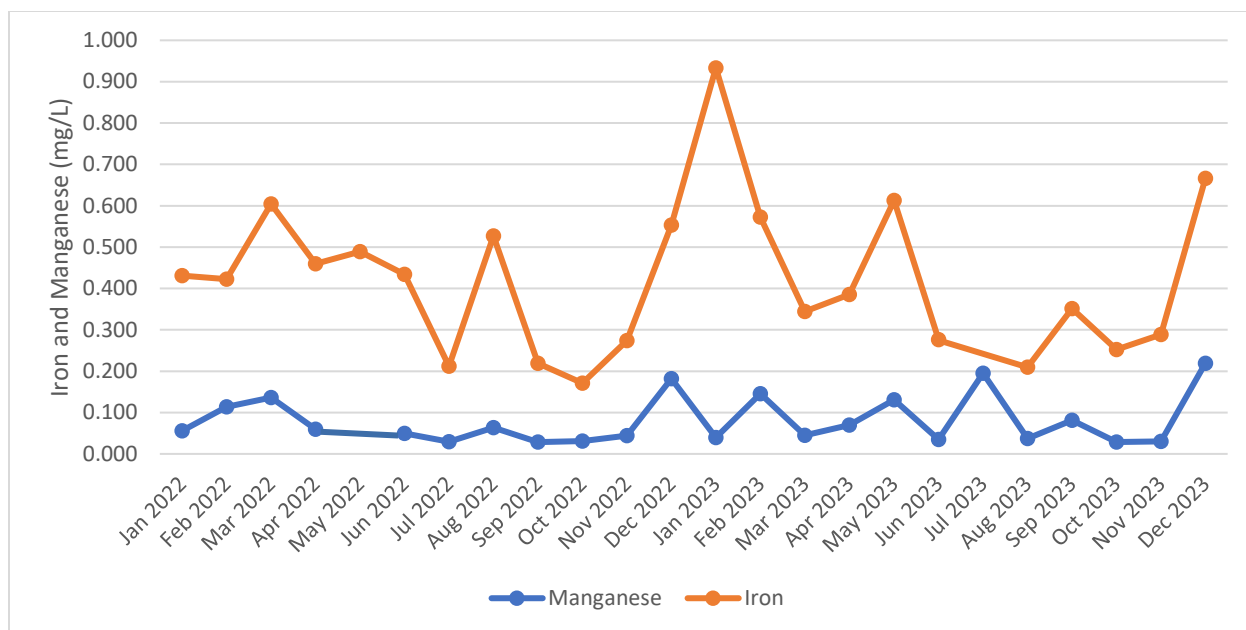


Figure 4.6 Raw Water Quality Graph – Iron and Manganese

Table 4.1 below summarizes the maximum measured levels compared to the maximum contaminant level (MCL) for each parameter. This comparison was the basis for determining treatment required at both the WTP and RWPS.

Table 4.1 Parameter Measured Levels vs MCL

Parameter	Maximum	Minimum	MCL
pH	8.2	6.5	N/A
Temperature	32.3 °C	3.4 °C	N/A
Turbidity	38.4 NTU	1.8 NTU	1 NTU
Total Organic Carbon (TOC)	8.6 mg/L	1.9 mg/L	N/A
Alkalinity	90.0 mg/L	39.2 mg/L	N/A
Hardness	92.1 mg/L	40.0 mg/L	N/A
Iron	0.93 mg/L	0.17 mg/L	0.30 mg/L
Manganese	0.22 mg/L	0.03 mg/L	0.05 mg/L

5. Treatment Process Evaluation

The VDH Waterworks Regulations located within Title 12, Agency 5, Chapter 590 of the Virginia Administrative Code 12VAC5-590 outlines the general framework for waterworks regulations, operations regulations for waterworks (including treatment requirements for surface water sources such as the James River), and the manual of practice for waterworks design. The raw water quality data collected above was evaluated and reviewed against the Waterworks Regulations in order to establish treatment objectives and requirements and to ensure compliance with all Waterworks Regulations. A bench scale study was also performed to validate and inform the recommended treatment processes established within this PER. This section summarizes the review of the Waterworks Regulations for compliance with treatment requirements and outlines two water treatment alternatives that were evaluated for this project.

5.1 Treatment Objectives

12VAC5-590-340 lists the compliance standards for primary and secondary maximum contaminant levels (PMCL, SMCL) within the water treatment process. **Table 5.1** summarizes how the compliance standard will be achieved through the treatment processes recommended within this PER.

Table 5.1 VDH Compliance Standards and Treatment Required

12VAC5-590-340 Tables	Compliance Standard	Treatment Required
340.1	Inorganic Chemicals	Not typical in high quantities within source water. However, source water monitoring required to confirm typical levels within source water. Typical treatment techniques would address through coagulation, flocculation, sedimentation, and filtration steps. Iron and manganese are known to be problematic within the James River and will need to be removed.
340.2	Organic Chemicals	Not typical in high quantities within source water. However, source water monitoring required to confirm typical levels within source water. Typical treatment techniques would achieve through coagulation, flocculation, and filtration steps.
340.3	Physical Quality	James River turbidity can vary significantly based on rainfall and will need to be addressed. Color, odor, total dissolved solids (TDS), and turbidity typically achieved through coagulation, flocculation, sedimentation, and filtration steps. pH is achieved through chemical addition.
340.4	Radiological Quality	Not typical in high quantities within source water. However, source water monitoring required to confirm typical levels within source water.
340.5	Microbial Contaminants	Achieved through filtration and disinfection steps as outlined below in Section 5.1.3 .
340.6	Disinfection Byproducts	Disinfection byproducts (DBPs) can be mitigated through filtration steps and/or disinfection steps. The James River has high natural organic matter (NOM) which can lead to a high potential for DPBs.
340.7	Residual Disinfectant	Achieved through chemical metering and monitoring of residual disinfectant.

The remaining subsections within **Section 4** outline two proposed treatment alternatives and further evaluated the treatment required to achieve compliance with the VDH Waterworks Regulations.

5.1.1 Process Alternatives Summary

Based on the raw water quality and surveys of existing treatment facilities that utilize the James River as a water source, two (2) process alternatives are evaluated within this report:

1. Treatment Process Alternative 1 – Conventional with Dual Media Filtration (Conventional Filtration)
2. Treatment Process Alternative 2 – Conventional with Dual Media Filtration and Nanofiltration (Conventional Filtration with Nanofiltration)

5.1.1.1 Treatment Process Alternative 1 – Conventional Filtration

Treatment Process Alternative 1 utilizes conventional water treatment and includes the following process steps:

1. Powdered Activated Carbon (PAC) and Permanganate
 - a. Ability to dose PAC and permanganate at the proposed RWPS.
2. Coagulation & Flocculation
 - a. A static mixer will be utilized and polyaluminum chloride (PACL), lime, and polymer will be dosed upstream of the static mixer and flocculation basins.
3. Sedimentation
4. Dual-Media Gravity Filtration
5. pH Adjustment and Chlorine Disinfection
 - a. Sodium hydroxide for pH adjustment and sodium hypochlorite for primary disinfection will be dosed in the chlorine contact basin.
6. Finished water chemicals will include a corrosion inhibitor and may include ammonium sulfate for chloramine residual disinfectant and/or fluoride to promote oral health.

Based on the expected water age in the system and the high levels of TOC and NOM in the James River, it is highly likely that Alternative 1 will need to utilize chloramines for residual disinfection to meet DBP compliance standards. The bench scale study summarized in **Section 5.2** and included as **Appendix A** expounds on the need for chloramine residual disinfection or enhanced filtration (i.e. nanofiltration).

5.1.1.2 Treatment Process Alternative 2 – Conventional Filtration with Nanofiltration

Treatment Process Alternative 2 includes the same steps as Alternative 1 except it adds an additional nanofiltration step after the dual-media gravity filters. It is likely that utilizing this alternative will eliminate the need for chloramine residual disinfection.

5.1.2 Coagulation, Flocculation, and Sedimentation

12VAC5-590-871 outlines the requirements for coagulation and flocculation and 12VAC5-590-872 outlines the treatment requirements for the sedimentation step. In general, for surface water sources or for sources with variable raw water turbidity, this step of the treatment process is needed for compliance with the effluent turbidity requirements summarized in **Table 5.2**. The coagulation, flocculation, and sedimentation steps ensure that particulates that can be removed are settled out prior to the filtration step. This further protects the filters from quickly fouling and requiring excessive backwashing.

5.1.3 Filtration and Disinfection

Section 12VAC5-590-395 of the Virginia Department of Health (VDH) Waterworks Regulations outlines the treatment requirements for surface water sources such as the James River. 12VAC5-590-401 summarizes the log removal credits for filtration and required log inactivation for *Cryptosporidium*. 12VAC5-590-500 summarizes the log removal credits and required log inactivation for *Giardia lamblia* and viruses. In general, the waterworks must achieve the following:

- At least 3-log removal and/or inactivation of *Giardia lamblia*
- At least 4-log removal and/or inactivation of viruses
- At least 2-log removal of *Cryptosporidium*

Log removal credits are given for the following filtration techniques as summarized below in **Table 5.2**. The remaining log-removal values (LRVs) required after filtration are summarized in the last two columns and will be achieved through inactivation by disinfection, provided the design of the filtration systems meets the requirements of the VDH Waterworks Regulations. **Table 5.2** assumes a Bin 1 Classification for *Cryptosporidium* which does not require additional treatment after filtration; the bin classification will be confirmed through compliance with the monitoring requirements as outlined in 12VAC5-590-401.

Table 5.2 Filtration Credits for Microbial Removal

FILTRATION TREATMENT TECHNOLOGY	COMBINED FILTER EFFLUENT TURBIDITY (95% MONTHLY/MAX) NTU	MAXIMUM LOGS OF CREDIT FOR PHYSICAL REMOVAL			MIN. LOGS OF INACTIVATION NEEDED BY DISINFECTION	
		<i>Crypto</i>	<i>Giardia</i>	Viruses	<i>Giardia</i>	Viruses
Conventional	0.3 / 1.0	>2	2.5	2.0	0.5	2.0
Reverse Osmosis/ Nanofiltration	0.3 / 1.0	>2	>3.0	3.0	0.0	1.0
Ultrafiltration/ Microfiltration	0.3 / 1.0	>2	>3.0	0.0	0.5	4.0

Table 5.2 summarizes the required combined 95% monthly and maximum filter effluent turbidity and maximum log removal credit for *Cryptosporidium*, *Giardia lamblia*, and viruses. **Table 5.2** also indicates required inactivation needed for *Giardia lamblia* and viruses after the filtration treatment step. Inactivation can be achieved through chlorination, ozonation, and ultraviolet (UV) disinfection. Typically, conventional filtration utilizes chlorination as it is a proven and cost-effective method for disinfection. Several factors contribute to the ability to achieve *Giardia lamblia* and virus inactivation by chlorination including the following:

- Temperature – typically taken as the lowest average temperature (3.4°C raw water quality data)
- pH – typically taken as the filtered water pH (assumed to be 7.8)
- Basin volume – typically in gallons
- Baffling factor – as recommended by Environmental Protection Agency (EPA)
- Flow rate – the maximum plant flow rate in gallons per minute
- Detention time – function of basin volume, baffling, and flow rate
- Contact time (CT) – function of the chlorine dose (C, mg/L) multiplied by the detention time (min)

The CT value required to inactivate *Giardia lamblia* typically controls when using free chlorine to disinfect as *Giardia lamblia* is more difficult to inactivate than viruses. **Table 5.3** summarizes the required CT values for the expected low temperature and expected pHs.

Table 5.3 CT Values for Inactivation of *Giardia* by Free Chlorine

CL Conc. (mg/L)	pH=7.5, 0.5°C or Lower						pH=8.0, 0.5°C or Lower						pH=7.5, at 5°C						pH=8.0, at 5°C					
	Log Inactivation						Log Inactivation						Log Inactivation						Log Inactivation					
	0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
<=0.4	40	79	119	158	198	237	46	92	139	185	231	277	28	55	83	111	138	166	33	66	99	132	165	198
0.6	40	80	120	159	199	239	48	95	143	191	238	286	29	57	86	114	143	171	34	68	102	136	170	204
0.8	41	82	123	164	205	246	49	98	148	197	246	295	29	58	88	117	146	175	35	70	105	140	175	210
1	42	84	127	169	211	253	51	101	152	203	253	304	30	60	90	119	149	179	36	72	108	144	180	216
1.2	43	86	130	173	216	259	52	104	157	209	261	313	31	61	92	122	153	183	37	74	111	147	184	221
1.4	44	89	133	177	222	266	54	107	161	214	268	321	31	62	94	125	156	187	38	76	114	151	189	227
1.6	46	91	137	182	228	273	55	110	165	219	274	329	32	64	96	128	160	192	39	77	116	155	193	232
1.8	47	93	140	186	233	279	56	113	169	225	282	338	33	65	98	131	163	196	40	79	119	159	198	238
2	48	95	143	191	238	286	55	115	173	231	288	346	33	67	100	133	167	200	41	81	122	162	203	243
2.2	50	99	149	198	248	297	59	118	177	235	294	353	34	68	102	136	170	204	41	83	124	165	207	248
2.4	50	99	149	199	248	298	60	120	181	241	301	361	35	70	105	139	174	209	42	84	127	169	211	253
2.6	51	101	152	203	253	304	61	123	184	245	307	368	36	71	107	142	178	213	43	86	129	172	215	258
2.8	52	103	155	207	258	310	63	125	188	250	313	375	36	72	109	145	181	217	44	88	132	175	219	263
3	53	105	158	211	263	316	64	127	191	255	318	382	37	74	111	147	184	221	45	89	134	179	223	268

5.1.3.1 Chloramination Considerations

The addition of ammonia to chlorinated waters has the potential to produce three different types of chloramine species:

1. Monochloramine (NH_2Cl)
2. Dichloramine (NHCl_2)
3. Nitrogen trichloride (NCl_3)

Although monochloramine is the weakest disinfectant of the three species, it is favored as a residual disinfectant due to its durability, low DBP formation potential, and lowest detectable chlorinous taste and odor (T&O). A low $\text{Cl}:\text{NH}_3$ ratio (between 4.5:1 and 5:1) and high pH (7.5-9) favor the creation of monochloramine. Higher $\text{Cl}:\text{NH}_3$ ratios can lead to the chlorine breakpoint, where free chlorine and excess ammonia dominate. Lower pH can potentially lead to formation of dichloramine and nitrogen trichloride as well as faster chloramine decay in the distribution system.

When switching to chloramines for residual disinfection, significant care must be taken to ensure the proper chloramine residual is maintained. The American Water Works Association (AWWA) Manual M20 *Water Chlorination/Chloramination Practices and Principles* outlines several key control considerations for chloramination. However, the factor that has the most significance is the ability to limit nitrification throughout the system. AWWA suggests controlling nitrification through the following recommendations¹:

- *Controlling the chlorine:ammonia-nitrogen ratio.* The chlorine:ammonia-nitrogen ratio should be maintained between 4.5:1 and 5:1 to reduce the concentration of free ammonia.
- *Limiting the excess free ammonia* (below 0.10 mg/L N)
- *Maintaining a set chloramine residual.* Systems that maintain a good chloramine residual everywhere in their system are less likely to encounter nitrification.
- *Maintaining pH and temperature.* The optimum pH range to minimize nitrification is 7.5-9.0 and the temperature is 50-59°F (10-15°C). Higher temperatures (77°F) (>25°C) have been associated with nitrification incidents.
- *Switching periodically to free chlorine.* Some systems find that switching to free chlorine periodically for short periods may help reduce the chloramine-resistant bacteria and reduce nitrification. However, switching to free chlorine may cause the system to exceed the DBP Rule, and the system may encounter biofilm sloughing.
- *Optimizing chemical addition and mixing.* Where the chemicals are added and in what order may influence the production of DBPs and the formation of desirable chloramine species (monochloramine instead of dichloramine). Mixing can help with the efficient formation of chloramines.
- *Monitoring ammonia, nitrite, and nitrate.* Careful surveillance of the distribution system (particularly in storage tanks and other areas where water may age) for free ammonia and the by-products of nitrification (nitrite and nitrate) may provide early warning signs of potential nitrification problems.
- *Attending to storage facility operation and maintenance.* Mixing may be needed to eliminate the development of problem areas within the storage facility. Operations strategies should minimize water age. Routinely clean and inspect all storage tanks and reservoirs.

¹ AWWA Manual M20: *Water Chlorination/Chloramination Practices and Principles*, 2nd Edition. American Water Works Association. 2006. Ch. 6, Chlorine/Chloramine Disinfection Strategies. Pg. 111 – 112.

- *Operating distribution systems to minimize nitrification* by decreasing water age, practicing systematic flushing, evaluating booster chloramination or chlorination, providing adequate corrosion control, and evaluating a periodic switch to free chlorine (may be required in some states).

The chlorine:ammonia-nitrogen ratio is critical to ensuring a proper chloramine residual. Therefore, it is recommended that the ammonia feed rate be automatically flow-paced based on the WTP flow rate and finished water chlorine concentration at the entry point to the system. This is accomplished through careful monitoring of the flow rate and chlorine concentration and controlling the new ammonia metering system with a programmable logic controller (PLC). Additionally, it is critical that the existing distribution corrosion control be reevaluated to ensure that the changes in finished water chemistry do not adversely affect the corrosivity of the finished water in the distribution system. This would involve further evaluating the Langelier Saturation Index (LSI) as discussed below in **Section 5.2.6**.

5.2 Bench Scale Testing

A detailed writeup of the bench scale testing protocol and results is included in **Appendix A**. One of the primary objectives of the bench scale study was to validate the selected treatment process alternatives and determine the requirements for mitigating the formation of DBPs. It should be noted that due to limitations with the bench scale testing, the filter paper used to simulate nanofiltration had a pore size of 0.02 µm; typical nanofiltration pore sizes are between 0.01 µm to 0.001 µm. The following conclusions were drawn from the bench scale testing:

5.2.1 Iron and Manganese

Iron and manganese levels were below the SMCL during the sampling phase. However, the iron concentration of the treated trials showed further reduction from the raw water sample. It is believed that there should not be any issues with removing iron and manganese below the secondary MCLs in the full-scale treatment process.

5.2.2 Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC)

The DOC values were near the TOC values indicating that the majority of NOM present in the source water at the time of sampling was dissolved. DOC and TOC both showed signs of reduction when treated with PAC. The dual-media trials utilizing a 10 µm filter produced nearly the same results for TOC and DOC reduction as the nanofiltration trials utilizing the following series of filters: 10 µm, 1.5 µm 1st pass, 1.5 µm 2nd pass, 0.45 µm, 0.02 µm.

This indicates that the nanofiltration pore size was likely too large to effectively simulate nanofiltration. It also indicates that increased PAC dosage or enhanced filtration may be required to more effectively remove NOM.

5.2.3 Specific Ultraviolet Absorbance at 254 nM (SUVA)

SUVA helps to characterize NOM within the sampled water for assisting with determination of DBP formation potential. Raw water SUVA values were an average of 2.63 L/mg-m and showed a reduction to an average of 1.21 L/mg-m after treatment.

SUVA values less than 2.00 L/mg-m show that the NOM “is mainly composed of hydrophilic, low molecular mass organic compounds”, which “consists of higher proportions of aliphatic carbon and nitrogenous compounds, such as carboxylic acids, carbohydrates and proteins.”² Menya and Olupot report that the hydrophilic portions of NOM are more difficult to remove using common methods of flocculation, sedimentation, and filtration, but that adsorption by means of activated carbon is a promising method for removal. This research is consistent with the results of the bench scale study which showed the greatest

² *Production and Performance of Activated Carbon from Rice Husks for Removal of Natural Organic Matter from Water: a Review*. E. Menya, P.W. Olupot. Chemical and Engineering Research and Design. Volume 129. January 2018. Pg. 271-296.

reduction of TOC and DOC using the highest concentration level of PAC of 15 mg/L. This indicates that the PAC dose may need to be increased higher than 20 mg/L to further increase the removal of NOM.

5.2.4 Chlorine Residual

The bench scale testing included a simulated distribution system (SDS) test to determine the effect of water age on the distribution system finished water quality. Chlorine was dosed at an initial residual of 2.5 mg/L to simulate the contact time required for disinfection/inactivation and samples were grabbed at 5, 10, and 15 days for both the dual-media and nanofiltration treatment process options. The dual-media option showed that no chlorine residual remained after 5-10 days in the system. The nanofiltration option showed that the no chlorine residual remained after 10-15 days in the system. Several conclusions can be observed:

1. The chlorine disinfectant is not as durable as a residual disinfectant with levels of NOM in the source water. Chloramines may prove more effective as a residual disinfectant.
2. The additional nanofiltration step likely aided in the removal of NOM and thereby prolonged the residual disinfectant.

It is highly likely that utilizing free chlorine for residual disinfection will require significant flushing to maintain the residual disinfectant at dead ends throughout the distribution system. This has the potential to waste significant volumes of finished water.

5.2.5 Disinfection Byproducts

Data showing the results from the testing of Haloacetic acids and Trihalomethanes are available in **Appendix A**. After 5-days of incubation, lab results showed an average of 85 µg/L total trihalomethanes, exceeding the 80 µg/L MCL. Total trihalomethanes showed minimal difference between the 5- and 10-day incubation periods but rose to 109 mg/L and 130 mg/L for dual-media and nanofiltration, respectively. Total Haloacetic acid concentrations for dual-media and nanofiltration following 5-days of incubation, registered at 57.3 and 50.4 µg/L, respectively. This is only slightly below the MCL of 60 µg/L. Dual-media exceeded the MCL for Total Haloacetic acids at the 10-day incubation period, while nanofiltration exceeded the limit at the 15-day incubation period.

5.2.6 Langelier Saturation Index (LSI)

The LSI is a calculated index based on raw water quality parameters that is indicative of the stability of the water. If the LSI is negative, then the water is under saturated with hardness and will tend to be corrosive in the distribution system. If the LSI is positive, then the water is over-saturated with hardness and will tend to form hardness scaling in the distribution system. If the LSI is close to zero, the water is just saturated with hardness and will neither be strongly corrosive nor scale forming. In general, it is better to land slightly higher than zero than slightly lower than zero as it is preferable to have some hardness scaling rather than corrosive water which can lead to copper and lead issues in the distribution system.

Calcium, magnesium, and total hardness, total alkalinity, temperature, pH, and TDS were measured for the raw water, and after filtration. These values were used to calculate the LSI to provide design guidance on the potential for corrosion or scale formation in the distribution network and the need for corrosion or scale inhibitor. All LSI values for the raw water and the treated samples were between -0.36 and - 0.89 showing moderate to high propensity for corrosion. This indicates that the ability to increase hardness, adjust pH, and/or a corrosion inhibitor will be needed during the treatment process.

5.3 PFAS/PFOA Considerations

Per- and Polyfluorinated substances (PFAS) are man-made chemicals utilized in industry that commonly make their way into the water supply due to their persistent nature in the environment. Typically, these chemicals dissolve into water and cannot be easily removed via conventional water treatment (flocculation, sedimentation, and media filtration). PFAS poses a risk to human health and health effects include (among others) degradation of the immune system, cancer, and thyroid disease. EPA has new regulations that establish MCLs and MLCGs for several PFAS compounds as summarized in **Table 5.4**.

Table 5.4 PFAS MCLGs and MCLs

COMPOUND	FINAL MCLG (ppt)	FINAL MCL (ppt)
PFOA	0	4.0
PFOS	0	4.0
PFHxS	10	10
PFNA	10	10
HFPO-DA	10	10
Mixtures containing 2 or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

Dewberry recently completed PFAS sampling and testing over a one-week period to obtain a snapshot of potential PFAS compounds in the raw water source. The results of the sampling are included as **Appendix J**. The testing results indicated that each of the samples were below the limit of quantitation and detection due to the testing method used (EPA-1633). However, the raw data indicated the presence of PFAS compounds.

5.4 Finished Water Blending Considerations

The County has indicated that they would like to keep several existing wells in working order for use in an emergency. The blending of groundwater and surface water finished water has the potential to be problematic. All the data to properly evaluate the finished water blending was not available at the time of this PER. Full water quality panels will be needed to properly evaluate blending; however, the ability to adjust finished water parameters affecting corrosivity will be included in the design of the plant including hardness (lime feed system), pH (lime and sodium hydroxide feed systems), and alkalinity (lime sodium hydroxide feed systems). Additionally, a corrosion inhibitor feed system will be included to protect the inside of piping from corrosion.

The existing wells are currently utilizing free chlorine for a residual disinfectant. If the system is switched to chloramines for a residual disinfectant, the well systems will need an additional step of adding an ammonia source downstream of the chlorine injection point for the formation of chloramines.

5.5 Summary of Treatment Process Evaluation

Both treatment process alternatives will provide the County with high quality finished water for delivery to their customers but both alternatives will need to include considerations for mitigating the high NOM in the James River. For the dual-media filtration option, chloramination will likely be needed to mitigate DBP formation potential. For the nanofiltration option, a smaller pore size than that which was tested will be required to filter out NOM.

6. Water Treatment Plant Conceptual Design

A conceptual design of the WTP was developed based on the raw water quality data and the bench scale testing to treat with an initial forward flow rate of 1.0 MGD with room to expand to meet a future flow rate of 1.5 MGD. Based on the quality of the source raw water, the necessary treatment required at the FUSD WTP was identified. This was the primary driver in determining key components of the preliminary design of the WTP. Two options were evaluated for filtration including granular dual media filters and nanofiltration. The following treatment technologies were determined to be required in the treatment train:

- Rapid Mix (achieved with static mixer)
- Flocculation (2-stage)
- Sedimentation (with plate settlers)
- Filtration
 - Option 1 – Conventional Filtration
 - Option 2 – Conventional Filtration with Nanofiltration
- Disinfection (chlorine contact basin)
- Clear Well
- Finished Water Pumps

This section of the PER outlines the proposed treatment processes, chemical feed systems, residuals disposal, and siting for the proposed WTP.

6.1 Treatment Process Alternative 1 – Conventional Filtration

The first treatment process alternative evaluated includes in-line static mixing, flocculation, sedimentation, and granular dual media filtration. The finished water will then be pumped out of the clear well downstream of the filters. A process flow diagram of the proposed treatment train for Alternative 1 is shown in **Figure 6.1**. **Appendix B** shows conceptual plans for both process alternatives for both site alternatives (discussed in **Section 6.7**). **Appendix Figures B.1 through B.4** show Treatment Process Alternative 1, **Figures B.5 through B.8** show Treatment Process Alternative 1, and **Figures B.9 through B.12** show the site alternatives.

6.1.1 Raw Water Chemical Feed Systems

Upstream of the proposed treatment train, several chemical feed systems will be required including the following:

- Dosed at the RWPS
 - Sodium Permanganate
 - Powdered Activated Carbon
- Dosed upstream of the static mixer
 - Coagulant (PACL)
 - Lime
 - Polymer

6.1.1.1 Sodium Permanganate System

Sodium permanganate will be dosed at the RWPS to treat the high levels of iron and manganese in the raw water. Sodium permanganate was selected since it provides ease of operation as it does not require the mixing step that powdered potassium permanganate does. Sodium permanganate (NaMnO_4) will be dosed at 20% strength and is available in 275-gallon totes. Anticipated dosage rates for NaMnO_4 at the WTP are summarized in **Table 6.1**. The chemical feed calculations are shown in **Appendix C**.

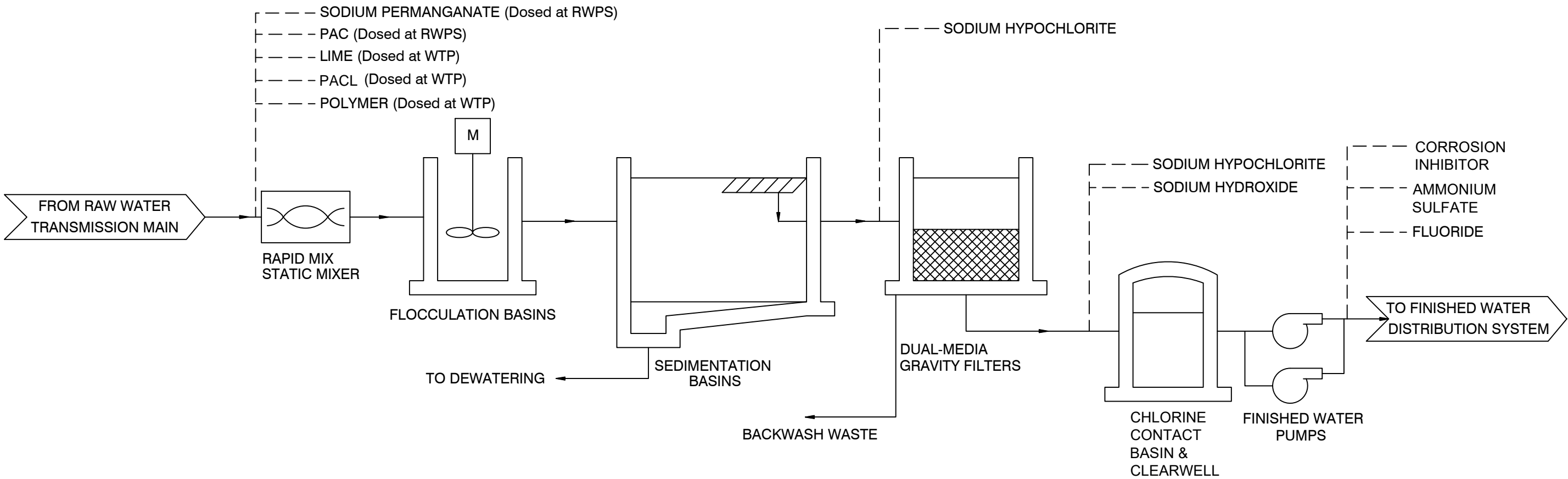


Figure 6.1 - Process Flow Diagram for Treatment Process Alternative 1 - Conventional Filtration with Chloramination

N.T.S.

Table 6.1 Sodium Permanganate Feed Rates

	20% NaMnO ₄ Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate (MGD)	0.15	1.0	1.5
NaMnO ₄ Dose (mg/L)	0.54	1.6	3.3
NaMnO ₄ Dose (lb/day)	3.38	67.7	203.1
Feed Rate (gpd)	0.30	5.9	17.7
Feed Rate (gph)	0.01	0.25	0.74

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.01 gph and a maximum feed rate of 0.74 gph. This corresponds to a minimum dosage of 0.54 mg/L and a maximum dosage of 3.25 mg/L.

Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 3.25 mg/L NaMnO₄. Based on this, the storage required for 30 days of NaMnO₄ is approximately 540 gallons. Two (2) 275-gallon totes will provide adequate storage for over 30 days.

6.1.1.2 PAC System

PAC will be dosed at the RPWS to maximize the contact time to assist with removal of TOC and DOC for the prevention of DBP formation. Preliminary dosage rates for PAC are summarized in **Table 6.2**. The chemical feed calculations are shown in **Appendix C**.

Table 6.2 Powdered Activated Carbon Feed Rates

	Powdered Activated Carbon		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate (MGD)	0.15	1.0	1.5
PAC Dose (mg/L)	5.0	20	25
PAC Dose (lb/day)	6.26	167	313
Feed Rate (gal PAC solution/day)	1.87	49.9	93.6
Feed Rate (gal PAC solution/hr)	0.08	2.08	3.90

Based on an initial design flow rate of 1.0 MGD, the PAC system will have a target dosage of 20 mg/L. At this dosage rate, the system will require approximately 167 lb/day of PAC. The PAC system will be a bulk bag feeder system with explosion proof bag unloading dust collector and will be housed in a separate chemical room at the RWPS, which will be designed as a Class II, Division II hazardous area per National Fire Protection Association (NFPA) 820. The system includes a main control panel with 480 VAC/3-Phase/60 Hz power requirement. The control panel will need to be installed outside of the hazardous environment of the chemical storage room.

Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 25 mg/L PAC. Based on this, the storage required for 30 days of PAC is approximately 7,500 lbs. The chemical feed room will be designed with adequate space for eight (8) 1,000-lb bulk bags.

6.1.1.3 PACL System

PACL will be dosed at the WTP upstream of the static mixer as a coagulant. For the purposes of this PER an 18% solution of PACL was assumed. Anticipated dosage rates for PACL at the WTP are summarized in **Table 6.3**. The chemical feed calculations are shown in **Appendix C**.

Table 6.3 PACL Feed Rates

	18% PACL Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate (MGD)	0.15	1.0	1.5
PACL Dose (mg/L)	5	25	50
PACL Dose (lb/day)	6.3	209	626
Feed Rate (gpd)	0.5	17.8	53.5
Feed Rate (gph)	0.02	0.74	2.2

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.02 gph and a maximum feed rate of 2.2 gph. This corresponds to a minimum PACL dosage of 5 mg/L and a maximum dosage of 50 mg/L.

Storage requirements are based on a 2-week usage plus bulk delivery (5,000 gallons) chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 25 mg/L PACL. Based on this, the storage required for two (2) weeks plus 5,000 gallons is approximately 5,375 gallons. A bulk storage tank with a minimum working volume of 5,375 gallons is recommended.

6.1.1.4 Lime System

Calcium hydroxide (Lime) will be dosed at the WTP upstream of the static mixer to enhance coagulation and has the added benefit of adding hardness to the finished water. The basis of design is a calcium hydroxide (Ca(OH)_2) feed system that comes as a dry powder and is mixed/slaked on site. Anticipated dosage rates for polymer at the WTP are summarized in **Table 6.4**. The chemical feed calculations are shown in **Appendix C**.

Table 6.4 Lime Feed Rates

	Ca(OH)_2		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate (MGD)	0.15	1.0	1.5
Ca(OH)_2 Dose (mg/L)	8.6	25.7	42.8
Ca(OH)_2 Dose (lb/day)	11.3	225	563
Feed Rate (gpd, lime solution)	12.3	245	614
Feed Rate (gph, lime solution)	0.51	10.2	25.6

Two (2) hose pumps will be utilized, sized for a minimum feed rate of 0.51 gph and a maximum feed rate of 25.6 gph. This corresponds to a minimum dosage rate of 8.6 mg/L Ca(OH)_2 and a maximum dosage rate of 42.8 mg/L Ca(OH)_2 .

Storage requirements are based on a 30-day storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and a design dose of 25.7 mg/L. Based on this, the storage required for a 30-day supply is over 12,000 lbs. Lime is available in 2,000-lb super sacks which will require 6 super sacks for 30-day supply. At this volume it is recommended that a larger silo-style system be utilized.

6.1.1.5 Polymer System

Polymer will be dosed at the WTP upstream of the static mixer as a coagulant and to serve as a filter aid. Anticipated dosage rates for polymer at the WTP are summarized in **Table 6.5**. The chemical feed calculations are shown in **Appendix C**.

Table 6.5 Polymer Feed Rates

	Polymer		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate (MGD)	0.15	1.0	1.5
Polymer Dose (mg/L)	0.5	0.5	0.5
Polymer Dose (lb/day)	0.63	4.17	6.26
Feed Rate (gpd)	0.07	0.49	0.73
Feed Rate (gph)	0.003	0.02	0.03

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.003 gph and a maximum feed rate of 0.03 gph. This corresponds to a minimum dosage rate of 0.5 mg/L polymer.

Storage requirements are based on a 30-day storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 0.5 mg/L. Based on this, the storage required for a 30-day supply is 22 gallons. Polymer is available in 55-gallon drums which will provide over two months of storage.

6.1.2 Coagulation, Flocculation, and Sedimentation

Conventional filtration requires coagulation, flocculation, and sedimentation upstream of the filtration step in order to protect the filters from breakthrough caused by high turbidity in the raw water requiring excessive backwashing. These steps treat the raw water and prepare it for filtration.

6.1.2.1 Coagulation

As noted above, PACL and polymer will be dosed upstream of an inline static mixer in lieu of traditional rapid mix basins. The inline mixer will provide complete mixing and dispersion of PACL and polymer prior to the flocculation stage.

6.1.2.2 Flocculation

Two-stage flocculation will be provided in a single, subdivided flocculation basin sized for a flow rate of 0.5 MGD. Two (2) flocculation basins will be provided with space for a third. The overall basin dimensions will be 14 ft x 10 ft x 15 ft (LxWxH) with each stage being 7 ft long. **Table 6.6** summarizes the flocculation basin design.

Table 6.6 Flocculation Basin Design

Parameter	Value	Units	Notes
Forward Flow Rate	0.5	MGD	Flow rate per basin
Number of Basins	2		Space for 1 additional basin for a future flow rate of 1.5 MGD
Basin Dimensions	14 x 10 x 15	ft	L x W x H
Target HRT	45	min	Minimum detention time of 30 min. set forth by VDH Waterworks Regulations, 12VAC-590-871.B.2.a
Stage 1 G-Value	65	sec ⁻¹	First of multiple compartments with tapered flocculation provided.
Stage 2 G-Value	45	sec ⁻¹	Second of multiple compartments with tapered flocculation provided.
GT Value	148,500		Typical value of 20,000 - 200,000 set forth by VDH Waterworks Regulations, 12VAC-590-871.B.2.b

As shown in Table 6.6, a minimum hydraulic retention time of 45 minutes will be achieved. The Stage 1 G-Value will be 65 sec⁻¹ and the Stage 2 G-Value will be 45 sec⁻¹ for a total GT value of 148,500. The design of these flocculation basins meets and exceeds the requirements of the VDH Waterworks Regulations.

6.1.2.3 Sedimentation

Two (2) sedimentations basins will be provided with space for a third. The overall basin dimensions will be 30 ft x 10 ft x 15 ft (LxWxH). The sedimentation basins will be provided with inclined plate settlers which increases the settling surface area while decreasing the vertical distance, thus saving cost by shrinking the overall size of the sedimentation basin. **Table 6.7** summarizes the sedimentation basin design.

Table 6.7 Sedimentation Basin Design

Parameter	Value	Units	Notes
WTP Flow Rate	0.5	MGD	Flow rate per basin
Number of Basins	2		Space for 1 additional basin for a future flow rate of 1.5 MGD
Basin Dimensions	30 x 10 x 15	ft	L x W x H
Width to Depth Ratio	3.0		
Overflow Rate	0.30	gpm/ft ²	Surface overflow rates should be within 0.25 - 0.38 gpm/ft ² , as set forth by VDH Waterworks Regulations, 12VAC5-590-872.G.
Projected Effective Plate Area per Basin	1157	ft ²	Required Plate Area = Q (gpm) / Overflow Rate
Plate Area per Cartridge	23	ft ²	Provided by plate settler manufacturer.
Number of plates per cartridge	51		
Hydraulic Retention Time	1.6	hrs	Less than the minimum of three hours settling time set by VDH Waterworks Regulations, 12VAC5-590-872.B since plate settlers are being implemented.

As shown in **Table 6.7**, the use of plate settlers achieves the overflow rate of 0.3 gpm/ft² while decreasing the size of the basin. Though the hydraulic retention time requirement is not met, increased settling efficiency is achieved by the implementation of plate settlers.

Each sedimentation basin will be equipped with a hoseless sludge collector system for removal of settled solids from the sedimentation basin. The sludge collector system flow rate will be approximately 150 gpm with a solids removal concentration of 0.5 – 2%. Residuals management is further discussed in **Section 6.8**.

6.1.3 Filtration and Chlorine Disinfection

Settled water flows from the sedimentation basin into the gravity filters and into the chlorine contact basin. This primary goal of this step is to remove and inactivate harmful bacteria including *Cryptosporidium*, *Giardia lamblia*, and viruses.

6.1.3.1 Filtration

Two (2) dual-media gravity filters will be provided with space for a third. The overall basin area will be 14 ft x 10 ft (WxL) with 12" of sand under 18" anthracite. **Table 6.8** summarizes the gravity filter design.

Table 6.8 Gravity Filter Design

Parameter	Value	Units	Notes
WTP Flow Rate	0.5	MGD	Flow rate per basin
Number of Filters	2		Space for 1 additional filter for a future flow rate of 1.5 MGD
Filter Dimensions	14 x 10	ft	W x L
Filter Area (each)	140	ft ²	
Media Depth	30	in	Total must be greater than 27 inches per VDH Waterworks Regulations, 12VAC5-590-874.E.1.
Loading Rate at 1.0 MGD w/ All basins online: One basin offline:	1.2 2.5	gpm/ft ² gpm/ft ²	Filter loading rates should not exceed 4.0 gpm/ft ² , as set forth by VDH Waterworks Regulations, 12VAC5-590-874.B.

Loading Rate at 1.5 MGD w/ All basins online: One basin offline:	2.5 3.8	gpm/ft ² gpm/ft ²	Filter loading rates should not exceed 4.0 gpm/ft ² , as set forth by VDH Waterworks Regulations, 12VAC5-590-874.B.
Air Scour	3-5	scfm/ft ²	Per VDH Waterworks Regulations, 12VAC5-590-874.H.
Backwash Rate	2,500	gpm	Backwash pumps will be sized to provide 50% media expansion per VDH Waterworks Regulations, 12VAC5-590-874.K.

As shown in **Table 6.8**, the maximum filter loading rate is 3.8 gpm/ft² at a design flow rate of 1.5 MGD. Blowers will be provided for air scouring at a rate between 3 – 5 scfm/ft² and backwash pumps will be provided capable of providing 3.6 MGD (2,500 gpm) for a media expansion of 50%. Turbidity monitors will be provided on each filter unit.

The filtration step achieves the required 2.0 log removal of *Cryptosporidium*, 2.5 log removal of *Giardia lamblia*, and 2.0 log removal of viruses.

6.1.3.2 Chlorine Contact Basin

Settled water flows by gravity through the dual-media filters and into the chlorine contact basin. Based on the requirements summarized in **Section 5.1.3 Filtration and Disinfection**, 0.5 log inactivation of *Giardia lamblia* and 2.0 log inactivation of viruses is required by chlorine disinfection. The chlorine CT value will be driven by the 0.5 log inactivation of *Giardia lamblia*. The amount of mixing in the clearwell directly affects the CT value. A large clearwell may have a high theoretical detention time, but without proper baffling, short-circuiting could occur within the basin and the required contact time may not be reached. 12VAC5-590-500 Table 500.15 summarizes the baffling classifications for CT calculation. This table is re-presented below as **Table 6.9**.

Table 6.9 Baffling Classification for CT Calculation (12VAC5-590-500, Table 500.15)

Baffling Condition	Baffling Factor	Baffling Description
Unbaffled (mixed flow)	0.1	None, agitated basin, very low length to width ratio, high inlet and outlet flow velocities.
Poor	0.3	Single or multiple unbaffled inlets and outlets, no intra-basin baffles.
Average	0.5	Baffled inlet or outlet with some intra-basin baffles.
Superior	0.7	Perforated inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders.
Perfect (plug flow)	1.0	Very high length to width ratio (pipeline flow), perforated inlet, outlet, and intra-basin baffles.

Using the factors above, preliminary sizing for the chlorine contact basin can be established. **Table 6.10** summarizes the estimated physical parameters for the CT calculation and **Table 6.11** summarizes the CT calculation results for the gravity filters, chlorine contact basin, and clearwell.

Table 6.10 CT Calculation Physical Parameters

TREATMENT STAGE	Baffling Factor	Residual Conc. (mg/L)	pH	Temp. (°C)	Peak Flow (GPM)	Volume (gal)
Filtration	0.7	2.00	7.80	3.4	347	1,120
Chlorine Contact Basin	0.5	2.50	7.80	3.4	1,041	36,000
Clearwell	0.1	2.00	7.80	3.4	1,041	60,000

Table 6.11 Chlorine CT Calculation

TREATMENT STAGE	TDT (min)	Contact Time (T) (min)	CT _{calc}	3-log CT _{req}	Log Inactivation (<i>Giardia</i>)	4-log CT _{req}	Log Inactivation (viruses)
Filtration	2.2	1.5	3.0	247.49	0.04	9.42	1.28
Chlorine Contact Basin	34.6	17.3	43.2	260.53	0.50	9.42	18.35
Clearwell	57.6	5.8	11.5	247.49	0.14	9.42	4.89
Total	94.37	24.56	57.77		0.67		24.52

As seen in **Table 6.10**, the chlorine contact basin was sized with a volume of 36,000 gallons to specifically achieve a 0.5 log inactivation of *Giardia lamblia*. Additional log inactivation credit can be claimed for dosing chlorine in the filters and for the retention time achieved in the clearwell as noted above. Log inactivation credits for viruses exceed the required 2.0 log inactivation.

6.1.3.3 Filtered Water Chemical Feed Systems

Filtered water flows from the dual-media filters to the chlorine contact basin. The filtered water chemicals are injected at the inlet of the chlorine contact basin.

6.1.3.3.1 Sodium Hypochlorite System

A sodium hypochlorite system will be required at the WTP for disinfection. As noted above, chlorine will be dosed at the filters to prevent biological fouling and at the inlet to the chlorine contact basin. The recommended strength of sodium hypochlorite solution is 12.5%. Sodium hypochlorite is a strong oxidant and a highly corrosive chemical and the lower concentration is recommended for safety of the plant operators. Anticipated dosage rates are summarized in **Table 6.12**. The chemical feed calculations are shown in **Appendix C**.

Table 6.12 Sodium Hypochlorite Feed Rates

	12.5% NaOCl Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate	0.15	1.0	1.5
NaOCl Dose (mg/L)	1	2.5	4
NaOCl Dose (lb/day)	10.0	167	400
Feed Rate (gpd)	0.99	16.5	40.0
Feed Rate (gph)	0.04	0.69	1.65

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.04 gph and a maximum feed rate of 1.65 gph. This corresponds to a minimum dosage of 1 mg/L NaOCl and a maximum dosage of 4 mg/L NaOCl.

Storage requirements are based on a 2-week usage plus bulk delivery (5,000 gallons) chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 4 mg/L NaOCl. Based on this, the storage required for two (2) weeks plus 5,000 gallons is approximately 5,600 gallons. A bulk storage tank with a minimum working volume of 5,600 gallons is recommended.

6.1.3.3.2 Sodium Hydroxide System

A sodium hydroxide (caustic) system will be required at the WTP for pH adjustment. Caustic will be dosed at the clearwell for pH adjustment. The recommended caustic solution is a 25% caustic solution. Caustic is a highly corrosive chemical and the lower concentration is recommended for safety of the plant operators. Anticipated dosage rates are summarized in **Table 6.13**. The chemical feed calculations are shown in **Appendix C**.

Table 6.13 Sodium Hydroxide Feed Rates

	25% NaOH Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate	0.15	1.0	1.5
NaOH Dose (mg/L)	8	12	20
NaOH Dose (lb/day)	10	100	250
Feed Rate (gpd)	3.8	37.5	93.7
Feed Rate (gph)	0.16	1.6	3.9

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.16 gph and a maximum feed rate of 3.9 gph. This corresponds to a minimum dosage of 8 mg/L NaOH and a maximum dosage of 20 mg/L NaOH.

Storage requirements are based on a 2-week usage plus bulk delivery (5,000 gallons) chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 20 mg/L NaOH. Based on this, the storage required for two (2) weeks plus 5,000 gallons is approximately 6,100 gallons. A bulk storage tank with a minimum working volume of 6,100 gallons is recommended.

6.1.3.4 Clearwell

The clearwell is downstream of the chlorine contact basin and has the purpose of providing a storage buffer for backwashing and for providing finished water to the distribution system via the finished water pumps. The presence of a large clearwell eliminates the need for additional on-site storage tanks. The clearwell is sized preliminarily at 60,000 gallons. The assumed backwash flow rate and duration is 3.6 MGD (2,500 gpm) and 10 minutes, respectively, for a total backwash volume of 25,000 gallons per filter backwash. Two (2), 3.6 MGD backwash pumps will be provided for redundancy. The clearwell is sized such that two backwashes could occur in sequence while still maintaining a sizeable buffer for meeting distribution system demands.

6.1.4 Finished Water Chemical Feed Systems

After filtration and disinfection, finished water chemicals are applied to prepare the water for the distribution. As previously mentioned, Treatment Process Alternative 1 will require chloramination for residual disinfection achieved by adding ammonia to the finished water. Corrosion inhibitor is added to prevent corrosion between the finished water and ferric pipes and fittings. Finally, fluoride is typically added to promote oral health.

6.1.4.1 Ammonium Sulfate System

As noted above in **Section 5.2**, several factors have led to the recommendation for using chloramines as the residual disinfectant, including the high TOC and DOC in the raw water and the high expected water age in the distribution system. For these reasons, under Treatment Option 1, ammonium sulfate is recommended for conversion from a free chlorine to chloramine residual disinfectant.

Ammonium sulfate was selected as it is significantly less corrosive than aqueous ammonia and much safer for operations staff. Ammonium sulfate $((\text{NH}_4)_2\text{SO}_4)$ will be dosed at 40% strength and a 4.5:1 chlorine to ammonia ratio. Anticipated dosage rates for $(\text{NH}_4)_2\text{SO}_4$ at the WTP are summarized in **Table 6.14**. The chemical feed calculations are shown in **Appendix C**.

Table 6.14 Ammonium Sulfate Feed Rates

	40% $(\text{NH}_4)_2\text{SO}_4$ Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate	0.15	1.0	1.5
$(\text{NH}_4)_2\text{SO}_4$ Dose (mg/L)	2.16	5.39	8.63
$(\text{NH}_4)_2\text{SO}_4$ Dose (lb/day)	2.70	45.0	108

Feed Rate (gpd)	0.26	4.38	10.5
Feed Rate (gph)	0.01	0.18	0.44

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.01 gph and a maximum feed rate of 0.44 gph. This corresponds to a minimum dosage of 2.16 mg/L $(\text{NH}_4)_2\text{SO}_4$ and a maximum dosage of 8.63 mg/L.

Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and a maximum dose of 8.63 mg/L $(\text{NH}_4)_2\text{SO}_4$. Based on this, the storage required for 30 days of $(\text{NH}_4)_2\text{SO}_4$ is approximately 315 gallons. Two (2) 275-gallon totes will provide adequate storage for over 30 days.

6.1.4.2 Corrosion Inhibitor System

Corrosion inhibitors slow the rate at which distribution system piping corrodes. Corrosion inhibitor is typically dosed at the outlet of the WTP. The basis of design for the purposes of this PER is the Brenntag Aquapure 3627 which is a 75% orthophosphate, 25% polyphosphate blend. Anticipated dosage rates for the corrosion inhibitor are summarized in **Table 6.15**. The chemical feed calculations are shown in **Appendix C**.

Table 6.15 Corrosion Inhibitor Feed Rates

	Corrosion Inhibitor Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate	0.15	1.0	1.5
Corrosion Inhibitor Dose (mg/L)	2.0	3.7	6.0
Corrosion Inhibitor Dose (lb/day)	2.5	30.86	75.06
Feed Rate (gpd)	0.21	2.64	6.43
Feed Rate (gph)	0.01	0.11	0.27

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.01 gph and a maximum feed rate of 0.27 gph. This corresponds to a minimum dosage of 2.0 mg/L and a maximum dosage of 6.0 mg/L.

Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose of 3.7 mg/L. Based on this, the storage required for 30 days of is approximately 120 gallons. One (1) 275-gallon totes will provide adequate storage for over 60 days.

6.1.4.3 Fluoride System

Fluoride is added to drinking water to prevent tooth decay and promote good oral health. The basis of design for the purposes of this PER is a 17% strength hydrofluosilicic acid (H_2SiF_6). Anticipated dosage rates for fluoride are summarized in **Table 6.16**. The chemical feed calculations are shown in **Appendix C**.

Table 6.16 Fluoride Feed Rates

	Fluoride Solution		
	MINIMUM	AVERAGE	MAXIMUM
WTP Flow Rate	0.15	1.0	1.5
Fluoride Dose (mg/L)	0.5	1.0	1.5
Fluoride Dose (lb/day)	3.68	49.1	110
Feed Rate (gpd)	0.36	4.78	10.8
Feed Rate (gph)	0.01	0.20	0.45

Two (2) peristaltic chemical feed pumps will be utilized, sized for a minimum feed rate of 0.01 gph and a maximum feed rate of 0.45 gph. This corresponds to a minimum dosage of 0.5 mg/L and a maximum dosage of 1.5 mg/L. Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose of 1.0 mg/L. Based on this, the storage required for 30 days is approximately 215 gallons. One (1) 275-gallon totes will provide adequate storage for over 30 days.

6.2 Treatment Process Alternative 2 – Conventional Filtration with Nanofiltration

The second treatment process alternative evaluated includes many of the same treatment processes as Alternative 1 except it will include nanofiltration downstream of the gravity filters and may not require the use of chloramines for residual disinfection (this will be confirmed during the design stage). The finished water will then be pumped out of the clearwell. A process flow diagram of the proposed treatment train for Alternative 2 is shown in **Figure 6.2**. **Appendix B** shows conceptual plans for both process alternatives for both site alternatives (discussed in **Section 6.7**). **Appendix Figures B.1** through **B.4** show Treatment Process Alternative 1, **Figures B.5** through **B.8** show Treatment Process Alternative 1, and **Figures B.9** through **B.12** show the site alternatives.

6.2.1 Nanofiltration

Two (2) nanofiltration skids will be provided and sized for 0.5 MGD each. Space for a third nanofiltration skid will be provided for the future 1.5 MGD scenario. The approximate pore size of the nanofiltration membranes used is 0.31 nm (0.00031 µm). **Table 6.17** summarizes the design of the nanofiltration system.

Table 6.17 Nanofiltration Design

Parameter	Value	Units	Notes
WTP Flow Rate	0.5	MGD	Flow rate per nanofiltration skid
Number of Skids	2		Space for 1 additional skid for a future flow rate of 1.5 MGD
Skid Dimension	7 x 24	ft	W x L
Treated Flow per Skid	350	gpm	
Membrane Type	Polymeric		
Membrane	Dow NF-90		
Number of Membranes	144	per skid	
Membrane Pore Size	0.31	nm	

The nanofiltration skids come equipped with the following: cartridge prefilter; high-pressure feed pump with VFD; meters and instrumentation required for measuring and transmitting flow rates, pressures, pH, ORP, temperature, and conductivity; fully automated control panel; clean-in-place (CIP) system including chemical tank, heater, pumps, and panel; sodium bisulfite and antiscalant chemical feed systems.

Polymeric membranes are typically replaced approximately every 7 to 10 years depending on the operating conditions. It should be noted that lower membrane lifespan has been attributed to high hardness in raw water due to the more frequent cleaning required as discussed below.

The nanofiltration step achieves the required 2.0 log removal of *Cryptosporidium*, 3.0 log removal of *Giardia lamblia*, and 3.0 log removal of viruses.

6.3 Finished Water Pumps

The finished water pumps will draw from the clearwell and will include two (2) 1.0 MGD vertical turbine pumps with room to add an additional identical pump in the future. The pumps will be sized for an initial firm pumping capacity of 1.0 MGD, but will be capable of meeting the future design point of 1.5 MGD. Based on the preliminary design conditions, the initial pump selection for each location alternative have design points as follows:

6.7.1 WTP Location Alternative 1

The first potential site evaluated is located at the back of parcel 51 A 129A, which is owned by the County. This parcel has been identified for potential future industrial growth and would benefit from proximity to the WTP. The parcel has the added benefit of being central to the overall FUSD water system which is important when controlling the water age in the system. Residuals would need to either be pumped to the FUMA Sewage Treatment Plant (STP) or treated on site with effluent being disposed of via a Virginia Pollutant Discharge Elimination System (VPDES) permit.

The RWPS for this location alternative would be located near where the JRWA waterline passes the corner of Gale Hill Road and East River Road. The raw water transmission main would run from the RWPS along East River Road and James Madison Highway to the WTP Location Alternative 1 on parcel 51 A 129A.

6.7.2 WTP Location Alternative 2

The second potential site evaluated is located on parcel 51 A 109A which is owned by FUMA in the middle of the FUSD. This proposed site, was identified due to its centrality to the water supply system and its proximity to the existing FUMA STP which provides a nearby solution for disposal of residuals.

The RWPS for this location alternative would be located near where the JRWA waterline passes the corner of Bremo Road and Cloverdale Road. The raw water transmission main would run from the RWPS along Cloverdale Road and Academy Road to the WTP Location Alternative 2 on parcel 51 A 109A.

6.7.3 WTP Location Advantages and Disadvantages

Each WTP location has several advantages and disadvantages as summarized in **Table 6.18**.

Table 6.18 WTP Location Advantages and Disadvantages

Location	Advantages	Disadvantages
Location Alternative 1: County-owned Industrial Property PIN 51 A 129A	<ul style="list-style-type: none"> Central to system Near existing 3-phase power Longer raw water transmission main allowing for longer reaction time for PAC & permanganate Benefit to encourage growth on industrial parcel Near potential development on FUMA properties 	<ul style="list-style-type: none"> Longer raw water transmission main requires higher initial capital cost Longer finished water transmission main to EST requires higher initial capital cost Residuals disposal is challenging
Location Alternative 2: FUMA Property PIN 51 A 109A	<ul style="list-style-type: none"> Central to system Near existing 3-phase power Adjacent to FUMA WWTP makes disposal of residuals simple Central to future development near FUMA properties 	<ul style="list-style-type: none"> No benefit to industrial parcel; would require major upgrades to finished waterlines Shorter raw water transmission main means shorter reaction time for PAC & permanganate

The most apparent advantage for Location Alternative 1 is the WTPs benefit to industrial growth. Location Alternative 1 does require a longer raw water transmission main which is a negative from an initial investment perspective but adds benefit from a process perspective as it increases the reaction time for PAC and permanganate (The RWPS and waterline is further discussed in **Section 7**). Furthermore,

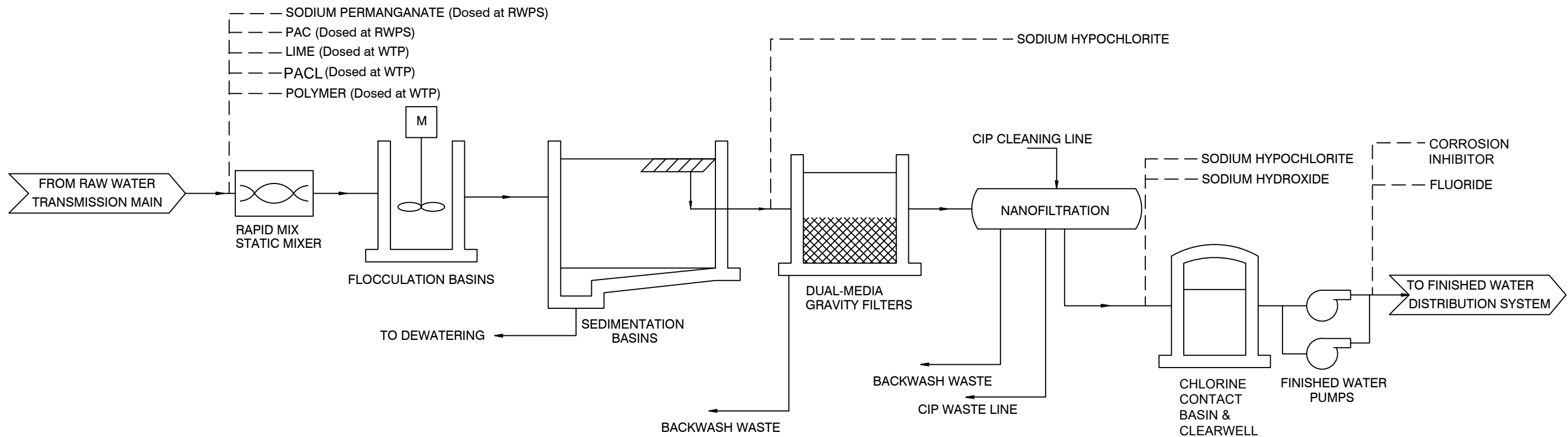


Figure 6.2 - Process Flow Diagram for Treatment Process Alternative 2 - Conventional Filtration with Nanofiltration

N.T.S.

- FWPS Alternative 1 to WTP Location 1
 - Initial conditions: 694 gpm at 262 ft TDH
 - Future conditions: 1,042 gpm at 303 ft TDH
- FWPS Alternative 2 to WTP Location 2
 - Initial conditions: 694 gpm at 304 ft TDH
 - Future conditions: 325 ft TDH

An analysis of each of the WTP locations is included in **Section 6.7**. Pump data sheets showing the pump curves for each of the preliminary finished water pump selections discussed above are included as **Appendix D** of this PER.

6.4 Electrical Requirements

The WTP will require 480Y/277 V, 3-phase power. 3-phase power is available on the parcel frontage that borders James Madison Highway. It is assumed that the new utility service will be provided via overhead power lines to the WTP site where it will connect to a new pad-mounted transformer. To provide emergency back-up power in the event of a utility failure, a permanent diesel-fueled, standby generator will be installed, sized to run the critical components of the WTP. An automatic transfer switch will be provided and located in the electrical room to automatically start the generator and switch to emergency power, and transfer back to utility power on restoration. The automatic transfer switch will have the normal side energized from the service entrance breaker and the emergency side energized from the standby generator.

A main distribution switchboard will provide the breaker loads for all 480V equipment including filter backwash pumps, finished water pump VFDs, motor control center (MCC), HVAC equipment, and a step-down transformer for 208/120V loads. The switchboard will be located in the electrical room and will contain a power monitor and surge protective device.

The building will be provided with LED lighting, as well as exterior lighting on the site and access road. The exterior lighting will be photocell controlled from a lighting contactor in the electrical room. A ground ring and lightning protection system will be installed to the building protect the electrical equipment and prolong useful life.

6.5 Instrumentation and Controls

Local control panels will be provided at each of the process steps for manual control and a computer lab or office will be provided as hub for control of the WTP and the overall County remote sites (via SCADA). All critical features at the WTP will be electronically monitored and/or have alarms compliant with the VDH Waterworks Regulations. Each of the filters will have online turbidimeters to monitor instantaneous turbidity.

The facility building will be provided with a motorized security gate equipped with call capabilities to the WTP control room. A security system for the facility with door contacts for access alarm and a camera system will be provided.

6.6 PFAS Treatment

Several advanced technologies exist that are capable of treating these substances including high pressure membranes (nanofiltration, reverse osmosis), granular activated carbon (GAC), and ion exchange. The County has expressed interest in utilizing nanofiltration for the removal of PFAS. The nanofiltration membranes that are selected will need to be able to remove the PFAS species identified in the sampling. The requirements for utilizing nanofilters for PFAS removal will be determined during the design stage after the results of the sampling are further analyzed.

6.7 Water Treatment Plant Siting

Two potential locations were evaluated for the site of the proposed WTP. WTP location alternatives were identified based on the configuration of the existing system as well as input from the County. The location of both alternatives is shown on **Figure 6.3** along with the RWPS and waterline alternatives. The RWPS is further discussed in **Section 7**.

6.7.1 WTP Location Alternative 1

The first potential site evaluated is located at the back of parcel 51 A 129A, which is owned by the County. This parcel has been identified for potential future industrial growth and would benefit from proximity to the WTP. The parcel has the added benefit of being central to the overall FUSD water system which is important when controlling the water age in the system. Residuals would need to either be pumped to the FUMA Sewage Treatment Plant (STP) or treated on site with effluent being disposed of via a Virginia Pollutant Discharge Elimination System (VPDES) permit.

The RWPS for this location alternative would be located near where the JRWA waterline passes the corner of Gale Hill Road and East River Road. The raw water transmission main would run from the RWPS along East River Road and James Madison Highway to the WTP Location Alternative 1 on parcel 51 A 129A.

6.7.2 WTP Location Alternative 2

The second potential site evaluated is located on parcel 51 A 109A which is owned by FUMA in the middle of the FUSD. This proposed site, was identified due to its centrality to the water supply system and its proximity to the existing FUMA STP which provides a nearby solution for disposal of residuals.

The RWPS for this location alternative would be located near where the JRWA waterline passes the corner of Bremo Road and Cloverdale Road. The raw water transmission main would run from the RWPS along Cloverdale Road and Academy Road to the WTP Location Alternative 2 on parcel 51 A 109A.

6.7.3 WTP Location Advantages and Disadvantages

Each WTP location has several advantages and disadvantages as summarized in **Table 6.18**.

Table 6.18 WTP Location Advantages and Disadvantages

Location	Advantages	Disadvantages
Location Alternative 1: County-owned Industrial Property PIN 51 A 129A	<ul style="list-style-type: none"> Central to system Near existing 3-phase power Longer raw water transmission main allowing for longer reaction time for PAC & permanganate Benefit to encourage growth on industrial parcel Near potential development on FUMA properties 	<ul style="list-style-type: none"> Longer raw water transmission main requires higher initial capital cost Longer finished water transmission main to EST requires higher initial capital cost Residuals disposal is challenging
Location Alternative 2: FUMA Property PIN 51 A 109A	<ul style="list-style-type: none"> Central to system Near existing 3-phase power Adjacent to FUMA WWTP makes disposal of residuals simple Central to future development near FUMA properties 	<ul style="list-style-type: none"> No benefit to industrial parcel; would require major upgrades to finished waterlines Shorter raw water transmission main means shorter reaction time for PAC & permanganate

The most apparent advantage for Location Alternative 1 is the WTPs benefit to industrial growth. Location Alternative 1 does require a longer raw water transmission main which is a negative from an initial investment perspective but adds benefit from a process perspective as it increases the reaction time for PAC and permanganate (The RWPS and waterline is further discussed in **Section 7**).

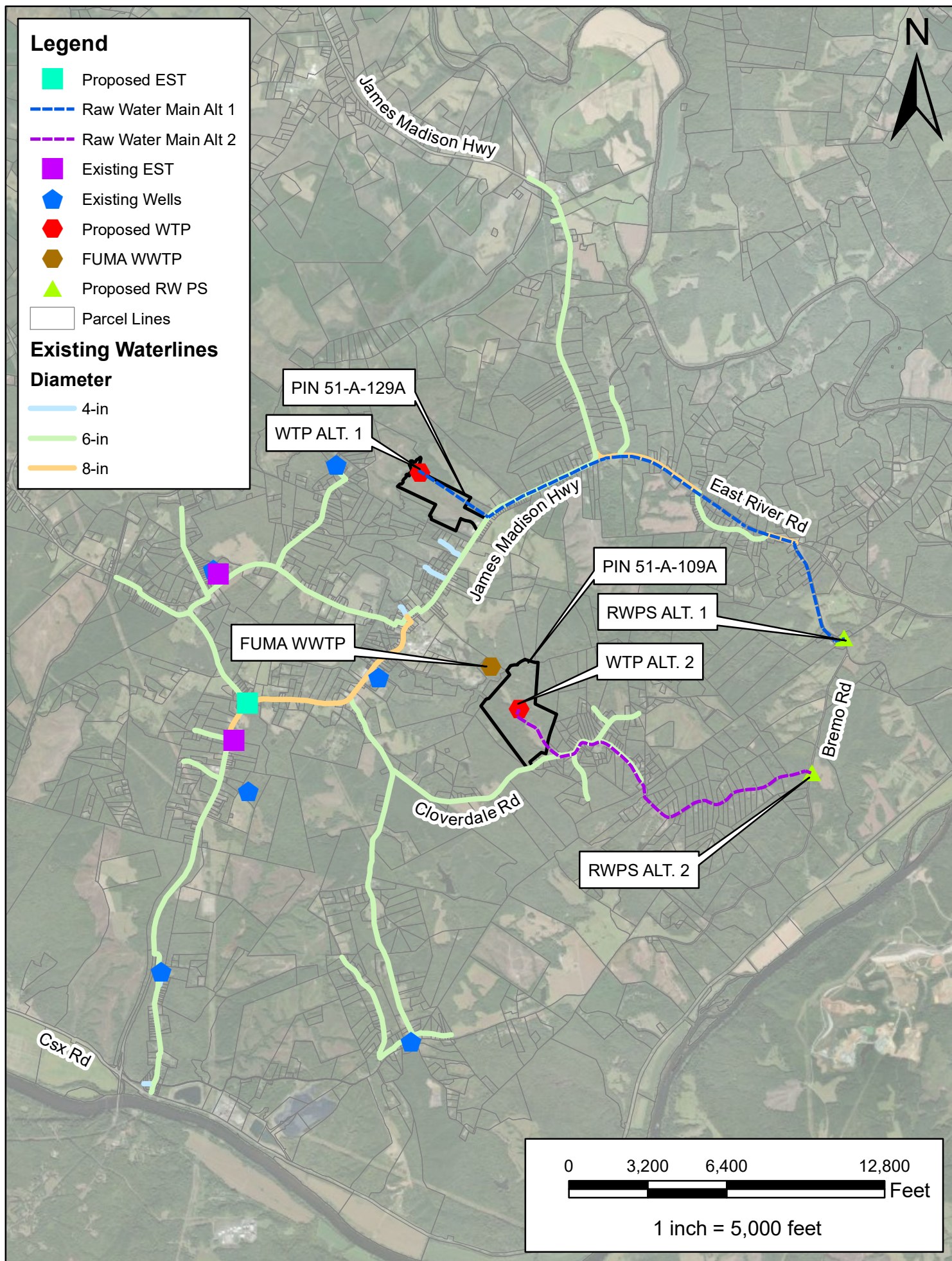


Figure 6.3 - WTP and RWPS Alternative Locations

Location Alternative 1 would either require onsite treatment of residuals with the effluent going to a VPDES outfall or a pump station and force main to the FUMA WWTP.

Location Alternative 2 has the primary benefit of being centrally located to the future FUMA development which can support growth in the area as well as being adjacent to the FUMA WWTP making disposal of residuals simple. Location Alternative 2 provides no benefit to the County-owned parcel planned for industrial growth and would require major waterline upgrades to provide fire protection to the parcel.

Additional discussion on residuals management is included in the next section. Water age of the two location alternatives is evaluated in **Section 8**.

6.8 Residuals Management

Residuals management is a necessary side stream in the water treatment process that involves the collection and treatment of the waste byproducts from the treatment process. In conventional water treatment, sludge from the coagulation and sedimentation process as well as spent-filter backwash is collected and treated. Backwash waste and brine waste from the nanofiltration process is typically sent to waste or to the head of the plant.

Two typical methods for managing residuals from the water treatment exist:

- Non-mechanical (lagoons, drying beds)
- Mechanical (belt press, centrifuge, screw press, etc)

As discussed in **Section 6.7**, the locations identified for the new WTP affect the recommended alternatives for residual management as follows:

- WTP Location Alternative 1
 - Located on the County-owned parcel identified for potential industrial development.
 - Lagoons with a drying pad is recommended as pumping the waste to the FUMA STP would be cost prohibitive.
 - A VPDES permit would be needed to dispose of the supernatant from the lagoons.
- WTP Location Alternative 2
 - Located on FUMA property near the existing FUMA STP.
 - An equalization basin with a small pump station is to pump to the FUMA STP is recommended.
 - Disposal would be managed by the FUMA STP.

The following sections summarize each of the recommended options. **Table 6.19** summarizes the estimated volume of solids generated by the

Table 6.19 Estimated WTP Residuals

Parameter	Value	Units	Notes
Plant Flow Rate	1.5	MGD	
Average Turbidity	15.6	ntu	
PACL Dose	25 – 50	mg/L	
PACL Sludge	84 – 167	lb/mil gal	For every 1 mg/L PACL added, 0.40 mg/L solids formed
Raw Water Solids	130	lb/mil gal	For every 1 ntu, 1 mg/L solids formed
Average Sludge Volume	320 – 446	lbs/day	Based on $S = 8.34Q(0.40 \text{ PACL} + \text{SS} + A)$
Average Sludge Volume	1,920 – 2,670	gpd	Based on 2% solids concentration

6.8.1 Lagoons with Drying Pad

Lagoons are typically the most common and least expensive method to thicken and dewater sludges from the water treatment process. Two lagoons will be provided to collect and dewater sludges for a 6- to 12-month duration and will be planned to be dredged annually. The lagoons will be equipped with a structure allowing continuous decanting which can either be sent to the head of the treatment plant or send to a

VPDES outfall. If sent to outfall, considerations need to be made to ensure dechlorination of the effluent. **Table 6.20** summarizes the lagoon system design.

Table 6.20 Lagoon System Design

Parameter	Value	Units	Notes
Total Lagoon Surface Area	0.5	ac	<i>Based on EPA guidance³</i>
Number of Lagoons	2		<i>0.25 ac, each</i>
Depth	9	ft	<i>7 ft working volume, with 2 ft minimum freeboard</i>
Total Days of Storage	427	days	
PACL Sludge Concentration	7 – 15	%	

As noted above, over six months of storage is provided for both lagoons for a total storage volume of 427 days. It is anticipated that the lagoons would be dredged annually. A large drying pad with underdrains would be provided adjacent to the lagoons so that when each lagoon is dredged the solids can have a space to further dry prior to sending to landfill.

Approximate sizing of the lagoons is shown on the conceptual figures in **Appendix B.9 – B.12**.

6.8.2 Equalization Basin and Pump Station

The proximity to the FUMA STP provides a simple means for disposing of residuals from the treatment process. However, the FUMA STP is rated for maximum flow rate of 0.099 MGD so an equalization (EQ) basin will be required to shave off the peak flows into the FUMA STP.

Typical backwash waste is around 2 to 5 percent of the total plant volume. For the 1.5 MGD future capacity this equates to 30,000 to 75,000 gpd. Typical basin backwash frequency largely depends on the raw water quality and ability settle out solids upstream of the filters. However, for the purposes of this PER it was assumed that no more than one filter will be backwashed per week. The EQ basins will be sized for one filter backwash event with an assumed 5-day pump back window. For smaller WTPs EPA recommends having a redundant basin if more than one filter needs to be backwashed in each week. **Table 6.21** summarizes the EQ basin and pump station sizing.

Table 6.21 EQ Basin Design

Parameter	Value	Units	Notes
Basin Volume	75,000	gal	
Basin Diameter	36	ft	
Basin Height	12	ft	<i>10 ft of working volume, 2 ft of freeboard</i>
Number of Basins	2		
EQ Pumping Rate	22	gpm	<i>15,000 gpd</i>

The average daily flow rate at the FUMA STP is close to 23,000 gpd. Even with a 5-day pump back period, the flow rate from the EQ basin pump station would be close to 15,000 gpd (22 gpm) which would almost double the flow rate to the FUMA STP. This option would likely be very challenging to implement given that the existing FUMA STP already has difficulty achieving their permit requirements.

³ *Large Water System Byproducts Treatment and Disposal Cost Document*, Environmental Protection Agency, Office of Water. April 1993.

6.8.3 Provisions for Future Mechanical Dewatering

Mechanical dewatering is a more costly, but effective means for handling the WTP residuals. Given that initial average daily flows will likely be around 0.5 MGD, utilizing mechanical dewatering would not be cost effective compared to the alternatives discussed above. Space will be allocated for a future mechanical dewatering building which may become more economical when the WTP is build out to 1.5 MGD.

7. Raw Water Distribution System

As previously outlined, the proposed raw water distribution system will draw surface water from the James River through the existing JRWA raw water transmission main. The proposed raw water system will consist of the following components:

- Raw Waterline
 - Alternative Location #1: 22,200, LF of 12-in C900 PVC pressure pipe
 - Alternative Location #2: 14,800, LF of 12-in C900 PVC pressure pipe
- 1 MG Raw Water GST
- Raw Water PS sized initially for 1 MGD with room to upgrade to 1.5 MGD in the future

7.1 Connection to JRWA Raw Water Transmission Main

The existing JRWA raw water main runs northeast along Bremono Road between the intake location on the James River and East River Road. Two potential locations were identified along this section for tying the proposed FUSD raw watermain into the existing JRWA waterline. The two identified locations, shown in **Figure 6.3**, are summarized below:

- Alternative 1 – Corner of Bremono Road and Gale Hill Road
- Alternative 2 – Corner of Bremono Road and Cloverdale Road

These locations were evaluated because of their proximity to potential sites identified by the County for the raw water PS and GST. Elevations of the JRWA water main and hydraulic grade line (HGL) at the point of connection for both locations are shown in **Table 7.1** below.

Table 7.1 JRWA Waterline Connection Locations

Connection Location	Waterline Elevation (ft)	HGL (ft)
Location 1 – Bremono Road and Gale Hill Road	360	502
Location 2 – Bremono Road and Cloverdale Road	217	503

7.2 Pump Sizing and Raw Waterline

The pump station will include two (2) booster pumps with room to add an additional identical booster pump in the future. The pumps will be sized for an initial firm pumping capacity of 1.0 MGD but will be capable of meeting the future design point of 1.5 MGD. As previously mentioned, two location alternatives were considered for the site of the raw water PS and GST. Based on the preliminary design conditions at each location, the initial pump selection for each location alternative have design points as follows:

- RWPS Alternative 1 to WTP Location 1
 - Initial conditions: 694 gpm at 42 ft TDH
 - Future conditions: 1,042 gpm at 75 ft TDH
- RWPS Alternative 2 to WTP Location 2
 - Initial conditions: 694 gpm at 212 ft TDH
 - Future conditions: 240 ft TDH

Pump data sheets showing the pump curves for each of the preliminary raw water pump selections discussed above are included as **Appendix E** of this PER.

7.2.1.1 Raw Waterline

After the raw water exists the booster pump station, it will be pumped through a new 12-in C900 PVC raw watermain to the location of the WTP. The ultimate alignment configuration and length of the raw watermain will be dependent upon which pump station siting alternative is chosen as well as the location of the WTP. Potential site alternatives for the WTP were evaluated as part of this PER and are summarized in **Section 6**.

The total raw waterline lengths for each siting alternative are summarized below:

- RWPS Alternative 1, WTP Alternative 1: 22,176 LF
- RWPS Alternative 2, WTP Alternative 2: 14,800 LF

Figure 6.3 shows the proposed raw waterline alignments for Alternatives 1 and 2.

7.3 Raw Water Pump Station Conceptual Design

As part of the proposed raw water distribution system for the FUSD, a raw water PS and GST facility is required to convey the raw water from the JRWA tie-in location to the proposed WTP. This section of the PER summarizes the considerations evaluated as part of the proposed raw water PS and GST facility. The design will incorporate features that will provide ease of operations & maintenance and flexibility for future expansion and facility upgrades due to increased anticipated demand, while cost-effectively meeting the required design criteria. The proposed water booster station facility will include the following components:

- 1 MG GST
- Site piping with associated valves and fittings
- Precast concrete raw water booster station building including:
 - Pump room including split case centrifugal raw water pumps, piping, valves, and appurtenances
 - Sodium permanganate chemical feed system
 - Separate climate-controlled electrical/control room including electrical distribution equipment, variable frequency drives (VFDs), and a control panel with a programmable logic controller (PLC)
 - Diesel-powered backup generator with automatic transfer switch capable of power the pumps and all electrical equipment for operation of the facility
- Separate precast concrete PAC feed building designed for a Class II, Division II hazardous classification

The raw water PS and GST facility will be designed for an initial capacity of 1.0 MGD, with the ability to be upgraded in the future to a capacity of 1.5 MGD.

7.3.1 Pump Station Building Features

Two (2) precast concrete buildings will be constructed to house the raw water pumps, valves, process piping, electrical equipment, and chemical feed systems. The first building will consist of three separate rooms including a pump room with the sodium permanganate feed system and an electrical/control room. A separate building housing the PAC feed system will be designed to Class II, Division II requirements. The buildings will be equipped with necessary HVAC equipment including exhaust fans, unit heaters, and motorized louver/dampers. The electrical room will be climate-controlled room with split system air conditioning unit. Conceptual raw water pump station figures are included in **Appendix F**.

7.3.2 Permanganate and PAC Systems

As previously discussed, in order to maximize the contact time, sodium permanganate and PAC will be dosed at the raw water pump station. The sodium permanganate feed system will be housed in the main pump room and fed into the discharge side of the pumps. As noted in **Section 6.1.1.1**, the required 30-day storage volume for the sodium permanganate feed system is 540 gallons which can be met with two 275-gallon totes.

The PAC system will be a bulk bag feeder system with explosion proof bag unloading dust collector and will be housed in the PAC building, which will be designed as a Class II, Division II hazardous area. The control panel will be installed outside of the hazardous area in the electrical room. Storage requirements are based on a 30-day chemical storage recommendation. The basis for the storage calculations is a design flow rate of 1.5 MGD and an average dose (max month) of 25 mg/L PAC. Based on this, the storage required for 30 days of PAC is approximately 7,500 lbs. The chemical feed room will be designed with adequate space for eight (8) 1,000-lb bulk bags.

7.3.3 Pump Station

The pump station building will house the tank fill line, which will include a magnetic flow meter to allow the County to monitor flow into the GST and an altitude valve with a backpressure sustaining feature. The altitude valve will regulate flow into the proposed GST from the JRWA raw waterline, while ensuring that the pressure in the JRWA system does not drop below the desired level during tank filling.

The 12" suction header will pull water from the GST and will be above ground. The pump inlet lines coming off the suction header will reduce to 6" and will include a 6" gate valve which will be normally opened but will allow for closure of the line when servicing a booster pump. In the initial flow condition, only three (3) pumps will be operational, however provisions for a fourth pump will be included in the design.

The discharge header will be 6" in diameter and will include injection ports for feeding the aforementioned chemical into the discharge header. The discharge header will include a magnetic flow meter to monitor flow out of the raw water PS. The discharge line will increase to 12" below ground before exiting the station and conveying the raw water to the WTP.

In order to protect the station and downstream piping from pressure spikes, the station will be equipped with a surge relief line connected to the discharge header and will include a surge relief valve. The surge relief line will provide a flow path outside the building to a concrete splash pad. The sizing of the line and valve will be finalized during the detailed design of the station.

The pump station process piping configuration will be laid out to provide operational flexibility in order to enhance system reliability. This will include a 12-inch bypass line with a pressure reducing valve (PRV) which will allow for bypass of the GST and pumps in the event that they need to be taken offline to be serviced.

The proposed pump station process flow diagram and conceptual figures for the station are shown in **Figure 7.1** and **Appendix F**, respectively.

7.3.4 Electrical and Control Requirements

The raw water pump station design will utilize a 480/277V 3-phase electrical service provided by the utility. This will be sufficient to run the existing and future pumps, the PAC feed system, and permanganate feed system as well as all ancillary equipment. The utility source will be backed up by a diesel-engine generator, capable of running all the critical station loads and not so lightly loaded that wet-stacking should be an issue.

The electrical design for the PAC building will be per NFPA 820 standards for Class II Division II facilities and everything will be designed to be explosion proof within the PAC building.

The pump station shall be equipped with a local control in an climate-controlled electrical room that is capable of operating the entire station. The pump station will be equipped with SCADA that will be tied back to the overall WTP control room for monitoring and operation of the facility remotely. Since the pump station will not typically be manned, it will be equipped with security features such as access alarms and security cameras.

7.3.5 Site Features and Ground Storage Tank

The site access road will be an asphalt drive sized to accommodate chemical delivery. The perimeter of the site will have security fencing with a double swing gate at the access road. For ease of maintenance the site within the fencing will be entirely paved. Water storage for the raw water PS and GST facility will be provided by a 1.0 MG glass-lined, bolted steel GST. The tank will be constructed on a cast-in-place concrete footing. Based on information provided by the tank manufacturer, the most economical size for a 1.0 MG bolted steel tank is a 72' diameter tank with 33' sidewall height. The tank will include separate 12-inch inlet and outlet, overflow, drain and all required miscellaneous appurtenances.

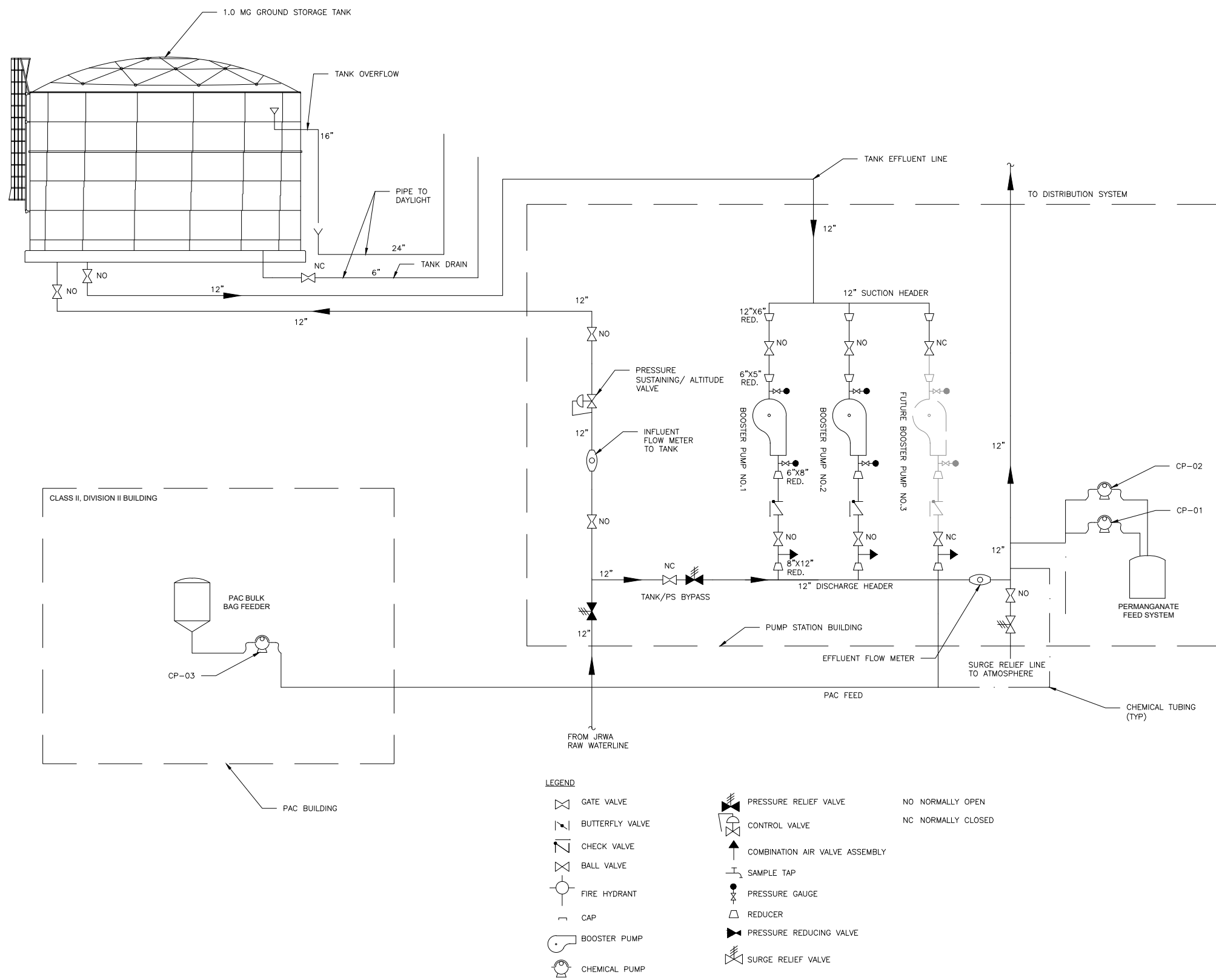


FIGURE 7.1 - RAW WATER PUMP STATION PROCESS FLOW DIAGRAM

N.T.S.

FIGURE NO.

7.1

TITLE RAW WATER PUMP STATION
PROCESS FLOW DIAGRAM

SCALE NTS

PROJECT

DATE DEC. 2024

PROJ. NO. 50150419

8. Finished Water Distribution System

The WTP will have two (2) finished water pumps initially, each rated for 1.0 MGD, capable of a firm pumping capacity of 1.0 MGD. Space for a third pump will be set aside in order to provide flexibility for the future expansion of the finished water pumping system. The sizing of the pumps will be dependent on the WTP location and the EST location as described below.

8.1 System Storage Evaluation

When evaluating water storage, both equalization and fire flow storage are totaled to determine the minimum required storage. Equalization storage is needed for a system to meet daily peak domestic demands and should be equal to approximately 1/3 of the maximum day demand over a 24-hour period per *AWWA Manual of Water Supply Practices M31*. The future maximum daily demand for Fork Union is estimated to be 1.5 MGD based upon demand projections summarized in **Section 3** which requires a future total equalization storage of 0.5 MG. The proposed new storage tank is proposed to be a 0.5 MG tank. The Fork Union distribution system is not currently sized to provide fire flow throughout the existing system. However, based on the existing storage of 0.35 MG and the proposed storage of 0.5 MG, an additional 0.35 MG is available for fire protection. This equates to approximately 3,400 gpm for 2 hours available for fire protection. Significant distribution system upgrades would be needed to meet this fire flow demand throughout the service area. **Table 8.1** summarizes the existing and proposed storage for the Fork Union system.

Table 8.1 Proposed System Storage

Existing Storage	Proposed Total Storage	Recommended Equalization Storage	Remaining Storage for Fire Protection
0.41	0.91	0.5	0.41

Note: all units MG.

8.2 Elevated Storage Tank Location

Three (3) locations were evaluated for the EST site as outlined below. **Figure 8.1** displays the three locations evaluated for the EST.

8.2.1 Elevated Storage Tank Location Alternative 1

Parcels 42-A-6 and 42-A-7 were identified under Alternative 1 as potential locations for the EST. Constructing the EST at this location would locate the EST towards the end of the system and at a lower HGL than the existing Weber City and Omohundro Tanks. Due to these factors, this site was ruled out as a potential site for the EST.

8.2.2 Elevated Storage Tank Location Alternative 2

Parcel 51-A-129A is an existing parcel owned by Fluvanna County and identified under Alternative 2 as a potential location for the EST. Constructing the EST at this location would locate the EST central to the system, but similar to Alternative 1, at a lower HGL than the existing Weber City and Omohundro Tanks. Due to this factor, this site was ruled out as a potential site for the EST.

8.2.3 Elevated Storage Tank Location Alternative 3

Parcel 51-A-79 or 51-A-80 were identified under Alternative 3 as potential locations for the EST. This location was chosen specifically because it is near the center of the system and located at a similar elevation as the Weber City and Omohundro Tanks. Due to these factors, Alternative 3 or somewhere at a similar elevation is the recommended location of the new EST.

8.3 Elevated Storage Tank Site and Features

Similar to the Zion Crossroads EST, the new EST will be an 0.5-MG welded-steel pedosphere. The tank location recommended above in **Section 8.2.3**, was selected due to its centrality to the system and for the ability to locate the tank at a similar base elevation of the other existing storage tanks. This will allow the new tank's HGL to match the existing tanks. **Appendix G** includes a conceptual figure of the EST site.

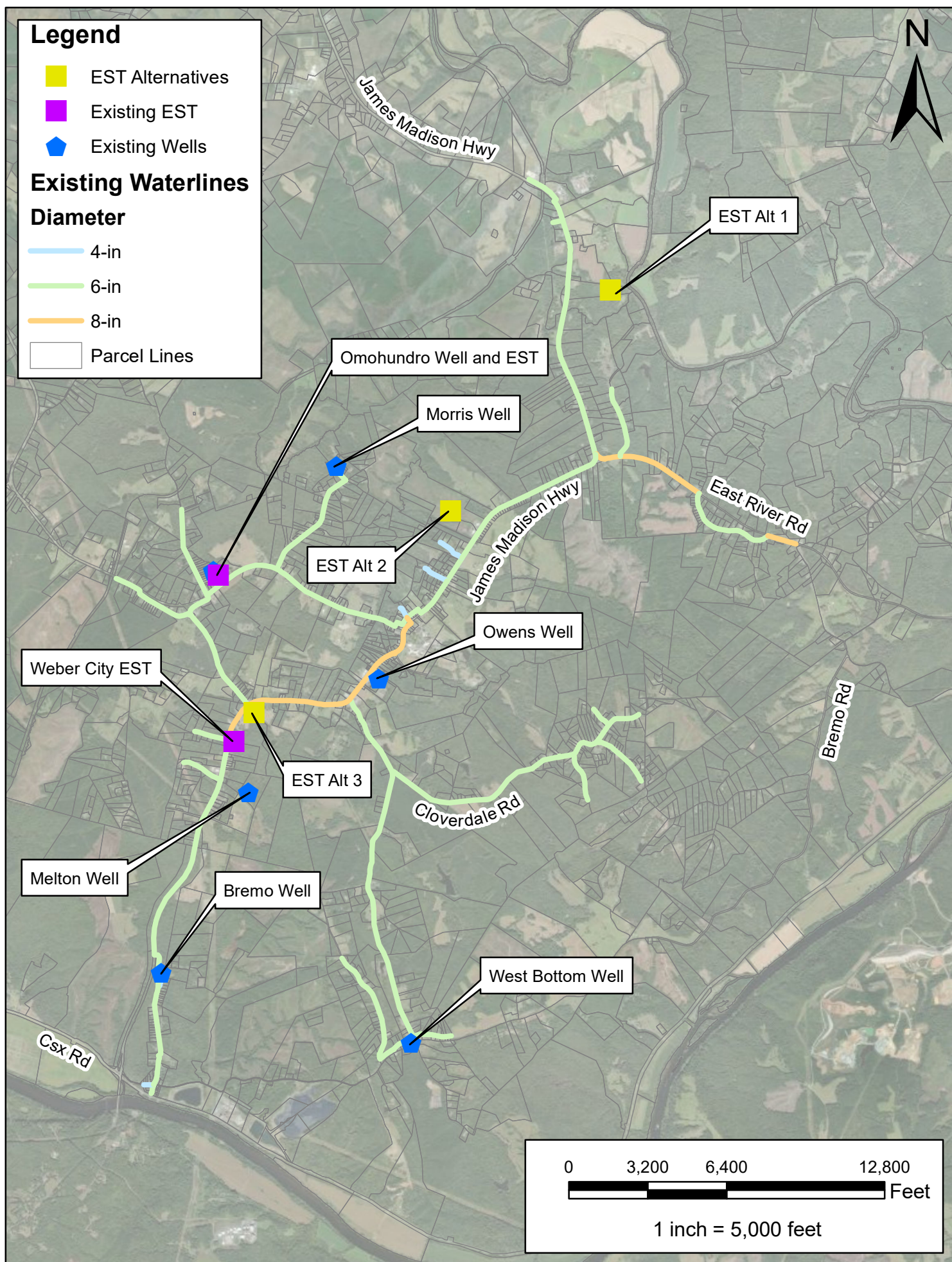


Figure 8.1 - Elevation Storage Tank Site Alternatives

The base of the tank will include all piping and valves for the EST accessible via an access door at the base of the tank. Similar to the Zion Crossroads EST, the tank will be equipped with a cathodic protection system and tank mixing system. Tank water level will be provided via pressure transducers installed in the base of the tank. A local control panel will display the tank status and level and will be connected to the County SCADA system. An emergency diesel backup generator will be provided to ensure critical tank features continue to operate in the event of a utility power failure. The tank site will have a paved access road and be fenced in with a chain link fence with three strands barbed wire and a 16-ft wide vehicular access gate.

8.4 Water Distribution System Configuration

Four (4) pressure reducing valves (PRVs) are recommended to reduce the pressure between the higher elevation zone where the tanks are located and the lower elevations of the FUSD system which are in the eastern and southern portions of the FUSD. Three (3) pressure zones are created with these improvements:

- 584 Zone: named for EST overflow elevation; includes higher elevations along west side of FUSD
- 510 Zone: named for average HGL in the zone; includes majority of FUSD west of 584 Zone
- 403 Zone: named for average HGL in the zone; includes lower elevations near Bremo Power Plant

Figure 8.2 displays the proposed PRVs, pressure zones, and finished waterlines. A 12-inch finished water transmission main will be run from the WTP location to the high-pressure side of the proposed EST in the 584 Zone. This will limit the pressure in the lower elevations to protect the existing system infrastructure and the proposed 6-inch, 8-inch, and 12-inch waterlines while allowing water to flow back to the 510 and 403 Zones. **Table 8.2** summarizes the size and lengths of the proposed finished waterlines and **Figure 8.2** displays the proposed finished waterlines.

Table 8.2 Proposed Finished Waterline

Finished Waterline Diameter (in)	Length of Pipe (ft)
6"	25,950
8"	12,110
12"	1,420
Alt 1 – Finished Water Transmission Main from WTP	16,760
Alt 2 – Finished Water Transmission Main from WTP	12,440

8.4.1 System Pressure

The two WTP locations were evaluated for PHD system pressures under the full buildout scenario. **Figure 8.3** and **Figure 8.4** summarize the pressure under a PHD scenario. Under Alternative 1, the pressure ranges from 24 psi to 121 psi. Under Alternative 2, the pressure ranges from 24 psi to 150 psi (within the finished water transmission main). The high pressure in the distribution system is 121 psi under Alternative 2.

It should be noted that under WTP Alternative 1, the industrial demand is included as discussed in **Section 3**. However, under WTP Alternative 2, the industrial demand could not be supported by the existing infrastructure and maintain pressure above the minimum pressure. The existing 6-inch waterline extending northeast up James Madison Highway will need to be upsized to a 12-inch pipe to support the industrial demand and the other system demands under WTP Alternative 2. The location of WTP Alternative 1 has the added benefit of being able to support the industrial demand.

8.4.2 Available Fire Flow

The two WTP locations were evaluated for available fire flow under an MDD. **Figure 8.5** and **Figure 8.6** summarize the available fire flow under an MDD while maintaining a minimum system pressure of 20 psi. This evaluation is intended to be for information only since the proposed waterline improvements are not only being sized to meet domestic demands, not to provide fire flow. Under both scenarios, the available fire flow ranges from under 200 gpm near the ends of the system to over 1,500 gpm near the elevated tanks.

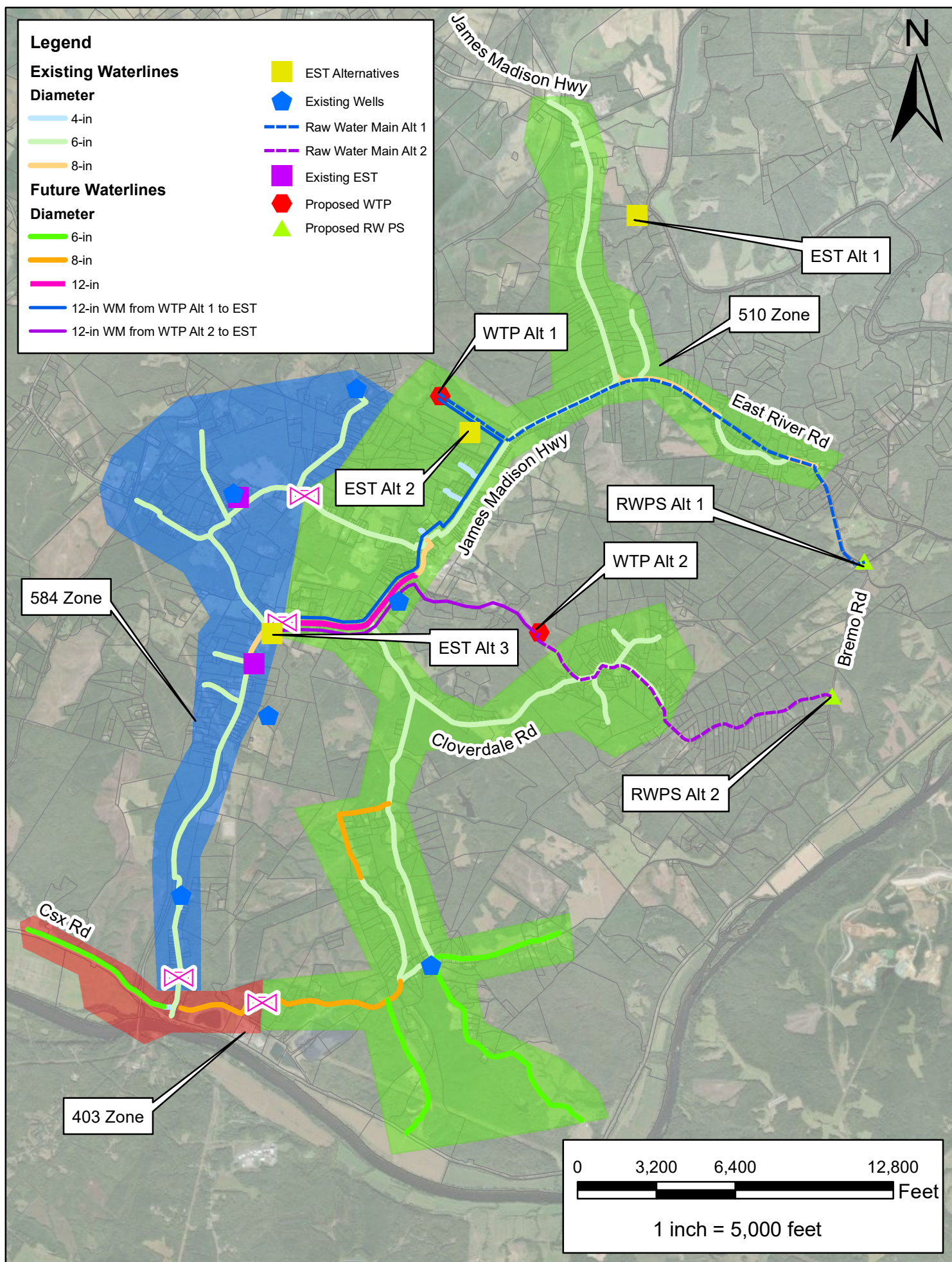


Figure 8.2 - Proposed Water Distribution System Improvements

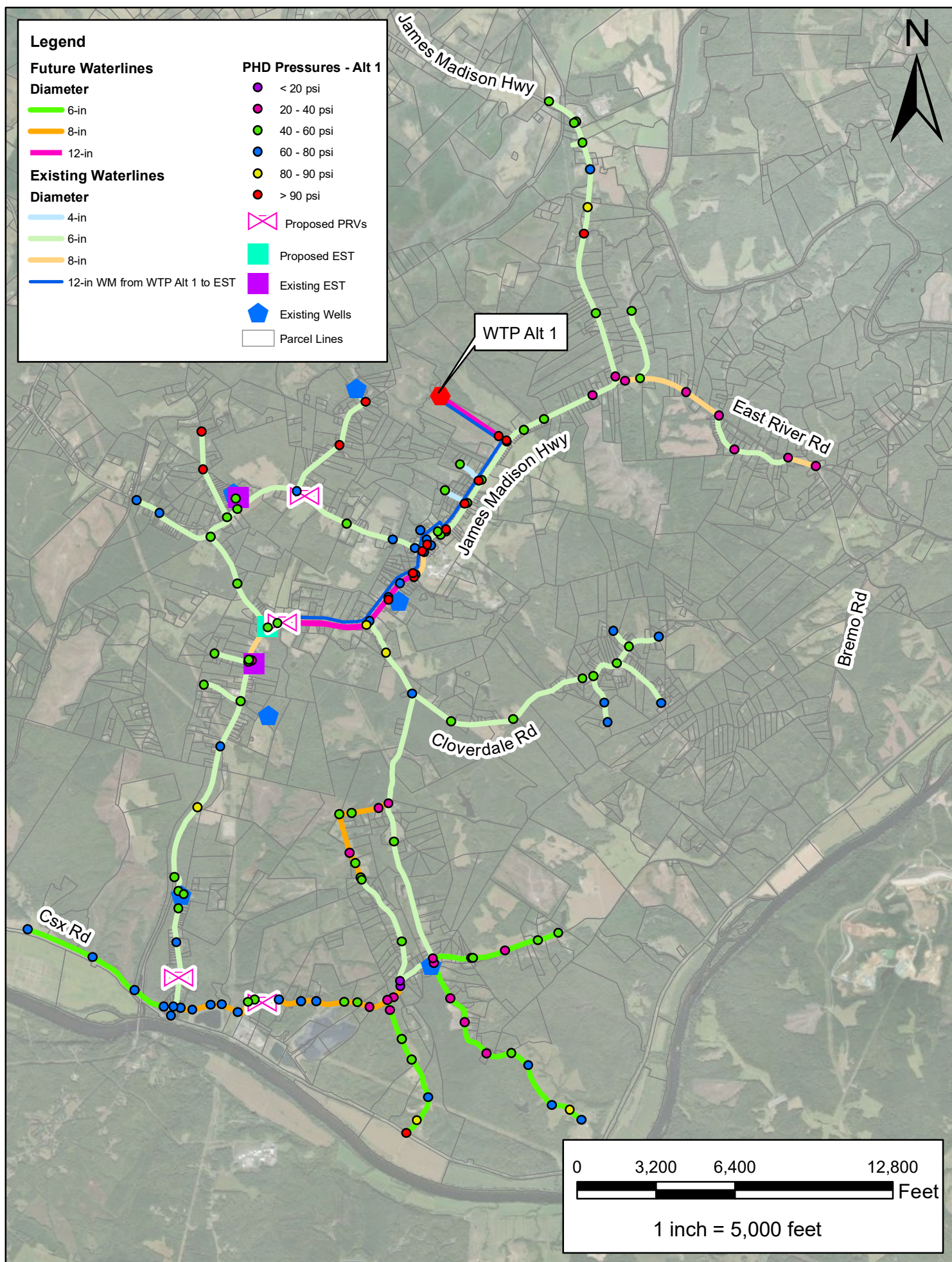


Figure 8.3 - Proposed Water Distribution System Pressure Results - WTP Alternative 1

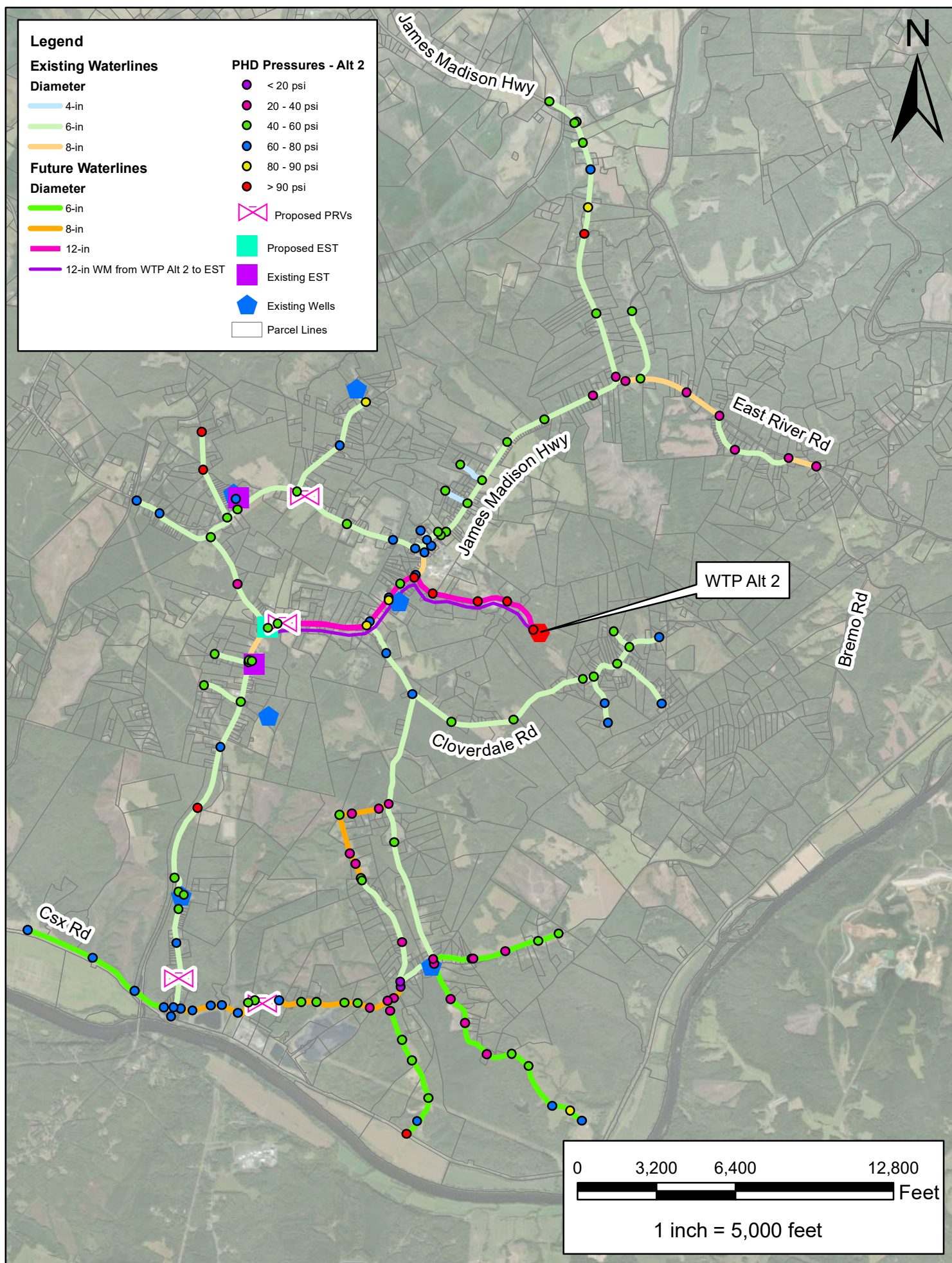


Figure 8.4 - Proposed Water Distribution System Pressure Results - WTP Alternative 2

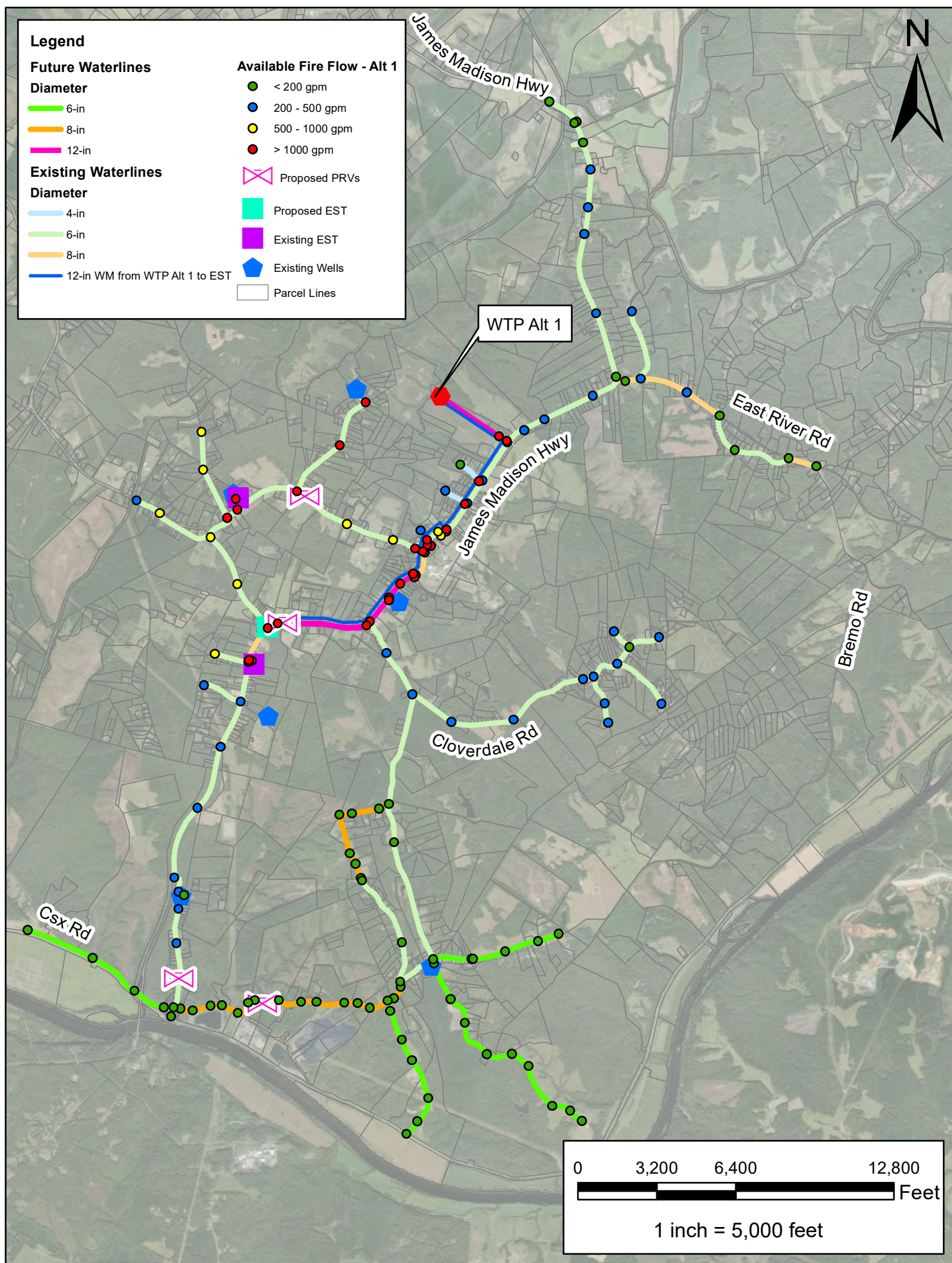


Figure 8.5 - Proposed Water Distribution System Available Fire Flow Results - WTP Alternative 1

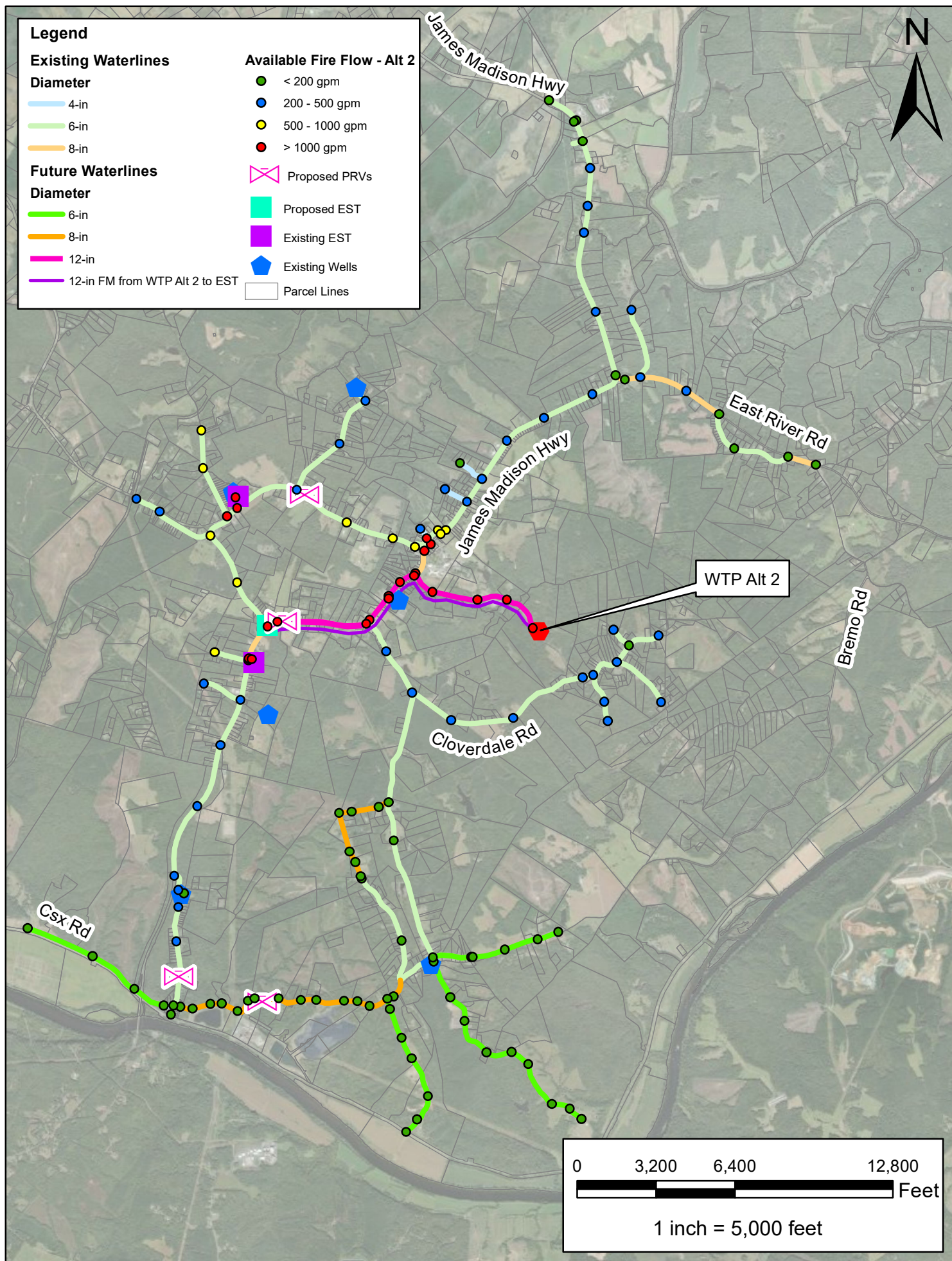


Figure 8.6 - Proposed Water Distribution System Available Fire Flow - WTP Alternative 2

Similar to the system pressure evaluation, WTP Location Alternative 1 has the benefit of the finished waterline being located near the demand center which has adequate fire flow capabilities without other infrastructure improvements. However, under WTP Alternative 2, the industrial demand could not be supported by the existing infrastructure while providing fire flow and maintaining 20 psi minimum pressure. The existing 6-inch waterline extending northeast up James Madison Highway will need to be upsized to a 12-inch pipe to support the industrial demand and the other system demands under WTP Location Alternative 2.

8.4.3 Water Age and Quality

Water age scenarios were run for the proposed improvements for both WTP locations and for the proposed finished water mains. The scenario was run utilizing a 20-day (480 hrs) extended period simulation and the existing ADD. **Table 8.3** summarizes the water age results for each WTP alternative. **Figure 8.7** shows the water age in the two existing and one proposed ESTs. As observed from this figure, the Omohundro tank may have issues with turnover under the new system configuration. **Figure 8.8** and **Figure 8.9** show the estimated water age throughout the system for both alternatives. WTP Location Alternative 1 shows some marginal improvement on the water age when compared with WTP Location Alternative 2.

Table 8.3 Simulated Water Age Scenario Results

WTP Location	Average Water Age (hrs)	Max. Water Age (hrs)
Alternative 1 – County Industrial Property	128	480
Alternative 2 – FUMA Property	136	480

The high water ages shown in **Table 8.3** and on **Figure 8.8** and **Figure 8.9** indicate that the dead ends of the distribution system will likely need to be equipped with auto-flushers or be regularly flushed in order to prevent high water age.

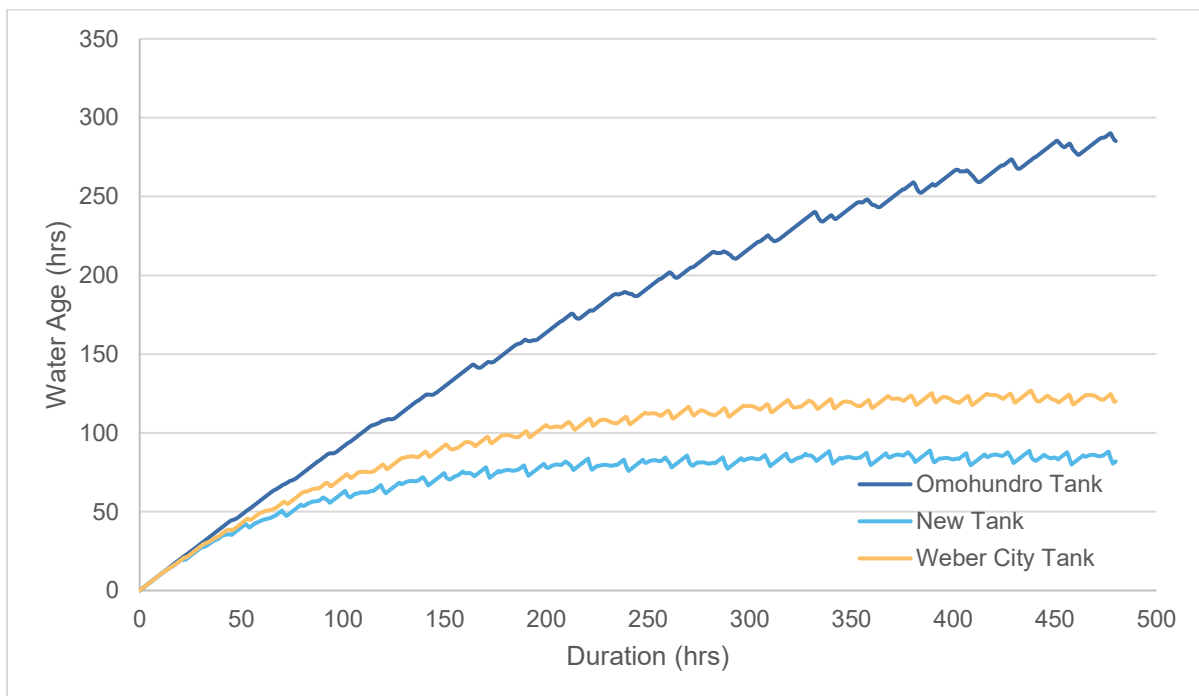


Figure 8.7 Storage Tank Water Age

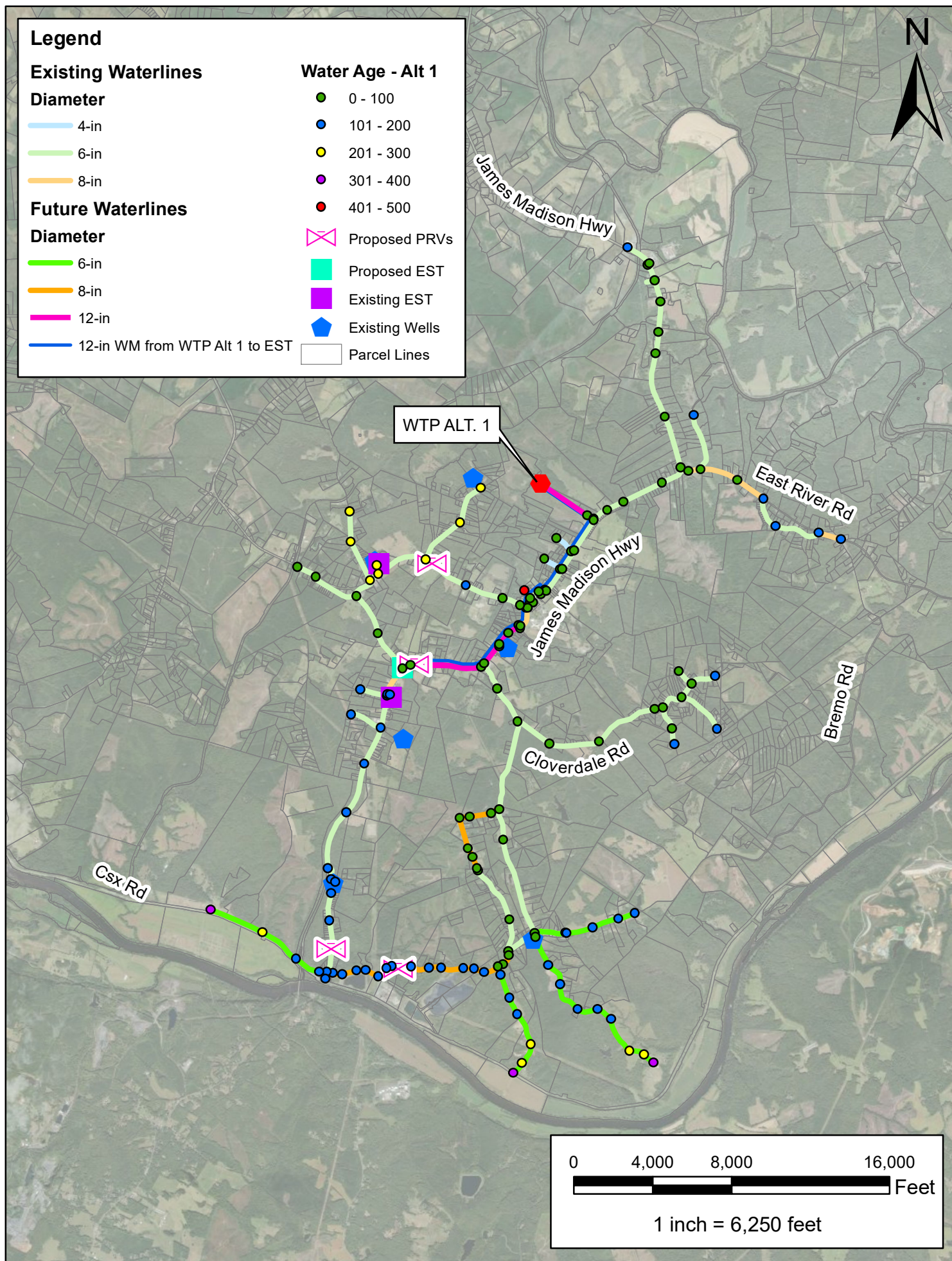


Figure 8.8 - Proposed Distribution System Water Age Results - WTP Alternative 1

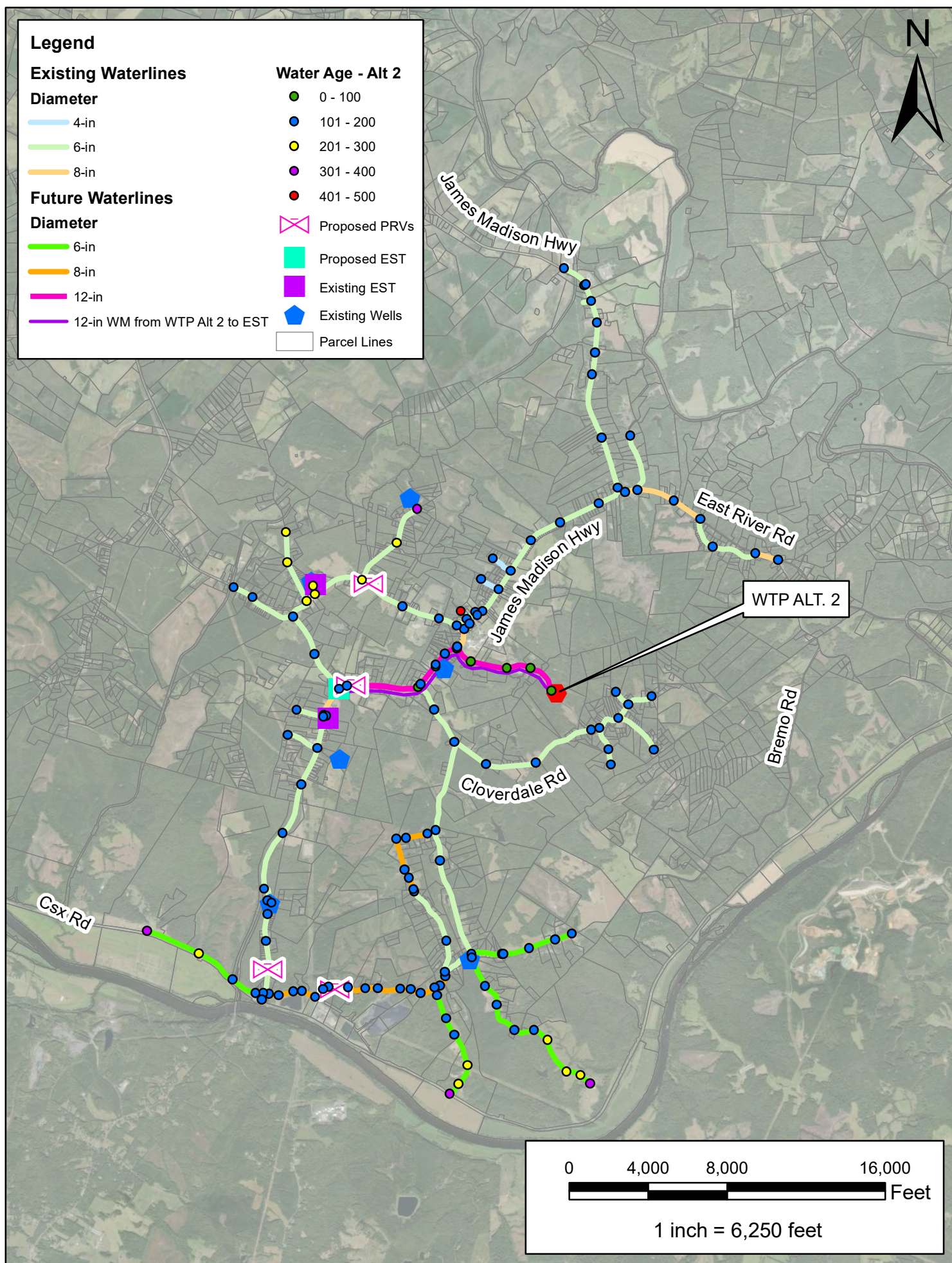


Figure 8.9 - Proposed Distribution System Water Age Results - WTP Alternative 2

9. Cost Analysis

9.1 Opinion of Probable Construction Cost

The construction cost estimates were developed using Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97 which outlines the recommended degree of accuracy based on a classification system for a given project. A Class 5 estimate is a high-level estimate prepared based on limited information while a Class 1 estimate is based on a highly defined project scope with supporting technical information. Since a preliminary engineering study has not been performed and details of the project are subject to change, a Class 4 estimate has been prepared which has an accuracy of -15% to +30%. **Table 9.1** summarizes the opinion of probable construction costs (OPCC) for each of the project alternatives discussed. 10% is assumed for contractor overhead and profit and a 25% construction contingency is included. Estimated costs for construction, land acquisition, and engineering (assumed at 10% of construction cost) are also included. The full OPCC for each project which can be found in **Appendix H**.

Table 9.1 Opinion of Probable Construction Cost

PROJECT	DESCRIPTION	CAPITAL CONSTRUCTION COST \$, millions			CONST. INSPECTION	LAND ACQU.	ENGINEERING
		COST	LOW RANGE (-15%)	HIGH RANGE (+30%)			
RWPS - Alt 1	Based on WTP Location 1	\$11.86	\$10.08	\$15.42	\$123,500	\$435,000	\$1,186,000
RWPS - Alt 2	Based on WTP Location 2	\$10.40	\$8.84	\$13.52	\$109,800	\$435,000	\$1,040,000
FW - Alt 1	Based on WTP Location 1	\$20.19	\$17.16	\$26.25	\$219,500	\$562,400	\$2,019,000
FW - Alt 2	Based on WTP Location 2	\$19.14	\$16.27	\$24.88	\$205,800	\$519,200	\$1,914,000
EST	EST Location 3	\$6.26	\$5.32	\$8.14	\$185,200	\$15,000	\$626,000
WTP Alt 1	WTP Process Alternative 1	\$20.27	\$17.22	\$26.35	\$246,900	\$25,000	\$2,033,000
WTP Alt 2	WTP Process Alternative 2	\$22.92	\$19.48	\$29.80	\$246,900	\$25,000	\$2,298,000

9.2 Net Present Worth Cost Analysis

The initial capital cost was factored into the net present worth cost (NPWC) analysis along with the operations and maintenance (O&M) cost. The life-cycle costs are evaluated on the basis of Net Present Worth Cost (NPWC) for a study period of 30-years and assuming a discount rate (interest rate) of 3.5%. The NPWC method considers both initial capital costs (present costs) and the present value for annualized O&M expenses over the project life. The O&M costs included routine maintenance, repairs, chemical use, energy use, and staffing costs. Probable future repairs and periodic replacements were summarized and evaluated for the net present worth cost. Typical repairs included the following:

- Impeller replacements replacement every 15 years (raw water, backwash, and finished water pumps only)
- EST interior (recoated every 20 years) and exterior coatings (recoated every 10 years)
- EST cathodic protection system replacement every 20 years
- Membrane replacement every 10 years (WTP Process Alt 2 only)
- Gravity filter media replacement every 15 years

Also included in the NPWC are estimated energy, staffing, and chemical costs as well as anticipated maintenance costs. O&M costs were estimated for both large periodic capital replacement items (membrane replacement, media replacement, UV lamp replacement) and a maintenance budget calculated

yearly as 2-6% of the total capital equipment costs. **Table 9.2** summarizes the results of the NPWC analysis. It should be noted that the finished waterlines do not require long-term O&M so their capital cost is the NPWC.

Table 9.2 Net Present Worth Cost

Project	Description	Capital Construction Cost	NPWC
RWPS Alt 1	Based on WTP Location 1	\$11.86	\$12.66
RWPS Alt 2	Based on WTP Location 2	\$10.40	\$11.90
FW Alt 1	Based on WTP Location 1	\$20.19	\$20.19
FW Alt 2	Based on WTP Location 2	\$19.14	\$19.14
EST	EST Location 3	\$6.26	\$6.90
WTP Alt 1	WTP Process Alternative 1	\$20.27	\$41.17
WTP Alt 2	WTP Process Alternative 2	\$23.06	\$46.54

Note: \$, millions

The NPWC for each of WTP Process Alternative is included below in **Table 9.3** and **Table 9.4**. The NPWC analysis for the RWPS and EST can be found in **Appendix I**.

Table 9.3 WTP Process Alternative #1 NPWC Analysis

Yearly O&M Costs WTP Process Alt. #1

Pumping Energy Costs (yearly)	\$66,000
Staffing Costs (250 manhours per week)	\$619,000
Chemical Costs (yearly)	\$343,000
Maintenance Costs (yearly, 2% of capital equipment)	\$96,400
Total	\$1,124,400

Net Present Worth Cost for WTP Process Alt. #1

Initial Capital Cost (CC)	\$20,270,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$18,908,000
NPWC of Yearly Maintenance Costs	\$1,773,000
NPWC of Major Equipment Replacement	\$219,300
Total Present Worth Cost (CC + P)	\$41,171,000

Table 9.4 WTP Process Alternative #2 NPWC Analysis

Yearly O&M Costs WTP Process Alt. #2	
Pumping Energy Costs (yearly)	\$106,100
Staffing Costs (250 manhours per week)	\$619,000
Chemical Costs (yearly)	\$394,600
Maintenance Costs (yearly, 2% of capital equipment)	\$123,900
Total	\$1,243,600
Net Present Worth Cost for WTP Process Alt. #2	
Initial Capital Cost (CC)	\$22,920,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$20,594,000
NPWC of Yearly Maintenance Costs	\$2,279,000
NPWC of Major Equipment Replacement	\$393,300
Total Present Worth Cost (CC + P)	\$46,187,000

Based on **Table 9.2**, the NPWC for WTP Location Alternative 1 is between \$81M and \$86M and the NPWC for WTP Location Alternative 2 is between \$79M and 85M depending on which WTP Process Alternative is selected. WTP Process Alternative 2 has a NPWC that is \$5M greater than WTP Process Alternative 1. This is largely due to the higher yearly costs associated with operating and maintaining the nanofiltration system.

9.3 Value-Engineering Options

The OPCCs provide a conservative estimate for a new water system and there are opportunities for potential savings at each of the facilities including the following:

- EST: the elevated storage tank is not needed in the immediate future and can be delayed until the system is expanded and additional storage is needed.
- RWPS: the raw water pump station and ground storage tank can be delayed until the water treatment plant is expanded. The planned JRWA RWPS will provide sufficient flow and pressure at the connection point to the Fluvanna raw waterline to allow for the delay of the raw water pump station and ground storage tank. The operation of the JRWA RWPS is still unknown but will be coordinated with the consultant who is designing that system during the detailed design of the Fluvanna Fork Union WTP. This may require a ground storage tank or pre-sedimentation basin to be added at the head of the Fork Union WTP which will be confirmed during the detailed design stage.
- WTP: utilize cheaper WTP Process Alternative #1 but add space for future PFAS treatment; minimize office space.

Some of these options may not be practical based on needs of the County. However, these could be further evaluated during the detailed design stage.

10. Summary and Recommendations

10.1 WTP Process and Location Comparison

Each aspect of the project has its unique benefits and drawbacks. Below is a brief qualitative comparison of each WTP process alternative (Table 9.3) and WTP location (Table 9.4).

Table 10.1 Water Treatment Process Comparison

Process	Advantages	Disadvantages
WTP Process Alt. 1: Conventional Filtration	<ul style="list-style-type: none"> Lower capital cost Lower long-term O&M costs Lower energy costs Simple technology, cheaper and easier to maintain 	<ul style="list-style-type: none"> May not protect against PFAS chemicals Will require use of chloramines for residual disinfection due to high THM formation potential Existing well facilities that need to remain online will need to be converted to chloramine residual
WTP Process Alt. 2: Conventional Filtration with Nanofiltration	<ul style="list-style-type: none"> Nanofiltration will provide protection against some PFAS chemicals Nanofiltration will remove more NOM and reduce chlorine demand in the distribution system 	<ul style="list-style-type: none"> Higher capital cost Higher long-term O&M costs Higher energy costs More complex technology

Table 10.2 Water Treatment Location Comparison

Process	Advantages	Disadvantages
WTP Location Alt. 1: County-Owned Industrial Site	<ul style="list-style-type: none"> Lower pumping (energy) costs Closer to demand center Existing interconnection at JRWA Property owned by County 	<ul style="list-style-type: none"> Higher capital costs for raw waterline and finished water transmission main
WTP Location Alt. 2: FUMA Property	<ul style="list-style-type: none"> Lower capital costs for raw waterline and finished water transmission main Closer to future potential FUMA development 	<ul style="list-style-type: none"> Higher pumping (energy) costs Further from demand center No existing interconnection at JRWA Property acquisition may be required

10.2 Recommended WTP Location

The recommended site for the WTP is the County-owned industrial property. The site is closest to the existing demand center and offers potential benefit to any development that may occur on the property. This location will require the RWPS to be located at the location identified on Gale Hill Road where the planned interconnection with the JRWA is located.

10.3 Recommended WTP Process and Budget

Based on the increasing scrutiny of PFAS chemicals, the recommended approach is WTP Process Alternative 2 which includes all of the treatment processes included in Process Alternative 1 with the addition of the nanofiltration step. The nanofiltration system has the benefit of being effective for PFAS removal and for the removal of NOM which can lead to increased DBP formation potential. There is a high potential the utilization of nanofiltration will eliminate the need for chloramination but this will be further investigated during the detailed design stage. Additional bench scale testing will be completed during the detailed design to confirm if chloramines are required for residual disinfection. Furthermore, the information needed to evaluate the blending of sources was not available at the time of this PER, but additional testing will be completed on the wells to mitigate any issues with blending. All processes will be sized initially for 1.0 MGD with the ability to be easily expanded to 1.5 MGD. A summary of the treatment process is as follows:

- Rapid Mix (static mixer)
- Flocculation (2-stage)
- Sedimentation (with plate settlers and hoseless sludge collectors)
- Gravity Media Filters
- Nanofiltration
- Disinfection (chlorine contact basin)

- Clear Well
- Finished Water Pumps
- Chemical Systems
 - Raw Water Chemicals
 - PAC and permanganate dosed at RWPS
 - Polymer, PACL, and lime dosed at rapid mix
 - Filtered Water Chemicals
 - Sodium hydroxide and sodium hypochlorite dosed at chlorine contact basin
 - Finished Water Chemicals
 - Ammonium sulfate for the formation of chloramines may be required depending on the DBP formation potential
 - Fluoride and corrosion inhibitor dosed at WTP finished waterline
- Residuals lagoon for collection of settled solids, backwash waste, and nanofiltration reject waste

The following budgets for each project are summarized below in **Table 10.3**.

Table 10.3 Recommended Project Cost

PROJECT	DESCRIPTION	CAPITAL CONSTRUCTION COST \$, millions			CONST. INSPECTION	LAND ACQU.	ENGINEERING \$, millions
		COST	LOW RANGE (-15%)	HIGH RANGE (+30%)			
RWPS - Alt 1	Based on WTP Location 1	\$11.86	\$10.08	\$15.42	\$123,500	\$435,000	\$1.19
FW - Alt 1	Based on WTP Location 1	\$20.19	\$17.16	\$26.25	\$219,500	\$562,400	\$2.02
EST	EST Location 3	\$6.26	\$5.32	\$8.14	\$185,200	\$15,000	\$0.63
WTP Alt 2	WTP Process Alternative 2	\$22.92	\$19.48	\$29.80	\$246,900	-	\$2.30
TOTAL		\$61.29	\$52.10	\$79.68	\$775,000	\$1,013,000	\$6.13

Based on **Table 10.3**, a total project cost of \$69.21 million should be budgeted to complete all of the projects.

10.4 Recommended Project Costs with Value Engineering

By applying the value engineering recommendations from **Section 9.3**, the initial capital budget costs can be reduced. This includes the following assumptions:

- Removal of the elevated storage tank from the initial scope of the project
- Removal of the raw water pump station and ground storage tank from the initial scope of the project
 - Includes moving the PAC and permanganate systems to the WTP

The value engineered budget summary is summarized below in **Table 10.4**.

Table 10.4 Value-Engineered Recommended Project Cost

PROJECT	DESCRIPTION	CAPITAL CONSTRUCTION COST \$, millions			CONST. INSPECTION	LAND ACQU.	ENGINEERING \$, millions
		COST	LOW RANGE (-15%)	HIGH RANGE (+30%)			
Raw Waterline - Alt 1	Based on WTP Location 1	\$5.42	\$4.61	\$7.05	\$110,000	\$410,000	\$0.54
FW - Alt 1	Based on WTP Location 1	\$20.19	\$17.16	\$26.25	\$219,500	\$562,400	\$2.02
WTP Alt 2	WTP Process Alternative 2	\$23.51	\$19.98	\$30.56	\$246,900	-	\$2.35
TOTAL		\$49.12	\$41.75	\$63.86	\$576,200	\$972,400	\$4.91

Based on **Table 10.4**, a total project cost of \$55.58 million should be budgeted to complete all of the projects. This is a reduction of \$13.63 million from the initial costs presented in **Table 10.3**.

10.5 Concluding Remarks

In conclusion, the proposed water supply system for Fluvanna County represents a critical step toward mitigating the environmental and public health impacts of CCR disposal at the Bremo Power Station landfill. By connecting to the James River Water Authority raw water main and incorporating advanced treatment and distribution infrastructure, the system aims to ensure a safe and reliable drinking water source for residents and businesses within the affected 1.5-mile radius and throughout the Fork Union service area. The detailed evaluations and recommendations provided within this PER, including raw water quality assessments, treatment process design, and system integration strategies, lay the foundation for a robust and sustainable solution. With the completion of this project, the County will not only address immediate groundwater contamination risks but also strengthen its long-term water resource resilience.

APPENDICES

- Appendix A** – Bench Scale Testing Report
- Appendix B** – Water Treatment Plant Conceptual Figures
- Appendix C** - Chemical Feed Calculations
- Appendix D** - Finished Water Pump Selections
- Appendix E** - Raw Water Pump Selections
- Appendix F** - Raw Water Pump Station Conceptual Figure
- Appendix G** – Elevated Water Storage Tank Conceptual Figure
- Appendix H** - Opinion of Probable Construction Costs
- Appendix I** – Net Present Worth Cost Analysis
- Appendix J** – PFAS Sampling & Testing Results
- Appendix K** – VDH Comments and Responses

APPENDIX A – BENCH SCALE TESTING REPORT

REFERENCE NO.

FLUVANNA COUNTY - FORK UNION WATER TREATMENT PLANT

Bench Testing Report

NOVEMBER, 2024



ORIGINAL

SUBMITTED BY
Dewberry Engineers Inc.
4805 Lake Brook Dr. Ste 200
Glen Allen, Virginia 23060
804.290.7957

SUBMITTED TO
Fluvanna County
P.O. Box 540, 132 Main Street
Palmyra, Va 22963
434.842.5310

Fluvanna County – Fork Union Water Treatment Plant – Bench Testing Report

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1. Introduction

Dewberry is currently designing a new water treatment plant for the Fork Union Water Supply System (FUWSS) in Fluvanna County. Source water will be collected from the James River and sent through the James River Water Authority Raw Water Transmission Main to a raw water storage tank. Downstream of the storage tank, powdered activated carbon (PAC) and sodium permanganate will be metered into the raw water stream at a pump station. The residence time in the water main between the pump station and the water treatment plant will allow the PAC to adsorb organics and the permanganate to remove color and decrease iron and manganese concentrations. Upon reaching the water treatment plant, the water will be sent to a rapid mix tank followed by a flocculation basin, and then a sedimentation basin. The inlet just upstream of the rapid mix tank will be dosed with Aluminum Sulfate to encourage flocculation and Sodium Hydroxide for pH adjustment. Following sedimentation, the clarified supernatant will be filtered. Two filtration processes were evaluated as part of this bench testing trial. Those include dual-media filtration and nanofiltration. It is anticipated that nanofiltration, if chosen, will not immediately follow sedimentation, but will require upstream pre-filters. For either chosen filtration process, polymer and sodium hypochlorite will be added prior to the filtration step for initial disinfection. Following filtration, additional sodium hypochlorite and sodium hydroxide will be added to the transfer pipe on the way to the clearwell. The clearwell will provide storage and residence time for final disinfection. Downstream of the clearwell, the finished water will receive orthophosphate for corrosion inhibition as it is pumped through the distribution system.

Bench scale testing was conducted to achieve the following objectives.

- Compare the efficacy of the two filtration technologies with various doses of treatment chemicals for removal of total organic carbon (TOC) and dissolved organic carbon (DOC).
- Compare the disinfection byproduct (DBP) formation potential in the waters following treatment.

The testing was split into two phases, one for each bullet point objective above. Six trials were tested as part of phase 1 which included (3) PAC dosages of 0, 10, and 15 mg/L and the two previously mentioned filtration technologies. Following receipt of Phase 1 results, two of the six trials were selected to be duplicated in Phase II. During Phase II, the two selected trials were run in the lab. The filtered samples were split and incubated for prescribed times to simulate the water distribution system. When a prescribed time was reached the sample was removed from incubation, dechlorinated, and tested for disinfection byproducts (DBPs). Phase 1 and 2 testing are described in detail in the Bench Testing Protocol dated 7/19/2024 and attached in Section 2.11. Deviations and enhancements to this protocol are described in section 1.3.

2. Protocol Modifications & Enhancements

1. The ability to obtain small, sample quantities of the dosing chemicals in a short time-frame was limited, so the concentrations of the chemicals purchased were slightly different from those previously specified. Through dilution, and correcting for the alternative concentration purchased, the correct target concentration was achieved. The dosing chemicals that varied from those listed in Section 3 of the protocol are listed below:
 - a. 48.5% Aluminum was used rather than 48%
 - b. 5.25% Sodium Hypochlorite was used rather than 12.5%
 - c. 5 N NaOH was purchased and diluted to 0.1 N NaOH for dosing
 - d. 0.042 N Potassium permanganate was used rather than Sodium Permanganate
2. The largest beakers available in the lab, for which a stir bar and magnetic stir plate could achieve replicable testing was 4,000 mL. A sample size of 3,500 mL was selected to leave some headspace in the beaker while retaining enough sample to ensure all parameters for Phase 1 and Phase 2 testing could be tested. The use of the Phipps and Bird coagulant/flocculant mixer was

evaluated for use, but was determined to not be a viable option do the container sizer limitation of 2L.

3. Use of the Extech CL203 Chlorine Analyzer Pen called out in the protocol was abandoned for two reasons. The meter is only able to measure total chlorine, not free chlorine which is the desired parameter. In addition, initial lab testing results were scattered and not able to be consistently replicated. As an alternative, HACH DPD free chlorine powder pillows were used with program 80 on the DR3900 spectrophotometer. Since the test range was limited to 0.02 – 2.00 mg/L, a 1:1 dilution with deionized water was used when targeting a final free chlorine residual of 2.50 mg/L. The result from the spectrophotometer was multiplied by 2 to correct for the dilution. The powder pillow method provided a rapid, replicable approach to obtain free chlorine measurements.
4. The protocol sedimentation period of 12 minutes was adjusted to 13 minutes and 38 seconds (13.64 min). This change was initiated for two reasons. First, the sample volume of 3,500 mL, when the test was initiated was different from what was originally contemplated. The volume at the sedimentation step was reduced further by water losses due to aliquot removal for pH, and COD testing. The sample volume at the beginning of the sedimentation step was held constant at 3,000 mL. By holding this constant, and using the same dimension beakers for each trial a singular sedimentation time could be used which corresponded to a specific surface overflow rate. Of equal importance to the sample volume and cylinder geometry, was the design basis of the surface overflow rate. The overflow rate follows Virginia regulatory guidance VDH 12VAC5-590-870 E.4. which prescribes a range of 0.25 – 0.38 gpm/ft² (400 – 547 gpd/ft²). A 13.64 min sedimentation period for a 3L sample provided a surface overflow rate of 0.30 gpm/ft² (432 gpd/ft²).
5. Initial testing confirmed that pre-filtration would be required prior to filtering the decanted samples with 0.02 µm filters. Rapid flow was observed through the 10 µm filters and through a second 1.5 µm filter. Flow was dramatically less when the filtrate that had been passed through the 1.5 µm filter was passed through a 0.45 µm filter. A second pass was made through a 1.5 µm filter before stepping down to 0.45 µms. The filtrate was then filtered using the 0.02 µm filter.
 - a. The resulting filtration sequence used was: 10 µm, 1.5 µm first-pass, 1.5 µm second-pass, 0.45 µm, 0.02 µm

3. Equipment

Table 1

EQUIPMENT LIST	
DESCRIPTION	BRAND & MODEL #
Spectrophotometer	Hach DR3900
Turbidity Meter	Geotech Portable Turbidity Meter
SUVA/UV254 Meter	Real Tech Inc. Real UVT with Split Sense Technology
pH & Temperature Probes	YSI Professional Plus
4,000 mL Beaker	
Stir Bar	
Stir Plate	Thermo Scientific Cimatec
Analytical Balance	
Incubator	Quincy Lab, Inc. – Model 10E
Decanter	Turkey baster
Micropipette	100 µL – 1000 µL & 1 mL – 5 mL
5 -gallon carboy	Uline S-12768
30 gal Polyethylene Drum	Uline S-19419
Spectrophotometer	DR 3900
Digital Reactor Block	DRB200

4. Method

4.1 Sample Collection

On Wednesday 8/28, a water sample was collected from the James River at the Bremo Bluff boat launch located at 256 Boat Landing Rd., New Canton, VA 23123. The sample was collected in (5) 5 gallon carboys using a telescoping extension pole with a plastic scoop attached to the end. The sample collector waded into ankle deep water and used the extension pole to reach out approximately 20+ ft from the bank. Each carboy was filled and pH and turbidity were measured. A sample of the water in each carboy was retained. Three carboys were tested for carbonate alkalinity and calcium hardness, and two of the three were additionally tested for Iron, Manganese, and Chemical Oxygen Demand (COD).

A 30 gallon, open-head, polyethylene drum was purchased and rinsed to ensure there was no residue from manufacturing. The (5) 5-gallon carboys were shaken and then dumped into the 30 gallon drum to generate a composite sample. The top head of the drum was sealed between removal of each aliquot for testing.

4.2 Solution Preparation

Table 2

PURCHASED SOLUTIONS	
SOLUTION	VENDOR
0.042 N Potassium Permanganate solution ; KMnO_4	USA Blue book – SO3439247
48.5% Aluminum Sulfate Tetradecahydrate Solution ; $\text{Al}_2(\text{SO}_4)_3 \cdot 14\text{H}_2\text{O}$	Alliance Chemical – A15633
5.0 N Sodium Hydroxide	Hach - 245053
5.25% Sodium Hypochlorite Solution ; NaOCl	Alliance Chemical – UC-YLMB-8W8O
WPH1000 Powdered Activated Carbon (PAC)	Calgon Carbon

- A 0.075% solution of NaOCl was prepared by adding 1 mL of 5.25% NaOCl solution to 69 mL of 5.25% NaOCl solution
- A 0.1 N solution of NaOH was prepared by adding 1 mL of 5 N NaOH solution to 49 mL of Deionized (DI) water
- 35 mg of Powdered Activated Carbon was measured using the analytical balance. The powder was added to 10 mL of DI water in a beaker. The mixture was mixed using a metal stir rod and the rod sprayed with DI water to ensure it had not inadvertently collected some of the PAC. This solution would be used for the 10 mg/L trials of PAC using a 3,500 mL sample size
 - The same procedure was used but with 52.5 mg of PAC for generation of PAC solution to be used for the 15 mg/L trials.
- The calculations supporting the solution preparation are listed in section 2.3

4.3 Pre-filtration for COD

Following addition of the PAC and Potassium Permanganate, the stir bar was set to 500 revolutions per minute (rpm). A small vortex was generated to ensure turbulent flow, in an effort to simulate the force main piping to the water treatment plant. A picture potassium permanganate addition is shown in Section

2.1. The pink hue of the liquid can be seen extending from the bottom of the beaker, upward to the bottom of the vortex. Aliquots of sample were removed and COD was tested at 5 minutes, 15 minutes, 30 minutes, and 60 minutes after the PAC addition. The COD test involved a 2 hour wait time while the sample sits in the reactor at 150°C. A procedure was necessary for filtering out the PAC without unintentionally filtering out organics, which would decrease the result of the COD test. The largest pore size filters available in the lab had a pore size of 10µm and were going to be used to simulate dual-media filtration. Since it was undesirable to filter at this pore size and potentially remove organics as well as the PAC, a larger filter size was desirable. Bunn coffee filters were selected for use. For an initial test, a solution of DI water that was oversaturated with PAC was filtered through one Bunn coffee filter. The filtrate was lighter than the pre-prepared PAC & DI solution but still had a dark hue. Three filters were then used with the same over-saturated solution and the filtrate was visibly far lighter but still had a tint to it. The raw solution was then filtered through six filters which were stacked on top of each other, and the resulting filtrate was not visually discernably different from DI water. A sample of the filtrate was tested for COD against a sample of DI water. The filtrate did not have a higher resulting COD than the DI water sample, so the use of (6) Bunn coffee filters was accepted for the removal of the PAC prior to the COD test. During Phase 1 trials an additional filter was added for a total of seven stacked filters per sample.

4.4 Phase 1 Trials

Phase 1 testing involved bench scale simulation of the entire water treatment plant process from initial raw water collection to pumping the treated water to customers through the distribution network. Aliquots of raw water from the 30 gallon drum were removed and used in (6) trials with (2) filtration options and (3) doses of PAC as displayed in Table 3. A list of steps that were used during the Phase 1 TOC and DOC testing, and the duplicate trials in Phase 2 is listed below Table 3.

Table 3

REACTOR SETUP SUMMARY				
SAMPLE	PAC (MG/L)	NAMNO4 (MG/L)	ALUM (MG/L)	FILTER
1	0	1	85	Dual media
2	0	1	85	Nanofilter
3	10	1	85	Dual media
4	10	1	85	Nanofilter
5	15	1	85	Dual media
6	15	1	85	Nanofilter

1. Set reactor to COD, preheat to 150° C
2. Label all sample bottles as follows:
 - a. 250 mL bottle – S# - After Initial PAC & KMnO₄ : 5 min
 - b. 250 mL bottle – S# - After Initial PAC & KMnO₄ : 15 min
 - c. 250 mL bottle – S# - After Initial PAC & KMnO₄ : 30 min
 - d. 500 mL bottle – S# - After Initial PAC & KMnO₄ : 60 min
 - e. 250 mL bottle – S# - After Decant
 - f. 500 mL bottle – S# – After Filtration
 - g. 500 mL bottle – S# – After final pH buffer & Disinfection

3. Mix raw water in 30 gal drum
4. Collect 3,490 mL of raw sample in a 4,000 mL beaker
5. Add medium stir bar and set to 500 RPM
6. Add the pre-made 10 mL of DI water with specified mg of PAC to achieve specified mg/L per Table 3
7. Add 235 μ L of 0.021N KmnO_4 solution to the 3,500 mL sample
8. Collect Sample at $t = 5$ min following additiona of PAC and permanganate. For trials containing PAC, filter out the PAC using (7) stacked coffee filters and test for COD
9. Collect Sample at $t = 15$ min following additiona of PAC and permanganate. For trials containing PAC, filter out the PAC using (7) stacked coffee filters and test for COD
10. Collect Sample at $t = 30$ min following additiona of PAC and permanganate. For trials containing PAC, filter out the PAC using (7) stacked coffee filters and test for COD
11. Collect Sample at $t = 60$ min following additiona of PAC and permanganate. For trials containing PAC, filter out the PAC using (7) stacked coffee filters and test for COD
12. Reduce sample volume to 3,000 mL in the beaker
13. Set stir bar to 400 RPM for rapid mix
14. Set timer on stopwatch for 60 seconds for the rapid mix
15. Add 190 μ L of 48.5% $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{H}_2\text{O}$ Solution; Start Timer
16. Decrease stir bar to 50 – 70 RPM for 30 min
17. Measure the pH and compare to the target of 7.5
18. Add 0.1 N NaOH to adjust the pH to the 7.5 target
19. Turn stir bar to 0 RPM to initiate the 13 minute 38 second sedimentation period

20. Decant the supernatant into a 2nd 4,000 mL beaker using a turkey baster. Evacuate the air from the bulb before lowering the tip into the liquid then release the bulb to collect the supernatant. Drag the tip of the baster up the wall of the beaker to ensure any drips run down the side wall of the beaker, causing minimal disturbance and turbulence
21. Collect a sample from the decanted supernatant
22. Add 0.075% NaOCl solution to achieve a free Chlorine residual of 1 mg/L
23. Setup vacuum pump and Erlenmeyer flask with appropriate filtration unit. Filter the decanted liquid as follows:
 - a. For Dual-Media filtration – use a 10 µm filter
 - b. For Nanofiltration – use the following filter sizes in series, ensuring clean filtration equipment and receiving beakers for each pass
 - i. 10 µm filter
 - ii. 1.5 µm filter – 1st pass
 - iii. 1.5 µm filter – 2nd pass
 - iv. 0.45 µm filter
 - v. 0.02 µm filter
24. Collect 500 mL bottle – S3 – After Filtration
25. Measure pH, free Chlorine residual, and volume remaining in the beaker.
26. Add 0.075% NaOCl solution to achieve a free Chlorine residual of 2.5 mg/L
27. Measure pH
28. If pH is below 7.5, add 0.1 N NaOH to increase pH to 7.5 target. If pH is above 7.5 Collect 500 mL bottle – S3 – After final pH buffer & Disinfection
29. Run all water tests on samples collected throughout the process

4.5 Phase 2 Trials

Following receipt of results from the third-party laboratory, two of the six Phase 1 trials were selected for duplication during Phase 2 Simulated Distribution System (SDS) testing. The two Phase 1 trials selected were Sample 5 which utilized 15 mg/L of PAC with Dual-Media Filtration, and Sample 6 which utilized 15 mg/L of PAC with nanofiltration. These two trials showed the greatest decrease in TOC and DOC concentrations from that of the raw water. SUVA values were also taken into account but showed reduction across all samples relative to the raw water values.

Trials 5 and 6 as listed in Table 3 from Phase 1 were duplicated during Phase 2 testing. Similarly, to Phase 1 testing, the pH following filtration was above the 7.50 target, so no final pH adjustment was made. After achieving a free chlorine residual of approximately 2.50 via the final sodium hypochlorite

addition, the two samples were each split between (4) labeled, amber glass sample bottles which were placed into an incubator at 25°C. A total of (8) sample bottles labeled for Sample 1 and Sample 2 were denoted with 30-minute, 5-day, 10-day, and 15-day time intervals. Each of the samples was removed at the end of its defined incubation period. Once removed from the incubator, each sample was distributed into the (5) volatile organic acid (VOA) vials with care taken to eliminate any headspace above the liquid. To accomplish this, bottles were filled nearly to the top and a 0.3 mL disposal pipette was used to add additional sample until a liquid dome was present above the open top of the glassware. The cap was then carefully secured onto the vial, and the vial inverted and tapped to ensure there was no air present. Dichlorination was achieved for the Trihalomethane (THM) samples using pre-packaged ascorbic acid and field preserved HCl. The Haloacetic Acid (HAA) sample bottles were prepackaged from the certified laboratory with ammonium chloride for dichlorination and preservation.

5. Lab Test Methods

Table 4.

LAB METHODS			
PARAMETER	METHOD /TEST KIT	METHOD RANGE	TESTING CONDUCTED BY
Temperature (°C)			Dewberry
Turbidity			Dewberry
pH			Dewberry
Chemical Oxygen Demand (COD)	Method 10211; TNTplus 820	1 – 60 mg/L	Dewberry
Dissolved Organic Carbon (DOC)	SM5310C		Enthalpy Analytical
Total Organic Carbon (TOC)	SM5310C		Enthalpy Analytical
Iron	HPT251	0.01 – 1.0 mg/L	Dewberry
Manganese	Method 10286 ; HPT291	0.005 – 0.500 mg/L	Dewberry
Free Chlorine		0 – 4.00 mg/L	Dewberry
Trihalomethanes (THM)	EPA 524, DW Matrix Preserved with Asc Acid + HCl		Enthalpy Analytical
HaloAcetic Acids (HAA)	EPA 552.3, DW Matrix Preserved with NH4Cl		Enthalpy Analytical
UV254			Dewberry
Total Alkalinity	Method 10239; TNTplus 870	25 – 400 mg/L as CaCO ₃	Dewberry
Calcium & Total Hardness	Method 10293 ; TNTplus 869	20 – 350 mg/L as CaCO ₃ ; 5-100 mg/L Ca+2; 3 – 50 mg/L Mg+2	Dewberry
Total Dissolved Solids (TDS)			Dewberry

6. Results & Discussion

6.1 Phase 1

Samples were sent to a certified third-party lab for testing of Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). In-house testing was performed for Iron, Manganese, Chemical Oxygen Demand (COD), temperature, pH, UV254, hardness, and alkalinity. COD

was used as a surrogate for TOC and DOC to obtain rapid results in the lab before the TOC and DOC results from the certified lab were returned.

6.1.1 Iron and Manganese

Manganese results from the treated water from all six trials were well below the secondary MCL. During Iron testing, Trial 4 showed a level slightly above the secondary MCL. Since the other five Iron trials showed a significant reduction in Iron concentration from that of the raw water composite sample, and the iron level from trial four was above that of the raw water composite sample before treatment, it is believed that there was an error in this measurement.

It is anticipated that there will be some variance in the Iron and Manganese concentrations in the raw water from the James River based on various environmental conditions. However, based on the sample collected on 8/28 the levels were already below the secondary MCLs for Iron and Manganese. Since the iron concentration of the treated trials showed further reduction from the raw water sample which was already below the secondary MCL it is believed that there should not be any issues with scale-up to the full-scale process. For Manganese, there was not a noticeable decrease in concentration following treatment, however both the raw water and treated water were far below the secondary MCLs.

Table 5

METALS VS. SECONDARY MAXIMUM CONTAMINANT LIMITS (MCLs)		
PHASE 1 SAMPLE/TRIAL	IRON (MG/L)	MANGANESE (MG/L)
Secondary MCL	0.3	0.05
Raw Water (composite)	0.277	0.008
#1	0.087	0.010
#2	0.064	0.008
#3	0.089	0.008
#4	0.302	0.003
#5	0.085	0.007
#6	0.100	0.003

[Secondary Drinking Water Standards: Guidance for Nuisance Chemicals | US EPA](#) ².

6.1.2 Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC)

Two of the five carboys collected from the James River were tested for TOC and DOC via a third-party certified laboratory. The samples showed had identical results of 3.9 mg/L for DOC and 3.5 mg/L for TOC. Since DOC is one of the constituents in TOC, it was unexpected to see a higher DOC value than that of TOC. The lab report indicated a 7.9% difference from theoretical 100% recovery for TOC and a 9.2% difference for TOC. Both results were within the +/- 20% acceptance criteria of the lab. Since the raw water TOC and DOC results were within the 20% variance for the acceptance criteria, this higher DOC value is attributed to the error inherent to the test.

All six treated water samples showed a reduction in TOC and DOC from the two raw water samples. Samples 5 and 6, which received 15 mg/L PAC, showed the greatest TOC and DOC reductions. Sample 5 had DOC and TOC concentrations of 1.8 and 1.9 mg/L respectively. Sample 6 had DOC and TOC

concentrations of 1.9 and 1.8 mg/L respectively. Following treatment, all TOC and DOC values for trials 1 through 4 were between 2.3 and 2.7 mg/L.

Table 6.

TOC AND DOC REDUCTIONS – PHASE 1				
PHASE 1 SAMPLE/TRIAL	FILTRATION	PAC DOSAGE (MG/L)	DISSOLVED ORGANIC CARBON - DOC (MG/L)	TOTAL ORGANIC CARBON TOC – (MG/L)
Raw Water			3.9	3.5
Phase 1 - #1	Dual-Media	0	2.5	2.3
Phase 1 - #2	Nanofiltration	0	2.7	2.4
Phase 1 - #3	Dual-Media	10	2.3	2.4
Phase 1 - #4	Nanofiltration	10	2.3	2.3
Phase 1 - #5	Dual-Media	15	1.8	1.9
Phase 1 - #6	Nanofiltration	15	1.9	1.8

6.1.3 Specific Ultraviolet Absorbance at 254 nM (SUVA)

Ultraviolet absorbance (UVA) and ultraviolet transmittance (UVT) were measured for two raw water carboys and for each of the (6) treated water samples. UVA was used in conjunction with the DOC values reported by the certified lab to obtain the SUVA values per the calculations displayed in section 2.3.8. The SUVA values for the two raw water samples registered at 2.62 for carboy 2 and 2.64 for carboy 4. All six treated water samples showed a reduction in SUVA from that of the raw water samples. Across the (3) PAC dosages, trials 1 and 2 which received 0 mg/L of PAC showed the greatest SUVA reduction. For the two filtration technology options, all three nanofiltration samples showed greater SUVA reduction than the corresponding dual-media trials for the same PAC dosage.

SUVA values less than 2.00 L/mg show that the natural organic matter “is mainly composed of hydrophilic, low molecular mass organic compounds”, which “consists of higher proportions of aliphatic carbon and nitrogenous compounds, such as carboxylic acids, carbohydrates and proteins.”³ Menya and Olupot report that the hydrophilic portions of NOM are more difficult to remove using common methods of flocculation, sedimentation, and filtration, but that adsorption by means of activated carbon is a promising method for removal. This research is consistent with the results of the bench scale study which showed the greatest reduction of TOC and DOC using the highest concentration level of PAC of 15 mg/L.

Table 7

SPECIFIC ULTRAVIOLET ABSORBANCE RESULTS – PHASE 1	
PHASE 1 SAMPLE/TRIAL	SUVA (L/MG*M)
Raw Water Carboy 2	2.62
Raw Water Carboy 4	2.64
Phase 1 - #1	1.20
Phase 1 - #2	0.70
Phase 1 - #3	1.65
Phase 1 - #4	1.04
Phase 1 - #5	1.67
Phase 1 - #6	1.00

6.1.4 Filter Replacement

The volume of liquid remaining at each step is listed in the tables in Sections 2.6 and 2.7. The sample volume at the filtration step varied per trial, due to removal of aliquots of sample for testing, and the manual decantation process in the previous step, but was typically between 1,400 and 2,200 mL. The speed of filtration was rapid for the 10µm and 1.5 µm filters, and far slower for the 0.45 and 0.02 µm filters. A steady stream of liquid flowed from the bottom of the Buchner funnel for the two largest filter sizes, while the two smallest pore size filters had either a low-flow angled stream from one edge of the vertical funnel discharge spout, or a constant drip. The two larger pore size filters required 1 – 4 minutes for the filtration step, notwithstanding having the empty the 1 L Erlenmeyer flask into a larger receiving vessel, or changing a clogged filter. The 0.45 and 0.02 µm filters took between 20 min and 1.5 hours to filter the 1,400 – 2,200 mL.

Having to replace the filters during the filtration step, due to a halted flow, was common for the 10 µm filters, less so for the 1.5 µm filters, and rare for the 0.45 and 0.02 µm filters. The 10 µm filter was changed on trial 4 after 1,550 mL, on trial 5 after 1,525 mL, on trial 6 after 1,375 mL and twice for Trial 3 after 925 and 1,850 mL. The additional filter change for trial 3 was attributed to a slightly less effective decant when some liquid dripped from the turkey baster suspending some of the settled solids. Trial 2 required changing the 1.5 µm filter after the first pass. Approximately 1 drip per second was observed. When a second filter was installed rapid flow was observed through the filter during the second 1.5 µm pass.

6.1.5 Langelier Saturation Index (LSI)

Calcium, magnesium, and total hardness, total alkalinity, temperature, pH, and TDS were measured for the raw water, and for the (6) Phase 1 and (2) Phase 2 trials after filtration. These values were used to calculate the Langelier Saturation Index (LSI) to provide design guidance on the potential for corrosion or scale formation in the distribution network and the need for corrosion or scale inhibitor. All LSI values for the raw water and the treated samples were between -0.36 and – 0.89 showing moderate to high propensity for corrosion.

6.2 Phase 2

Trials 5 and 6 from Phase 1 were duplicated during Phase 2 testing. Phase 1 – Trial 5 was labeled Phase 2 – Trial 1 and Phase 1- Trial 6 was labeled Phase 2 – Trial 2.

6.2.1 Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC)

The TOC and DOC removal during the Phase 2 duplicate trials was consistent with that seen during Phase 1. All (8) TOC and DOC values were within 1.7 – 1.9 mg/L. As displayed in Section 2.3 no other trials from Phase 1 showed as large of a reduction from the raw water, with the next lowest value was 2.3 mg/L which was present in trials 1, 3 and 4.

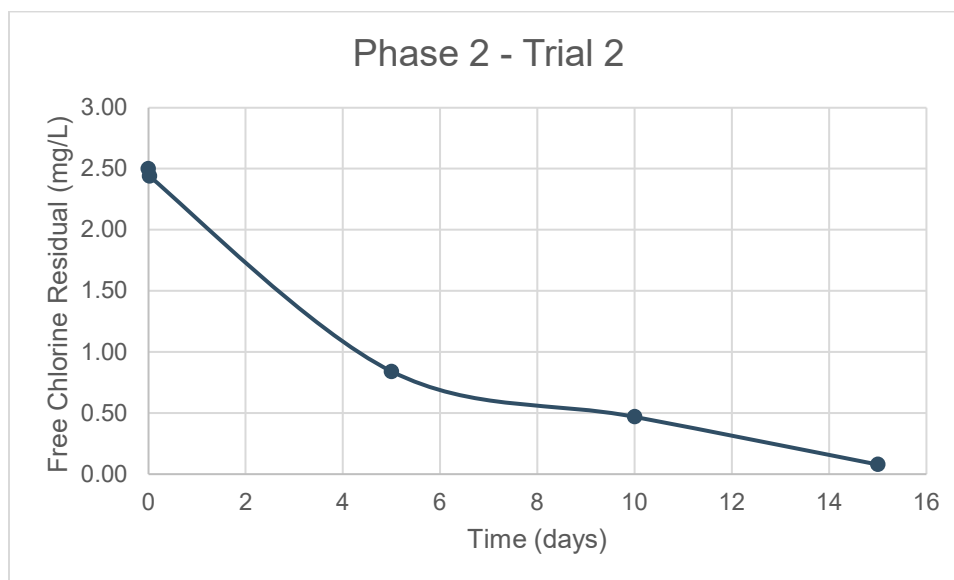
The TOC and DOC values for Phase 2 did not show a significant reduction for the nanofiltration option as compared to the dual-media filtration trials.

Table 8

TOC AND DOC REDUCTIONS				
PHASE SAMPLE/TRIAL	FILTRATION	PAC DOSAGE (MG/L)	DISSOLVED ORGANIC CARBON – DOC (MG/L)	TOTAL ORGANIC CARBON - TOC (MG/L)
Raw Water			3.9	3.5
Phase 1 - #1	Dual-Media	0	2.5	2.3
Phase 1 - #2	Nanofiltration	0	2.7	2.4
Phase 1 - #3	Dual-Media	10	2.3	2.4
Phase 1 - #4	Nanofiltration	10	2.3	2.3
Phase 1 - #5	Dual-Media	15	1.8	1.9
Phase 1 - #6	Nanofiltration	15	1.9	1.8
Phase 2 - #1	Dual-Media	15	1.8	1.8
Phase 2 - #2	Nanofiltration	15	1.9	1.7

Figure 1 – Free Chlorine Reduction Phase 2 – Trial 1



Figure 2– Free Chlorine Reduction Phase 2 – Trial 2

6.2.2 Disinfection Byproducts

Data showing the results from third-party testing of Haloacetic acids and Trihalomethanes are available in Section 2.9. After 5-days of incubation, lab results showed levels of total trihalomethanes of 85.2 µg/L for Phase 2 Trial 1 and 84.8 for Phase 2 Trial 2. These are both in excess of the 80 µg/L MCL established in the primary drinking water regulations. Total trihalomethanes showed minimal difference between the 5 and 10 day incubation periods, but rose to 109 mg/L and 130 mg/L for Phase 2 trials 1 and 2 respectively. Total Haloacetic acid concentrations for Trial 1 and Trial 2 following 5-days of incubation, registered at 57.3 and 50.4 µg/L respectively. This is only slightly below the Primary Drinking water MCL of 60 µg/L. Trial 1 exceeded the MCL for Total Haloacetic acids at the 10-day incubation period, while Trial 2 exceeded the limit at the 15-day incubation period.

7. Potential Sources of Error

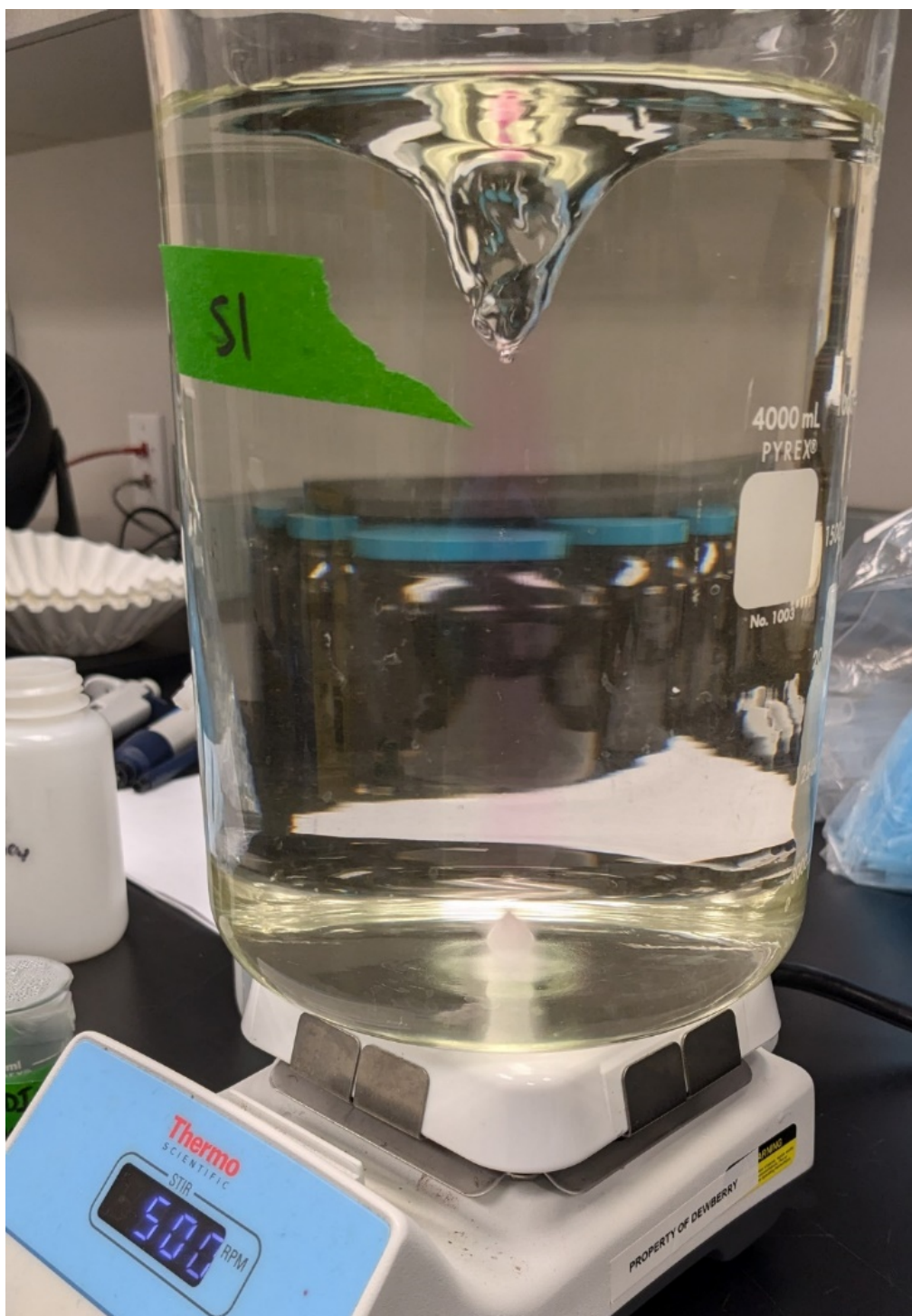
The following list represents qualitative notes captured during the Phase 1 trials that are potential sources of error within the experiment.

1. pH of the raw water dropped from the time of collection to the time of testing. The pH depression caused by the addition of aluminum sulfate was greater than the pH depression from the time of collection of the raw water sample to the final Phase II trials. As such, it is anticipated that the pH depression would impact the first sodium hydroxide pH adjustment, but not the final adjustment.
2. Due to the high specific gravity of 48.5% Alum, the Alum did not have enough surface tension to stay in the pipette. During testing, the lab techs had to quickly micropipette it from the container into the 4,000 mL beaker to avoid any drips.
3. Lab equipment was not available to continuously vibrate the PAC for a wet-out period. The 50 mL beakers were stirred the day before and the day of the addition to encourage proper wetting.
4. Slight variations existing in the stir plate vortexes when using the same speeds and the same stir bar size

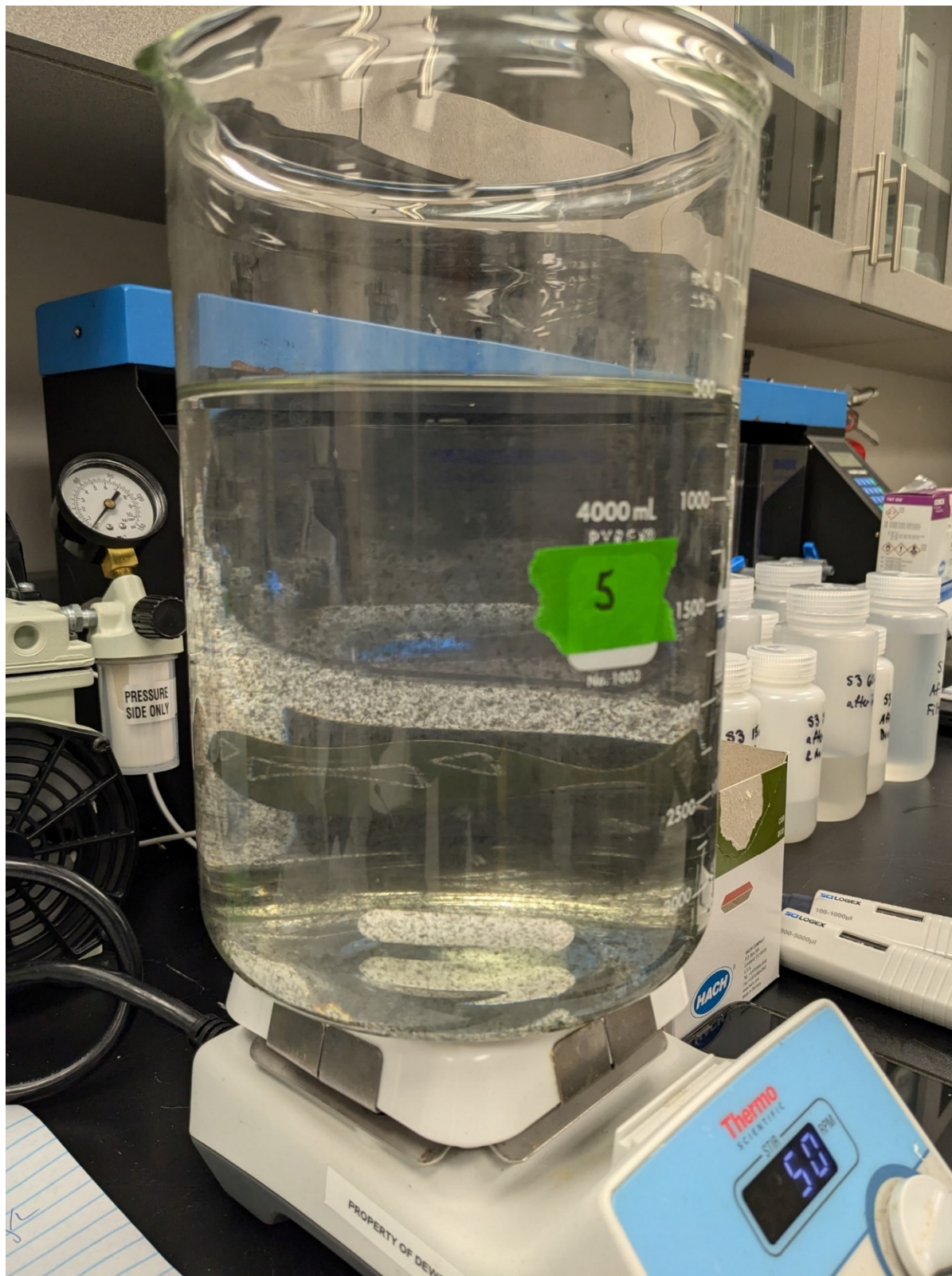
5. Some sediment on the bottom of the 55 gallon drum was unable to be suspended even after vigorous stirring.
6. DOC and TOC were collected for the raw water and the treated trials. Some DOC values results were higher than the TOC for the same sample. This is discussed in section 1.7.1.2
7. Turbidity values for the raw water measured in the field were lower than those recorded in for the treated samples in the lab. A different lab tech collected the field samples from those working in the lab, but both followed the calibration procedures for the turbidity meter before use.
8. Depending on the method of sampling from the 4,000 mL beaker some PAC can be inadvertently removed. The sample collection container was dipped into the 4,000 mL beaker several times to break the vortex. The open top was kept along the side wall of the beaker. Sample was collected from the side wall to avoid collecting any PAC agglomerates in the center
9. Seven stacked Bunn coffee filters were used to remove PAC from 5, 15, 30, and 60 minute samples during COD testing. This would not impact the TOC and DOC or TDS testing, but could possibly have impacted the COD measruements.

Appendix A - Pictures

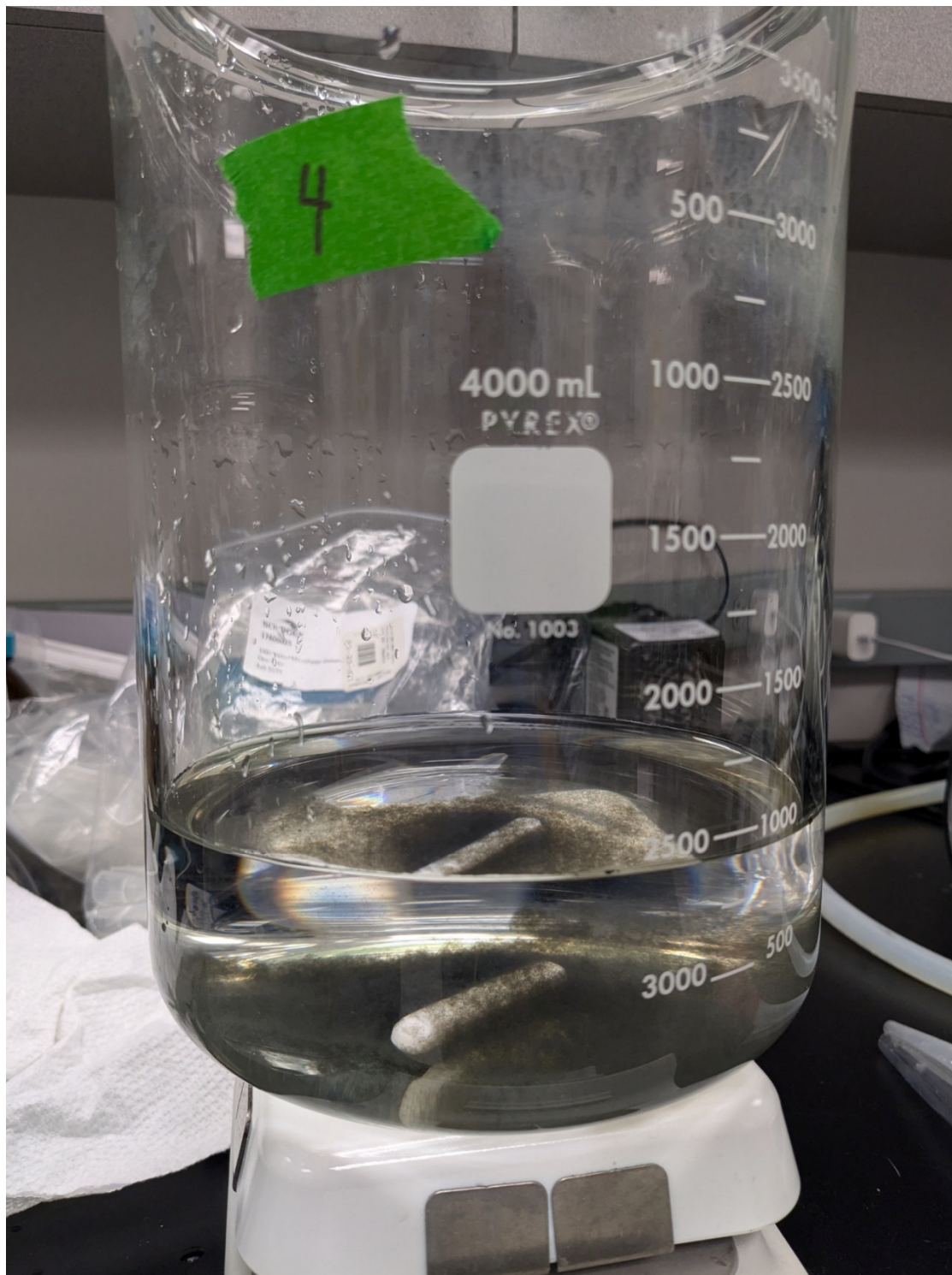
Potassium Permanganate Addition & Vortex



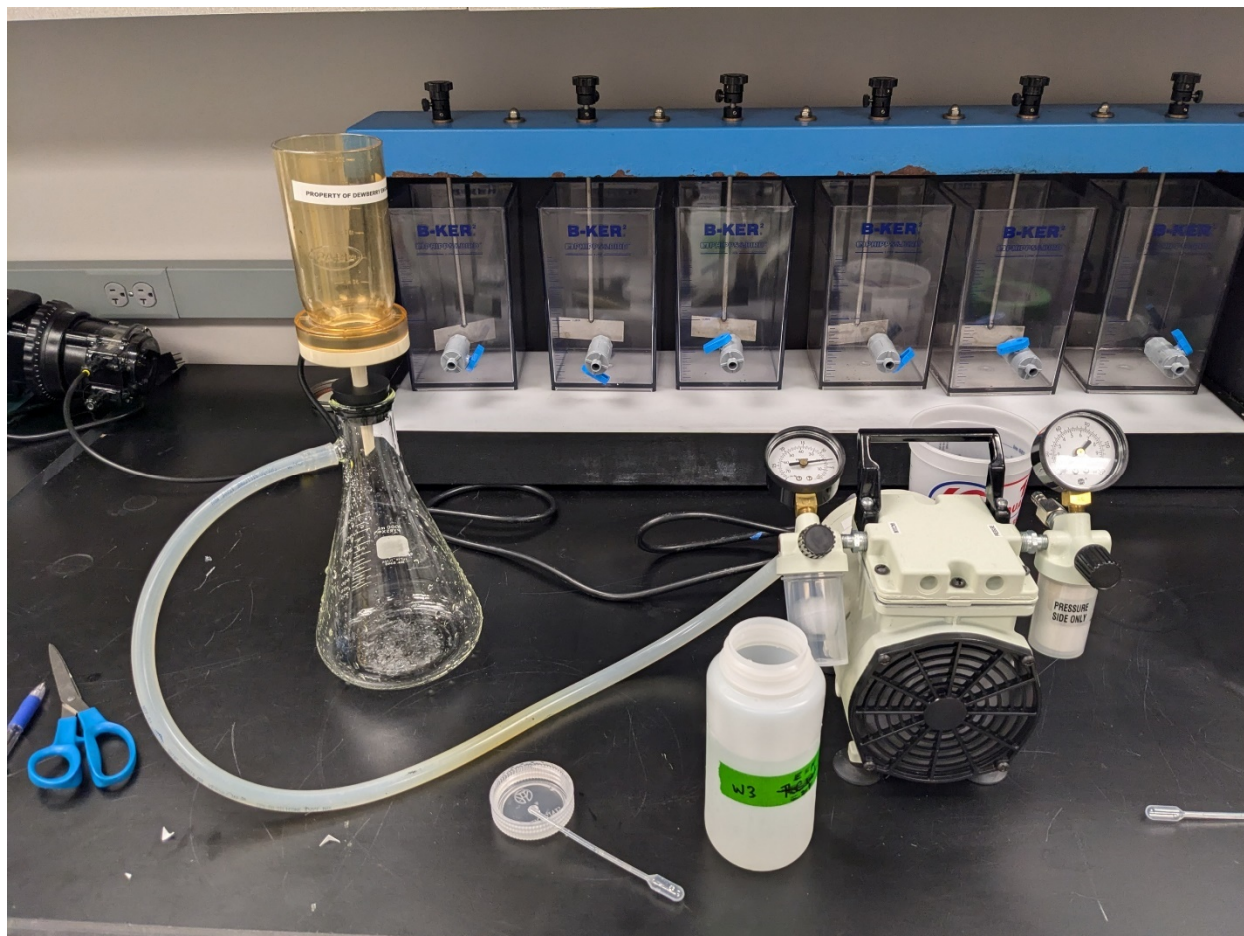
Flocculation



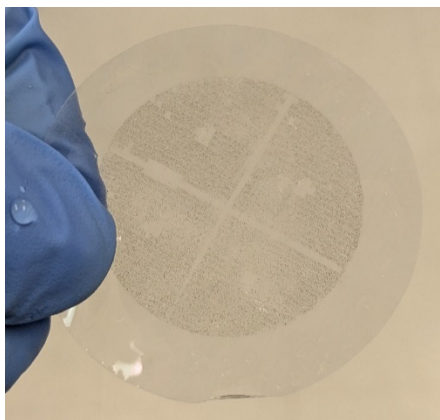
Settled Solids following Decant



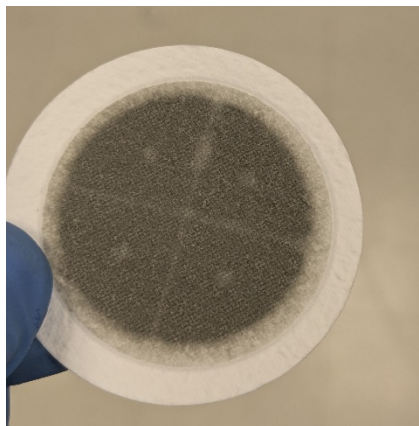
Vacuum Pump & Combined Filtration funnel with receiving Erlenmeyer Flask



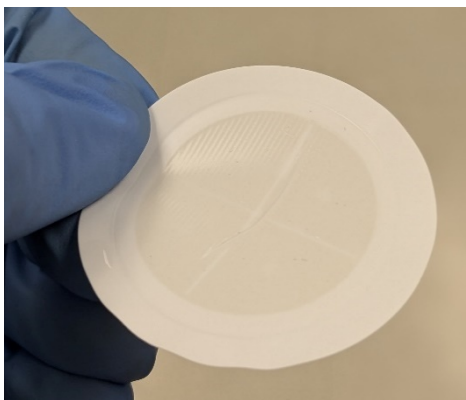
10 µm Filter



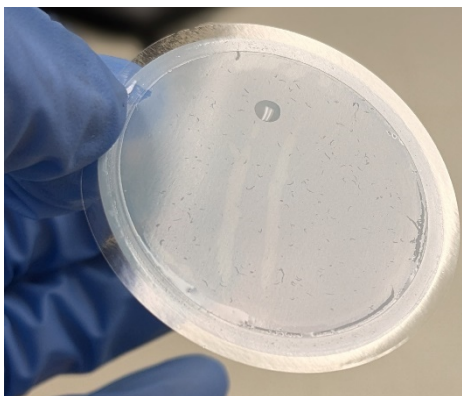
1.5 µm Filter



0.45 µm Filter



0.02 µm Filter



Appendix B – Calculations & Lab Data Tables

Powdered Activated Carbon

$$\frac{35 \text{ mgPAC}}{3.500 \text{ L}} = 10 \frac{\text{mg}}{\text{L}}$$

$$\frac{52.5 \text{ mgPAC}}{3.500 \text{ L}} = 15 \frac{\text{mg}}{\text{L}}$$

Table 9

PAC PREPARATION		
PAC SOLUTION LABEL	PAC SOLUTION USED IN	PAC MASS MEASURED USING ANALYTICAL BALANCE
N/A	Phase 1 – Sample 1	Not used in this trial
N/A	Phase 1 – Sample 2	Not used in this trial
#1	Phase 1 – Sample 3	35.0 mg
#2	Phase 1 – Sample 4	35.0 mg
#4	Phase 1 – Sample 5	52.5 mg
#5	Phase 1 – Sample 6	52.7 mg
P2S1	Phase 2 – Sample 1	52.5 mg
PSS2	Phase 2 – Sample 2	52.4 mg

Aluminum Sulfate

Desired 85 mg/L of 48% $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{ H}_2\text{O}$ Solution

3,500 mL of sample was added to an 4,000 mL beaker. Following initial additions of PAC and KMnO_4 solution, the 5 min, 15 min, 30 min, and 60 min COD samples were removed. After these additions, the volume was decreased to 3,000 mL for consistency. The volume was 3,000 mL when the Alum was added.

$$\left[\left(3,000 \text{ mL} * \left(\frac{1 \text{ gal}}{3,785 \text{ mL}} \right) * \left(\frac{1 \text{ MG}}{1 \text{E}6 \text{ gal}} \right) \right) * \left(85 \frac{\text{mg}}{\text{L}} \right) * \left[\left(\frac{1 \text{ lb}}{453592 \text{ mg}} \right) * \left(\frac{3.785 \text{ L}}{1 \text{ gal}} \right) * \left(\frac{10^6 \text{ gal}}{1 \text{ MGD}} \right) \right] \right] = 5.62 * 10^{-4} \text{ lbs}$$

OR

$$\left[\left(3,000 \text{ mL} * \left(\frac{1 \text{ gal}}{3,785 \text{ mL}} \right) * \left(\frac{1 \text{ MG}}{1 \text{ E6 gal}} \right) \right) \right] * \left(85 \frac{\text{mg}}{\text{L}} \right) * [8.3445] = 5.62 * 10^{-4} \text{ lbs}$$

The solution purchased was 48.5% $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{ H}_2\text{O}$ Solution

$$5.62 * 10^{-4} * \left(\frac{0.48}{0.485} \right) = 5.56 * 10^{-4} \text{ lbs}$$

$$5.56 * 10^{-4} \text{ lbs} * \left(\frac{453.6 \text{ g}}{1 \text{ lb}} \right) * \left(\frac{1000 \text{ mg}}{1 \text{ g}} \right) = 252.3 \text{ mg}$$

The specific gravity of the solution is 1.33, so the relative density = 11.08 lb/gal

$$5.56 * 10^{-4} * \left(\frac{1 \text{ gal}}{11.08 \text{ lb soln}} \right) = 5.02 * 10^{-5} \text{ gal}$$

$$5.02 * 10^{-5} \text{ gal} * \left(\frac{3785 \text{ mL}}{1 \text{ gal}} \right) = 0.190 \text{ mL} = 190 \text{ } \mu\text{L}$$

190 μL of 48.5% $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{ H}_2\text{O}$ Solution in a 3,000 mL sample should produce the equivalent of 85 mg/L of 48% $\text{Al}_2(\text{SO}_4)_3 \cdot 14 \text{ H}_2\text{O}$ Solution

Potassium Permanganate

Desired 1 mg/L of 20% NaMnO_4 solution

$$\left[\left(3,500 \text{ mL} * \left(\frac{1 \text{ gal}}{3,785 \text{ mL}} \right) * \left(\frac{1 \text{ MG}}{1 \text{ E6 gal}} \right) \right) \right] * \left(\frac{1 \text{ mg } 20\% \text{ NaMnO}_4 \text{ soln}}{1 \text{ L}} \right) * \left[\left(\frac{1 \text{ lb}}{453592 \text{ mg}} \right) * \left(\frac{3.785 \text{ L}}{1 \text{ gal}} \right) * \left(\frac{10^6 \text{ gal}}{1 \text{ MGD}} \right) \right] \\ = 6.56 * 10^{-4} \text{ lbs}$$

OR

$$\left[\left(3,500 \text{ mL} * \left(\frac{1 \text{ gal}}{3,785 \text{ mL}} \right) * \left(\frac{1 \text{ MG}}{1 \text{ E6 gal}} \right) \right) \right] * \left(1 \frac{\text{mg } 20\% \text{ NaMnO}_4}{\text{L}} \right) * [8.3445] = 6.56 * 10^{-4} \text{ lbs}$$

$$\frac{1 \text{ mg } 20\% \text{ NaMnO}_4 \text{ soln}}{1 \text{ L}} = \frac{0.2 \text{ mg } 100\% \text{ NaMnO}_4}{\text{L}}$$

$$\frac{0.20 \text{ mg NaMnO}_4}{1 \text{ L soln}} * \left(\frac{1 \text{ g}}{1000 \text{ mg}} \right) * \left(1 \text{ mol } \frac{\text{NaMnO}_4}{141.9 \text{ g NaMnO}_4} \right) * \left(\frac{1 \text{ mol MnO}_4^-}{1 \text{ mol NaMnO}_4} \right) * \left(\frac{118.9 \text{ g NaMnO}_4}{1 \text{ mol MnO}_4^-} \right) \\ * \left(\frac{1000 \text{ mg}}{1 \text{ g}} \right) = \frac{0.168 \text{ mg MnO}_4^-}{1 \text{ L soln}}$$

$$\frac{0.168 \text{ mg MnO}_4^-}{1 \text{ L soln}} * \left(\frac{158 \text{ g KMnO}_4}{118.9 \text{ g MnO}_4^-} \right) = \frac{0.223 \text{ mg } 100\% \text{ KMnO}_4}{1 \text{ L soln}}$$

$$\frac{0.223 \text{ mg } 100\% \text{ KMnO}_4}{1 \text{ L soln}} * 3.5 \text{ L soln} = 0.781 \text{ mg } 100\% \text{ KMnO}_4$$

1 L of 0.042 N KMnO₄ solution was purchased. Since 1 Mol of MnO₄⁻, Molarity = Normality

$$\frac{0.042 \text{ mol KMnO}_4}{1 \text{ L}} * \left(\frac{158 \text{ g KMnO}_4}{1 \text{ mol KMnO}_4} \right) = \frac{6.636 \text{ g KMnO}_4}{1 \text{ L}}$$

$$\frac{0.781 \text{ mg KMnO}_4}{1} * \left(\frac{1 \text{ L}}{6636 \text{ mg KMnO}_4} \right) = 1.18 * 10^{-4} \text{ L} = 0.118 \text{ mL} = 118 \text{ } \mu\text{L of } 0.042 \text{ N KMnO}_4 \text{ soln}$$

The smallest unit of measure for the micropipette is 5 μL , so without dilution, we would add 120 μL rather than 118 μL . SDS lists the relative density as 1.01 g/cm³ = 8.43 lbs/gal

Percent Error

$$\frac{|T - E|}{T} * 100 = \% \text{ Error}$$

$$\frac{|118 \mu\text{L} - 120 \mu\text{L}|}{118 \mu\text{L}} * 100 = 1.69\% \text{ error}$$

$$101.69\% * \left(\frac{1 \text{ mg}}{1 \text{ L}} \right) = 1.02 \text{ mg/L}$$

A 0.021 N KMnO₄ solution was made by a 2X dilution and reduced error to 0.42%

$$\frac{118 \mu\text{L } 0.042 \text{ N KMnO}_4}{1} = \frac{(236 \mu\text{L } 0.021 \text{ N KMnO}_4)}{1}$$

$$\frac{|236 \mu\text{L} - 235 \mu\text{L}|}{236 \mu\text{L}} * 100 = 0.42\% \text{ error}$$

$$(100 - 0.42)\% * \left(\frac{1 \text{ mg}}{1 \text{ L}} \right) = 0.996 \text{ mg/L}$$

Sodium Hypochlorite Initial Addition (Sample 2)

$$\left[\left(2,100 \text{ mL} * \left(\frac{1 \text{ gal}}{3,785 \text{ mL}} \right) * \left(\frac{1 \text{ MG}}{1 \text{ E6 gal}} \right) \right] * \left(\frac{1 \text{ mg free Cl}}{1 \text{ L}} \right) * [8.3445] = 4.63 * 10^{-6} \text{ lbs}$$

$$(4.63 * 10^{-6} \text{ lbs}) * \left(\frac{453.6 \text{ g}}{1 \text{ lb}} \right) * \left(\frac{1000 \text{ mg}}{1 \text{ g}} \right) = 2.10 \text{ mg} = 2.10 * 10^{-3} \text{ g free Cl}$$

$$\frac{2.10 * 10^{-3} \text{ g Free Cl}}{1} * \frac{1 \text{ mol Cl} -}{35.45 \text{ g Cl} -} * \frac{1 \text{ mol NaOCl}}{1 \text{ mol Cl} -} * \left(\frac{74.44 \text{ g } 100\% \text{ NaOCl}}{1 \text{ mol NaOCl}} \right) * \left(\frac{100\%}{0.075\%} \right) \\ = 5.88 \text{ g } 0.075\% \text{ NaOCl soln}$$

$$\frac{5.88g \text{ } 0.075 \% \text{ } NaOCl}{1} * \left(\frac{1mL}{cm^3}\right) * \left(\frac{1 \text{ } cm^3}{1.2098g}\right) = 4.86mL$$

SDS shows density = 1.2098 g/mL

Sodium Hypochlorite Final Addition (Sample 2)

$$Free \text{ } Cl \text{ } Target \text{ } Residual = Free \text{ } Cl \text{ } after \text{ } filtration + [Free \text{ } Cl]from \text{ } Final \text{ } NaOCl \text{ } addition$$

$$2.50 = 0.55 + [Free \text{ } Cl]from \text{ } Final \text{ } NaOCl \text{ } addition$$

$$[Free \text{ } Cl]from \text{ } Final \text{ } NaOCl \text{ } addition = 1.95$$

$$\left[\left(1,238mL * \left(\frac{1 \text{ } gal}{3,785 \text{ } mL}\right) * \left(\frac{1 \text{ } MG}{1E6 \text{ } gal}\right)\right) * \left(\frac{1.95 \text{ } mg \text{ } free \text{ } Cl}{L}\right) * [8.3445]\right] = 5.32 * 10^{-6}lbs$$

$$(5.32 * 10^{-6}) * \left(\frac{453.6g}{1lb}\right) * \left(\frac{1000mg}{1g}\right) = 2.41mg = 2.41 * 10^{-3}g \text{ } free \text{ } Cl$$

$$\frac{2.41 * 10^{-3} \text{ } g \text{ } Free \text{ } Cl}{1} * \frac{1 \text{ } mol \text{ } Cl -}{35.45 \text{ } g \text{ } Cl -} * \frac{1 \text{ } mol \text{ } NaOCl}{1 \text{ } mol \text{ } Cl -} * \left(\frac{74.44 \text{ } g \text{ } 100\% \text{ } NaOCl}{1mol \text{ } NaOCl}\right) * \left(\frac{100\%}{0.075\%}\right) \\ = 6.75g \text{ } 0.075\% \text{ } NaOCl \text{ } soln$$

$$\frac{6.75 \text{ } g \text{ } 0.075\% \text{ } NaOCl}{1} * \left(\frac{1mL}{cm^3}\right) * \left(\frac{1 \text{ } cm^3}{1.2098g}\right) = 5.58 \text{ } mL$$

Clarifier Sedimentation - Surface Overflow Rate

A surface overflow rate of 0.30 gpm/ft² (432 gpd/ft²) was specified to be within the range of 0.25 – 0.38 gpm/ft² as set forth by VDH 12VAC5-590-870 E.4, for use of rapid rate gravity.

3,500 mL of sample were added to an 4,000 mL beaker with an inner diameter of 6 1/16" (~154 mm). Following initial additions of PAC and KMnO₄ solution, the 5 min, 15 min, 30 min, and 60 min COD samples will be removed. After these additions, the volume will be decreased to 3,000 mL for consistency. The liquid height at 3,000 mL as measured from the interior of the beaker is 6 9/16" (~167mm).

$$Vo = \frac{Q}{A} = \frac{d}{t}$$

Vo = critical setline velocity = overflow rate

Q = Flow rate

A = surface area, plan view

d = sampling depth (m) (=0.1 m for 1000 mL cylinder, Larsson, 1986) ₄

t = settling time (h)

$$\frac{0.30 \text{ gpm}}{ft^2} = \frac{432 \text{ gpd}}{ft^2} = \left(\frac{0.733 \text{ m}}{\text{hour}} \right)$$

$$\left(\frac{0.733 \text{ m}}{\text{hour}} \right) = \frac{d}{t} = \frac{0.167 \text{ m}}{t}$$

$$t = 0.23 \text{ hours} = 13.64 \text{ min} = 13 \text{ min } 38 \text{ sec}$$

UVA & UVT

UVA and UVT are measurements of the absorbance and transmission of UV light at 254nm. The RealTech meter provided both of these values. The conversion between them is shown below

$$A = 2 - \log_{10}(T)$$

A = absorbance

T – Transmittance

SUVA & UVA

$$SUVA \left(\frac{L}{\text{mg} * m} \right) = \frac{UV_{254}(\text{cm}^{-1})}{DOC(\frac{\text{mg}}{L})} * 100 \left(\frac{\text{cm}}{m} \right)$$

Langelier Saturation Index (LSI)

Sample Info	Calcium Hardness (mg/L as CaCO ₃)	Calcium Hardness (mg/L as Ca+2)	Calcium Hardness (mg/L as Mg+2)	Alkalinity (mg/L as CaCO ₃)	Alkalinity (mg/L as HCO ₃ -)	TDS (mg/L)	Water Temperature (°C)	pH (after treatment)	pHs	Langelier Saturation Index (LSI)
Raw Water Carboy 1	65.7	17.2	4.22							
Raw Water Carboy 2	60	18.4	4.86			102				
Raw Water Carboy 4	68	17.8	4.98			104				
Composite	68.3	19.7	4.67	63.9	77.9					
Phase 1 - Trial 1	58.6	18.3	3.11	65.5	79.9	151	22	7.78	8.4	-0.65
Phase 1 - Trial 2	57.6	17.6	3.35	64.5	78.6	130	22	8.03	8.4	-0.42
Phase 1 - Trial 3	62.9	17.6	4.62	63.7	77.7	142	22	7.79	8.5	-0.67
Phase 1 - Trial 4	63	18.2	4.26	91.2	111.2	156	22	7.94	8.3	-0.36
Phase 1 - Trial 5	62.9	17.7	4.56	64.6	78.8	141	22	7.8	8.5	-0.65
Phase 1 - Trial 6	64.8	18.4	4.6	67	81.7	166	22	7.96	8.4	-0.47
Phase 2 - Trial 1	64.5	17.8	4.91	55.3	67.4	130	22	7.62	8.5	-0.89
Phase 2 - Trial 2	65.3	17.5	5.22	55.7	67.9	140	22	7.98	8.5	-0.54

Organic Carbon and Metals Removal

Phase 1 - Trial 1 : 0 mg/L PAC, 1 mg/L NaMnO ₄ , Dual-Media Filtration	DOC (mg/L)	TOC (mg/L)	Fe (mg/L)	Mn (mg/L)	UV ₂₅₄ (UVA)	SUVA (L/mg*m)	TDS (mg/L)
Raw Water Carboy 1			0.259	0.010	0.102		
Raw Water Carboy 2	3.9	3.5			0.102	2.62	102
Raw Water Carboy 3					0.102		
Raw Water Carboy 4	3.9	3.5	0.257	0.012	0.103	2.64	104
Raw Water Carboy 5					0.101		
Composite			0.277	0.008	0.107		
Phase 1 - Trial 1	2.5	2.3	0.087	0.01	0.03	1.20	151
Phase 1 - Trial 2	2.7	2.4	0.064	0.008	0.019	0.70	130
Phase 1 - Trial 3	2.3	2.4	0.089	0.008	0.038	1.65	142
Phase 1 - Trial 4	2.3	2.3	0.302	0.003	0.024	1.04	156
Phase 1 - Trial 5	1.8	1.9	0.085	0.007	0.03	1.67	141
Phase 1 - Trial 6	1.9	1.8	0.100	0.003	0.019	1.00	166
Phase 2 - Trial 1	1.8	1.8	0.107	0.016	0.039	2.17	130
Phase 2 - Trial 2	1.9	1.7	0.055	0.008	0.028	1.47	140

Phase 1 - COD & pH Throughout Treatment

Phase 1 - Trial 1 : 0 mg/L PAC, 1 mg/L NaMnO4, Dual-Media Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)
					60 min
Initial PAC & NaMnO4 Addition	3500	9/16/24 ; 07:23			
		9/16/24 ; 08:23			7.49
Addition of Alum, and NaOH	3000		6.38		
Rapid Mix					
Flocculation		9/16/24 ; 08:40	7.50		
Sedimentation		9/16/24 ; 09:10			
Decant		9/16/24 ; 09:23			
					5.59
NaOCl Addition (Pre-filtration)		9/16/24 ; 09:37		1.27	
Filtration					
	1400	9/16/24 ; 10:13	7.72	1.05	3.75
pH buffer addition & Disinfection					
		9/16/24 ; 11:05	7.78	2.50	

Phase 1 - Trial 2 : 0 mg/L PAC, 1 mg/L NaMnO4, Nano-Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)
					60 min
Initial PAC & NaMnO4 Addition	3500	9/16/24 ; 07:14			
		9/16/24 ; 08:14			5.31
Addition of Alum, and NaOH	3000	9/16/24 ; 08:17	6.55		
Rapid Mix		9/16/24 ; 08:17			
Flocculation		9/16/24 ; 08:18	7.51		
Sedimentation		9/16/24 ; 08:48			
Decant		9/16/24 ; 09:01			
					6.21
NaOCl Addition (Pre-filtration)	2100	9/16/24 ; 09:23		1.05	
Filtration					
	1238		8.03	0.55	6.5
pH buffer addition & Disinfection		9/16/24 ; 13:03			
			8.03	2.52	

Phase 1 - Trial 3 : 10 mg/L PAC, 1 mg/L NaMnO4, Dual-Media Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3490	9/12/24 ; 07:51						
	3500	9/12/24 ; 08:51			11.9	16.3	6.25	10
Addition of Alum, and NaOH	3000	9/12/24 ; 09:16	6.67					
Rapid Mix		9/12/24 ; 09:17						
Flocculation		9/12/24 ; 09:47	7.43					
Sedimentation		9/12/24 ; 09:47						
Decant		9/12/24 ; 10:01						
			7.57					7.56
NaOCl Addition (Pre-filtration)								
Filtration	2100							
	1625	9/12/24 ; 11:26	7.66	0.99				7.99
pH buffer addition & Disinfection		9/12/24 ; 11:50						
			7.79	2.40				

Phase 1 - Trial 4 : 10 mg/L PAC, 1 mg/L NaMnO4, Nano-Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3490	9/13/24 ; 7:30						
	3500	9/13/24 ; 8:30			13.2	12.8	9.86	11.1
Addition of Alum, and NaOH	3000	9/13/24 ; 8:48	6.44					
Rapid Mix		9/13/24 ; 8:49						
Flocculation		9/13/24 ; 9:19	7.48					
Sedimentation								
Decant								
		9/13/24 ; 9:40						6.11
NaOCl Addition (Pre- filtration)		9/13/24 ; 10:58		0.96				
Filtration								
		9/13/24 ; 14:00	7.94	0.34				5.59
pH buffer addition & Disinfection	980							
				2.60				

Phase 1 - Trial 5 : 15 mg/L PAC, 1 mg/L NaMnO4, Dual-Media Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3490	9/12/24 ; 09:02						
	3500	9/12/24 ; 10:02			11.9	11	10.4	8.72
Addition of Alum, and NaOH	3000		6.86					
Rapid Mix								
Flocculation			7.78					
Sedimentation								
Decant		9/12/24 ; 11:57						
	2200		7.8					5.93
NaOCl Addition (Pre- filtration)				0.97				
Filtration								
	1500	9/12/24 ; 13:34	7.89	0.83				4.07
pH buffer addition & Disinfection								
			7.86	2.46				

Phase 1 - Trial 6 : 15 mg/L PAC, 1 mg/L NaMnO4, Nano-Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3490	9/13/24 ; 08:40						
	3500	9/13/24 ; 09:40			8..97	9.38	8.16	7.45
Addition of Alum, and NaOH	3000		6.31					
Rapid Mix		9/13/24 ; 09:50						
Flocculation		9/13/24 ; 09:51	7.51					
Sedimentation		9/13/24 ; 10:21						
Decant		9/13/24 ; 10:35						
								6.4
NaOCl Addition (Pre- filtration)		9/13/24 ; 11:14		0.99				
Filtration		9/13/24 ; 16:05						
	1000		7.96	0.26				7.82
pH buffer addition & Disinfection								
				2.58				

Phase 2 - COD & pH Throughout Treatment

Phase 2 - Trial 1 : 15 mg/L PAC, 1 mg/L NaMnO4, Dual-Media Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3500	10/2/24 ; 06:51						
		10/2/24 ; 07:51			16.7	14.4	21.3	13.3
Addition of Alum, and NaOH	3000		6.74					
Rapid Mix		10/2/24 ; 08:00						
Flocculation		10/2/24 ; 08:01	7.49					
Sedimentation		10/2/24 ; 08:31						
Decant		10/2/24 ; 08:45						
	2050							7.9
NaOCl Addition (Pre- filtration)		10/2/24 ; 09:24		1.01				
Filtration	1980							
			7.62	0.49				6.16
pH buffer addition & Disinfection	1325							
		10/2/24 ; 13:49		2.54				

Phase 2 - Trial 2 : 15 mg/L PAC, 1 mg/L NaMnO4, Nano- Filtration	Sample Volume at this step (mL)	Date /Time	pH	Cl (mg/L)	COD (mg/L)			
					5 min	15 min	30 min	60 min
Initial PAC & NaMnO4 Addition	3500	10/2/24 ; 07:24						
		10/2/24 ; 08:24			18.2	17.4	17.1	13.7
Addition of Alum, and NaOH	3000		6.76					
Rapid Mix		10/2/24 ; 08:37						
Flocculation		10/2/24 ; 08:38						
Sedimentation		10/2/24 ; 09:08						
Decant		10/2/24 ; 09:22						
	2020							7.57
NaOCl Addition (Pre- filtration)		10/2/24 ; 09:57		1.01				
Filtration								
	1490	10/2/24 ; 13:51	7.98	0.40				6.12
pH buffer addition & Disinfection								
				2.50				

Phase 2 – Free Chlorine and pH Adjustment

Sample Info	PAC (mg/L)	NaMnO4 (mg/L)	Alum (mg/L)	Filtration Type	Target pH	Target Free Cl residual	Sample Volume after Filtration	Actual pH After Filtration	Free Cl residual after Filtration	[NaOCl] % Solution	Cl Residual after addition	V of NaOCl added (mL)	pH measured after addition	Temperature
Sample - 1	15	1	85	Dual- Media	7.5	2.5	1325	7.62	0.49	0.075	2.54	5.25		
30-min											2.36		7.88	22.4
5-day											0.32		7.88	23
10-day											0.03		7.80	22.7
15-day											0.03		7.82	23.1
Sample - 2	15	1	85	Nano- filtration	7.5	2.5	1490	7.96	0.4	0.075	2.50	5.65		
30-min											2.44		7.95	23.0
5-day											0.84		7.86	23.9
10-day											0.47		7.88	22.9
15-day											0.08		7.81	23.5

Phase 2 – Disinfection Byproducts

Sample Info	Bromo-dichloro-methane (µg/L)	Bromoform (µg/L)	Chloroform (µg/L)	Dibromochloro-methane (µg/L)	Total Trihalo-methanes (µg/L)
MCL or TT					80
MCLG	0	0	70	60	
Sample - 1					
30-min	3.01	< LOD	11.9	< LOD	15.2
5-day	9.09	< LOD	75.2	0.91	85.2
10-day	7.21	< LOD	71.0	0.77	79.0
15-day	10.5	< LOD	97.7	1.07	109
Sample - 2					
30-min	2.15	< LOD	9.08	< LOD	11.5
5-day	8.49	< LOD	75.4	0.83	84.8
10-day	6.78	< LOD	76.7	0.74	84.2
15-day	9.81	< LOD	119	1.04	130

Sample Info	Dibromoacetic Acid (µg/L)	Dichloroacetic Acid (µg/L)	Monobromoacetic Acid (µg/L)	Monochloroacetic Acid (µg/L)	Trichloroacetic Acid (µg/L)	HAA5, Total (µg/L)
MCL or TT						60
MCLG		0		70	20	
Sample - 1						
30-min	< LOD	11	3.02	< LOD	11.00	25.6
5-day	< LOD	29.0	< LOD	2.40	25.9	57.3
10-day	< LOD	31.8	< LOD	3.16	28.4	63.4
15-day	< LOD	42.0	0.413	4.84	25.7	72.9
Sample - 2						
30-min	< LOD	7.54	2.36	< LOD	8.01	18.1
5-day	< LOD	29.6	< LOD	2.66	18.2	50.4
10-day	< LOD	32.3	0.42	3.90	20.4	57.0
15-day	< LOD	35.5	0.359	5.93	30.0	71.7

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Appendix C – Bench Testing Protocol

FLUVANNA COUNTY – FORK UNION SANITARY DISTRICT WTP BENCH TESTING PROTOCOL

Testing Protocol

July 2024

1. Background and Objectives

Dewberry is currently designing a new water treatment plant for the Fork Union Water Supply System (FUWSS) in Fluvanna County. The water treatment plant will be fed from the James River Water Authority Raw Water Transmission Main. Following initial storage, raw water will be pumped to a rapid mix tank followed by a flocculation basin. Powdered activated carbon (PAC) and sodium permanganate will be metered into the raw water stream after the pump station, followed by aluminum sulfate (alum) and sodium hydroxide near the rapid mix tank. The water stream will flow through sedimentation basins and on to filtration. Two filtration processes are being evaluated which include dual-media filters or nanofiltration. Sodium hydroxide will then be added for pH adjustment and sodium hypochlorite for disinfection prior to entering the clearwell. From the clearwell, the finished water will receive orthophosphate for corrosion inhibitor on its way to the distribution system.

Testing will be conducted to achieve the following objectives.

- Compare the efficacy of the two filtration technologies with various doses of treatment chemicals for removal of total organic carbon (TOC) and dissolved organic carbon (DOC).
- Compare the disinfection byproduct (DBP) formation potential in the waters following treatment.

2. Testing Approach

Testing will be broken into two phases.

- Phase 1 simulates the proposed treatment process through filtration and aimed at identifying the effectiveness of Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) removal.
- The second phase will evaluate the DBP formation potential of the treated water from Phase 1.

The unit processes and respective design criteria to be simulate during testing are summarized in Table 1.

Table 1. Treatment Processes and Design Criteria

Process	Dose/Variables	Treatment Time
Powder Activated Carbon	0 mg/l 10 mg/l 15 mg/l	1 hour
Permanganate	1 mg/l	1 hour
Alum	85 mg/l as 48% alum	1 minute rapid mix 30 minutes flocculation
Sodium Hydroxide	7.5 s.u. target	
Sedimentation	-	12 minutes, equivalent to surface overflow rate of 295 gpd/ft ²
Chlorine Pre-Filtration	1 mg/l target residual	-
Filtration	Nanofiltration Dual Media Filtration	-
Sodium Hydroxide Post Filtration	7.5 s.u. target	-

Chlorine Disinfection	2.5 mg/l target residual	Maintain target at 30 minutes
Distribution System Residence Time DBP Formation	-	30 min 5 days 10 days 15 days @ 25 ^o C

mg/l indicates milligrams per liter

3. Equipment and Materials

Testing will be conducted by Dewberry at Dewberry's laboratory in Raleigh, North Carolina. Items and equipment necessary for testing will be provided by Dewberry and are listed below:

- Incubator – Quincy lab, Inc. Model 10E Incubator
- Spectrophotometer – Hach DR390
- pH meter
- UV254 Meter (Rental)
- Turbidity Meter
- Thermometer
- Vacuum Pump – Welch Model 2534B-01
- Buechner funnel & flask
- Extech CL200 Chlorine Tester – Resolution 0.01ppm
- 1 L Glass Sample bottles
- Chlorine Tablets for Extech CL203 Chlorine Analyzer Pen
- Sample cell, 50 mm rectangular PMMA, 10 pcs.
- Replacement cell compartment, 50 mm rectangular, for DR3900
- Hach Test Kits
 - Manganese LR PAN (50) HPT291 0.005 - 0.500 mg/L
 - Iron Trace vial Test, ULR (0.01 - 1 mg/L Fe), 20 tests
 - Alkalinity (Total) TNTplus Vial Test (25-400 mg/L CaCO₃), 25 Tests
 - Water Hardness TNTplus Reagent Set
 - Chemical Oxygen Demand (COD) TNTplus Vial Test, LR (3-150 mg/L COD), 25 Tests
- Standards
 - Hach Company Metals Quality Control Standard for Drinking Water, Low Range, 500 mL
 - Calcium standard solution, 100 mg/L Ca
 - StablCal Stabilized Turbidity Standard, 200 NTU 500 mL
- Filter paper
 - 0.45 mm pore size glass-fiber filter paper to simulate dual media filter
 - CYTIVA WHATMAN Membrane Filter: 25 mm Dia, 0.02 um Pore Size, Aluminum Oxide, Membrane Filter
- Commercial laboratory bottles for:
 - Total organic carbon (TOC)
 - Dissolved organic carbon (DOC)
 - Iron
 - Manganese
 - Disinfection byproducts (HAA₅/TTHM)
- Nitrile gloves
- Kim wipes
- Liquinox and deionized (DI) water for equipment decontamination
- Dosing solutions
 - 12.5% Sodium Hypochlorite solution
 - 50% Sodium Hydroxide solution
 - 48% Aluminum Sulfate solution

- Powdered Activated Carbon - Calgon Carbon WPH1000 Powdered Activated Carbon
- Sodium Permanganate solution

4. Protocol

Dewberry proposes to collect 25 gallons of raw water from James River Water Authority Raw Water Transmission Main for testing.

4a. Phase 1 TOC & DOC

1. Dewberry will thoroughly mix the raw water sample, then remove (3) 1 L samples from the 25 gal originally collected.
2. Analyze each sample for temperature, pH, turbidity, COD, Manganese concentration, Iron concentration, and UV₂₅₄. Samples will be sent to a commercial laboratory for Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) testing.
3. An additional (10) 5 L samples will then be removed from the 25 gallons. The samples will be dosed with Powdered Activated Carbon (PAC) and Sodium Permanganate (NaMnO₄) per Table 2.
4. Samples will be collected for COD at 5 minutes, 15 minute, 30 minute, and 1 hour time intervals from the reactors dosed with PAC.
5. Samples will be mixed for a period of 60 minutes and then will be dosed with Aluminum Sulfate (Alum). The (10) samples will be mixed rapidly for 1 minute using magnetic stir bars to simulate the rapid mix chamber.
6. Reactors will then be stirred slowly for 30 minutes to allow for flocculation
7. Reactors will then be allowed to sit without the stir bar active, for 12 minutes for sedimentation.
8. The liquid will be decanted off the top of the settled particulate.
9. Samples will be analyzed for iron and manganese concentration.
10. Decant samples will be dosed with sodium hypochlorite to a residual chlorine of 1 mg/l prior to filtration
11. The samples will then be passed through a filter. Vacuum filtration will be used to simulate both Dual-Media filtration (anthracite & sand) and nanofiltration. Filter paper with a pore size of 10 µm will be used to simulate a Dual-media filter while nanofiltration will be simulated using an aluminum oxide membrane filter with a pore size of 0.02µm. Either size filter paper will be placed in a Buechner funnel above a vacuum flask connected to a vacuum pump.
12. Filtered samples will be measured for turbidity, COD, pH, Cl, and UV₂₅₄
13. An aliquot of each sample will be sent to a commercial lab for analysis of TOC, DOC, Fe, and Mn. Each sample will be analyzed for pH and turbidity.

Table 2. Reactor Setup Summary

Sample	PAC (mg/l)	NaMnO ₄ (mg/l)	Alum (mg/l)	Filter
1	0	1	85	Dual media
2	0	1	85	Nanofilter
3	10	1	85	Dual media
4	10	1	85	Nanofilter
5	15	1	85	Dual media
6	15	1	85	Nanofilter

4b. Phase 1 Chlorine Demand Testing

1. For each sample from Phase 1, sodium hydroxide will be added to the target pH of 7.5.
2. Sodium hypochlorite will be added to achieve a residual chlorine of 2.5 mg/l. The volume of sodium hypochlorite required will be recorded.

4c. Phase 2 Simulated Distribution System (SDS) Testing

Phase 2 will begin immediately following Phase 1 and the selected samples will be based on the COD, iron, and manganese results measured in-house from Phase 1.

1. Two treatment configurations will be selected from the Phase 1 results based on effectiveness of TOC, DOC, iron, and manganese removal.
2. The samples will be treated according to the (2) most effective trials from Phase 1.
3. Samples will be distributed into 10 bottles and then receive dosages of sodium hypochlorite according to the table in Appendix C.
4. Immediately following sodium hypochlorite addition to the samples, they will be tested for temperature, pH, and residual chlorine and placed in the incubator at 25 °C.
5. A sample for each treatment scenario will be removed at the following times: 30 minutes, 5 days, 10 days, and 15 days
6. Residual chlorine, temperature, and pH will be measured.
7. Samples will be dechlorinated and preserved in commercial lab bottles and sent for HAA₅ and TTHM analysis.
 - a. The commercial lab provides NH₄Cl and ascorbic acid with an HCl dropper for HAA and THM dichlorination and preservation, respectively

5. Data Collection & Analysis

Photos will be taken to document the testing. Detailed bench notes will be taken to document testing steps and observations.

Based on conditions observed during testing, Dewberry may adjust the protocols described above. Dewberry will discuss protocol modifications with the project manager prior to implementing them.

After each unit process simulation, samples for the parameters identified in Table 2 will be collected.

5a. Phase 1

Analytical results collected in Phase 1 will be used to determine:

1. Efficacy of the chemical doses and the two filters for removal of DOC, TOC, iron and manganese.
2. Duplicate samples collected will be used to compare variability of bench test results.
3. Phase 1 results will be used to determine the doses and filtration method to use in Phase 2. The two best iterations will be used in the Phase 2 SDS testing.
4. Chlorine dosing requirements for Phase 2 DBP formation potential testing
5. pH buffering dosage needed for Phase 2 testing

5b. Phase 2 Simulated Distribution System (SDS) Testing

Dewberry will maintain detailed notes during the SDS test on the log provided in Appendix C. THM, HAA₅, and chlorine residual data will be provided to Fluvanna County in tabular and graphic format.

Table 3. Sample Analysis Parameter Summary

PROCESS	TIME	TEMP	TURBIDITY	PH	COD	DOC	TOC	FE	MN	CL	DBPS	UV254	CARBONATE ALKALINITY	CALCIUM HARDNESS	TDS
Raw Water		X	X	X	X	X	X	X	X			X	X	X	X
Initial PAC & NaMnO4 Addition	5 min				X										
	15 min				X										
	30 min				X										
	1 hour				X			X	X			X			
Alum Addition															
Rapid Mix	1 min														
Flocculation	30 min														
Sedimentation	12 min														
Decant				X	X										
NaOCl Addition (Pre-filtration)				X						X					
Filtration			X	X	X	X	X	X	X	X		X			
pH buffer addition & Disinfection		X		X						X			X	X	X
Incubation & Dechlorination		X		X						X	X				

Appendix D – Certified Lab Results



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 8/30/2024 11:46:26AM

24H1690

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: 50150419
Site ID: James River	PO Number: 20240828001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 09/04/2024 23:59 (3 day TAT)

Received By: Ryan Johnson

Date Received: 08/29/2024 09:50

Logged In By: Hannah Gaul

Date Logged In: 08/29/2024 10:27

Analysis	Due	TAT	Expires	Comments
24H1690-01 Raw Water Carboy 4 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 15:35				NC Sample
Sample disposal fee	09/04/2024 15:00	3	10/27/2024 23:59	
TDS SM2540C	09/04/2024 15:00	3	09/04/2024 23:59	NC Sample
24H1690-02 Raw Water Carboy 2 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 15:34				NC Sample
Sample disposal fee	09/04/2024 15:00	3	10/27/2024 23:59	
TDS SM2540C	09/04/2024 15:00	3	09/04/2024 23:59	NC Sample

*** no group analyses ***

24H1690

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

50150419

Site ID: James River

PO Number:

20240828001

Sample Conditions Checklist

Samples Received at:	4.6°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Remaining analysis found on work order 24H1694 .HEG 8/29/24 1038

Austin Dix notified via email for the containers received did not have a matching sample ID or collection time to the chain of custody. (Raw H2O Carboy 4 - 1535 & Raw H2O Carboy 2 - 1534) The container marked with 2 has been labeled as "Raw Water 2" and the sample marked with 4 has been labeled as "Raw Water 1". The samples have been logged with collection times per the containers received. HEG 8/29/24 1235

Austin Dix confirmed the sample IDs per the container and chain of custody via email. HEG 8/29/24 1555

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd Ste 410 Raleigh NC		PROJECT NUMBER: 50150419	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: <i>Austin Dix</i>		Turn Around Time: Circle 10 (5 Days) or 3 Day(s) - TDS	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other From River Surface Water					
LAB USE ONLY		Field Filtered (Dissolved Metals)		ANALYSIS	
Grab		Composite		TDS SM2540C	
Cooler Temp		Grab Date or Composite Stop Date		TDM EPA 524	
Therm ID: 271		Grab Time or Composite Stop Time		HAA EPA 552	
Observed Temp °C 4.6		Composite Start Date		TOC SM5310	
Correction Factor °C 0.0		Composite Start Time		DOC SM5310	
Corrected Temp °C 4.6		Grab Date or Composite Stop Date		Number of Containers	
CLIENT SAMPLE I.D.		Grab Time or Composite Stop Time		Matrix (See Codes)	
1) RAW WATER 1		8/28/24 10:45		15:35 OT	
2) RAW WATER 2		8/28/24 10:45		15:35 OT	
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					
RELINQUISHED: <i>Austin Dix</i>		DATE / TIME: 08/28/24 19:00		QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>	
RELINQUISHED: <i>Feder E</i>		DATE / TIME: 8-29-24 0950		Custody Seals used and intact? (Y/N) (N)	
RELINQUISHED: <i>Feder E</i>		DATE / TIME: 8-29-24 0950		Received on (Y/N) (Y)	
Dewberry - Raleigh 24H1690 FCFU Bench Scale Testing Recd: 08/29/2024 Due: 09/04/2024					



1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24H1690

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: August 29, 2024 9:50
Date Issued: September 4, 2024 10:11
Project Number: 50150419
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 08/29/2024 09:50. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Keith Sprouse
Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
Client Site ID: James River
Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Laboratory Sample ID: 24H1690-01

Client Sample ID: Raw Water Carboy 4

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	01	SM2540C-2015	104		10	10	1	mg/L

Laboratory Sample ID: 24H1690-02

Client Sample ID: Raw Water Carboy 2

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	02	SM2540C-2015	102		10	10	1	mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/4/2024 10:11:55AM

Client Site I.D.: James River

Submitted To: Austin Dix

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Raw Water Carboy 4	24H1690-01	Ground Water	08/28/2024 15:35	08/29/2024 09:50
Raw Water Carboy 2	24H1690-02	Ground Water	08/28/2024 15:34	08/29/2024 09:50

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/4/2024 10:11:55AM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 4

Laboratory Sample ID: 24H1690-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	01	E1642222	SM2540C-20 15	08/29/2024 08:55	08/29/2024 08:55	104		10	10	1	mg/L	ACA

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/4/2024 10:11:55AM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 2

Laboratory Sample ID: 24H1690-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	02	E1642222	SM2540C-20 15	08/29/2024 08:55	08/29/2024 08:55	102		10	10	1	mg/L	ACA

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
 Client Site I.D.: James River
 Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHH1266 - No Prep Wet Chem										
Blank (BHH1266-BLK1)				Prepared & Analyzed: 08/29/2024						
TDS	ND	10	mg/L							
LCS (BHH1266-BS1)				Prepared & Analyzed: 08/29/2024						
TDS	298	10	mg/L	300		99.3	80-120			
Duplicate (BHH1266-DUP1)				Source: 24H1462-01		Prepared & Analyzed: 08/29/2024				
TDS	182	10	mg/L		191			4.83	10	

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Wet Chem	
24H1690-01	100 mL / 100 mL	SM2540C-2015	BHH1266	SHH1152	
24H1690-02	100 mL / 100 mL	SM2540C-2015	BHH1266	SHH1152	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/4/2024 10:11:55AM

Client Site I.D.: James River

Submitted To: Austin Dix

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Wet Chem	
BHH1266-BLK1	100 mL / 100 mL	SM2540C-2015	BHH1266	SHH1152	
BHH1266-BS1	100 mL / 100 mL	SM2540C-2015	BHH1266	SHH1152	
BHH1266-DUP1	100 mL / 100 mL	SM2540C-2015	BHH1266	SHH1152	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/4/2024 10:11:55AM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>SM2540C-2015 in Non-Potable Water</i>	
TDS	VELAP,NCDEQ,WVDEP

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
SCDHEC	South Carolina Dept of Health and Environmental Control Certificate 93016001	93016	09/14/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



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RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
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Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd Ste 410 Raleigh NC		PROJECT NUMBER: 50150419	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES NO	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: <i>Austin Dix</i>		Turn Around Time: Circle 10 (5 Days) or 3 Day(s) - TDS	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other From River Surface Water					
LAB USE ONLY		ANALYSIS		COMMENTS	
Cooler Temp		TDS SM2540C		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol	
Therm ID: 371		TDM EPA 524		DOC needs to be lab filtered	
Observed Temp °C 4.6		HAA EPA 552		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)	
Correction Factor °C 0.0		TOC SM5310			
Corrected Temp °C 4.6		DOC SM5310			
CLIENT SAMPLE I.D.		Number of Containers			
1) RAW WATER 1		Matrix (See Codes)			
2) RAW WATER 2		Time Preserved			
3)		Grab Time or Composite Stop			
4)		Composite Stop Date			
5)		Grab Date or			
6)		Composite Start Time			
7)		Composite Start Date			
8)		Field Filtered (Dissolved Metals)			
9)		Composite			
10)		Grab			
RELINQUISHED: <i>Austin Dix</i>		DATE / TIME: 08/28/24 19:00		QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>	
RELINQUISHED: <i>Feder E</i>		DATE / TIME: 08/28/24 19:00		Custody Seals used and intact? (Y/N) (Y)	
RELINQUISHED: <i>Feder E</i>		DATE / TIME: 08/28/24 19:00		Received on (Y/N) (Y)	

Dewberry - Raleigh 24H1690
FCFU Bench Scale Testing

Recd: 08/29/2024 Due: 09/04/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Laboratory Order ID: 24H1690

Sample Conditions Checklist

Samples Received at:	4.60°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Remaining analysis found on work order 24H1694 .HEG 8/29/24 1038

Austin Dix notified via email for the containers received did not have a matching sample ID or collection time to the chain of custody. (Raw H2O Carboy 4 - 1535 &

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/4/2024 10:11:55AM

Raw H2O Carboy 2 - 1534) The container marked with 2 has been labeled as "Raw Water 2" and the sample marked with 4 has been labeled as "Raw Water 1". The samples have been logged with collection times per the containers received. HEG 8/29/24 1235

Austin Dix confirmed the sample IDs per the container and chain of custody via email. HEG 8/29/24 1555



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 8/30/2024 12:17:29PM

24H1694

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: 50150419
Site ID: James River	PO Number: 20240828001

<u>Report To:</u>	<u>Invoice To:</u>
Dewberry - Raleigh, NC	Dewberry - Raleigh, NC
Austin Dix	Austin Dix
2610 Wycliff Road #410	2610 Wycliff Road #410
Raleigh, NC 27607-3073	Raleigh, NC 27607-3073
Phone: 704-625-5078	Phone :704-625-5078
Fax:	Fax:

Date Due: 09/06/2024 23:59 (5 day TAT)

Received By: Ryan Johnson

Date Received: 08/29/2024 09:50

Logged In By: Hannah Gaul

Date Logged In: 08/29/2024 10:39

Analysis	Due	TAT	Expires	Comments
24H1694-01 Raw Water Carboy 2 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 15:37				NC Sample
Sample disposal fee	09/05/2024 17:00	5	10/27/2024 23:59	
TOC SM5310C	09/05/2024 17:00	5	09/25/2024 23:59	NC Sample
24H1694-02 Raw Water Carboy 2 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 10:45				NC Sample// lab filter
DOC SM5310C	09/05/2024 17:00	5	09/25/2024 23:59	NC Sample. Lab filtration
Lab Filtration	09/05/2024 17:00	5	10/27/2024 23:59	
24H1694-03 Raw Water Carboy 4 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 15:39				NC Sample
Sample disposal fee	09/05/2024 17:00	5	10/27/2024 23:59	
TOC SM5310C	09/05/2024 17:00	5	09/25/2024 23:59	NC Sample
24H1694-04 Raw Water Carboy 4 [Non-Potable Water] (Grab)				
Sampled: 08/28/2024 15:38				NC Sample// lab filter
DOC SM5310C	09/05/2024 17:00	5	09/25/2024 23:59	NC Sample. Lab filtration
Lab Filtration	09/05/2024 17:00	5	10/27/2024 23:59	

*** no group analyses ***

Unless otherwise agreed in writing, these services are provided pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-and-conditions>. Enthalpy's acceptance of this order is expressly limited to these terms and conditions.

24H1694

Enthalpy Analytical

Client:	Dewberry - Raleigh, NC	Project Manager:	Ginny Thrasher
Project Name:	FCFU Bench Scale Testing	Project Number:	50150419
Site ID:	James River	PO Number:	20240828001

Sample Conditions Checklist

Samples Received at:	4.6°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Remaining analysis found on work order 24H1690 .HEG 8/29/24 1038

Austin Dix notified via email for The chain of custody was received with sample IDs "Raw Water 1" and "Raw Water 2" with a collection date of 8/28/24 at 1045 however, we received containers with different sample IDs and collection information.

Water Carboy 4- 1539

Raw H2O Carboy 4 - 1538

Raw H2O Carboy 2 - 1537

Raw H2O 2 - no time on the container

The containers marked with 2 have been labeled as "Raw Water 2" and the samples marked with 4 have been labeled as "Raw Water 1". The samples have been logged with collection times per the containers received with sample 4 being logged with a collection time of 1045 from the chain as the container did not indicate a time. HEG 8/29/24 1236

Austin Dix via email confirmed to use sample IDs from the containers. HEG 8/29/24 1348

Austin Dix notified via email to confirm which sample should be labeled as "Raw water carboy 4" and "Raw Water carboy 2". HEG 8/29/24 1350

Austin Dix confirmed the sample IDs per the container and chain of custody via email. HEG 8/29/24 1555



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804)358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: Jones River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2616 Wycliff Rd Ste 410 Raleigh NC		PROJECT NUMBER: 50150419	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: <i>Austin Dix</i>		Turn Around Time: Circle 10 (5 Days) or 3 Day(s) - TDS	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Solids OR=Organic A=Air WP=Wipe Off=Other From River Surface Water To Lab					
LAB USE ONLY					
Cooler Temp		ANALYSIS			
Therm ID: 271		TDS SM2540C			
Observed Temp °C 4.6		THM EPA 524			
Correction Factor °C 0.0		HAA EPA 552			
Corrected Temp °C 4.6		TOC SM5310			
CLIENT SAMPLE I.D.		DOC SM5310			
1) RAW WATER 1		Number of Containers			
2) RAW WATER 2		Matrix (See Codes)			
3)		Time Preserved			
4)		Grab Time or Composite Stop			
5)		Composite Start Date			
6)		Composite Stop Date			
7)		Grab Date or			
8)		Composite Start Time			
9)		Composite Stop Time			
10)		Field Filtered (Dissolved Metals)			
RELINQUISHED: <i>Austin Dix</i>		DATE / TIME: 08/28/24 19:00		RECEIVED: <i>Feder E</i>	
RELINQUISHED: <i>Feder E</i>		DATE / TIME: 08/28/24 19:00		RECEIVED: <i>Feder E</i>	
RELINQUISHED:		DATE / TIME:		RECEIVED:	
QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>					
Custody Seals used and intact? (Y/N) (Y) (N)					
Received on (Y/N) (Y) (N)					
Dewberry - Raleigh 24H1694					
FCFU Bench Scale Testing					
Recd: 08/29/2024 Due: 09/06/2024					

Unless otherwise agreed in writing, any and all products and/or services provided by Enthalpy are pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-ar>

v130325002

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1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24H1694

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: August 29, 2024 9:50
Date Issued: September 6, 2024 15:54
Project Number: 50150419
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 08/29/2024 09:50. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Sarah R. Endsley
Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

Laboratory Sample ID: 24H1694-01 Client Sample ID: Raw Water Carboy 2

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TOC	01	SM5310C-2014	3.5		1.0	1.0	1	mg/L

Laboratory Sample ID: 24H1694-02 Client Sample ID: Raw Water Carboy 2

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	02	SM5310C-2014	3.9		1.0	1.0	1	mg/L

Laboratory Sample ID: 24H1694-03 Client Sample ID: Raw Water Carboy 4

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TOC	03	SM5310C-2014	3.5		1.0	1.0	1	mg/L

Laboratory Sample ID: 24H1694-04 Client Sample ID: Raw Water Carboy 4

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	04	SM5310C-2014	3.9		1.0	1.0	1	mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Raw Water Carboy 2	24H1694-01	Ground Water	08/28/2024 15:37	08/29/2024 09:50
Raw Water Carboy 2	24H1694-02	Ground Water	08/28/2024 10:45	08/29/2024 09:50
Raw Water Carboy 4	24H1694-03	Ground Water	08/28/2024 15:39	08/29/2024 09:50
Raw Water Carboy 4	24H1694-04	Ground Water	08/28/2024 15:38	08/29/2024 09:50

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 2

Laboratory Sample ID: 24H1694-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TOC	01	7440-44-0	SM5310C-20 14	09/04/2024 14:30	09/04/2024 14:30	3.5		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 2

Laboratory Sample ID: 24H1694-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	02	7440-44-0	SM5310C-20 14	09/05/2024 12:29	09/05/2024 12:29	3.9		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 4

Laboratory Sample ID: 24H1694-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TOC	03	7440-44-0	SM5310C-20 14	09/04/2024 14:53	09/04/2024 14:53	3.5		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Raw Water Carboy 4

Laboratory Sample ID: 24H1694-04

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	04	7440-44-0	SM5310C-20 14	09/05/2024 12:51	09/05/2024 12:51	3.9		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHI0086 - No Prep Halides										
Blank (BHI0086-BLK1)				Prepared & Analyzed: 09/04/2024						
TOC	ND	1.0	mg/L							
LCS (BHI0086-BS1)				Prepared & Analyzed: 09/04/2024						
TOC	10.0	1	mg/L	10.0		99.8	80-120			
Duplicate (BHI0086-DUP1)				Source: 24I0041-01 Prepared & Analyzed: 09/04/2024						
TOC	3660	200	mg/L		3700			1.12	15	
Matrix Spike (BHI0086-MS1)				Source: 24H1688-01 Prepared & Analyzed: 09/04/2024						
TOC	9.5	1.0	mg/L	10.0	BLOD	95.3	80-120			
Batch BHI0163 - No Prep Halides										
Blank (BHI0163-BLK1)				Prepared & Analyzed: 09/05/2024						
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L							
LCS (BHI0163-BS1)				Prepared & Analyzed: 09/05/2024						
Dissolved Organic Carbon (DOC)	9.8	1	mg/L	10.0		97.6	80-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method: No Prep Halides		
24H1694-01	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
24H1694-03	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
24H1694-02	40.0 mL / 40.0 mL	SM5310C-2014	BHI0163	SHI0149	AH40172
24H1694-04	40.0 mL / 40.0 mL	SM5310C-2014	BHI0163	SHI0149	AH40172

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Halides	
BHI0086-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
BHI0086-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
BHI0086-DUP1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
BHI0086-MS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0086	SHI0124	AH40172
BHI0163-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0163	SHI0149	AH40172
BHI0163-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0163	SHI0149	AH40172

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/6/2024 3:54:52PM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>SM5310C-2014 in Non-Potable Water</i>	
TOC	VELAP,WVDEP,NCDEQ

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
SCDHEC	South Carolina Dept of Health and Environmental Control Certificate 93016001	93016	09/14/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		INVOICE NAME/Quote #: FCFU Bench Scale Testing		
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: Jones River		
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2616 Wycliff Rd Ste 410 Raleigh NC		PROJECT NUMBER: 50150419		
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001		
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:		
Is sample for compliance reporting?		YES NO	Regulatory State: VA		Is sample from a chlorinated supply? YES NO	PWS I.D. #:
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: Austin Dix		Turn Around Time: Circle 10 (5 Days) or 3 Day(s) - TDS		COMMENTS
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other From River Surface Water To C/2nd						
LAB USE ONLY		ANALYSIS				
Cooler Temp		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol				
Therm ID: 371		DOC needs to be lab filtered				
Observed Temp °C 4.6		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)				
Correction Factor °C 0.0						
Corrected Temp °C 4.6						
CLIENT SAMPLE I.D.						
1) RAW WATER 1						
2) RAW WATER 2						
3)						
4)						
5)						
6)						
7)						
8)						
9)						
10)						
RELINQUISHED: Austin Dix		DATE / TIME 08/28/24 19:00	RECEIVED: 8/29/24	DATE / TIME	QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>	LAB USE ONLY
RELINQUISHED: Feder E		DATE / TIME	RECEIVED: 8-29-24 0950	DATE / TIME	Custody Seals used and intact? (Y/N) (Y)	
RELINQUISHED: Feder E		DATE / TIME	RECEIVED:	DATE / TIME	Received on (Y/N) (Y)	
Unless otherwise agreed in writing, any and all products and/or services provided by Enthalpy are pursuant to the terms and conditions as set forth at https://enthalpy.com/terms-ar						

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

Laboratory Order ID: 24H1694

Sample Conditions Checklist

Samples Received at:	4.60°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Remaining analysis found on work order 24H1690 .HEG 8/29/24 1038

Austin Dix notified via email for The chain of custody was received with sample IDs
"Raw Water 1" and "Raw Water 2" with a collection date of 8/28/24 at 1045

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/6/2024 3:54:52PM

however, we received containers with different sample IDs and collection information.

Water Carboy 4- 1539

Raw H2O Carboy 4 - 1538

Raw H2O Carboy 2 - 1537

Raw H2O 2 - no time on the container

The containers marked with 2 have been labeled as "Raw Water 2" and the samples marked with 4 have been labeled as "Raw Water 1". The samples have been logged with collection times per the containers received with sample 4 being logged with a collection time of 1045 from the chain as the container did not indicate a time. HEG 8/29/24 1236

Austin Dix via email confirmed to use sample IDs from the containers. HEG 8/29/24 1348

Austin Dix notified via email to confirm which sample should be labeled as "Raw water carboy 4" and "Raw Water carboy 2". HEG 8/29/24 1350

Austin Dix confirmed the sample IDs per the container and chain of custody via email. HEG 8/29/24 1555



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 9/19/2024 4:04:12PM

24I0906

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: 50150419
Site ID: James River	PO Number: 20240916001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 09/24/2024 23:59 (5 day TAT)

Received By: Ryan Johnson

Date Received: 09/17/2024 11:20

Logged In By: Hannah Gaul

Date Logged In: 09/17/2024 11:43

Analysis	Due	TAT	Expires	Comments
24I0906-01 S1 0PAC DM [Potable Water] (Composite)				
Sampled: 09/16/2024 14:37 to 09/16/2024 14:42				NC Sample
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
24I0906-02 S1 0PAC DM [Potable Water] (Grab)				
Sampled: 09/16/2024 14:49				NC Sample// lab filter
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration
24I0906-03 S2 0PAC NF [Potable Water] (Composite)				
Sampled: 09/16/2024 14:38 to 09/16/2024 14:54				NC Sample
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
24I0906-04 S2 0PAC NF [Potable Water] (Grab)				
Sampled: 09/16/2024 14:53				NC Sample// lab filter
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration

Unless otherwise agreed in writing, these services are provided pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-and-conditions>. Enthalpy's acceptance of this order is expressly limited to these terms and conditions.

24I0906

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: 50150419
Site ID: James River	PO Number: 20240916001

Analysis	Due	TAT	Expires	Comments
24I0906-05 S3 10PAC DM [Potable Water] (Grab)				
Sampled: 09/16/2024 14:58				NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
24I0906-06 S3 10PAC DM [Potable Water] (Grab)				
Sampled: 09/16/2024 14:59				NC Sample// lab filter
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
24I0906-07 #3 10PAC DM after filt [Potable Water] (Grab)				
Sampled: 09/16/2024 14:38				NC Sample
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
24I0906-09 S4 10PAC NF [Potable Water] (Composite)				
Sampled: 09/16/2024 14:29 to 09/16/2024 15:03				NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
24I0906-10 S4 10PAC NF [Potable Water] (Grab)				
Sampled: 09/16/2024 15:04				NC Sample// lab filter
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration
24I0906-11 S5 15PAC DM [Potable Water] (Grab)				
Sampled: 09/16/2024 15:07				NC Sample
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
24I0906-12 S5 15PAC DM [Potable Water] (Grab)				
Sampled: 09/16/2024 15:08				NC Sample// lab filter
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration
24I0906-13 #5 15PAC DM After filtration [Potable Water] (Grab)				
Sampled: 09/16/2024 14:40				NC Sample
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	

Unless otherwise agreed in writing, these services are provided pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-and-conditions>. Enthalpy's acceptance of this order is expressly limited to these terms and conditions.

24I0906

Enthalpy Analytical

Client:	Dewberry - Raleigh, NC	Project Manager:	Ginny Thrasher
Project Name:	FCFU Bench Scale Testing	Project Number:	50150419
Site ID:	James River	PO Number:	20240916001

Analysis	Due	TAT	Expires	Comments
24I0906-15 S6 15PAC NF [Potable Water] (Composite)				
Sampled: 09/16/2024 14:41 to 09/16/2024 15:12				NC Sample
Sample disposal fee	09/23/2024 17:00	5	11/15/2024 23:59	
TDS SM2540C	09/23/2024 17:00	5	09/23/2024 23:59	NC Sample
TOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample
24I0906-16 S6 15PAC NF [Potable Water] (Grab)				
Sampled: 09/16/2024 15:13				NC Sample// lab filter
Lab Filtration	09/23/2024 17:00	5	11/15/2024 23:59	
DOC SM5310C	09/23/2024 17:00	5	10/14/2024 23:59	NC Sample. Lab filtration

*** no group analyses ***

2410906

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

50150419

Site ID: James River

PO Number:

20240916001

Sample Conditions Checklist

Samples Received at:	5.8°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Austin Dix notified via email for the chain of custody was received with a collection date of 8/28/24 and collection time of 1045. The containers received have a collection date of 9/16 and varying collection times. The samples have been logged with collection information per the containers received. The samples have also been logged as composite samples, as the containers for each sample have a range of collection times. HEG 9/18/24 1158

Per Austin Dix via phone samples are potable water.
JNH 9/19/24 1358

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd, Ste 410, Raleigh NC 27607		PROJECT NUMBER: 50150419	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-2234		P.O. #: 26240816001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: Austin Dix		Turn Around Time: Circle 10 (5 Days) or Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other From River Surface H2O					
LAB USE ONLY					
Cooler Temp		Therm ID: 393		Observed Temp °C 5.8	
Correction Factor °C 0.0		Corrected Temp °C 5.8		CLIENT SAMPLE I.D.	
1) S1 OPAC DM		2) S2 OPAC NF		3) S3 OPAC DM	
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1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24I0906

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: September 17, 2024 11:20
Date Issued: September 24, 2024 13:23
Project Number: 50150419
Purchase Order: 20240916001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 09/17/2024 11:20. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Keith Sprouse
Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

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Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Laboratory Sample ID: 24I0906-01

Client Sample ID: S1 0PAC DM

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	01	SM2540C-2015	151		10	10	1	mg/L
TOC	01	SM5310C-2014	2.3		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-02

Client Sample ID: S1 0PAC DM

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	02	SM5310C-2014	2.5		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-03

Client Sample ID: S2 0PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	03	SM2540C-2015	130		10	10	1	mg/L
TOC	03	SM5310C-2014	2.4		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-04

Client Sample ID: S2 0PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	04	SM5310C-2014	2.7		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-05

Client Sample ID: S3 10PAC DM

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TOC	05	SM5310C-2014	2.4		1.0	1.0	1	mg/L

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Laboratory Sample ID: 24I0906-06 **Client Sample ID: S3 10PAC DM**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	06	SM5310C-2014	2.3		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-07 **Client Sample ID: #3 10PAC DM after filt**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	07	SM2540C-2015	142		10	10	1	mg/L

Laboratory Sample ID: 24I0906-09 **Client Sample ID: S4 10PAC NF**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	09	SM2540C-2015	156		10	10	1	mg/L
TOC	09	SM5310C-2014	2.3		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-10 **Client Sample ID: S4 10PAC NF**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	10	SM5310C-2014	2.3		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-11 **Client Sample ID: S5 15PAC DM**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TOC	11	SM5310C-2014	1.9		1.0	1.0	1	mg/L

Analysis Detects ReportClient Name: Dewberry - Raleigh, NC
Client Site ID: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Laboratory Sample ID: 24I0906-12 Client Sample ID: S5 15PAC DM

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	12	SM5310C-2014	1.8		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-13 Client Sample ID: #5 15PAC DM After filtration

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	13	SM2540C-2015	141		10	10	1	mg/L

Laboratory Sample ID: 24I0906-15 Client Sample ID: S6 15PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
TDS	15	SM2540C-2015	166		10	10	1	mg/L
TOC	15	SM5310C-2014	1.8		1.0	1.0	1	mg/L

Laboratory Sample ID: 24I0906-16 Client Sample ID: S6 15PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	16	SM5310C-2014	1.9		1.0	1.0	1	mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S1 0PAC DM	24I0906-01	Potable Water	09/16/2024 14:37 to 09/16/2024 14:42	09/17/2024 11:20
S1 0PAC DM	24I0906-02	Potable Water	09/16/2024 14:49	09/17/2024 11:20
S2 0PAC NF	24I0906-03	Potable Water	09/16/2024 14:38 to 09/16/2024 14:54	09/17/2024 11:20
S2 0PAC NF	24I0906-04	Potable Water	09/16/2024 14:53	09/17/2024 11:20
S3 10PAC DM	24I0906-05	Potable Water	09/16/2024 14:58	09/17/2024 11:20
S3 10PAC DM	24I0906-06	Potable Water	09/16/2024 14:59	09/17/2024 11:20
#3 10PAC DM after filt	24I0906-07	Potable Water	09/16/2024 14:38	09/17/2024 11:20
S4 10PAC NF	24I0906-09	Potable Water	09/16/2024 14:29 to 09/16/2024 15:03	09/17/2024 11:20
S4 10PAC NF	24I0906-10	Potable Water	09/16/2024 15:04	09/17/2024 11:20
S5 15PAC DM	24I0906-11	Potable Water	09/16/2024 15:07	09/17/2024 11:20
S5 15PAC DM	24I0906-12	Potable Water	09/16/2024 15:08	09/17/2024 11:20
#5 15PAC DM After filtration	24I0906-13	Potable Water	09/16/2024 14:40	09/17/2024 11:20
S6 15PAC NF	24I0906-15	Potable Water	09/16/2024 14:41 to 09/16/2024 15:12	09/17/2024 11:20
S6 15PAC NF	24I0906-16	Potable Water	09/16/2024 15:13	09/17/2024 11:20

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S1 0PAC DM

Laboratory Sample ID: 24I0906-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	01	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	151		10	10	1	mg/L	ACA
TOC	01	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	2.3		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Client Site I.D.: James River

Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Client Sample ID: S1 0PAC DM

Laboratory Sample ID: 24I0906-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	02	7440-44-0	SM5310C-20 14	09/19/2024 19:50	09/19/2024 19:50	2.5		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S2 0PAC NF

Laboratory Sample ID: 24I0906-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	03	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	130		10	10	1	mg/L	ACA
TOC	03	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	2.4		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name:

Dewberry - Raleigh, NC

Client Site I.D.:

James River

Submitted To:

Austin Dix

Date Issued:

9/24/2024 1:23:07PM

Client Sample ID: S2 0PAC NF					Laboratory Sample ID: 24I0906-04							
Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	04	7440-44-0	SM5310C-20 14	09/19/2024 20:10	09/19/2024 20:10	2.7		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S3 10PAC DM

Laboratory Sample ID: 24I0906-05

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TOC	05	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	2.4		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name:

Dewberry - Raleigh, NC

Client Site I.D.:

James River

Submitted To:

Austin Dix

Date Issued:

9/24/2024 1:23:07PM

Client Sample ID: S3 10PAC DM					Laboratory Sample ID: 24I0906-06							
Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	06	7440-44-0	SM5310C-20 14	09/19/2024 20:30	09/19/2024 20:30	2.3		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: #3 10PAC DM after filt

Laboratory Sample ID: 24I0906-07

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	07	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	142		10	10	1	mg/L	ACA

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S4 10PAC NF

Laboratory Sample ID: 24I0906-09

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	09	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	156		10	10	1	mg/L	ACA
TOC	09	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	2.3		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name:

Dewberry - Raleigh, NC

Client Site I.D.:

James River

Submitted To:

Austin Dix

Date Issued:

9/24/2024 1:23:07PM

Client Sample ID: S4 10PAC NF					Laboratory Sample ID: 24I0906-10							
Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	10	7440-44-0	SM5310C-20 14	09/19/2024 20:50	09/19/2024 20:50	2.3		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Client Site I.D.: James River

Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Client Sample ID: S5 15PAC DM

Laboratory Sample ID: 24I0906-11

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TOC	11	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	1.9		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S5 15PAC DM

Laboratory Sample ID: 24I0906-12

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	12	7440-44-0	SM5310C-20 14	09/19/2024 21:10	09/19/2024 21:10	1.8		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: #5 15PAC DM After filtration

Laboratory Sample ID: 24I0906-13

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	13	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	141		10	10	1	mg/L	ACA

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: S6 15PAC NF

Laboratory Sample ID: 24I0906-15

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	15	E1642222	SM2540C-20 15	09/19/2024 08:51	09/19/2024 08:51	166		10	10	1	mg/L	ACA
TOC	15	NA	SM5310C-20 14	09/19/2024 09:31	09/19/2024 09:31	1.8		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Client Site I.D.: James River

Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Client Sample ID: S6 15PAC NF

Laboratory Sample ID: 24I0906-16

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	16	7440-44-0	SM5310C-20 14	09/19/2024 21:30	09/19/2024 21:30	1.9		1.0	1.0	1	mg/L	ATG

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHI0726 - No Prep Halides										
Blank (BHI0726-BLK1)				Prepared & Analyzed: 09/19/2024						
TOC	ND	1.0	mg/L							
LCS (BHI0726-BS1)				Prepared & Analyzed: 09/19/2024						
TOC	9.7	1	mg/L	10.0		96.9	80-120			
Duplicate (BHI0726-DUP1)				Source: 24I0750-02 Prepared & Analyzed: 09/19/2024						
TOC	2.6	1.0	mg/L		2.6			0.0990	15	
Matrix Spike (BHI0726-MS1)				Source: 24I0750-01 Prepared & Analyzed: 09/19/2024						
TOC	11.9	1.0	mg/L	10.0	2.6	92.5	80-120			
Batch BHI0729 - No Prep Halides										
Blank (BHI0729-BLK1)				Prepared & Analyzed: 09/19/2024						
TOC	ND	1.0	mg/L							
LCS (BHI0729-BS1)				Prepared & Analyzed: 09/19/2024						
TOC	9.7	1	mg/L	10.0		96.9	80-120			
Duplicate (BHI0729-DUP1)				Source: 24I0750-07 Prepared & Analyzed: 09/19/2024						
TOC	2.6	1.0	mg/L		2.6			0.140	15	
Matrix Spike (BHI0729-MS1)				Source: 24I0750-06 Prepared & Analyzed: 09/19/2024						
TOC	11.9	1.0	mg/L	10.0	2.7	92.1	80-120			
Batch BHI0758 - No Prep Wet Chem										
Blank (BHI0758-BLK1)				Prepared & Analyzed: 09/19/2024						
TDS	ND	10	mg/L							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHI0758 - No Prep Wet Chem										
LCS (BHI0758-BS1)				Prepared & Analyzed: 09/19/2024						
TDS	293	10	mg/L	300		97.7	80-120			
Duplicate (BHI0758-DUP1)				Source: 24I0906-03 Prepared & Analyzed: 09/19/2024						
TDS	147	10	mg/L		130			12.3	10	P
Duplicate (BHI0758-DUP2)				Source: 24I0906-01 Prepared & Analyzed: 09/19/2024						
TDS	154	10	mg/L		151			1.97	10	
Batch BHI0826 - No Prep Halides										
Blank (BHI0826-BLK1)				Prepared & Analyzed: 09/19/2024						
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L							
LCS (BHI0826-BS1)				Prepared & Analyzed: 09/19/2024						
Dissolved Organic Carbon (DOC)	9.1	1	mg/L	10.0		90.8	80-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Halides	
24I0906-01	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
24I0906-03	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
24I0906-05	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
24I0906-09	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
24I0906-11	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
24I0906-15	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
24I0906-02	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
24I0906-04	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
24I0906-06	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
24I0906-10	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
24I0906-12	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
24I0906-16	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Wet Chem	
24I0906-01	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
24I0906-03	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
24I0906-07	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
24I0906-09	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
24I0906-13	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
24I0906-15	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Halides	
BHI0726-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
BHI0726-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
BHI0726-DUP1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
BHI0726-MS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0726	SHI0688	AH40172
BHI0729-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
BHI0729-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
BHI0729-DUP1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
BHI0729-MS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0729	SHI0688	AH40172
BHI0826-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
BHI0826-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHI0826	SHI0753	AH40172
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Wet Chem	
BHI0758-BLK1	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
BHI0758-BS1	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
BHI0758-DUP1	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	
BHI0758-DUP2	100 mL / 100 mL	SM2540C-2015	BHI0758	SHI0684	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 9/24/2024 1:23:07PM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>SM2540C-2015 in Non-Potable Water</i>	
TDS	VELAP,NCDEQ,WVDEP
<i>SM5310C-2014 in Non-Potable Water</i>	
TOC	VELAP,WVDEP,NCDEQ

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Qualifiers and Definitions

P	Duplicate analysis does not meet the acceptance criteria for precision
RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd, Ste 410 Raleigh NC 27607		PROJECT NUMBER: 50150419	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-2234		P.O. #: 26240816001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: Austin Dix		Turn Around Time: Circle 10 (5 Days) or _Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other From River Surface H2O					
LAB USE ONLY					
Cooler Temp		Therm ID: 393		Observed Temp °C 5.8	
Correction Factor °C 0.0		Corrected Temp °C 5.8		CLIENT SAMPLE I.D.	
1) S1 OPAC DM		Grab		Field Filtered (Dissolved Metals)	
2) S2 OPAC NF		Composite		Composite Start Date	
3) S3 OPAC DM		Grab		Composite End Date	
4) S4 OPAC DM		Composite		Grab Date or Composite Stop Date	
5) S5 OPAC NF		Grab		Time Preserved	
6) S6 OPAC DM		Composite		Matrix (See Codes)	
7) S7 OPAC NF		Grab		Number of Containers	
8) S8 OPAC NF		Composite		DOC SM5310	
9) S9 OPAC NF		Grab		TOC SM5310	
10) S10 OPAC NF		Composite		HAA EPA 552	
		Grab		THM EPA 524	
		Composite		TDS SM2540C	
		Grab		DOC SM5310	
		Composite		TOC SM5310	
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		Grab		HAA EPA 552	
		Composite		THM EPA 524	
		Grab		TDS SM254	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

Laboratory Order ID: 24I0906

Sample Conditions Checklist

Samples Received at:	5.80°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	No
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Austin Dix notified via email for the chain of custody was received with a collection date of 8/28/24 and collection time of 1045. The containers received have a collection date of 9/16 and varying collection times. The samples have been logged with collection information per the containers received. The samples have also been

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 9/24/2024 1:23:07PM

logged as composite samples, as the containers for each sample have a range of collection times. HEG 9/18/24 1158

Per Austin Dix via phone samples are potable water.
JNH 9/19/24 1358



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 10/7/2024 8:54:28AM

24J0307

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: FCFU Bench Scale Testing
Site ID: James River	PO Number: 20240828001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 10/10/2024 23:59 (5 day TAT)

Received By: Hannah Gaul

Date Received: 10/03/2024 09:45

Logged In By: Hannah Gaul

Date Logged In: 10/04/2024 11:51

Analysis	Due	TAT	Expires	Comments
24J0307-01 PH2 S1 15PAC DM [Potable Water] (Composite)				
Sampled: 10/02/2024 13:08 to 10/02/2024 14:38				NC Sample
HAA EPA552.3	10/09/2024 17:00	5	10/16/2024 23:59	NC Sample
Sample disposal fee	10/09/2024 17:00	5	12/01/2024 23:59	
TDS SM2540C	10/09/2024 17:00	5	10/09/2024 23:59	NC Sample
THM EPA524	10/09/2024 17:00	5	10/16/2024 23:59	NC Sample
TOC SM5310C	10/09/2024 17:00	5	10/30/2024 23:59	NC Sample// only 1 VOA
24J0307-02 PH2 S1 15PAC DM [Potable Water] (Grab)				
Sampled: 10/02/2024 14:36				NC Sample// 1 VOA
DOC SM5310C	10/09/2024 17:00	5	10/30/2024 23:59	NC Sample. Lab filtration
Lab Filtration	10/09/2024 17:00	5	12/01/2024 23:59	
24J0307-03 PH2 S2 15PAC NF [Potable Water] (Composite)				
Sampled: 10/02/2024 13:08 to 10/02/2024 15:26				NC Sample
HAA EPA552.3	10/09/2024 17:00	5	10/16/2024 23:59	NC Sample
Sample disposal fee	10/09/2024 17:00	5	12/01/2024 23:59	
TDS SM2540C	10/09/2024 17:00	5	10/09/2024 23:59	NC Sample
THM EPA524	10/09/2024 17:00	5	10/16/2024 23:59	NC Sample
TOC SM5310C	10/09/2024 17:00	5	10/30/2024 23:59	NC Sample// 1 VOA

Unless otherwise agreed in writing, these services are provided pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-and-conditions>. Enthalpy's acceptance of this order is expressly limited to these terms and conditions.

24J0307

Enthalpy Analytical

Client:	Dewberry - Raleigh, NC	Project Manager:	Ginny Thrasher
Project Name:	FCFU Bench Scale Testing	Project Number:	FCFU Bench Scale Testing
Site ID:	James River	PO Number:	20240828001

Analysis	Due	TAT	Expires	Comments
24J0307-04 PH2 S2 15PAC NF [Potable Water] (Grab)				
Sampled: 10/02/2024 15:03				NC Sample// 1 VOA
DOC SM5310C	10/09/2024 17:00	5	10/30/2024 23:59	NC Sample. Lab filtration
Lab Filtration	10/09/2024 17:00	5	12/01/2024 23:59	

24J0307-05 Trip Blank [Potable Water] (Trip Blank)				
Sampled: 08/27/2024 11:05				1 VOA
THM EPA524	10/09/2024 17:00	5	09/10/2024 23:59	NC Sample

*** no group analyses ***

24J0307

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

FCFU Bench Scale Testing

Site ID: James River

PO Number:

20240828001

Sample Conditions Checklist

Samples Received at:	5.3°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	No
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	Yes
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Austin Dix notified via email for the chain of custody was received with collection information that differs from the containers received. The samples have been logged as composite samples with collection information per the containers received. Trip Blanks were added to the work order with collection information per the VOAs received. The chain of custody was also received with a matrix of "OT", the samples have been logged as non-potable waters. HEG 10/4/24 1527

Austin Dix confirmed the matrix as drinking water. HEG 10/4/24 1552

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd, Ste 410 Raleigh, NC		PROJECT NUMBER: FCFU Bench Scale Testing	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: <i>Austin Dix</i>		Turn Around Time: Circle 10 (5 Days) or Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other OT					
LAB USE ONLY					
Cooler Temp		ANALYSIS			
Therm ID: 338		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol			
Observed Temp °C 5.2		DOC needs to be lab filtered			
Correction Factor °C 0.1		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (U/min)			
Corrected Temp °C 5.3					
CLIENT SAMPLE I.D.					
1) PH2 S1 ISPAC DM		TDS SM2540C			
2) PH2 S2 ISPAC NF		THM EPA 524			
3)		HAA EPA 552			
4)		TOC SM5310			
5)		DOC SM5310			
6)		Number of Containers			
7)		Matrix (See Codes)			
8)		Time Preserved			
9)		Grab Time or Composite Stop			
10)		Composite Start Date			
DATE / TIME		DATE / TIME		DATE / TIME	
RELINQUISHED: Austin Dix <i>Austin Dix</i> 10/2/24 15:30		RECEIVED: FedEx E		QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>	
RELINQUISHED: FedEx E		RECEIVED: <i>Austin Dix</i> 10/3/24 0945		Custody Seals used and intact? (Y/N)	
RELINQUISHED:		RECEIVED:		Received on ice? (Y/N)	



1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24J0307

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: October 3, 2024 9:45
Date Issued: October 10, 2024 17:36
Project Number: FCFU Bench Scale Testing
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 10/03/2024 09:45. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Keith Sprouse
Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
Client Site ID: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Laboratory Sample ID: 24J0307-01 **Client Sample ID: PH2 S1 15PAC DM**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	01	EPA524.2	3.01		0.40	1.00	1	ug/L
Chloroform	01	EPA524.2	11.9		0.50	1.00	1	ug/L
Total Trihalomethanes	01	EPA524.2	15.2		1.00	4.00	1	ug/L
Dichloroacetic Acid	01	EPA552.3	11.0		0.330	1.00	1	ug/L
HAA5, Total	01	EPA552.3	25.6		5.00	5.00	1	ug/L
Monobromoacetic Acid	01	EPA552.3	3.02		0.330	1.00	1	ug/L
Trichloroacetic Acid	01	EPA552.3	11.0		0.830	1.00	1	ug/L
TDS	01	SM2540C-2015	130		10	10	1	mg/L
TOC	01	SM5310C-2014	1.8		1.0	1.0	1	mg/L

Laboratory Sample ID: 24J0307-02 **Client Sample ID: PH2 S1 15PAC DM**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	02	SM5310C-2014	1.8		1.0	1.0	1	mg/L

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Laboratory Sample ID: 24J0307-03 Client Sample ID: PH2 S2 15PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	03	EPA524.2	2.15		0.40	1.00	1	ug/L
Chloroform	03	EPA524.2	9.08		0.50	1.00	1	ug/L
Total Trihalomethanes	03	EPA524.2	11.5		1.00	4.00	1	ug/L
Dichloroacetic Acid	03	EPA552.3	7.54		0.330	1.00	1	ug/L
HAA5, Total	03	EPA552.3	18.1		5.00	5.00	1	ug/L
Monobromoacetic Acid	03	EPA552.3	2.36		0.330	1.00	1	ug/L
Trichloroacetic Acid	03	EPA552.3	8.01		0.830	1.00	1	ug/L
TDS	03	SM2540C-2015	140		10	10	1	mg/L
TOC	03	SM5310C-2014	1.7		1.0	1.0	1	mg/L

Laboratory Sample ID: 24J0307-04 Client Sample ID: PH2 S2 15PAC NF

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Dissolved Organic Carbon (DOC)	04	SM5310C-2014	1.9		1.0	1.0	1	mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PH2 S1 15PAC DM	24J0307-01	Drinking Water	10/02/2024 13:08 to 10/02/2024 14:38	10/03/2024 09:45
PH2 S1 15PAC DM	24J0307-02	Drinking Water	10/02/2024 14:36	10/03/2024 09:45
PH2 S2 15PAC NF	24J0307-03	Drinking Water	10/02/2024 13:08 to 10/02/2024 15:26	10/03/2024 09:45
PH2 S2 15PAC NF	24J0307-04	Drinking Water	10/02/2024 15:03	10/03/2024 09:45
Trip Blank	24J0307-05	Drinking Water	08/27/2024 11:05	10/03/2024 09:45

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 15PAC DM

Laboratory Sample ID: 24J0307-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	01	75-27-4	EPA524.2	10/09/2024 17:05	10/09/2024 17:05	3.01		0.40	1.00	1	ug/L	JWR
Bromoform	01	75-25-2	EPA524.2	10/09/2024 17:05	10/09/2024 17:05	BLOD		0.40	1.00	1	ug/L	JWR
Chloroform	01	67-66-3	EPA524.2	10/09/2024 17:05	10/09/2024 17:05	11.9		0.50	1.00	1	ug/L	JWR
Dibromochloromethane	01	124-48-1	EPA524.2	10/09/2024 17:05	10/09/2024 17:05	BLOD		0.35	1.00	1	ug/L	JWR
Total Trihalomethanes	01	NA	EPA524.2	10/09/2024 17:05	10/09/2024 17:05	15.2		1.00	4.00	1	ug/L	JWR
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	01	108 %	70-120	10/09/2024 17:05	10/09/2024 17:05							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	01	100 %	75-120	10/09/2024 17:05	10/09/2024 17:05							
<i>Surr: Dibromofluoromethane (Surr)</i>	01	102 %	80-119	10/09/2024 17:05	10/09/2024 17:05							
<i>Surr: Toluene-d8 (Surr)</i>	01	103 %	85-120	10/09/2024 17:05	10/09/2024 17:05							
Micro-extractables by GC/ECD												
Dibromoacetic Acid	01	631-64-1	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	01	79-43-6	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	11.0		0.330	1.00	1	ug/L	ZDR
Monobromoacetic Acid	01	79-08-3	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	3.02		0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	01	79-11-8	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	BLOD		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	01	76-03-9	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	11.0		0.830	1.00	1	ug/L	ZDR
HAA5, Total	01	NA	EPA552.3	10/08/2024 11:00	10/10/2024 12:34	25.6		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	01	93.9 %	70-130	10/08/2024 11:00	10/10/2024 12:34							
Wet Chemistry Analysis												
TDS	01	E1642222	SM2540C-20 15	10/08/2024 08:40	10/08/2024 08:40	130		10	10	1	mg/L	ACA
TOC	01	NA	SM5310C-20 14	10/09/2024 16:00	10/09/2024 16:00	1.8		1.0	1.0	1	mg/L	RFH

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 15PAC DM

Laboratory Sample ID: 24J0307-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	02	7440-44-0	SM5310C-20 14	10/09/2024 16:00	10/09/2024 16:00	1.8		1.0	1.0	1	mg/L	RFH

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF

Laboratory Sample ID: 24J0307-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	03	75-27-4	EPA524.2	10/09/2024 17:28	10/09/2024 17:28	2.15		0.40	1.00	1	ug/L	JWR
Bromoform	03	75-25-2	EPA524.2	10/09/2024 17:28	10/09/2024 17:28	BLOD		0.40	1.00	1	ug/L	JWR
Chloroform	03	67-66-3	EPA524.2	10/09/2024 17:28	10/09/2024 17:28	9.08		0.50	1.00	1	ug/L	JWR
Dibromochloromethane	03	124-48-1	EPA524.2	10/09/2024 17:28	10/09/2024 17:28	BLOD		0.35	1.00	1	ug/L	JWR
Total Trihalomethanes	03	NA	EPA524.2	10/09/2024 17:28	10/09/2024 17:28	11.5		1.00	4.00	1	ug/L	JWR
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	03	103 %	70-120	10/09/2024 17:28	10/09/2024 17:28							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	03	99.9 %	75-120	10/09/2024 17:28	10/09/2024 17:28							
<i>Surr: Dibromofluoromethane (Surr)</i>	03	104 %	80-119	10/09/2024 17:28	10/09/2024 17:28							
<i>Surr: Toluene-d8 (Surr)</i>	03	103 %	85-120	10/09/2024 17:28	10/09/2024 17:28							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF

Laboratory Sample ID: 24J0307-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Micro-extractables by GC/ECD												
Dibromoacetic Acid	03	631-64-1	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	03	79-43-6	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	7.54		0.330	1.00	1	ug/L	ZDR
Monobromoacetic Acid	03	79-08-3	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	2.36		0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	03	79-11-8	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	BLOD		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	03	76-03-9	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	8.01		0.830	1.00	1	ug/L	ZDR
HAA5, Total	03	NA	EPA552.3	10/08/2024 11:00	10/10/2024 12:52	18.1		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	03	81.5 %	70-130	10/08/2024 11:00	10/10/2024 12:52							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF

Laboratory Sample ID: 24J0307-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
TDS	03	E1642222	SM2540C-20 15	10/08/2024 08:40	10/08/2024 08:40	140		10	10	1	mg/L	ACA
TOC	03	NA	SM5310C-20 14	10/09/2024 16:00	10/09/2024 16:00	1.7		1.0	1.0	1	mg/L	RFH

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF

Laboratory Sample ID: 24J0307-04

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Dissolved Organic Carbon (DOC)	04	7440-44-0	SM5310C-20 14	10/09/2024 16:00	10/09/2024 16:00	1.9		1.0	1.0	1	mg/L	RFH

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: Trip Blank

Laboratory Sample ID: 24J0307-05

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	05	75-27-4	EPA524.2	10/09/2024 15:13	10/09/2024 15:13	BLOD		0.40	1.00	1	ug/L	JWR
Bromoform	05	75-25-2	EPA524.2	10/09/2024 15:13	10/09/2024 15:13	BLOD		0.40	1.00	1	ug/L	JWR
Chloroform	05	67-66-3	EPA524.2	10/09/2024 15:13	10/09/2024 15:13	BLOD		0.50	1.00	1	ug/L	JWR
Dibromochloromethane	05	124-48-1	EPA524.2	10/09/2024 15:13	10/09/2024 15:13	BLOD		0.35	1.00	1	ug/L	JWR
Total Trihalomethanes	05	NA	EPA524.2	10/09/2024 15:13	10/09/2024 15:13	BLOD		1.00	4.00	1	ug/L	JWR
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	05	113 %	70-120	10/09/2024 15:13	10/09/2024 15:13							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	05	99.1 %	75-120	10/09/2024 15:13	10/09/2024 15:13							
<i>Surr: Dibromofluoromethane (Surr)</i>	05	107 %	80-119	10/09/2024 15:13	10/09/2024 15:13							
<i>Surr: Toluene-d8 (Surr)</i>	05	99.9 %	85-120	10/09/2024 15:13	10/09/2024 15:13							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0420 - SW5030B-MS										
Blank (BHJ0420-BLK1)				Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	ND	1.00	ug/L							
Bromoform	ND	1.00	ug/L							
Chloroform	ND	1.00	ug/L							
Dibromochloromethane	ND	1.00	ug/L							
Total Trihalomethanes	ND	4.00	ug/L							
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	53.4		ug/L	50.0		107	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	49.7		ug/L	50.0		99.5	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	50.0		ug/L	50.0		100	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	50.3		ug/L	50.0		101	85-120			
LCS (BHJ0420-BS1)				Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	17.2	1	ug/L	20.0		86.0	75-120			
Bromoform	18.0	1	ug/L	20.0		90.2	70-130			
Chloroform	18.3	1	ug/L	20.0		91.4	65-135			
Dibromochloromethane	17.2	1	ug/L	20.0		86.0	60-135			
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	55.6		ug/L	50.0		111	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	52.0		ug/L	50.0		104	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	54.0		ug/L	50.0		108	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	48.8		ug/L	50.0		97.7	85-120			
Matrix Spike (BHJ0420-MS1)				Source: 24J0140-01 Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	16.6	1	ug/L	20.0	BLOD	83.0	75-120			
Bromoform	17.5	1	ug/L	20.0	BLOD	87.5	70-130			
Chloroform	18.1	1	ug/L	20.0	BLOD	89.6	65-135			
Dibromochloromethane	18.3	1	ug/L	20.0	BLOD	91.5	60-135			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
 Client Site I.D.: James River
 Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0420 - SW5030B-MS

Matrix Spike (BHJ0420-MS1)

Source: 24J0140-01

Prepared & Analyzed: 10/09/2024

<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	56.2		ug/L	50.0		112	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	51.2		ug/L	50.0		102	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	52.0		ug/L	50.0		104	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	49.2		ug/L	50.0		98.5	85-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0344 - EPA552.3										
Blank (BHJ0344-BLK1)				Prepared: 10/08/2024 Analyzed: 10/10/2024						
Dibromoacetic Acid	ND	1.00	ug/L							
Dichloroacetic Acid	ND	1.00	ug/L							
Monobromoacetic Acid	ND	1.00	ug/L							
Monochloroacetic Acid	ND	1.00	ug/L							
Trichloroacetic Acid	ND	1.00	ug/L							
HAA5, Total	ND	5.00	ug/L							
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.74		ug/L	4.00		93.5	70-130			
LCS (BHJ0344-BS1)				Prepared: 10/08/2024 Analyzed: 10/09/2024						
Bromochloroacetic Acid	4.01	1.00	ug/L	4.00		100	70-130			
Bromodichloroacetic Acid	4.62	1.00	ug/L	4.00		115	70-130			
Chlorodibromoacetic Acid	4.16	1.00	ug/L	4.00		104	70-130			
Dibromoacetic Acid	3.40	1.00	ug/L	4.00		85.0	70-130			
Dichloroacetic Acid	4.38	1.00	ug/L	4.00		110	70-130			
Monobromoacetic Acid	3.87	1.00	ug/L	4.00		96.6	70-130			
Monochloroacetic Acid	4.17	1.00	ug/L	4.00		104	70-130			
Trichloroacetic Acid	3.86	1.00	ug/L	4.00		96.5	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.83		ug/L	4.00		95.8	70-130			
Duplicate (BHJ0344-DUP1)				Source: 24J0307-01		Prepared: 10/08/2024 Analyzed: 10/10/2024				
Bromochloroacetic Acid	2.62	1.00	ug/L					17.5	30	
Bromodichloroacetic Acid	0.486	1.00	ug/L					NA	30	P
Chlorodibromoacetic Acid	0.286	1.00	ug/L					NA	30	
Dibromoacetic Acid	ND	1.00	ug/L		BLOD			NA	30	
Dichloroacetic Acid	8.12	1.00	ug/L		11.0			30.0	30	P
Monobromoacetic Acid	3.06	1.00	ug/L		3.02			1.35	30	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0344 - EPA552.3

Duplicate (BHJ0344-DUP1)

Source: 24J0307-01

Prepared: 10/08/2024 Analyzed: 10/10/2024

Monochloroacetic Acid	1.01	1.00	ug/L		BLOD			NA	30	
Trichloroacetic Acid	11.0	1.00	ug/L		11.0			0.772	30	
HAA5, Total	23.6	5.00	ug/L		25.6			8.01	30	
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.42		ug/L	4.00		85.4	70-130			

Matrix Spike (BHJ0344-MS1)

Source: 24J0307-03

Prepared: 10/08/2024 Analyzed: 10/09/2024

Bromochloroacetic Acid	6.14	1.00	ug/L	4.00		91.2	70-130			
Bromodichloroacetic Acid	5.42	1.00	ug/L	4.00		105	70-130			
Chlorodibromoacetic Acid	4.16	1.00	ug/L	4.00		96.9	70-130			
Dibromoacetic Acid	3.64	1.00	ug/L	4.00	BLOD	90.9	70-130			
Dichloroacetic Acid	11.7	1.00	ug/L	4.00	7.54	105	70-130			
Monobromoacetic Acid	5.94	1.00	ug/L	4.00	2.36	89.5	70-130			
Monochloroacetic Acid	4.22	1.00	ug/L	4.00	BLOD	106	70-130			
Trichloroacetic Acid	12.1	1.00	ug/L	4.00	8.01	102	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.54		ug/L	4.00		88.6	70-130			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0326 - No Prep Wet Chem										
Blank (BHJ0326-BLK1)				Prepared & Analyzed: 10/08/2024						
TDS	BLOD	10	mg/L							
LCS (BHJ0326-BS1)				Prepared & Analyzed: 10/08/2024						
TDS	296	10	mg/L	301		98.3	80-120			
Duplicate (BHJ0326-DUP1)				Source: 24J0307-01 Prepared & Analyzed: 10/08/2024						
TDS	128	10	mg/L		130			1.55	10	
Batch BHJ0472 - No Prep Halides										
Blank (BHJ0472-BLK1)				Prepared & Analyzed: 10/09/2024						
TOC	ND	1.0	mg/L							
LCS (BHJ0472-BS1)				Prepared & Analyzed: 10/09/2024						
TOC	9.6	1	mg/L	10.0		95.8	80-120			
Duplicate (BHJ0472-DUP1)				Source: 24J0317-02 Prepared & Analyzed: 10/09/2024						
TOC	2.4	1.0	mg/L		2.5			2.70	15	
Matrix Spike (BHJ0472-MS1)				Source: 24J0317-01 Prepared & Analyzed: 10/09/2024						
TOC	12.5	1.0	mg/L	10.0	2.9	96.3	80-120			
Batch BHJ0476 - No Prep Halides										
Blank (BHJ0476-BLK1)				Prepared & Analyzed: 10/09/2024						
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Wet Chemistry Analysis - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0476 - No Prep Halides**LCS (BHJ0476-BS1)**

Prepared & Analyzed: 10/09/2024

Dissolved Organic Carbon (DOC)	9.1	1	mg/L	10.0		91.1	80-120			
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Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method: EPA552.3		
24J0307-01	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
24J0307-03	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method: No Prep Halides		
24J0307-01	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
24J0307-03	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
24J0307-02	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0476	SHJ0422	AH40172
24J0307-04	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0476	SHJ0422	AH40172
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method: No Prep Wet Chem		
24J0307-01	100 mL / 100 mL	SM2540C-2015	BHJ0326	SHJ0288	
24J0307-03	100 mL / 100 mL	SM2540C-2015	BHJ0326	SHJ0288	
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method: SW5030B-MS		
24J0307-01	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
24J0307-03	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
24J0307-05	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method:	EPA552.3	
BHJ0344-BLK1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
BHJ0344-BS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0376	AJ40214
BHJ0344-DUP1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
BHJ0344-MS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0376	AJ40214
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Halides	
BHJ0472-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
BHJ0472-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
BHJ0472-DUP1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
BHJ0472-MS1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0472	SHJ0422	AH40172
BHJ0476-BLK1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0476	SHJ0422	AH40172
BHJ0476-BS1	40.0 mL / 40.0 mL	SM5310C-2014	BHJ0476	SHJ0422	AH40172
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis			Preparation Method:	No Prep Wet Chem	
BHJ0326-BLK1	100 mL / 100 mL	SM2540C-2015	BHJ0326	SHJ0288	
BHJ0326-BS1	100 mL / 100 mL	SM2540C-2015	BHJ0326	SHJ0288	
BHJ0326-DUP1	100 mL / 100 mL	SM2540C-2015	BHJ0326	SHJ0288	
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	
BHJ0420-BLK1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-BS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-DUP1		EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-MRL1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-MS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>EPA524.2 in Potable Water</i>	
Bromodichloromethane	MdDOE, VELAP
Bromoform	MdDOE, VELAP
Chloroform	MdDOE, VELAP
Dibromochloromethane	MdDOE, VELAP
Total Trihalomethanes	VELAP
<i>EPA552.3 in Potable Water</i>	
Dibromoacetic Acid	VELAP
Dichloroacetic Acid	VELAP
Monobromoacetic Acid	VELAP
Monochloroacetic Acid	VELAP
Trichloroacetic Acid	VELAP
HAA5, Total	VELAP
<i>SM2540C-2015 in Potable Water</i>	
TDS	VELAP, MdDOE
<i>SM5310C-2014 in Potable Water</i>	
Dissolved Organic Carbon (DOC)	VELAP
TOC	VELAP

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Qualifiers and Definitions

J	The reported result is an estimated value.
P	Duplicate analysis does not meet the acceptance criteria for precision
RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX

Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd, Ste 410 Raleigh, NC		PROJECT NUMBER: FCFU Bench Scale Testing	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 523-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE: <i>Austin Dix</i>		Turn Around Time: Circle 10 (5 Days) or Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other OT					
LAB USE ONLY					
Cooler Temp		ANALYSIS			
Therm ID: 338		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Hydrobromic Acid A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol			
Observed Temp °C 5.2		DOC needs to be lab filtered			
Correction Factor °C 0.1		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)			
Corrected Temp °C 5.3					
CLIENT SAMPLE I.D.					
1) PH2 S1 ISPAC DM					
2) PH2 S2 ISPAC NF					
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					
RELINQUISHED: Austin Dix <i>Austin Dix</i>		RECEIVED: FedEx E		DATE / TIME: 10/24/24 15:30	
RELINQUISHED: FedEx E		RECEIVED: <i>Austin Dix</i>		DATE / TIME: 10/3/24 0945	
RELINQUISHED:		RECEIVED:		DATE / TIME:	
QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/> Custody Seals used and intact? (Y/N) (Y) Received on ice? (Y/N) (Y)					
LAB USE ONLY					
Dewberry - Raleigh 24J0307 FCFU Bench Scale Testing Recd: 10/03/2024 Due: 10/10/2024					

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/10/2024 5:36:46PM

Laboratory Order ID: 24J0307

Sample Conditions Checklist

Samples Received at:	5.30°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	No
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	Yes
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Austin Dix notified via email for the chain of custody was received with collection information that differs from the containers received. The samples have been logged as composite samples with collection information per the containers received. Trip Blanks were added to the work order with collection information per the VOAs received. The chain of custody was also received with a matrix of "OT", the samples

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/10/2024 5:36:46PM

Client Site I.D.: James River

Submitted To: Austin Dix

have been logged as non-potable waters. HEG 10/4/24 1527

Austin Dix confirmed the matrix as drinking water. HEG 10/4/24 1552



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 10/9/2024 10:21:15AM

24J0463

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: FCFU Bench Scale Testing
Site ID: James River	PO Number: 20240828001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 10/15/2024 23:59 (5 day TAT)

Received By: Ryan Johnson

Date Received: 10/08/2024 09:55

Logged In By: Ally Booth

Date Logged In: 10/08/2024 11:20

Analysis	Due	TAT	Expires	Comments
24J0463-01 PH2 S1 ISPAC DM 5-day [Potable Water] (Composite)				
Sampled: 10/07/2024 15:24 to 10/07/2024 15:26				NC Sample
HAA EPA552.3	10/14/2024 17:00	5	10/21/2024 23:59	NC Sample
Sample disposal fee	10/14/2024 17:00	5	12/06/2024 23:59	
THM EPA524	10/14/2024 17:00	5	10/21/2024 23:59	NC Sample
24J0463-02 PH2 S1 ISPAC NF 5-day [Potable Water] (Grab)				
Sampled: 10/07/2024 15:34 to 10/07/2024 15:38				NC Sample
HAA EPA552.3	10/14/2024 17:00	5	10/21/2024 23:59	NC Sample
Sample disposal fee	10/14/2024 17:00	5	12/06/2024 23:59	
THM EPA524	10/14/2024 17:00	5	10/21/2024 23:59	NC Sample

*** no group analyses ***

24J0463

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

FCFU Bench Scale Testing

Site ID: James River

PO Number:

20240828001

Sample Conditions Checklist

Samples Received at:	3.4°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	No
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Austin Dix notified via email that the chain of custody indicates the sample collection date/time is 8/28/24 at 1100; however, the containers received indicate a sample collection date/time of 10/7/24 with varying times around 1500. Client asked to confirm sample collection data. AKB2 10/8/24 1149

Austin Dix replied via email confirming sample collection times per information written on the containers. Email sent confirming receipt and informing client that this order was received without trip blanks. AKB2 10/8/24 1501

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: Adix@dentberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd STE 410		PROJECT NUMBER: FCFU Bench Scale Testing	
PHONE #: 704-625-5078		INVOICE PHONE #: 919-523-3374		P.O. #: 2024-0828001	
FAX #:		EMAIL: Adix@dentberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE:		Turn Around Time: Circle 10 5 Days or Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other					
LAB USE ONLY					
Cooler Temp		ANALYSIS			
Therm ID: 271		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H= Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol			
Observed Temp °C 3.4		DOC needs to be lab filtered			
Correction Factor °C 0.0		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)			
Corrected Temp °C 3.4					
CLIENT SAMPLE I.D.					
1) PH2 SL SPAC-DM 5-day		TDS SM2540C			
2) PH2 S2 SPAC-NF 5-day		THM EPA 524			
3)		HAA EPA 552			
4)		TOC SM5310			
5)		DOC SM5310			
6)		Number of Containers			
7)		Matrix (See Codes)			
8)		Time Preserved			
9)		Grab Time			
10)		Composite Time or Composite Stop			
Grab		Composite Stop Date			
Field Filtered (Dissolved Metals)		Grab Date or Composite Stop Date			
Composite		Composite Start Time			
Grab		Composite Start Date			
DATE / TIME		DATE / TIME			
10/7/24 16:00		10/7/24 16:00			
Austin Dix		Felder B			
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DATE / TIME		DATE / TIME			
10/7/24 16:00		10/7/24 16:00			
Austin Dix		Felder B			
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Austin Dix		Felder B			
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Austin Dix		Felder B			
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10/7/24 16:00		10/7/24 16:00			
Austin Dix		Felder B			
RELINQUISHED:		RELINQUISHED:			
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10/7/24 16:00		10/7/24 16:00			
Austin Dix		Felder B			
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DATE / TIME		DATE / TIME			
10/7/24 16:00		10/7/24 16:00			
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1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24J0463

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: October 8, 2024 9:55
Date Issued: October 14, 2024 16:01
Project Number: FCFU Bench Scale Testing
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 10/08/2024 09:55. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ginny Thrasher
Senior Project Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Laboratory Sample ID: 24J0463-01 Client Sample ID: PH2 S1 ISPAC DM 5-day

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	01	EPA524.2	9.09		0.40	1.00	1	ug/L
Chloroform	01	EPA524.2	75.2		0.50	1.00	1	ug/L
Dibromochloromethane	01	EPA524.2	0.91	J	0.35	1.00	1	ug/L
Total Trihalomethanes	01	EPA524.2	85.2		1.00	4.00	1	ug/L
Dichloroacetic Acid	01RE1	EPA552.3	29.0		0.660	2.00	2	ug/L
HAA5, Total	01	EPA552.3	57.3		5.00	5.00	1	ug/L
Monochloroacetic Acid	01	EPA552.3	2.40		0.330	1.00	1	ug/L
Trichloroacetic Acid	01RE1	EPA552.3	25.9		1.66	2.00	2	ug/L

Laboratory Sample ID: 24J0463-02 Client Sample ID: PH2 S1 ISPAC NF 5-day

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	02	EPA524.2	8.49		0.40	1.00	1	ug/L
Chloroform	02	EPA524.2	75.4		0.50	1.00	1	ug/L
Dibromochloromethane	02	EPA524.2	0.83	J	0.35	1.00	1	ug/L
Total Trihalomethanes	02	EPA524.2	84.8		1.00	4.00	1	ug/L
Dichloroacetic Acid	02RE1	EPA552.3	29.6		0.660	2.00	2	ug/L
HAA5, Total	02	EPA552.3	50.4		5.00	5.00	1	ug/L
Monochloroacetic Acid	02	EPA552.3	2.66		0.330	1.00	1	ug/L
Trichloroacetic Acid	02	EPA552.3	18.2		0.830	1.00	1	ug/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PH2 S1 ISPAC DM 5-day	24J0463-01	Drinking Water	10/07/2024 15:24 to 10/07/2024 15:26	10/08/2024 09:55
PH2 S1 ISPAC NF 5-day	24J0463-02	Drinking Water	10/07/2024 15:34 to 10/07/2024 15:38	10/08/2024 09:55

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 ISPAC DM 5-day

Laboratory Sample ID: 24J0463-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	01	75-27-4	EPA524.2	10/09/2024 18:13	10/09/2024 18:13	9.09		0.40	1.00	1	ug/L	JWR
Bromoform	01	75-25-2	EPA524.2	10/09/2024 18:13	10/09/2024 18:13	BLOD		0.40	1.00	1	ug/L	JWR
Chloroform	01	67-66-3	EPA524.2	10/09/2024 18:13	10/09/2024 18:13	75.2		0.50	1.00	1	ug/L	JWR
Dibromochloromethane	01	124-48-1	EPA524.2	10/09/2024 18:13	10/09/2024 18:13	0.91	J	0.35	1.00	1	ug/L	JWR
Total Trihalomethanes	01	NA	EPA524.2	10/09/2024 18:13	10/09/2024 18:13	85.2		1.00	4.00	1	ug/L	JWR
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	01	113 %	70-120	10/09/2024 18:13	10/09/2024 18:13							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	01	102 %	75-120	10/09/2024 18:13	10/09/2024 18:13							
<i>Surr: Dibromofluoromethane (Surr)</i>	01	111 %	80-119	10/09/2024 18:13	10/09/2024 18:13							
<i>Surr: Toluene-d8 (Surr)</i>	01	101 %	85-120	10/09/2024 18:13	10/09/2024 18:13							
Micro-extractables by GC/ECD												
Dibromoacetic Acid	01	631-64-1	EPA552.3	10/09/2024 08:00	10/10/2024 13:11	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	01RE1	79-43-6	EPA552.3	10/09/2024 08:00	10/10/2024 14:43	29.0		0.660	2.00	2	ug/L	ZDR
Monobromoacetic Acid	01	79-08-3	EPA552.3	10/09/2024 08:00	10/10/2024 13:11	BLOD		0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	01	79-11-8	EPA552.3	10/09/2024 08:00	10/10/2024 13:11	2.40		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	01RE1	76-03-9	EPA552.3	10/09/2024 08:00	10/10/2024 14:43	25.9		1.66	2.00	2	ug/L	ZDR
HAA5, Total	01	NA	EPA552.3	10/09/2024 08:00	10/10/2024 13:11	57.3		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	01	70.8 %	70-130	10/09/2024 08:00	10/10/2024 13:11							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 ISPAC NF 5-day

Laboratory Sample ID: 24J0463-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	02	75-27-4	EPA524.2	10/09/2024 18:35	10/09/2024 18:35	8.49		0.40	1.00	1	ug/L	JWR
Bromoform	02	75-25-2	EPA524.2	10/09/2024 18:35	10/09/2024 18:35	BLOD		0.40	1.00	1	ug/L	JWR
Chloroform	02	67-66-3	EPA524.2	10/09/2024 18:35	10/09/2024 18:35	75.4		0.50	1.00	1	ug/L	JWR
Dibromochloromethane	02	124-48-1	EPA524.2	10/09/2024 18:35	10/09/2024 18:35	0.83	J	0.35	1.00	1	ug/L	JWR
Total Trihalomethanes	02	NA	EPA524.2	10/09/2024 18:35	10/09/2024 18:35	84.8		1.00	4.00	1	ug/L	JWR
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	02	110 %	70-120	10/09/2024 18:35	10/09/2024 18:35							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	02	102 %	75-120	10/09/2024 18:35	10/09/2024 18:35							
<i>Surr: Dibromofluoromethane (Surr)</i>	02	108 %	80-119	10/09/2024 18:35	10/09/2024 18:35							
<i>Surr: Toluene-d8 (Surr)</i>	02	101 %	85-120	10/09/2024 18:35	10/09/2024 18:35							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 ISPAC NF 5-day

Laboratory Sample ID: 24J0463-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Micro-extractables by GC/ECD												
Dibromoacetic Acid	02	631-64-1	EPA552.3	10/09/2024 08:00	10/10/2024 13:30	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	02RE1	79-43-6	EPA552.3	10/09/2024 08:00	10/10/2024 15:02	29.6		0.660	2.00	2	ug/L	ZDR
Monobromoacetic Acid	02	79-08-3	EPA552.3	10/09/2024 08:00	10/10/2024 13:30	BLOD		0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	02	79-11-8	EPA552.3	10/09/2024 08:00	10/10/2024 13:30	2.66		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	02	76-03-9	EPA552.3	10/09/2024 08:00	10/10/2024 13:30	18.2		0.830	1.00	1	ug/L	ZDR
HAA5, Total	02	NA	EPA552.3	10/09/2024 08:00	10/10/2024 13:30	50.4		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	02		111 % 70-130	10/09/2024 08:00	10/10/2024 13:30							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0420 - SW5030B-MS										
Blank (BHJ0420-BLK1)				Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	ND	1.00	ug/L							
Bromoform	ND	1.00	ug/L							
Chloroform	ND	1.00	ug/L							
Dibromochloromethane	ND	1.00	ug/L							
Total Trihalomethanes	ND	4.00	ug/L							
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	53.4		ug/L	50.0		107	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	49.7		ug/L	50.0		99.5	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	50.0		ug/L	50.0		100	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	50.3		ug/L	50.0		101	85-120			
LCS (BHJ0420-BS1)				Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	17.2	1	ug/L	20.0		86.0	75-120			
Bromoform	18.0	1	ug/L	20.0		90.2	70-130			
Chloroform	18.3	1	ug/L	20.0		91.4	65-135			
Dibromochloromethane	17.2	1	ug/L	20.0		86.0	60-135			
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	55.6		ug/L	50.0		111	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	52.0		ug/L	50.0		104	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	54.0		ug/L	50.0		108	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	48.8		ug/L	50.0		97.7	85-120			
Matrix Spike (BHJ0420-MS1)				Source: 24J0140-01 Prepared & Analyzed: 10/09/2024						
Bromodichloromethane	16.6	1	ug/L	20.0	BLOD	83.0	75-120			
Bromoform	17.5	1	ug/L	20.0	BLOD	87.5	70-130			
Chloroform	18.1	1	ug/L	20.0	BLOD	89.6	65-135			
Dibromochloromethane	18.3	1	ug/L	20.0	BLOD	91.5	60-135			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
 Client Site I.D.: James River
 Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0420 - SW5030B-MS

Matrix Spike (BHJ0420-MS1) **Source: 24J0140-01** Prepared & Analyzed: 10/09/2024

<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	56.2		ug/L	50.0		112	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	51.2		ug/L	50.0		102	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	52.0		ug/L	50.0		104	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	49.2		ug/L	50.0		98.5	85-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0344 - EPA552.3										
Blank (BHJ0344-BLK1)				Prepared: 10/08/2024 Analyzed: 10/10/2024						
Dibromoacetic Acid	ND	1.00	ug/L							
Dichloroacetic Acid	ND	1.00	ug/L							
Monobromoacetic Acid	ND	1.00	ug/L							
Monochloroacetic Acid	ND	1.00	ug/L							
Trichloroacetic Acid	ND	1.00	ug/L							
HAA5, Total	ND	5.00	ug/L							
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.74		ug/L	4.00		93.5	70-130			
LCS (BHJ0344-BS1)				Prepared: 10/08/2024 Analyzed: 10/09/2024						
Bromochloroacetic Acid	4.01	1.00	ug/L	4.00		100	70-130			
Bromodichloroacetic Acid	4.62	1.00	ug/L	4.00		115	70-130			
Chlorodibromoacetic Acid	4.16	1.00	ug/L	4.00		104	70-130			
Dibromoacetic Acid	3.40	1.00	ug/L	4.00		85.0	70-130			
Dichloroacetic Acid	4.38	1.00	ug/L	4.00		110	70-130			
Monobromoacetic Acid	3.87	1.00	ug/L	4.00		96.6	70-130			
Monochloroacetic Acid	4.17	1.00	ug/L	4.00		104	70-130			
Trichloroacetic Acid	3.86	1.00	ug/L	4.00		96.5	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.83		ug/L	4.00		95.8	70-130			
Duplicate (BHJ0344-DUP1)				Source: 24J0307-01		Prepared: 10/08/2024 Analyzed: 10/10/2024				
Bromochloroacetic Acid	2.62	1.00	ug/L					17.5	30	
Bromodichloroacetic Acid	0.486	1.00	ug/L					NA	30	P
Chlorodibromoacetic Acid	0.286	1.00	ug/L					NA	30	
Dibromoacetic Acid	ND	1.00	ug/L		BLOD			NA	30	
Dichloroacetic Acid	8.12	1.00	ug/L		11.0			30.0	30	P
Monobromoacetic Acid	3.06	1.00	ug/L		3.02			1.35	30	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0344 - EPA552.3

Duplicate (BHJ0344-DUP1)		Source: 24J0307-01		Prepared: 10/08/2024 Analyzed: 10/10/2024						
Monochloroacetic Acid	1.01	1.00	ug/L		BLOD			NA	30	
Trichloroacetic Acid	11.0	1.00	ug/L		11.0			0.772	30	
HAA5, Total	23.6	5.00	ug/L		25.6			8.01	30	
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.42		ug/L	4.00		85.4	70-130			
Matrix Spike (BHJ0344-MS1)		Source: 24J0307-03		Prepared: 10/08/2024 Analyzed: 10/09/2024						
Bromochloroacetic Acid	6.14	1.00	ug/L	4.00		91.2	70-130			
Bromodichloroacetic Acid	5.42	1.00	ug/L	4.00		105	70-130			
Chlorodibromoacetic Acid	4.16	1.00	ug/L	4.00		96.9	70-130			
Dibromoacetic Acid	3.64	1.00	ug/L	4.00	BLOD	90.9	70-130			
Dichloroacetic Acid	11.7	1.00	ug/L	4.00	7.54	105	70-130			
Monobromoacetic Acid	5.94	1.00	ug/L	4.00	2.36	89.5	70-130			
Monochloroacetic Acid	4.22	1.00	ug/L	4.00	BLOD	106	70-130			
Trichloroacetic Acid	12.1	1.00	ug/L	4.00	8.01	102	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.54		ug/L	4.00		88.6	70-130			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method: EPA552.3		
24J0463-01	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
24J0463-01RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
24J0463-02	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
24J0463-02RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method: SW5030B-MS		
24J0463-01	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
24J0463-02	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method:	EPA552.3	
BHJ0344-BLK1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
BHJ0344-BS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0376	AJ40214
BHJ0344-DUP1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0416	AJ40214
BHJ0344-MS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0344	SHJ0376	AJ40214
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	
BHJ0420-BLK1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-BS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-DUP1		EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-MRL1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243
BHJ0420-MS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0420	SHJ0377	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>EPA524.2 in Potable Water</i>	
Bromodichloromethane	MdDOE, VELAP
Bromoform	MdDOE, VELAP
Chloroform	MdDOE, VELAP
Dibromochloromethane	MdDOE, VELAP
Total Trihalomethanes	VELAP
<i>EPA552.3 in Potable Water</i>	
Dibromoacetic Acid	VELAP
Dichloroacetic Acid	VELAP
Monobromoacetic Acid	VELAP
Monochloroacetic Acid	VELAP
Trichloroacetic Acid	VELAP
HAA5, Total	VELAP

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/14/2024 4:01:38PM

Client Site I.D.: James River

Submitted To: Austin Dix

Qualifiers and Definitions

J The reported result is an estimated value.

P Duplicate analysis does not meet the acceptance criteria for precision

RPD Relative Percent Difference

Qual Qualifiers

-RE Denotes sample was re-analyzed

LOD Limit of Detection

BLOD Below Limit of Detection

LOQ Limit of Quantitation

DF Dilution Factor

TIC Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

PCBs, Total Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCFU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: Adix@dentberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd STE 410		PROJECT NUMBER: FCFU Bench Scale Testing	
PHONE #: 704-625-5078		INVOICE PHONE #: 919-523-3374		P.O. #: 2024-0828001	
FAX #:		EMAIL: Adix@dentberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State: VA		YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Austin Dix		SAMPLER SIGNATURE:		Turn Around Time: Circle 10 5 Days or Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other					
LAB USE ONLY					
Cooler Temp					
Therm ID: 271					
Observed Temp °C 3.4					
Correction Factor °C 0.0					
Corrected Temp °C 3.4					
CLIENT SAMPLE I.D.					
1) PH2 SL SPAC-DM 5-day					
2) PH2 S2 SPAC-NF 5-day					
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					
RELINQUISHED: Austin Dix 10/7/24 16:00					
ELINQUISHED: Fledel B 10/7/24 16:00					
ELINQUISHED: 10/8/24 09:55					
RECEIVED: 10/7/24 16:00					
RECEIVED: 10/8/24 09:55					
RECEIVED: 10/8/24 09:55					
QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/> Custody Seals used and intact? (Y/N) (Y) Received on ice? (Y/N) (Y)					
LAB USE ONLY					
ANALYSIS					
DOC SM5310					
TOC SM5310					
HAA EPA 552					
THM EPA 524					
TDS SM2540C					
Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Hydrogen Peroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol					
DOC needs to be lab filtered					
PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)					
Dewberry - Raleigh 24J0463					
FCFU Bench Scale Testing					
Recd: 10/08/2024 Due: 10/15/2024					
24J0463					
v130325002					

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Laboratory Order ID: 24J0463

Sample Conditions Checklist

Samples Received at:	3.40°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	No
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Austin Dix notified via email that the chain of custody indicates the sample collection date/time is 8/28/24 at 1100; however, the containers received indicate a sample collection date/time of 10/7/24 with varying times around 1500. Client asked to confirm sample collection data. AKB2 10/8/24 1149

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/14/2024 4:01:38PM

Austin Dix replied via email confirming sample collection times per information written on the containers. Email sent confirming receipt and informing client that this order was received without trip blanks. AKB2 10/8/24 1501



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 10/17/2024 9:44:18AM

24J0964

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: FCFU Bench Scale Testing
Site ID: James River	PO Number: 20240828001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 10/22/2024 23:59 (5 day TAT)

Received By: Ryan Johnson

Date Received: 10/15/2024 09:40

Logged In By: Ally Booth

Date Logged In: 10/15/2024 10:18

Analysis	Due	TAT	Expires	Comments
24J0964-01 PH2 S1 15PAC DM 10DAY [Potable Water] (Composite)				
Sampled: 10/12/2024 14:58 to 10/12/2024 15:06				NC Sample
HAA EPA552.3	10/21/2024 17:00	5	10/26/2024 23:59	NC Sample
Sample disposal fee	10/21/2024 17:00	5	12/11/2024 23:59	
THM EPA524	10/21/2024 17:00	5	10/26/2024 23:59	NC Sample
24J0964-02 PH2 S2 15PAC NF 10DAY [Potable Water] (Composite)				
Sampled: 10/12/2024 14:48 to 10/12/2024 14:56				NC Sample
HAA EPA552.3	10/21/2024 17:00	5	10/26/2024 23:59	NC Sample
Sample disposal fee	10/21/2024 17:00	5	12/11/2024 23:59	
THM EPA524	10/21/2024 17:00	5	10/26/2024 23:59	NC Sample

*** no group analyses ***

24J0964

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

FCFU Bench Scale Testing

Site ID: James River

PO Number:

20240828001

Sample Conditions Checklist

Samples Received at:	1.8°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

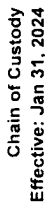
Austix Dix informed via email that:

- the chain of custody does not indicate sample collection dates/times
- the sample collection information has been logged according to the information indicated on the containers
- we combined samples 1-5 into one sample "PH2 S1 15PAC DM 10DAY", and samples 6-10 into a second sample "PH2 S2 15PAC NF 10DAY"

AKB2 10/15/24 1113

Austin Dix informed via email that this order was received without trip blanks and that this is considered a deviation. AKB2 10/15/24 1628

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.



**1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX**

CHAIN OF CUSTODY

PAGE OF

COMPANY NAME: Dewberry - Raleigh, NC							INVOICE TO:						PROJECT NAME/Quote #: FCFU Bench Scale Testing											
CONTACT: Austin Dix							INVOICE CONTACT: ADIX@dewberry.com						SITE NAME: James River											
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607							INVOICE ADDRESS: 2610 Wycliff Rd, STE 4B Raleigh, NC						PROJECT NUMBER: FCFU Bench Scale Testing											
PHONE #: 704-625-5078							INVOICE PHONE #: (919) 523-3334						P.O.#: 20240828001											
FAX #:							EMAIL: ADIX@dewberry.com						Pretreatment Program:											
Is sample for compliance reporting? YES NO							Regulatory State:						Is sample from a chlorinated supply? YES (NO)						PWS I.D.#:					
SAMPLER NAME (PRINT): Devan Hailey							SAMPLER SIGNATURE: [Signature]						Turn Around Time: Circle 10 (5 Days) or _Day(s)						COMMENTS					
Matrix Codes: WW=Waste Water/Storm Water GW=Groundwater DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other													DW											
LAB USE ONLY							ANALYSIS												Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Hydrogen Peroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol					
Cooler Temp																			DOC needs to be lab filtered					
Therm ID: 393																								
Observed Temp °C 1.8																								
Correction Factor °C 0.0																								
Corrected Temp °C 1.8																								
CLIENT SAMPLE I.D.																			PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)					
1) PH2 SI SPAC DM 10DAY																								
2) PH2 SI SPAC DM 10DAY																								
3) PH2 SI SPAC DM 10DAY																								
4) PH2 SI SPAC DM 10DAY																								
5) PH2 SI SPAC DM 10DAY																								
6) PH2 SI SPAC NF 10DAY																								
7) PH2 SI SPAC NF 10DAY																								
8) PH2 SI SPAC NF 10DAY																								
9) PH2 SI SPAC NF 10DAY																								
10) PH2 SI SPAC NF 10DAY																								
RELINQUISHED: Devan Hailey [Signature] 10/14/24 10:05							RECEIVED: FedEx E						DATE / TIME						QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>					
RELINQUISHED: Felix 10/14/24 10:05							RECEIVED: [Signature] 10-15-24 0940						DATE / TIME						Custody Seals used and intact? (Y/N)					
RELINQUISHED: Felix							RECEIVED: [Signature]						DATE / TIME						Received on ice? (Y/N)					



1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24J0964

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: October 15, 2024 9:40
Date Issued: October 23, 2024 13:09
Project Number: FCFU Bench Scale Testing
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 10/15/2024 09:40. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ginny Thrasher
Senior Project Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Laboratory Sample ID: 24J0964-01 **Client Sample ID: PH2 S1 15PAC DM 10DAY**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	01	EPA524.2	7.21		0.40	1.00	1	ug/L
Chloroform	01	EPA524.2	71.0		0.50	1.00	1	ug/L
Dibromochloromethane	01	EPA524.2	0.77	J	0.35	1.00	1	ug/L
Total Trihalomethanes	01	EPA524.2	79.0		1.00	4.00	1	ug/L
Dichloroacetic Acid	01RE1	EPA552.3	31.8		0.660	2.00	2	ug/L
HAA5, Total	01RE1	EPA552.3	63.4		5.00	5.00	1	ug/L
Monochloroacetic Acid	01	EPA552.3	3.16		0.330	1.00	1	ug/L
Trichloroacetic Acid	01RE1	EPA552.3	28.4		1.66	2.00	2	ug/L

Laboratory Sample ID: 24J0964-02 **Client Sample ID: PH2 S2 15PAC NF 10DAY**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	02	EPA524.2	6.78		0.40	1.00	1	ug/L
Chloroform	02	EPA524.2	76.7		0.50	1.00	1	ug/L
Dibromochloromethane	02	EPA524.2	0.74	J	0.35	1.00	1	ug/L
Total Trihalomethanes	02	EPA524.2	84.2		1.00	4.00	1	ug/L
Dichloroacetic Acid	02RE1	EPA552.3	32.3		0.660	2.00	2	ug/L
HAA5, Total	02RE1	EPA552.3	57.0		5.00	5.00	1	ug/L
Monobromoacetic Acid	02	EPA552.3	0.420	J	0.330	1.00	1	ug/L
Monochloroacetic Acid	02	EPA552.3	3.90		0.330	1.00	1	ug/L
Trichloroacetic Acid	02RE1	EPA552.3	20.4		1.66	2.00	2	ug/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the " Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PH2 S1 15PAC DM 10DAY	24J0964-01	Drinking Water	10/12/2024 14:58 to 10/12/2024 15:06	10/15/2024 09:40
PH2 S2 15PAC NF 10DAY	24J0964-02	Drinking Water	10/12/2024 14:48 to 10/12/2024 14:56	10/15/2024 09:40

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 15PAC DM 10DAY

Laboratory Sample ID: 24J0964-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	01	75-27-4	EPA524.2	10/15/2024 16:05	10/15/2024 16:05	7.21		0.40	1.00	1	ug/L	RJB
Bromoform	01	75-25-2	EPA524.2	10/15/2024 16:05	10/15/2024 16:05	BLOD		0.40	1.00	1	ug/L	RJB
Chloroform	01	67-66-3	EPA524.2	10/15/2024 16:05	10/15/2024 16:05	71.0		0.50	1.00	1	ug/L	RJB
Dibromochloromethane	01	124-48-1	EPA524.2	10/15/2024 16:05	10/15/2024 16:05	0.77	J	0.35	1.00	1	ug/L	RJB
Total Trihalomethanes	01	NA	EPA524.2	10/15/2024 16:05	10/15/2024 16:05	79.0		1.00	4.00	1	ug/L	RJB
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	01	97.1 %	70-120	10/15/2024 16:05	10/15/2024 16:05							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	01	100 %	75-120	10/15/2024 16:05	10/15/2024 16:05							
<i>Surr: Dibromofluoromethane (Surr)</i>	01	98.6 %	80-119	10/15/2024 16:05	10/15/2024 16:05							
<i>Surr: Toluene-d8 (Surr)</i>	01	102 %	85-120	10/15/2024 16:05	10/15/2024 16:05							
Micro-extractables by GC/ECD												
Dibromoacetic Acid	01	631-64-1	EPA552.3	10/21/2024 10:00	10/22/2024 03:03	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	01RE1	79-43-6	EPA552.3	10/21/2024 10:00	10/22/2024 10:31	31.8		0.660	2.00	2	ug/L	ZDR
Monobromoacetic Acid	01	79-08-3	EPA552.3	10/21/2024 10:00	10/22/2024 03:03	BLOD		0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	01	79-11-8	EPA552.3	10/21/2024 10:00	10/22/2024 03:03	3.16		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	01RE1	76-03-9	EPA552.3	10/21/2024 10:00	10/22/2024 10:31	28.4		1.66	2.00	2	ug/L	ZDR
HAA5, Total	01RE1	NA	EPA552.3	10/21/2024 10:00	10/22/2024 10:31	63.4		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	01	89.3 %	70-130	10/21/2024 10:00	10/22/2024 03:03							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF 10DAY

Laboratory Sample ID: 24J0964-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	02	75-27-4	EPA524.2	10/15/2024 16:28	10/15/2024 16:28	6.78		0.40	1.00	1	ug/L	RJB
Bromoform	02	75-25-2	EPA524.2	10/15/2024 16:28	10/15/2024 16:28	BLOD		0.40	1.00	1	ug/L	RJB
Chloroform	02	67-66-3	EPA524.2	10/15/2024 16:28	10/15/2024 16:28	76.7		0.50	1.00	1	ug/L	RJB
Dibromochloromethane	02	124-48-1	EPA524.2	10/15/2024 16:28	10/15/2024 16:28	0.74	J	0.35	1.00	1	ug/L	RJB
Total Trihalomethanes	02	NA	EPA524.2	10/15/2024 16:28	10/15/2024 16:28	84.2		1.00	4.00	1	ug/L	RJB
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	02	94.1 %	70-120	10/15/2024 16:28	10/15/2024 16:28							
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	02	99.8 %	75-120	10/15/2024 16:28	10/15/2024 16:28							
<i>Surr: Dibromofluoromethane (Surr)</i>	02	98.2 %	80-119	10/15/2024 16:28	10/15/2024 16:28							
<i>Surr: Toluene-d8 (Surr)</i>	02	100 %	85-120	10/15/2024 16:28	10/15/2024 16:28							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF 10DAY

Laboratory Sample ID: 24J0964-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Micro-extractables by GC/ECD												
Dibromoacetic Acid	02	631-64-1	EPA552.3	10/21/2024 10:00	10/22/2024 03:41	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	02RE1	79-43-6	EPA552.3	10/21/2024 10:00	10/22/2024 10:50	32.3		0.660	2.00	2	ug/L	ZDR
Monobromoacetic Acid	02	79-08-3	EPA552.3	10/21/2024 10:00	10/22/2024 03:41	0.420	J	0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	02	79-11-8	EPA552.3	10/21/2024 10:00	10/22/2024 03:41	3.90		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	02RE1	76-03-9	EPA552.3	10/21/2024 10:00	10/22/2024 10:50	20.4		1.66	2.00	2	ug/L	ZDR
HAA5, Total	02RE1	NA	EPA552.3	10/21/2024 10:00	10/22/2024 10:50	57.0		5.00	5.00	1	ug/L	ZDR
Surr: 2,3-Dibromopropionic Acid	02		108 % 70-130	10/21/2024 10:00	10/22/2024 03:41							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
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Batch BHJ0676 - SW5030B-MS

Blank (BHJ0676-BLK1)

Prepared & Analyzed: 10/15/2024

Bromodichloromethane	ND	1.00	ug/L							
Bromoform	ND	1.00	ug/L							
Chloroform	ND	1.00	ug/L							
Dibromochloromethane	ND	1.00	ug/L							
Total Trihalomethanes	ND	4.00	ug/L							
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	<i>45.2</i>		ug/L	<i>50.0</i>		<i>90.4</i>	<i>70-120</i>			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	<i>50.0</i>		ug/L	<i>50.0</i>		<i>99.9</i>	<i>75-120</i>			
<i>Surr: Dibromofluoromethane (Surr)</i>	<i>44.1</i>		ug/L	<i>50.0</i>		<i>88.2</i>	<i>80-119</i>			
<i>Surr: Toluene-d8 (Surr)</i>	<i>50.1</i>		ug/L	<i>50.0</i>		<i>100</i>	<i>85-120</i>			

LCS (BHJ0676-BS1)

Prepared & Analyzed: 10/15/2024

Bromodichloromethane	14.3	1	ug/L	20.0		71.3	75-120			L
Bromoform	16.5	1	ug/L	20.0		82.4	70-130			
Chloroform	13.4	1	ug/L	20.0		66.9	65-135			
Dibromochloromethane	15.6	1	ug/L	20.0		78.2	60-135			
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	<i>40.7</i>		ug/L	<i>50.0</i>		<i>81.4</i>	<i>70-120</i>			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	<i>49.1</i>		ug/L	<i>50.0</i>		<i>98.3</i>	<i>75-120</i>			
<i>Surr: Dibromofluoromethane (Surr)</i>	<i>40.6</i>		ug/L	<i>50.0</i>		<i>81.2</i>	<i>80-119</i>			
<i>Surr: Toluene-d8 (Surr)</i>	<i>50.5</i>		ug/L	<i>50.0</i>		<i>101</i>	<i>85-120</i>			

Duplicate (BHJ0676-DUP1)

Source: 24J0956-02

Prepared & Analyzed: 10/15/2024

Bromodichloromethane	ND	1.00	ug/L		BLOD			NA	30	
Bromoform	ND	1.00	ug/L		BLOD			NA	30	
Chloroform	ND	1.00	ug/L		BLOD			NA	30	
Dibromochloromethane	ND	1.00	ug/L		BLOD			NA	30	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0676 - SW5030B-MS										
Duplicate (BHJ0676-DUP1)		Source: 24J0956-02		Prepared & Analyzed: 10/15/2024						
Total Trihalomethanes	ND	4.00	ug/L		BLOD			NA	30	
Surr: 1,2-Dichloroethane-d4 (Surr)	49.8		ug/L	50.0		99.5	70-120			
Surr: 4-Bromofluorobenzene (Surr)	49.4		ug/L	50.0		98.9	75-120			
Surr: Dibromofluoromethane (Surr)	47.6		ug/L	50.0		95.1	80-119			
Surr: Toluene-d8 (Surr)	51.6		ug/L	50.0		103	85-120			
Matrix Spike (BHJ0676-MS1)		Source: 24J0956-01		Prepared & Analyzed: 10/15/2024						
Bromodichloromethane	15.1	1	ug/L	20.0	BLOD	75.6	75-120			
Bromoform	16.2	1	ug/L	20.0	BLOD	81.0	70-130			
Chloroform	14.5	1	ug/L	20.0	BLOD	72.5	65-135			
Dibromochloromethane	16.8	1	ug/L	20.0	BLOD	84.0	60-135			
Surr: 1,2-Dichloroethane-d4 (Surr)	42.5		ug/L	50.0		85.1	70-120			
Surr: 4-Bromofluorobenzene (Surr)	47.9		ug/L	50.0		95.7	75-120			
Surr: Dibromofluoromethane (Surr)	42.1		ug/L	50.0		84.2	80-119			
Surr: Toluene-d8 (Surr)	49.5		ug/L	50.0		98.9	85-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0957 - EPA552.3										
Blank (BHJ0957-BLK1) Prepared: 10/21/2024 Analyzed: 10/22/2024										
Dibromoacetic Acid	ND	1.00	ug/L							
Dichloroacetic Acid	ND	1.00	ug/L							
Monobromoacetic Acid	ND	1.00	ug/L							
Monochloroacetic Acid	ND	1.00	ug/L							
Trichloroacetic Acid	ND	1.00	ug/L							
HAA5, Total	ND	5.00	ug/L							
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.93		ug/L	4.00		98.3	70-130			
LCS (BHJ0957-BS1) Prepared: 10/21/2024 Analyzed: 10/22/2024										
Bromochloroacetic Acid	4.06	1.00	ug/L	4.00		101	70-130			
Bromodichloroacetic Acid	3.58	1.00	ug/L	4.00		89.6	70-130			
Chlorodibromoacetic Acid	3.04	1.00	ug/L	4.00		76.1	70-130			
Dibromoacetic Acid	3.90	1.00	ug/L	4.00		97.5	70-130			
Dichloroacetic Acid	4.19	1.00	ug/L	4.00		105	70-130			
Monobromoacetic Acid	4.60	1.00	ug/L	4.00		115	70-130			
Monochloroacetic Acid	4.30	1.00	ug/L	4.00		108	70-130			
Trichloroacetic Acid	3.95	1.00	ug/L	4.00		98.8	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	4.18		ug/L	4.00		105	70-130			
Duplicate (BHJ0957-DUP1) Source: 24J0964-02 Prepared: 10/21/2024 Analyzed: 10/22/2024										
Bromochloroacetic Acid	4.46	1.00	ug/L					3.57	30	
Bromodichloroacetic Acid	1.54	1.00	ug/L					13.5	30	
Chlorodibromoacetic Acid	0.731	1.00	ug/L					NA	30	P
Dibromoacetic Acid	ND	1.00	ug/L		BLOD			NA	30	
Dichloroacetic Acid	32.0	1.00	ug/L		32.6			1.84	30	
Monobromoacetic Acid	0.438	1.00	ug/L		0.420			NA	30	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0957 - EPA552.3										
Duplicate (BHJ0957-DUP1)		Source: 24J0964-02		Prepared: 10/21/2024 Analyzed: 10/22/2024						
Monochloroacetic Acid	3.78	1.00	ug/L		3.90			2.97	30	
Trichloroacetic Acid	21.0	1.00	ug/L		21.9			4.05	30	
HAA5, Total	57.7	5.00	ug/L		59.3			2.83	30	
<i>Surr: 2,3-Dibromopropionic Acid</i>	<i>4.10</i>		ug/L	<i>4.00</i>		<i>102</i>	<i>70-130</i>			
Matrix Spike (BHJ0957-MS1)		Source: 24J0964-01		Prepared: 10/21/2024 Analyzed: 10/22/2024						
Bromochloroacetic Acid	9.39	1.00	ug/L	4.00		121	70-130			
Bromodichloroacetic Acid	6.18	1.00	ug/L	4.00		128	70-130			
Chlorodibromoacetic Acid	4.77	1.00	ug/L	4.00		98.1	70-130			
Dibromoacetic Acid	4.55	1.00	ug/L	4.00	BLOD	114	70-130			
Dichloroacetic Acid	37.9	1.00	ug/L	4.00	28.5	233	70-130			M
Monobromoacetic Acid	5.01	1.00	ug/L	4.00	BLOD	125	70-130			
Monochloroacetic Acid	8.11	1.00	ug/L	4.00	3.16	124	70-130			
Trichloroacetic Acid	39.7	1.00	ug/L	4.00	27.7	298	70-130			M
<i>Surr: 2,3-Dibromopropionic Acid</i>	<i>4.58</i>		ug/L	<i>4.00</i>		<i>115</i>	<i>70-130</i>			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method:	EPA552.3	
24J0964-01	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J0964-01RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J0964-02	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J0964-02RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	
24J0964-01	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243
24J0964-02	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method:	EPA552.3	
BHJ0957-BLK1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-BS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-DUP1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-MS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	
BHJ0676-BLK1	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243
BHJ0676-BS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243
BHJ0676-DUP1	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243
BHJ0676-MRL1	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243
BHJ0676-MS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0676	SHJ0623	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>EPA524.2 in Potable Water</i>	
Bromodichloromethane	MdDOE, VELAP
Bromoform	MdDOE, VELAP
Chloroform	MdDOE, VELAP
Dibromochloromethane	MdDOE, VELAP
Total Trihalomethanes	VELAP
<i>EPA552.3 in Potable Water</i>	
Dibromoacetic Acid	VELAP
Dichloroacetic Acid	VELAP
Monobromoacetic Acid	VELAP
Monochloroacetic Acid	VELAP
Trichloroacetic Acid	VELAP
HAA5, Total	VELAP

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

Qualifiers and Definitions

J	The reported result is an estimated value.
L	LCS recovery is outside of established acceptance limits
M	Matrix spike recovery is outside established acceptance limits
P	Duplicate analysis does not meet the acceptance criteria for precision
RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



**1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804) 358-8297 FAX**

PAGE OF

COMPANY NAME: Dewberry - Raleigh, NC		INVOICE TO:		PROJECT NAME/Quote #: FCPU Bench Scale Testing	
CONTACT: Austin Dix		INVOICE CONTACT: ADIX@dewberry.com		SITE NAME: James River	
ADDRESS: 2610 Wycliff Rd #410, Raleigh, NC 27607		INVOICE ADDRESS: 2610 Wycliff Rd, STE 410 Raleigh, NC		PROJECT NUMBER: FCPU Bench Scale Testing	
PHONE #: 704-625-5078		INVOICE PHONE #: (919) 528-3334		P.O. #: 20240828001	
FAX #:		EMAIL: ADIX@dewberry.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO		Regulatory State:		Is sample from a chlorinated supply? YES (NO) PWS I.D. #:	
SAMPLER NAME (PRINT): Devan Hailey		SAMPLER SIGNATURE: <i>Devan Hailey</i>		Turn Around Time: Circle 10 (5 Days) or _Day(s)	
Matrix Codes: WW=Waste Water/Storm Water GW=Groundwater DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other <i>DW</i>					
LAB USE ONLY		ANALYSIS		COMMENTS	
Cooler Temp		DOC SM5310		Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol	
Therm ID: 393		TDS SM2540C		DOC needs to be lab filtered	
Observed Temp °C 1.8		THM EPA 524		PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)	
Correction Factor °C 0.0		HAA EPA 552			
Corrected Temp °C 1.8		TOC SM5310			
CLIENT SAMPLE I.D.		Number of Containers			
1) PH2 SI 15PAC DM 10DAY		Matrix (See Codes)			
2) PH2 SI 15PAC DM 10DAY		Time Preserved			
3) PH2 SI 15PAC DM 10DAY		Grab Time or Composite Stop			
4) PH2 SI 15PAC DM 10DAY		Grab Date or Composite Stop Date			
5) PH2 SI 15PAC DM 10DAY		Composite Start Time			
6) PH2 SI 15PAC NF 10DAY		Composite Start Date			
7) PH2 SI 15PAC NF 10DAY		Field Filtered (Dissolved Metals)			
8) PH2 SI 15PAC NF 10DAY		Composite			
9) PH2 SI 15PAC NF 10DAY		Grab			
10) PH2 SI 15PAC NF 10DAY		DATE / TIME		DATE / TIME	
RELINQUISHED: <i>Devan Hailey</i> 10/14/24 10:05		RECEIVED: <i>Feder</i>		QC Data Package Level III <input type="checkbox"/> Level IV <input type="checkbox"/>	
RELINQUISHED: <i>Feder</i>		DATE / TIME		Custody Seals used and intact? (Y/N) <i>(Y)</i>	
RELINQUISHED: <i>Feder</i>		DATE / TIME		Received on ice? <i>(N)</i>	

Unless otherwise agreed in writing, any and all products and/or services provided by Enthalpy are pursuant to the terms and conditions as set forth at <https://enthalpy.com/terms-and-conditions/>

FCFU Bench Testing

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 1:09:00PM

Laboratory Order ID: 24J0964

Sample Conditions Checklist

Samples Received at:	1.80°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Work Order Comments

Austix Dix informed via email that:
-the chain of custody does not indicate sample collection dates/times
-the sample collection information has been logged according to the information indicated on the containers

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 1:09:00PM

Client Site I.D.: James River

Submitted To: Austin Dix

-we combined samples 1-5 into one sample "PH2 S1 15PAC DM 10DAY", and
samples 6-10 into a second sample "PH2 S2 15PAC NF 10DAY"
AKB2 10/15/24 1113

Austin Dix informed via email that this order was received without trip blanks and
that this is considered a deviation. AKB2 10/15/24 1628



1941 Reymet Road Richmond, VA 23237 804-358-8295 Phone 804-358-8297 Fax

WORK ORDER

Printed: 10/21/2024 8:53:24AM

24J1192

Enthalpy Analytical

Client: Dewberry - Raleigh, NC	Project Manager: Ginny Thrasher
Project Name: FCFU Bench Scale Testing	Project Number: FCFU Bench Scale Testing
Site ID: James River	PO Number: 20240828001

Report To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone: 704-625-5078
Fax:

Invoice To:

Dewberry - Raleigh, NC
Austin Dix
2610 Wycliff Road #410
Raleigh, NC 27607-3073
Phone :704-625-5078
Fax:

Date Due: 10/25/2024 23:59 (5 day TAT)

Received By: Ryan Johnson

Date Received: 10/18/2024 09:47

Logged In By: Cameron Baker

Date Logged In: 10/18/2024 10:12

Analysis	Due	TAT	Expires	Comments
24J1192-01 PH2 S1 15PAC DM 15DAY [Potable Water] (Grab)				
Sampled: 10/17/2024 11:00				
HAA EPA552.3	10/24/2024 17:00	5	10/31/2024 23:59	NC Sample
Sample disposal fee	10/24/2024 17:00	5	12/16/2024 23:59	
THM EPA524	10/24/2024 17:00	5	10/31/2024 23:59	NC Sample
24J1192-02 PH2 S2 15PAC NF 15DAY [Potable Water] (Grab)				
Sampled: 10/17/2024 11:00				
HAA EPA552.3	10/24/2024 17:00	5	10/31/2024 23:59	NC Sample
Sample disposal fee	10/24/2024 17:00	5	12/16/2024 23:59	
THM EPA524	10/24/2024 17:00	5	10/31/2024 23:59	NC Sample

*** no group analyses ***

24J1192

Enthalpy Analytical

Client: Dewberry - Raleigh, NC

Project Manager:

Ginny Thrasher

Project Name: FCFU Bench Scale Testing

Project Number:

FCFU Bench Scale Testing

Site ID: James River

PO Number:

20240828001

Sample Conditions Checklist

Samples Received at:	2.1°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Are the samples received on ice (not required for metals)?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

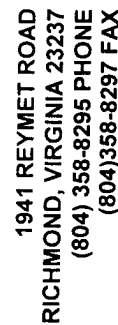
Work Order Comments

Samples 1-5 on the chain of custody: "PH2 S1 15PAC DM 15DAY" have been logged as one sample for THM and HAA.
 Samples 6-10 on the chain of custody: "PH2 S2 15PAC NF 15DAY" have been logged as one sample for THM and HAA.
 The collection date is indicated as 8/28/24 on the chain of custody for all samples, while the containers have collection dates of 10/17 as well as the time preserved.
 No trip blanks were received with the samples, which is considered a deviation.

The samples can be combined as described above and analysis can proceed without trip blanks per Austin Dix via email.
 Additionally, Austin Dix was notified via email that the samples have been logged with collection dates of 10/17/24 per project history of using sample preservation and preparation date that was provided by Austin Dix via email.

CSB 10/18/24 1147

Subcontracting-- The turn around time for subcontracted analyses begins when the subcontract laboratory receives the samples. Enthalpy will manage subcontracted work with the client's approval but will not assume any liability for any performance issues that the subcontract laboratory might encounter during the course of the project. Clients are responsible for subcontract laboratories' minimum invoice fees.



Chain of Custody
Effective: Jan 31, 2024

PAGE 1 OF 1

[illegible]



1941 Reymet Road • Richmond, Virginia 23237 • Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 24J1192

Client Name: Dewberry - Raleigh, NC
2610 Wycliff Road #410
Raleigh, NC 27607-3073

Submitted To: Austin Dix

Date Received: October 18, 2024 9:47
Date Issued: October 23, 2024 8:15
Project Number: FCFU Bench Scale Testing
Purchase Order: 20240828001

Client Site I.D.: James River

Enclosed are the results of analyses for samples received by the laboratory on 10/18/2024 09:47. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars
Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

Analysis Detects Report

Client Name: Dewberry - Raleigh, NC
 Client Site ID: James River
 Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Laboratory Sample ID: 24J1192-01 **Client Sample ID: PH2 S1 15PAC DM 15DAY**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	01	EPA524.2	10.5		0.40	1.00	1	ug/L
Chloroform	01	EPA524.2	97.7		0.50	1.00	1	ug/L
Dibromochloromethane	01	EPA524.2	1.07		0.35	1.00	1	ug/L
Total Trihalomethanes	01	EPA524.2	109		1.00	4.00	1	ug/L
Dichloroacetic Acid	01RE1	EPA552.3	42.0		1.32	4.00	4	ug/L
HAA5, Total	01RE1	EPA552.3	72.9		5.00	5.00	1	ug/L
Monobromoacetic Acid	01	EPA552.3	0.413	J	0.330	1.00	1	ug/L
Monochloroacetic Acid	01	EPA552.3	4.84		0.330	1.00	1	ug/L
Trichloroacetic Acid	01RE1	EPA552.3	25.7		3.32	4.00	4	ug/L

Laboratory Sample ID: 24J1192-02 **Client Sample ID: PH2 S2 15PAC NF 15DAY**

Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Dil. Factor	Units
Bromodichloromethane	02	EPA524.2	9.81		0.40	1.00	1	ug/L
Chloroform	02	EPA524.2	119		0.50	1.00	1	ug/L
Dibromochloromethane	02	EPA524.2	1.04		0.35	1.00	1	ug/L
Total Trihalomethanes	02	EPA524.2	130		1.00	4.00	1	ug/L
Dichloroacetic Acid	02RE1	EPA552.3	35.5		1.32	4.00	4	ug/L
HAA5, Total	02RE1	EPA552.3	71.7		5.00	5.00	1	ug/L
Monobromoacetic Acid	02	EPA552.3	0.359	J	0.330	1.00	1	ug/L
Monochloroacetic Acid	02	EPA552.3	5.93		0.330	1.00	1	ug/L
Trichloroacetic Acid	02RE1	EPA552.3	30.0		3.32	4.00	4	ug/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the " Certificate of Analysis".

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PH2 S1 15PAC DM 15DAY	24J1192-01	Drinking Water	10/17/2024 11:00	10/18/2024 09:47
PH2 S2 15PAC NF 15DAY	24J1192-02	Drinking Water	10/17/2024 11:00	10/18/2024 09:47

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S1 15PAC DM 15DAY

Laboratory Sample ID: 24J1192-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	01	75-27-4	EPA524.2	10/21/2024 14:54	10/21/2024 14:54	10.5		0.40	1.00	1	ug/L	MAH
Bromoform	01	75-25-2	EPA524.2	10/21/2024 14:54	10/21/2024 14:54	BLOD		0.40	1.00	1	ug/L	MAH
Chloroform	01	67-66-3	EPA524.2	10/21/2024 14:54	10/21/2024 14:54	97.7		0.50	1.00	1	ug/L	MAH
Dibromochloromethane	01	124-48-1	EPA524.2	10/21/2024 14:54	10/21/2024 14:54	1.07		0.35	1.00	1	ug/L	MAH
Total Trihalomethanes	01	NA	EPA524.2	10/21/2024 14:54	10/21/2024 14:54	109		1.00	4.00	1	ug/L	MAH
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	01	122 %	70-120	10/21/2024 14:54	10/21/2024 14:54							S
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	01	100 %	75-120	10/21/2024 14:54	10/21/2024 14:54							
<i>Surr: Dibromofluoromethane (Surr)</i>	01	125 %	80-119	10/21/2024 14:54	10/21/2024 14:54							S
<i>Surr: Toluene-d8 (Surr)</i>	01	101 %	85-120	10/21/2024 14:54	10/21/2024 14:54							
Micro-extractables by GC/ECD												
Dibromoacetic Acid	01	631-64-1	EPA552.3	10/21/2024 10:00	10/22/2024 04:19	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	01RE1	79-43-6	EPA552.3	10/21/2024 10:00	10/22/2024 11:27	42.0		1.32	4.00	4	ug/L	ZDR
Monobromoacetic Acid	01	79-08-3	EPA552.3	10/21/2024 10:00	10/22/2024 04:19	0.413	J	0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	01	79-11-8	EPA552.3	10/21/2024 10:00	10/22/2024 04:19	4.84		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	01RE1	76-03-9	EPA552.3	10/21/2024 10:00	10/22/2024 11:27	25.7		3.32	4.00	4	ug/L	ZDR
HAA5, Total	01RE1	NA	EPA552.3	10/21/2024 10:00	10/22/2024 11:27	72.9		5.00	5.00	1	ug/L	ZDR
<i>Surr: 2,3-Dibromopropionic Acid</i>	01	130 %	70-130	10/21/2024 10:00	10/22/2024 04:19							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF 15DAY

Laboratory Sample ID: 24J1192-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
Bromodichloromethane	02	75-27-4	EPA524.2	10/21/2024 15:39	10/21/2024 15:39	9.81		0.40	1.00	1	ug/L	MAH
Bromoform	02	75-25-2	EPA524.2	10/21/2024 15:39	10/21/2024 15:39	BLOD		0.40	1.00	1	ug/L	MAH
Chloroform	02	67-66-3	EPA524.2	10/21/2024 15:39	10/21/2024 15:39	119		0.50	1.00	1	ug/L	MAH
Dibromochloromethane	02	124-48-1	EPA524.2	10/21/2024 15:39	10/21/2024 15:39	1.04		0.35	1.00	1	ug/L	MAH
Total Trihalomethanes	02	NA	EPA524.2	10/21/2024 15:39	10/21/2024 15:39	130		1.00	4.00	1	ug/L	MAH
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	02	122 %	70-120	10/21/2024 15:39	10/21/2024 15:39							S
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	02	100 %	75-120	10/21/2024 15:39	10/21/2024 15:39							
<i>Surr: Dibromofluoromethane (Surr)</i>	02	121 %	80-119	10/21/2024 15:39	10/21/2024 15:39							S
<i>Surr: Toluene-d8 (Surr)</i>	02	102 %	85-120	10/21/2024 15:39	10/21/2024 15:39							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Client Sample ID: PH2 S2 15PAC NF 15DAY

Laboratory Sample ID: 24J1192-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Micro-extractables by GC/ECD												
Dibromoacetic Acid	02	631-64-1	EPA552.3	10/21/2024 10:00	10/22/2024 04:38	BLOD		0.700	1.00	1	ug/L	ZDR
Dichloroacetic Acid	02RE1	79-43-6	EPA552.3	10/21/2024 10:00	10/22/2024 11:47	35.5		1.32	4.00	4	ug/L	ZDR
Monobromoacetic Acid	02	79-08-3	EPA552.3	10/21/2024 10:00	10/22/2024 04:38	0.359	J	0.330	1.00	1	ug/L	ZDR
Monochloroacetic Acid	02	79-11-8	EPA552.3	10/21/2024 10:00	10/22/2024 04:38	5.93		0.330	1.00	1	ug/L	ZDR
Trichloroacetic Acid	02RE1	76-03-9	EPA552.3	10/21/2024 10:00	10/22/2024 11:47	30.0		3.32	4.00	4	ug/L	ZDR
HAA5, Total	02RE1	NA	EPA552.3	10/21/2024 10:00	10/22/2024 11:47	71.7		5.00	5.00	1	ug/L	ZDR
Surr: 2,3-Dibromopropionic Acid	02		107 % 70-130	10/21/2024 10:00	10/22/2024 04:38							

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
---------	--------	-----	-------	-------------	---------------	------	-------------	-----	-----------	------

Batch BHJ0968 - SW5030B-MS

Blank (BHJ0968-BLK1)

Prepared & Analyzed: 10/21/2024

Bromodichloromethane	ND	1.00	ug/L							
Bromoform	ND	1.00	ug/L							
Chloroform	ND	1.00	ug/L							
Dibromochloromethane	ND	1.00	ug/L							
Total Trihalomethanes	ND	4.00	ug/L							
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	59.2		ug/L	50.0		118	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	50.9		ug/L	50.0		102	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	58.9		ug/L	50.0		118	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	49.1		ug/L	50.0		98.2	85-120			

LCS (BHJ0968-BS1)

Prepared & Analyzed: 10/21/2024

Bromodichloromethane	18.4	1	ug/L	20.0		92.1	75-120			
Bromoform	18.1	1	ug/L	20.0		90.6	70-130			
Chloroform	19.7	1	ug/L	20.0		98.5	65-135			
Dibromochloromethane	18.6	1	ug/L	20.0		93.2	60-135			
<i>Surr: 1,2-Dichloroethane-d4 (Surr)</i>	59.2		ug/L	50.0		118	70-120			
<i>Surr: 4-Bromofluorobenzene (Surr)</i>	49.0		ug/L	50.0		98.0	75-120			
<i>Surr: Dibromofluoromethane (Surr)</i>	57.8		ug/L	50.0		116	80-119			
<i>Surr: Toluene-d8 (Surr)</i>	48.7		ug/L	50.0		97.4	85-120			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0957 - EPA552.3										
Blank (BHJ0957-BLK1) Prepared: 10/21/2024 Analyzed: 10/22/2024										
Dibromoacetic Acid	ND	1.00	ug/L							
Dichloroacetic Acid	ND	1.00	ug/L							
Monobromoacetic Acid	ND	1.00	ug/L							
Monochloroacetic Acid	ND	1.00	ug/L							
Trichloroacetic Acid	ND	1.00	ug/L							
HAA5, Total	ND	5.00	ug/L							
<i>Surr: 2,3-Dibromopropionic Acid</i>	3.93		ug/L	4.00		98.3	70-130			
LCS (BHJ0957-BS1) Prepared: 10/21/2024 Analyzed: 10/22/2024										
Bromochloroacetic Acid	4.06	1.00	ug/L	4.00		101	70-130			
Bromodichloroacetic Acid	3.58	1.00	ug/L	4.00		89.6	70-130			
Chlorodibromoacetic Acid	3.04	1.00	ug/L	4.00		76.1	70-130			
Dibromoacetic Acid	3.90	1.00	ug/L	4.00		97.5	70-130			
Dichloroacetic Acid	4.19	1.00	ug/L	4.00		105	70-130			
Monobromoacetic Acid	4.60	1.00	ug/L	4.00		115	70-130			
Monochloroacetic Acid	4.30	1.00	ug/L	4.00		108	70-130			
Trichloroacetic Acid	3.95	1.00	ug/L	4.00		98.8	70-130			
<i>Surr: 2,3-Dibromopropionic Acid</i>	4.18		ug/L	4.00		105	70-130			
Duplicate (BHJ0957-DUP1) Source: 24J0964-02 Prepared: 10/21/2024 Analyzed: 10/22/2024										
Bromochloroacetic Acid	4.46	1.00	ug/L					3.57	30	
Bromodichloroacetic Acid	1.54	1.00	ug/L					13.5	30	
Chlorodibromoacetic Acid	0.731	1.00	ug/L					NA	30	P
Dibromoacetic Acid	ND	1.00	ug/L		BLOD			NA	30	
Dichloroacetic Acid	32.0	1.00	ug/L		32.6			1.84	30	
Monobromoacetic Acid	0.438	1.00	ug/L		0.420			NA	30	

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Micro-extractables by GC/ECD - Quality Control

Enthalpy Analytical

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BHJ0957 - EPA552.3										
Duplicate (BHJ0957-DUP1)		Source: 24J0964-02		Prepared: 10/21/2024 Analyzed: 10/22/2024						
Monochloroacetic Acid	3.78	1.00	ug/L		3.90			2.97	30	
Trichloroacetic Acid	21.0	1.00	ug/L		21.9			4.05	30	
HAA5, Total	57.7	5.00	ug/L		59.3			2.83	30	
<i>Surr: 2,3-Dibromopropionic Acid</i>	<i>4.10</i>		ug/L	<i>4.00</i>		<i>102</i>	<i>70-130</i>			
Matrix Spike (BHJ0957-MS1)		Source: 24J0964-01		Prepared: 10/21/2024 Analyzed: 10/22/2024						
Bromochloroacetic Acid	9.39	1.00	ug/L	4.00		121	70-130			
Bromodichloroacetic Acid	6.18	1.00	ug/L	4.00		128	70-130			
Chlorodibromoacetic Acid	4.77	1.00	ug/L	4.00		98.1	70-130			
Dibromoacetic Acid	4.55	1.00	ug/L	4.00	BLOD	114	70-130			
Dichloroacetic Acid	37.9	1.00	ug/L	4.00	28.5	233	70-130			M
Monobromoacetic Acid	5.01	1.00	ug/L	4.00	BLOD	125	70-130			
Monochloroacetic Acid	8.11	1.00	ug/L	4.00	3.16	124	70-130			
Trichloroacetic Acid	39.7	1.00	ug/L	4.00	27.7	298	70-130			M
<i>Surr: 2,3-Dibromopropionic Acid</i>	<i>4.58</i>		ug/L	<i>4.00</i>		<i>115</i>	<i>70-130</i>			

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method: EPA552.3		
24J1192-01	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J1192-01RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J1192-02	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
24J1192-02RE1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method: SW5030B-MS		
24J1192-01	5.00 mL / 5.00 mL	EPA524.2	BHJ0968	SHJ0852	AJ40243
24J1192-02	5.00 mL / 5.00 mL	EPA524.2	BHJ0968	SHJ0852	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

QC Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Micro-extractables by GC/ECD			Preparation Method:	EPA552.3	
BHJ0957-BLK1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-BS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-DUP1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
BHJ0957-MS1	40.0 mL / 4.00 mL	EPA552.3	BHJ0957	SHJ0878	AJ40334
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			Preparation Method:	SW5030B-MS	
BHJ0968-BLK1	5.00 mL / 5.00 mL	EPA524.2	BHJ0968	SHJ0852	AJ40243
BHJ0968-BS1	5.00 mL / 5.00 mL	EPA524.2	BHJ0968	SHJ0852	AJ40243
BHJ0968-MRL1	5.00 mL / 5.00 mL	EPA524.2	BHJ0968	SHJ0852	AJ40243
BHJ0968-MS1		EPA524.2	BHJ0968	SHJ0852	AJ40243
BHJ0968-MSD1		EPA524.2	BHJ0968	SHJ0852	AJ40243

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Certified Analyses included in this Report

Analyte	Certifications
<i>EPA524.2 in Potable Water</i>	
Bromodichloromethane	MdDOE, VELAP
Bromoform	MdDOE, VELAP
Chloroform	MdDOE, VELAP
Dibromochloromethane	MdDOE, VELAP
Total Trihalomethanes	VELAP
<i>EPA552.3 in Potable Water</i>	
Dibromoacetic Acid	VELAP
Dichloroacetic Acid	VELAP
Monobromoacetic Acid	VELAP
Monochloroacetic Acid	VELAP
Trichloroacetic Acid	VELAP
HAA5, Total	VELAP

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2024
NCDEQ	North Carolina DEQ	495	12/31/2024
NCDOH	North Carolina Department of Health	51714	07/31/2025
NYDOH	New York DOH Drinking Water	12069	04/01/2025
PADEP	NELAP-Pennsylvania Certificate #009	68-03503	10/31/2024
TXCEQ	Texas Comm on Environmental Quality #T104704576-23-1	T104704576	05/31/2025
VELAP	NELAP-Virginia Certificate #12969	460021	06/14/2025
WVDEP	West Virginia DEP	350	11/30/2024

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC

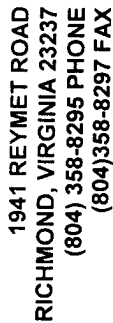
Date Issued: 10/23/2024 8:15:08AM

Client Site I.D.: James River

Submitted To: Austin Dix

Qualifiers and Definitions

J	The reported result is an estimated value.
M	Matrix spike recovery is outside established acceptance limits
P	Duplicate analysis does not meet the acceptance criteria for precision
S	Surrogate recovery was outside acceptance criteria
RPD	Relative Percent Difference
Qual	Qualifiers
-RE	Denotes sample was re-analyzed
LOD	Limit of Detection
BLOD	Below Limit of Detection
LOQ	Limit of Quantitation
DF	Dilution Factor
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



Chain of Custody
Effective: Jan 31, 2024

CHAIN OF CUSTODY

PAGE 1 OF 1

[illegible]

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Certificate of Analysis

Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

Laboratory Order ID: 24J1192

Sample Conditions Checklist

Samples Received at:	2.10°C
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	No
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. In addition, field parameters are always received outside holding time and will be marked accordingly.	Yes

Samples 1-5 on the chain of custody: "PH2 S1 15PAC DM 15DAY" have been logged as one sample for THM and HAA.

Samples 6-10 on the chain of custody: "PH2 S2 15PAC NF 15DAY" have been logged as one sample for THM and HAA.

The collection date is indicated as 8/28/24 on the chain of custody for all samples,

Certificate of Analysis

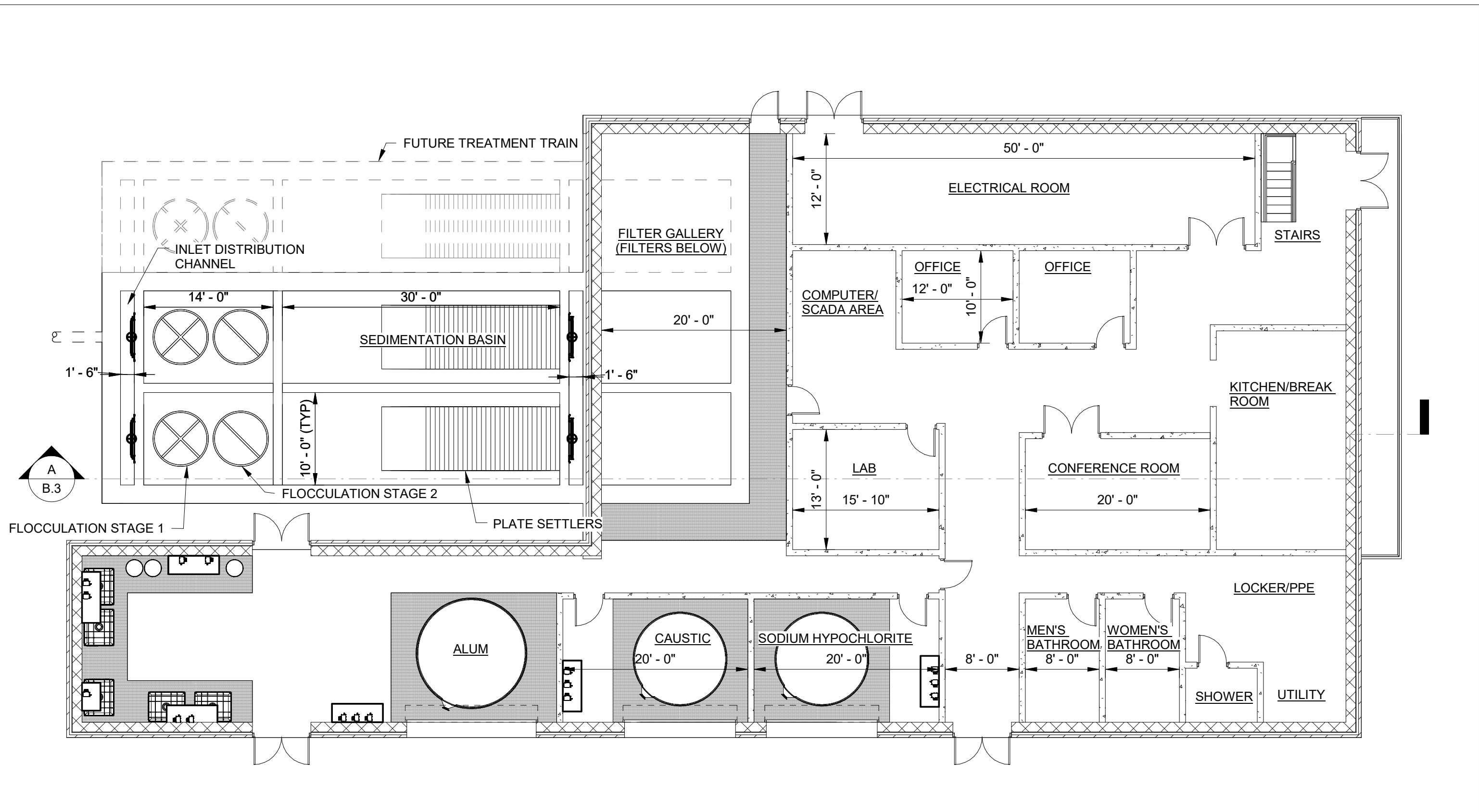
Client Name: Dewberry - Raleigh, NC
Client Site I.D.: James River
Submitted To: Austin Dix

Date Issued: 10/23/2024 8:15:08AM

while the containers have collection dates of 10/17 as well as the time preserved.
No trip blanks were received with the samples, which is considered a deviation.

The samples can be combined as described above and analysis can proceed without trip blanks per Austin Dix via email.
Additionally, Austin Dix was notified via email that the samples have been logged with collection dates of 10/17/24 per project history of using sample preservation and preparation date that was provided by Austin Dix via email.
CSB 10/18/24 1147

APPENDIX B – WATER TREATMENT PLANT CONCEPTUAL FIGURES



TITLE
WATER TREATMENT PLANT UPPER LEVEL - CONVENTIONAL FILTRATION

PROJECT
FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM

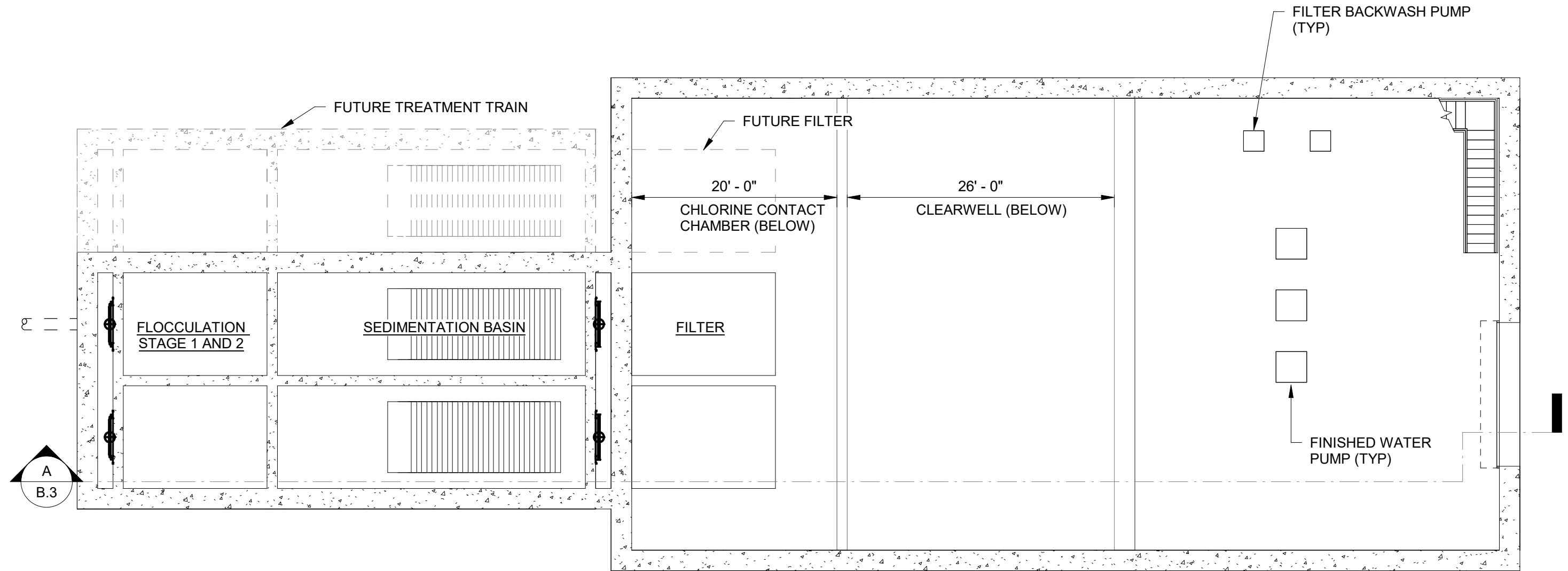
DATE
DEC 2024

PROJECT NO.
50150419

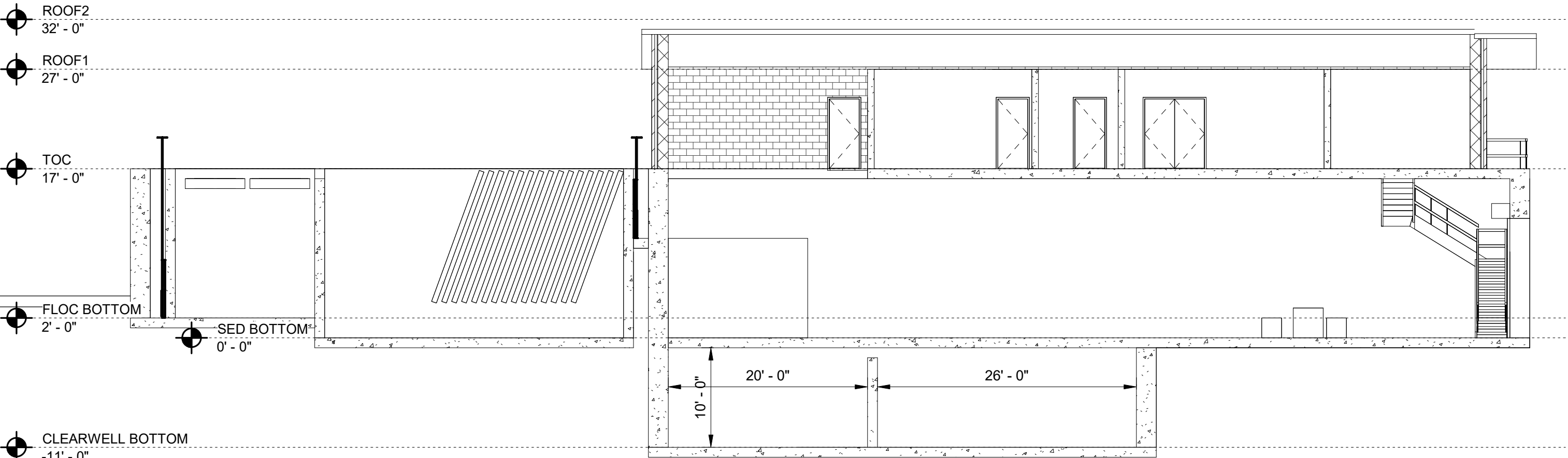
SCALE
1" = 10'-0"

DRAWING NO.

FIGURE NO.
B.1



TITLE WATER TREATMENT PLANT LOWER LEVEL - CONVENTIONAL FILTRATION	DATE DEC 2024	SCALE 1" = 10'-0"	FIGURE NO. B.2
	PROJECT NO. 50150419	DRAWING NO.	



TITLE
WATER TREATMENT PLANT SECTION - CONVENTIONAL FILTRATION

PROJECT
FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM

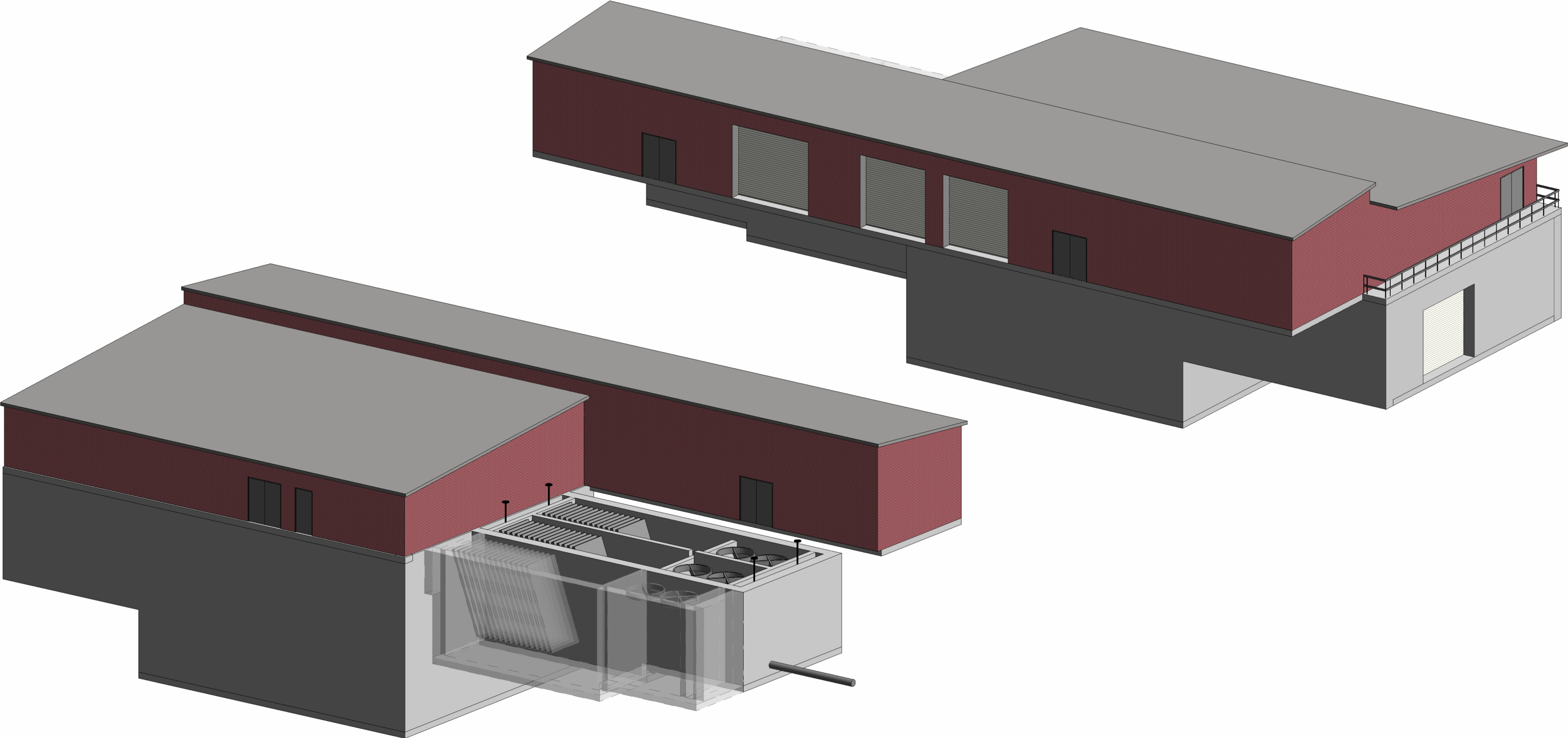
DATE
DEC 2024

SCALE
1" = 10'-0"

PROJECT NO.
50150419

DRAWING NO.

FIGURE NO.
B.3



TITLE
WATER TREATMENT PLANT - CONVENTIONAL FILTRATION 3D

PROJECT
FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM

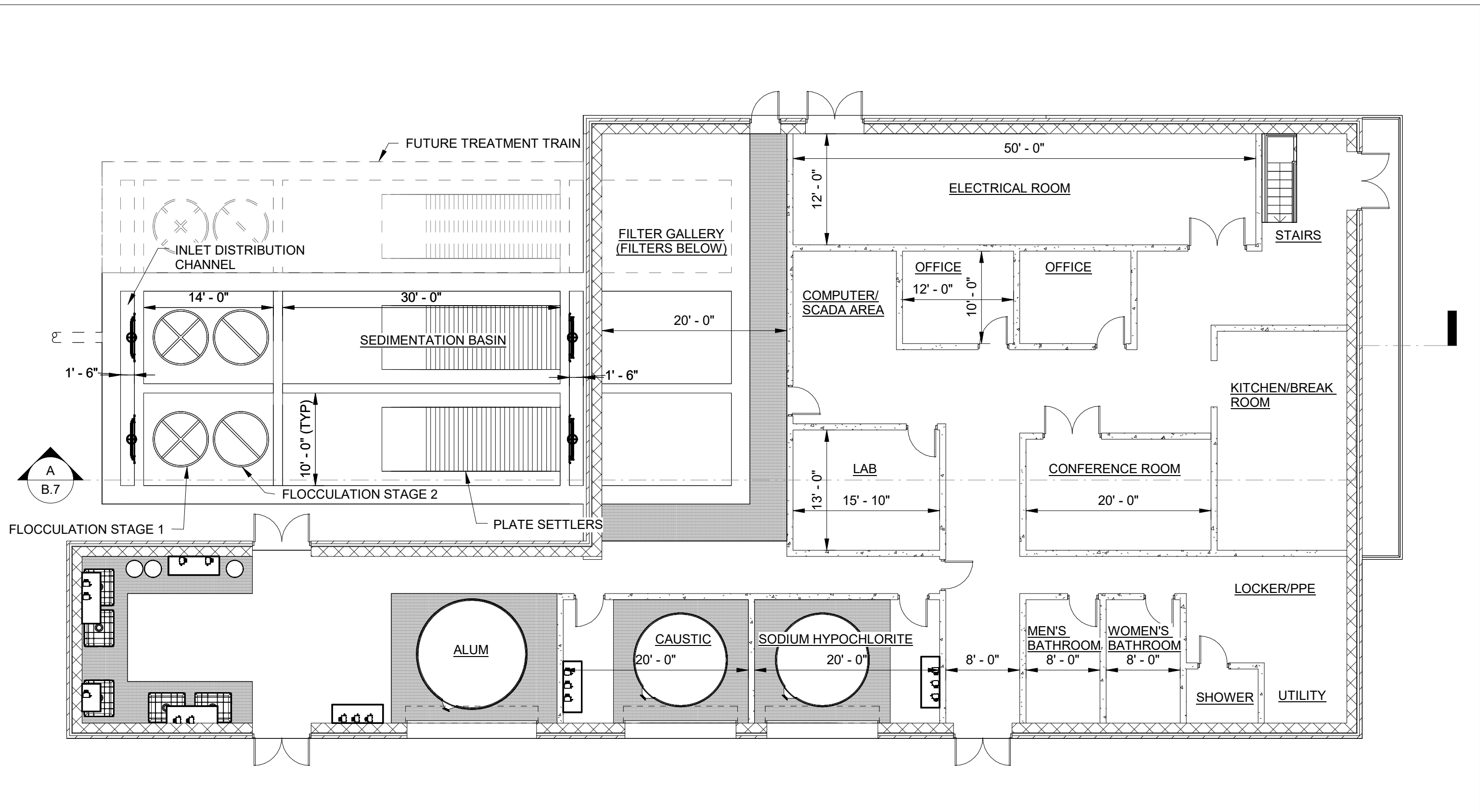
DATE
DEC 2024


PROJECT NO.
50150419

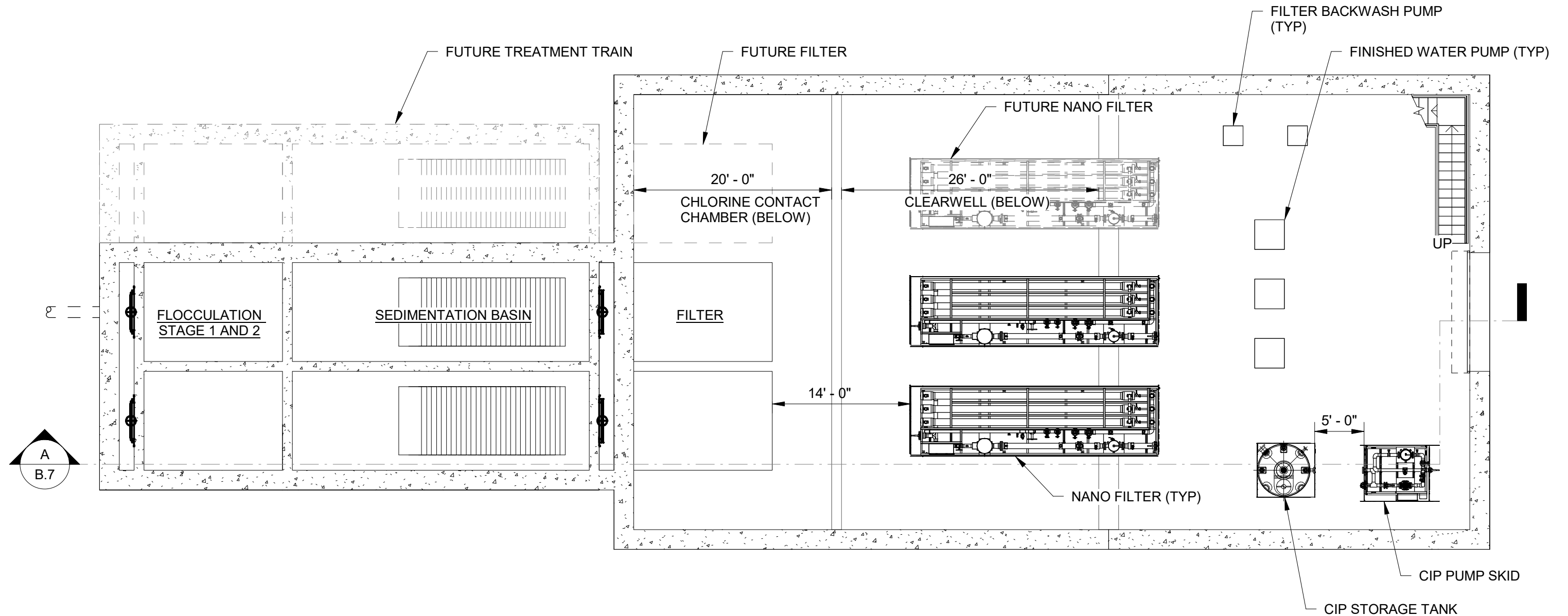
SCALE

DRAWING NO.

FIGURE NO.
B.4

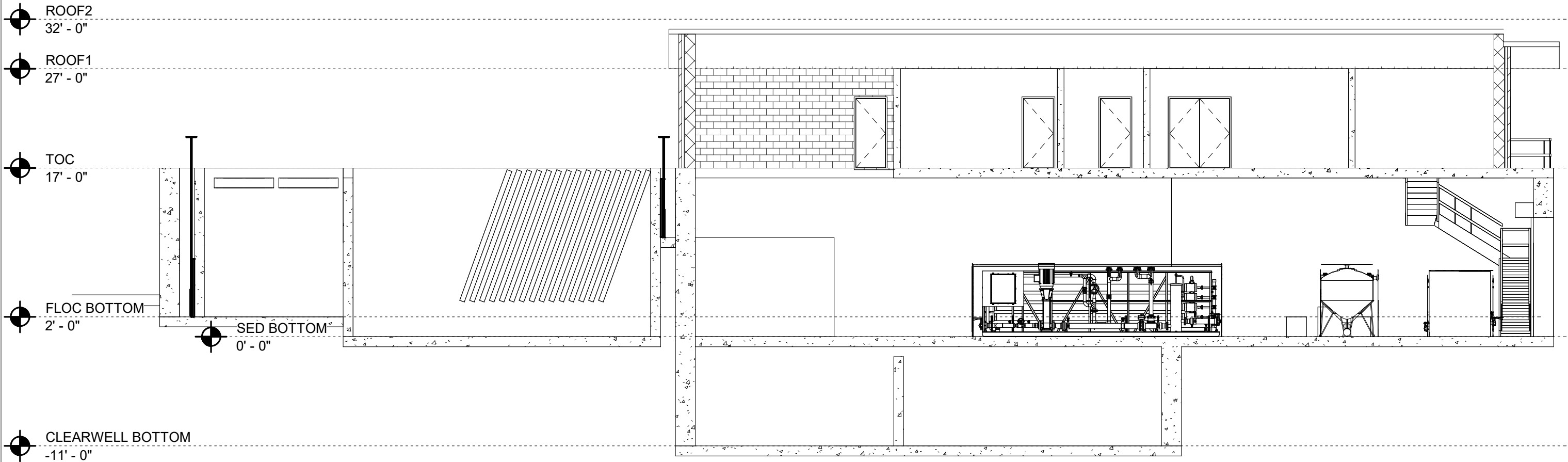


	TITLE	DATE	SCALE	FIGURE NO. B.5
	WATER TREATMENT PLANT UPPER LEVEL - CONVENTIONAL WITH NANOFILTRATION	DEC 2024	1" = 10'-0"	
	PROJECT	PROJECT NO.	DRAWING NO.	
	FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM	50150419		



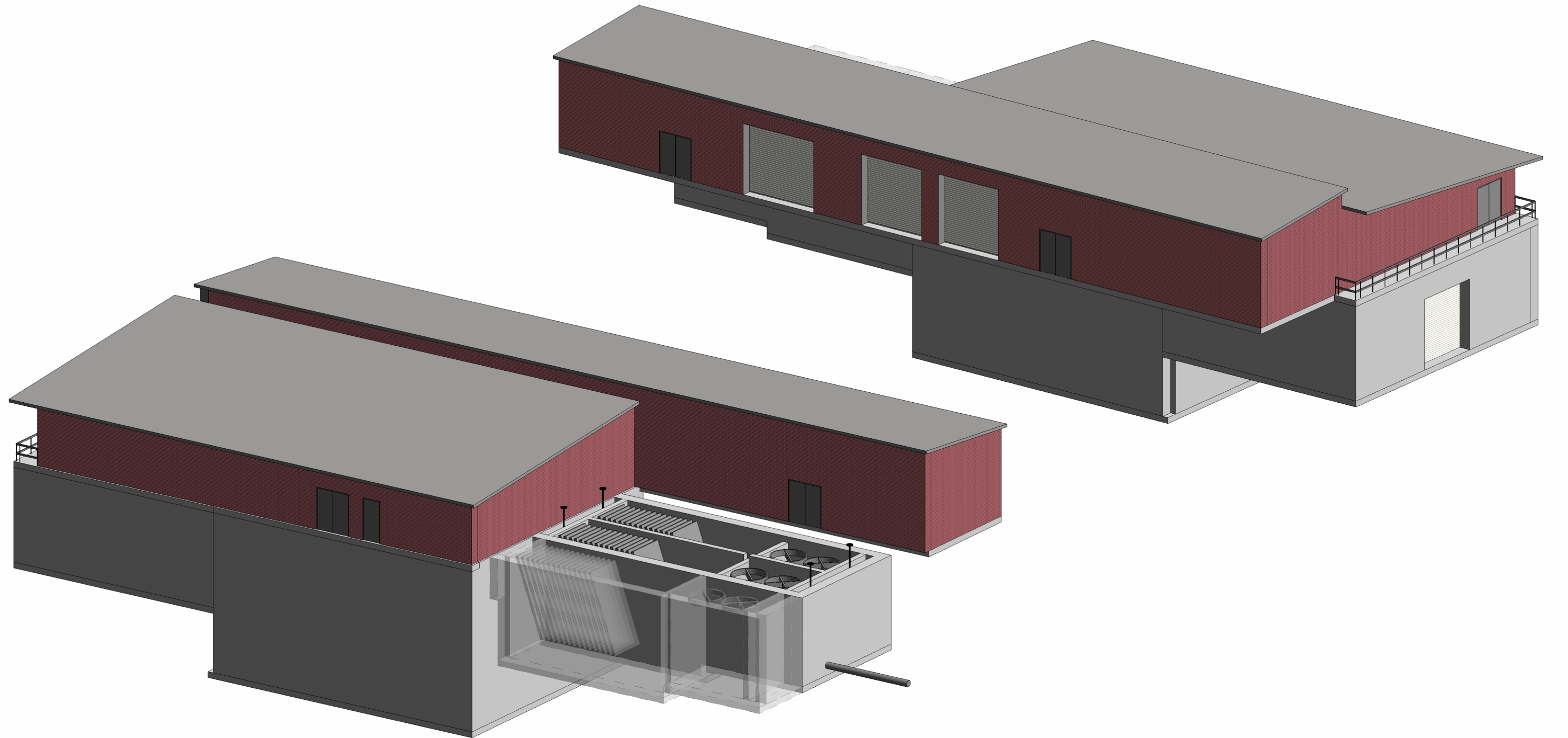
TITLE	WATER TREATMENT PLANT LOWER LEVEL - CONVENTIONAL FILTRATION W/ NANOFILTRATION
PROJECT	FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM

DATE	DEC 2024	SCALE	1" = 10'-0"	FIGURE NO. B.6
PROJECT NO.	50150419	DRAWING NO.		

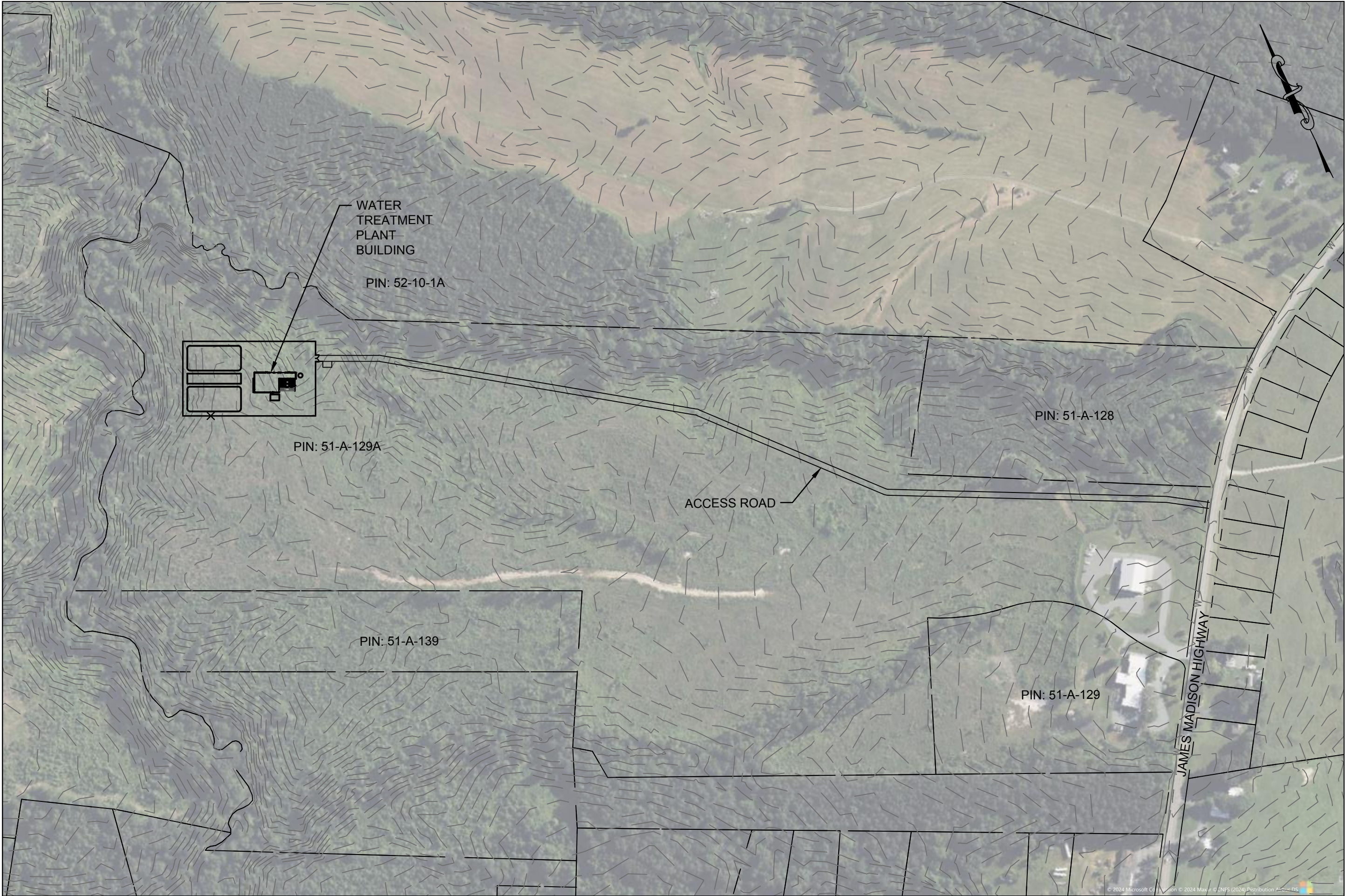



TITLE
WATER TREATMENT PLANT SECTION - CONVENTIONAL FILTRATION W/ NANOFILTRATION
PROJECT
FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM

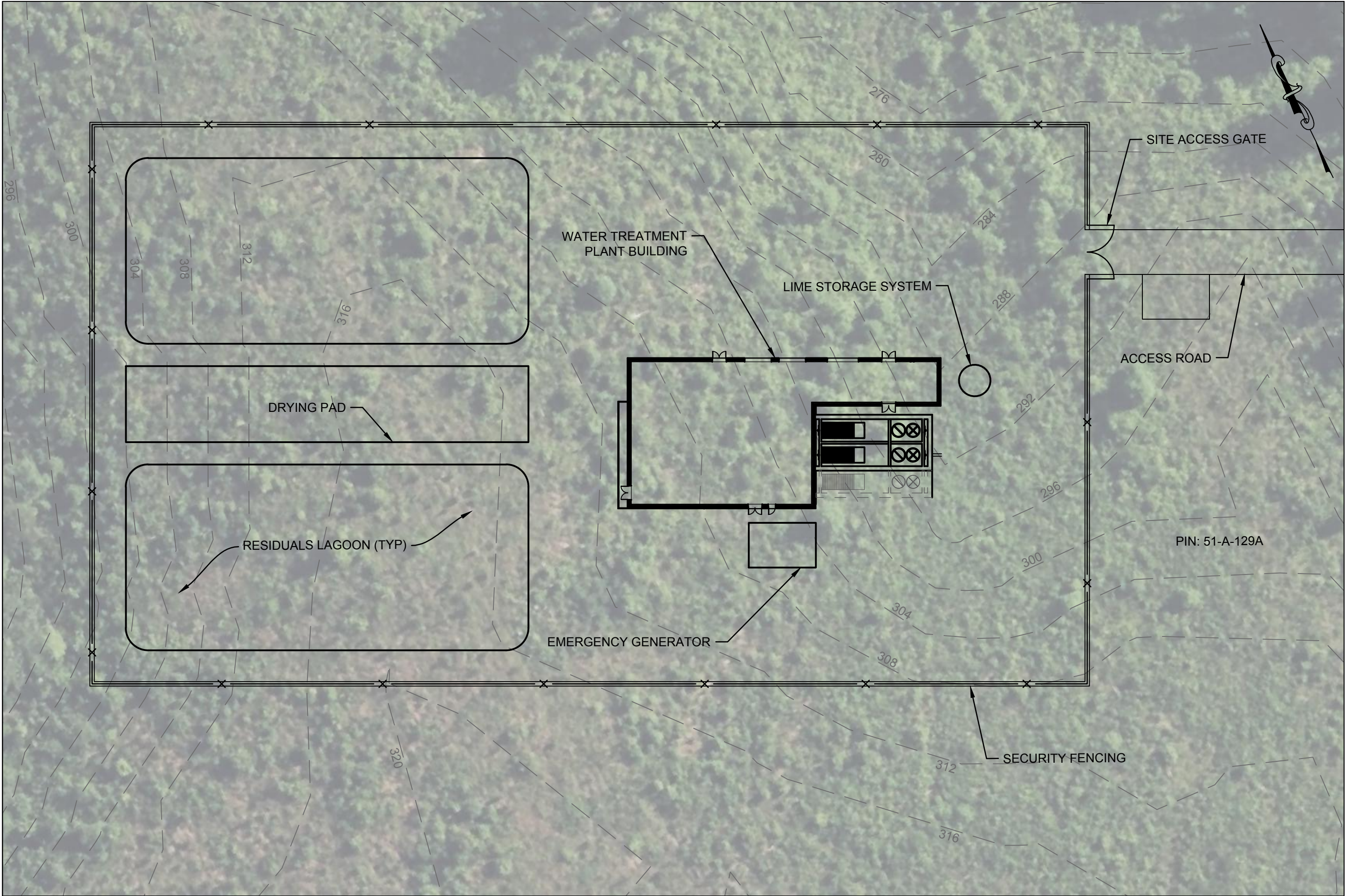
DATE	SCALE	FIGURE NO. B.7
DEC 2024	1" = 10'-0"	
PROJECT NO.	DRAWING NO.	
50150419		




<div>TITLE</div> <div>WATER TREATMENT PLANT - CONVENTIONAL FILTRATION W/ NANOFILTRATION 3D</div> <div>PROJECT</div> <div>FORK UNION SANITARY DISTRICT WATER SUPPLY SYSTEM</div>	<div>DATE</div> <div>DEC 2024</div>	<div>SCALE</div>	<div>FIGURE NO.</div> <div>B.8</div>
	<div>PROJECT NO.</div> <div>50150419</div>	<div>DRAWING NO.</div>	




 Dewberry Dewberry Engineers Inc. 4805 Lake Brook Drive, Suite 200 Glen Allen, VA 23060 Phone: 804.290.7957 Fax: 804.290.7928	DATE DEC. 2024 PROJ. NO. 50150419	SCALE 1" = 300' PROJECT	TITLE WATER TREATMENT PLANT SITE LAYOUT OPTION 1	FIGURE NO. B.9
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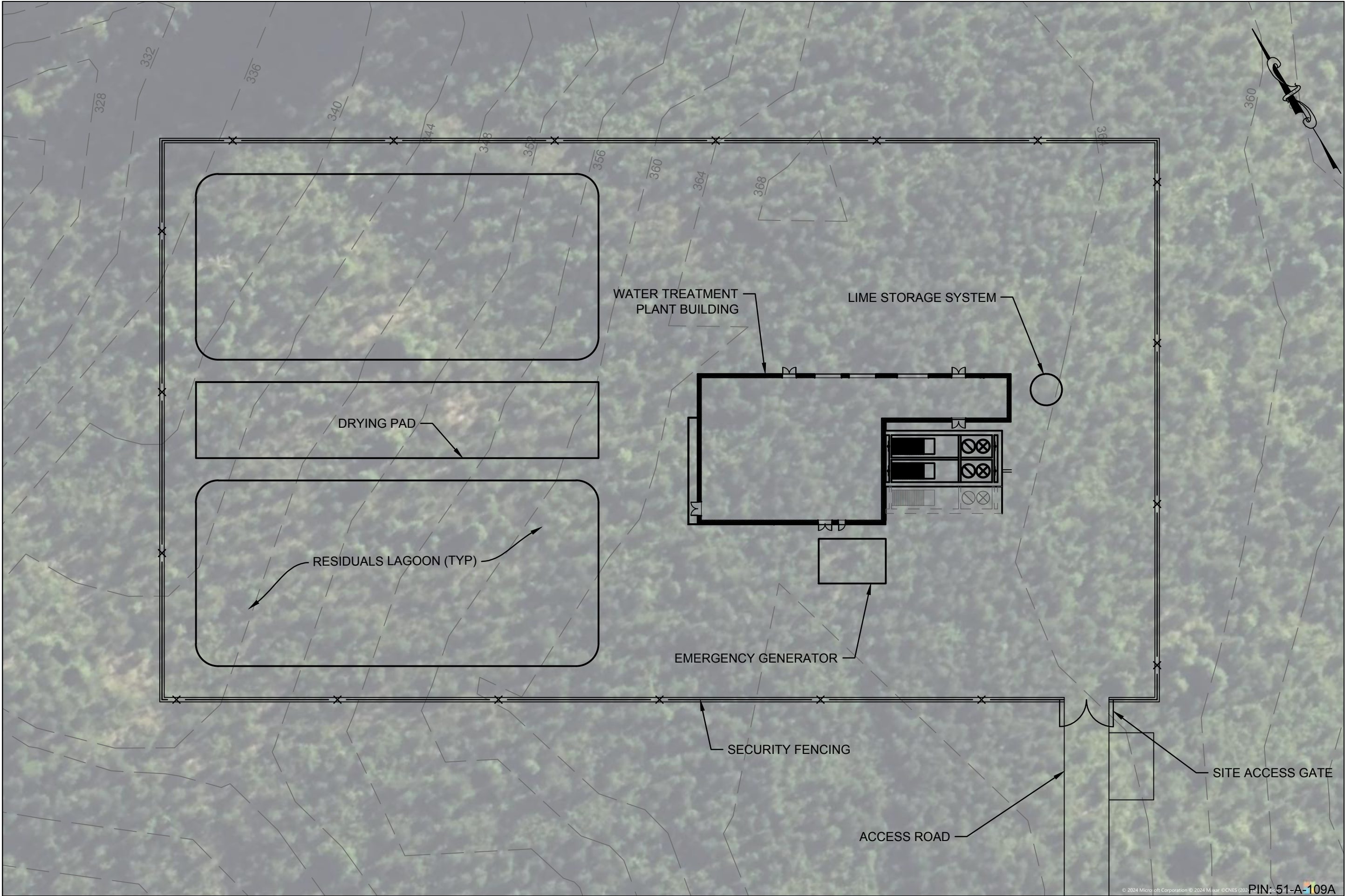


**Dewberry**
Dewberry Engineers Inc.
4805 Lake Brook Drive, Suite 200
Glen Allen, VA 23060
Phone: 804.290.7957
Fax: 804.290.7928

DATE DEC. 2024	SCALE 1" = 40'	TITLE WATER TREATMENT PLANT SITE LAYOUT OPTION 1	FIGURE NO. B.10
PROJ. NO. 50150419	PROJECT		



 Dewberry Engineers Inc. 4805 Lake Brook Drive, Suite 200 Glen Allen, VA 23060 Phone: 804.290.7957 Fax: 804.290.7928	DATE DEC. 2024 PROJ. NO. 50150419	SCALE 1" = 300' PROJECT	TITLE WATER TREATMENT PLANT SITE LAYOUT OPTION 2	FIGURE NO. B.11
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APPENDIX C – CHEMICAL FEED CALCULATIONS

PAC SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: RW Line at RW PS

POWDER ACTIVATED CARBON

Injection Point: RW Line

Q min	0.15	MGD	Min dose	5.00	mg/L
Q avg	1.00	MGD	Avg. dose	20.00	mg/L
Q design	1.50	MGD	Max dose	25.00	mg/L

PAC Bulk Density 25.0 lb/ft³

- Amount of PAC required per day

$$\text{PAC} = [(\text{Flowrate (MGD)}) \times (\text{Design Dosage (mg/L)}) \times 8.34]$$

		Minimum Flow and Dosing	Average Flow and Dosing	Design Flow and Dosing	Design Flow, avg dose
gal PAC solution/d	=	1.87	49.91	93.58	74.87
gal PAC solution/hr	=	0.08	2.08	3.90	3.12
lb PAC/day	=	6.26	166.80	312.75	250.20
lb PAC/hr	=	0.26	6.95	13.03	10.43
ft ³ PAC/day	=	0.25	6.67	12.51	10.01

*Use for budget

- PAC Solution Storage Capacity based on Average Dose at Design Flow Rate

Storage capacity = PAC solution per day x 30 day (design flow rate, average dose)

lbs = 7,506
8 8 bags (1000 lbs each)

Min Pumping Rate	0.3	lbs/h
Max Pumping Rate	13.0	lbs/h

PERMANGANATE SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: RW Line at RW PS

SODIUM PERMANGANATE

4.6 gal NaMnO₄ = 10 lbs KMnO₄

Q min 0.15	MGD	Min dose	0.50	mg/L	
Q avg 1.00	MGD	Avg. dose	1.50	mg/L	Use 1 mg/L
Q design 1.50	MGD	Max dose	5.00	mg/L	
		Avg. dose (max month)	3.00	mg/L	

Formula for Sodium Permanganate: NaMnO₄

NaMnO₄ Strength: 20.0% (also comes in 40%)
 NaMnO₄ Specific Gravity: 1.38
 NaMnO₄ Density: 11.5 lb/gal

Molecular Weight		
Na	MnO ₄	KMnO ₄
23	119	142
Available MnO ₄ :		83.8%
Permanganate lb/gal:		1.92201761

- Amount of NaMnO₄ solution required per day

$$\text{NaMnO}_4 = [(\text{Flow (MGD)}) \times (\text{Design Dosage (mg/L)}) \times 8.34] \div [(\text{NaMnO}_4 \text{ Density (lb/gal)}) \times (\text{NaMnO}_4 \text{ Strength (\%)})]$$

		0.15 MGD	1.0 MGD	1.5 MGD	Avg Dose (max Month)	Design flow, avg dose
mg/L	=	0.54	1.62	3.25	3.25	3.25
gal NaMnO ₄ solution/d	=	0.30	5.90	17.71	17.71	8.85
Gal/hr	=	0.01	0.25	0.738	0.738	0.369
lb/day	=	3.38	67.68	203.05	203.05	101.52

- NaMnO₄ Solution Storage Capacity based on Average Dose at Design Flow Rate

*Use for budget

Storage capacity = NaMnO₄ solution per day (avg dose, max month) x 30 day

gal = 540 **Use 275-gal totes of NaMnO₄
 # 275 gal totes = 2 for 30 day supply

Min Pumping Rate 0.01 gph
 Max Pumping Rate 0.74 gph

LIME SYSTEM CALCULATIONS

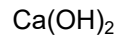
Fork Union Water Treatment Plant

December 2024

Injection Point: RW Line at WTP

	Flowrate (MGD)	Dosage (gpg)	Dosage (mg/L)
Design	1.50	2.5	42.75
Average	1.0	1.5	25.65
Minimum	0.15	0.5	8.55

Formula for Lime (Calcium Hydroxide):



Lime Strength: 95.0%
Lime Solubility: 10.0%
Lime Solubility: 0.9 lb/gal
Lime Bulk Density: 30 lb/ft³

- Amount of Lime solution required per day

$$\text{Lime} = [(\text{Flowrate (MGD)}) \times (\text{Design Dosage (mg/L)}) \times 8.34] \div [(\text{Lime Density (lb/gal)}) \times (\text{Lime Strength (\%)})]$$

MAX	=	613.64 gal Lime solution/d
MAX	=	25.57 Gal/hr
MAX	=	562.95 lbs solution/day
AVG	=	368.18 gal Lime solution/d
AVG	=	15.34 Gal/hr
AVG	=	337.77 lb/day
MIN	=	12.27 gal Lime solution/d
MIN	=	0.51 Gal/hr
MIN	=	11.26 lb/day

* Size Storage Hopper for: 6.3 ft³ (8 hours min storage)
* 30-day storage req.: 6.0 2000-lb super sacks
* Size Two Feed Pumps for: 40 GPH Pumping Rate (each)

POLYMER SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: RW Line at WTP

POLYMER: Nalclear 8181

Injection Point: 16" RW Line, MH "C"

Q min	0.15	MGD	Min dose	0.50	mg/L
Q avg	1.00	MGD	Avg. dose	0.50	mg/L
Q design	1.50	MGD	Max dose	0.50	mg/L
			Avg. Dose (max month)	0.50	mg/L

Polymer Specific Gravity: 1.03
Polymer Density 8.6 lb/gal

- Amount of Polymer solution required per day

Polymer = [(Flowrate (MGD)) x (Design Dosage (mg/L)) x 8.34] ÷ [Polymer Denisty (lb/gal)]

		0.15 MGD	1.0 MGD	1.5 MGD	Avg Dose (max Month)	Design flow, avg dose
gal Polymer solution/d	=	0.07	0.49	0.73	0.73	0.73
Gal/hr	=	0.003	0.02	0.03	0.03	0.03
lb/day	=	0.63	4.17	6.26	6.26	6.26

**Use for budget

Polymer Storage = 21.921729 gallons for a 30 day supply

Min Pumping Rate 0.003 gph
Max Pumping Rate 0.03 gph

SODIUM HYDROXIDE SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: Clearwell

SODIUM HYDROXIDE DOSAGE

Flowrate (MGD):	0.15	1.00	1.50	1.50
Alkalinity Addition (lbs/day)	10.0	100.0	250.0	200.0
NaOH meq (mg/meq)	40.0	40.0	40.0	40.0
Na ₂ CO ₃ meq (mg/meq)	53.0	53.0	53.0	53.0
NaOH dose (mg/L)	8.0	12.0	20.0	16.0
25% NaOH rate	3.75 gpd	37.47 gpd	93.68 gpd	74.94 gpd
	0.16 gph	1.56 gph	3.90 gph	3.12 gph
50% NaOH rate	1.87 gpd	18.74 gpd	46.84 gpd	37.47 gpd
	0.08 gph	0.78 gph	1.95 gph	1.56 gph

NaOH Strength: 25.0% 50.0%

NaOH Specific Gravity: 1.28 1.54

NaOH Density 10.7 12.8 lb/gal

- Amount of NaOH solution required per day

NaOH = [(Flowrate (MGD)) x (Design Dosage (mg/L)) x 8.34] ÷ [(NaOH Denisty (lb/gal)) x (NaOH Strength (%))]

	Minimum Flow and Dosing		Average Flow and Dosing		Design Flow and Max Dosing		Design Flow and Avg Dosing	
	25%	50%	25%	50%	25%	50%	25%	50%
gal NaOH solution/d	= 3.75	1.56	37.47	15.57	93.68	38.93	56.21	23.36
Gal/hr	= 0.16	0.06	1.56	0.65	3.90	1.62	2.34	0.97
lb/day	= 40.00	20.00	400.00	200.00	1000.00	500.00	600.00	300.00

- NaOH Solution Storage Capacity based on Average Dose at Design Flow Rate for 2 weeks + 5,000 gal bulk delivery

gal = 25% 50%
6,100 5,500 2 weeks + bulk deliver

Min Pumping Rate 0.156 0.065 gph

Max Pumping Rate 3.90 1.62 gph

SODIUM HYPOCHLORITE SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: Clearwell

SODIUM HYPOCHLORITE

Q min	0.15	MGD	Min dose	1.00	mg/L
Q avg	1.00	MGD	Avg. dose	2.50	mg/L
Q design	1.50	MGD	Max dose	4.00	mg/L
			Avg. dose (max month)	4.00	mg/L

NaOCl Strength: 12.5%
NaOCl Specific Gravity: 1.21
NaOCl Density: 10.1 lb/gal

- Amount of NaOCl solution required per day

NaOCl= [(Flowrate (MGD)) x (Design Dosage (mg/L)) x 8.34] ÷ [(NaOCl Density (lb/gal)) x (NaOCl Strength (%))]

0.15 MGD 1.0 MGD 1.5 MGD Avg Dose (n Design flow, avg dose)

gal NaOCl solution/d	=	0.99	16.53	39.67	39.67	24.79
Gal/hr	=	0.04	0.69	1.65	1.65	1.03
lb/day	=	10.01	166.80	400.32	400.32	250.20

NaOCl Storage = 5600.0 gallons for 2 weeks + bulk delivery

Min Pumping Rate 0.04 gph
Max Pumping Rate 1.7 gph

AMMONIUM SULFATE CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: Finished Waterline

Ammonium Sulfate Dosage

FLOW RATE			CI DOSAGE	
Min	0.15	MGD	Min	1.00 mg/L
Avg	1.00	MGD	Avg	2.50 mg/L
Max (design)	1.5	MGD	Max	4.00 mg/L
Avg. dose (max month)			4.00 mg/L	

Design Ratio

mg/L Cl₂ per mg/L NH₄: 4.5 :1

	NH ₃ Dose:		(NH ₄) ₂ SO ₄ Dose:	
Design Dosage:	0.89	mg/L	8.63	mg/L
Minimum Dosage:	0.22	mg/L	2.16	mg/L
AVG DOSE	0.56	mg/L	5.39	mg/L
Avg Dose (max month)	0.89	mg/L	8.63	mg/L

Formula for Ammonium Sulfate: (NH₄)₂SO₄

(NH ₄) ₂ SO ₄ Strength	40.0%	Molecular Weight			
(NH ₄) ₂ SO ₄ Specific Gravity	1.232	S	O ₄	(NH ₄) ₂	(NH ₃) ₂
Available NH ₃ :	25.75%	32.06	64	36	34
(NH ₄) ₂ SO ₄ Density	10.27 lb/gal				
Ammonia lb/gal	1.06 lb/gal				

- (NH₄)₂SO₄ Chemical Pump Sizing Requirements

(NH₄)₂SO₄ = [(Max Flowrate (MGD)) x (Design Dosage (mg/L)) x 8.34] ÷ [Ammonia (lb/gal) x 24 hrs/day]

MAX MONTH	=	10.51	gal (NH ₄) ₂ SO ₄ solution/day	Aqueous Ammonia Dose
MAX	=	10.51	gal (NH ₄) ₂ SO ₄ solution/day	Use 100 mL Calib. Column
MAX	=	0.44	gal (NH ₄) ₂ SO ₄ solution/hr	
MAX	=	107.98	lbs (NH ₄) ₂ SO ₄ solution/day	
AVG	=	4.38	gal (NH ₄) ₂ SO ₄ solution/day	
AVG	=	0.18	gal (NH ₄) ₂ SO ₄ solution/hr	
AVG	=	44.99	lbs (NH ₄) ₂ SO ₄ solution/day	
MIN	=	0.26	gal (NH ₄) ₂ SO ₄ solution/day	
MIN	=	0.01	gal (NH ₄) ₂ SO ₄ solution/hr	
MIN	=	2.70	lbs (NH ₄) ₂ SO ₄ solution/day	

- (NH₄)₂SO₄ Solution Storage Capacity based on Average Dose (max month), Design Flow

Storage capacity = 30 days x [(Avg. Flowrate (MGD)) x (Avg. Dosage (mg/L)) x 8.34] ÷ [Ammonia (lb/gal)]

=	315 gal	*Use 330 gallon totes
# totes =	1.0	

CORROSION INHIBITOR SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: Finished Waterline

CORROSION INHIBITOR: Aquapure 3627

Q min 0.15	MGD	Min dose 2.00	mg/L
Q avg 1.00	MGD	Avg. dose 3.70	mg/L
Q design 1.50	MGD	Max dose 6.00	mg/L
		Avg. dose (max month) 3.70	mg/L

Aquapure Specific Gravity: 1.40
Aquapure Density 11.7 lb/gal

- Amount of Aquapure solution required per day

Aquapure = [(Flowrate (MGD)) x (Design Dosage (mg/L)) x 8.34] ÷ [Aquapure Density (lb/gal)]

		0.15 MGD	1.0 MGD	1.5 MGD	Avg Dose (max Month)	Design flow, avg dose
gal Aquapure solution/d	=	0.21	2.64	6.43	3.96	3.96
Gal/hr	=	0.01	0.11	0.27	0.17	0.17
lb/day	=	2.50	30.86	75.06	46.29	46.29

Phosphate Storage = 118.929 gallons for a 30 day supply

Min Pumping Rate 0.01 gph
Max Pumping Rate 0.27 gph

FLUORIDE SYSTEM CALCULATIONS

Fork Union Water Treatment Plant

December 2024

Injection Point: Finished Waterline

HYDROFLUOSILICIC ACID DOSAGE

Max Flow:	1.5	MGD	Max Dose	1.5	mg/L
Average flow:	1	MGD	Design Dosage	1	mg/L
Min Flow:	0.15	MGD	Min Dose	0.5	mg/L

Formula for Hydrofluosilicic Acid:



H ₂ SiF ₆ Strength:	17.0%
H ₂ SiF ₆ Specific Gravity:	1.23
H ₂ SiF ₆ Density	10.3 lb/gal

- Amount of H₂SiF₆ solution required per day

$$\text{H}_2\text{SiF}_6 = [(\text{Flowrate (MGD)}) \times (\text{Design Dosage (mg/L)}) \times 8.34] \div [(\text{H}_2\text{SiF}_6 \text{ Density (lb/gal)}) \times (\text{H}_2\text{SiF}_6 \text{ Strength})]$$

Max	=	10.76 gal solution/d
	=	0.45 Gal/hr
	=	110.38 lb/day
Average	=	4.78 gal solution/d
	=	0.20 Gal/hr
	=	49.06 lb/day
Minimum	=	0.36 gal solution/d
	=	0.01 Gal/hr
	=	3.68 lb/day

- H₂SiF₆ Solution Storage Capacity based on Average Flow

$$\begin{aligned}\text{Storage capacity} &= \text{H}_2\text{SiF}_6 \text{ solution per day} \times 30 \text{ day} \\ &= 215 \text{ gal}\end{aligned}$$

* Provide approx. **400** gal storage for H₂SiF₆ to allow for bulk delivery and 2 week reserve supply

APPENDIX D – FINISHED WATER PUMP SELECTIONS



7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **ANTHONY RENTERIA**

anthony.renteria@natlpump.com

www.nationalpumpcompany.com

623-979-3560

PRODUCT: DSVT

CONFIGURATION NAME: Q-136463-1

CONFIGURATION SN: C-196629-B1

Flow Rate: 700 US GPM

Total Dynamic Head: 262 FT.

Fluid: WATER

Fluid Temp: 68 °F

Pump Selection Catalog: VERT.TURB.ENCLOSED

Pump Speed: 1800 RPM

Motor Selection Criteria: MAX POWER ON DESIGN CURVE

Selected Driver HP*: HP

**Selected Driver HP is based on the Driver HP selected in the configuration and may be different than the Motor HP listed on the Pump Data Sheet. Motor Enclosure is also based on the selection made in the configuration and may be different than the Motor Enclosure listed on the Pump Data Sheet.*

DESCRIPTION: C-196629 - ALTERNATIVE 1: 700 GPM AT 262 FT TDH

QTY	ITEM	DESCRIPTION
1	K10HC-BA~	BWL.ASSY: K10HC~ DESIGN HP: 56.8 / NOL HP: 59.2 K10HC-06; PL.CA/SB CIEN BOWLS; 6 X 1.25-10 TPI; SS FIT COL.DIS.ADAPT 6"B X 8"B M/C DI IMPELLER (876 BZ) TRIM (4)(PER PUMP): FULL IMPELLER (876 BZ) TRIM (2)(PER PUMP): 7.54 IN. SHAFT PROJECTION: 16 IN. BRG MAT: SUC: BZ; INT: BZ; TOP: BZ 10" BOLT-ON BASKET STRAINER; 304SS
1	CAPLTHD08000125E~	THD COL ASM; PL 8 X 1.25 - 416~ 12 FT. (144.00 IN.) TOTAL PUMP LENGTH MAX COL LEN: 5' TOP & BTM W / 10' INT 0.277 COLUMN WALL; 10 TPI SHAFT THREADS
1	HDASSY-N-260-08-CI~	DIS HEAD ASSY: N-260; 08; CI~ 8" N-260 SOLE PLATE
1	HSASM12541600RH~	HEAD SHAFT ASM: 1.25 - 416 SS - RH~
1	PDV-USM060H146460P30	US,60HP,VHS,WPI,1800,460PWS,PRE
1	ASSEMBLY INSTRUCTIONS~	ASSEMBLE AS A SCVT PUMP
1	COATINGS~	COATINGS OPTIONS STD PAINT - BOWL OD STD PAINT - COLUMN OD

Company:
Name:
Date: 12/6/2024

Q-136463-1

**Pump:**

Size: K10HC (6 stage)
Type: VERT.TURB.ENCLOSED
Synch Speed: 1800 rpm
Curve: CVK10HC4P6CY
Specific Speeds:
Dimensions:
Vertical Turbine:
Speed: 1770 rpm
Dia: 7.68 in
Impeller: K10HC (1/8)
Ns: 2401
Nss: 5900
Suction: ---
Discharge: ---
Bowl Size: 9.75 in
Max Lateral: 1 in
Thrust K Factor: 6.6 lbf/ft

Search Criteria:

Flow: 700 US gpm Head: 262 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP
NPSHa: ---
Temperature: 68 °F
Vapor Pressure: 0.3391 psi a
Atm Pressure: 14.7 psi a

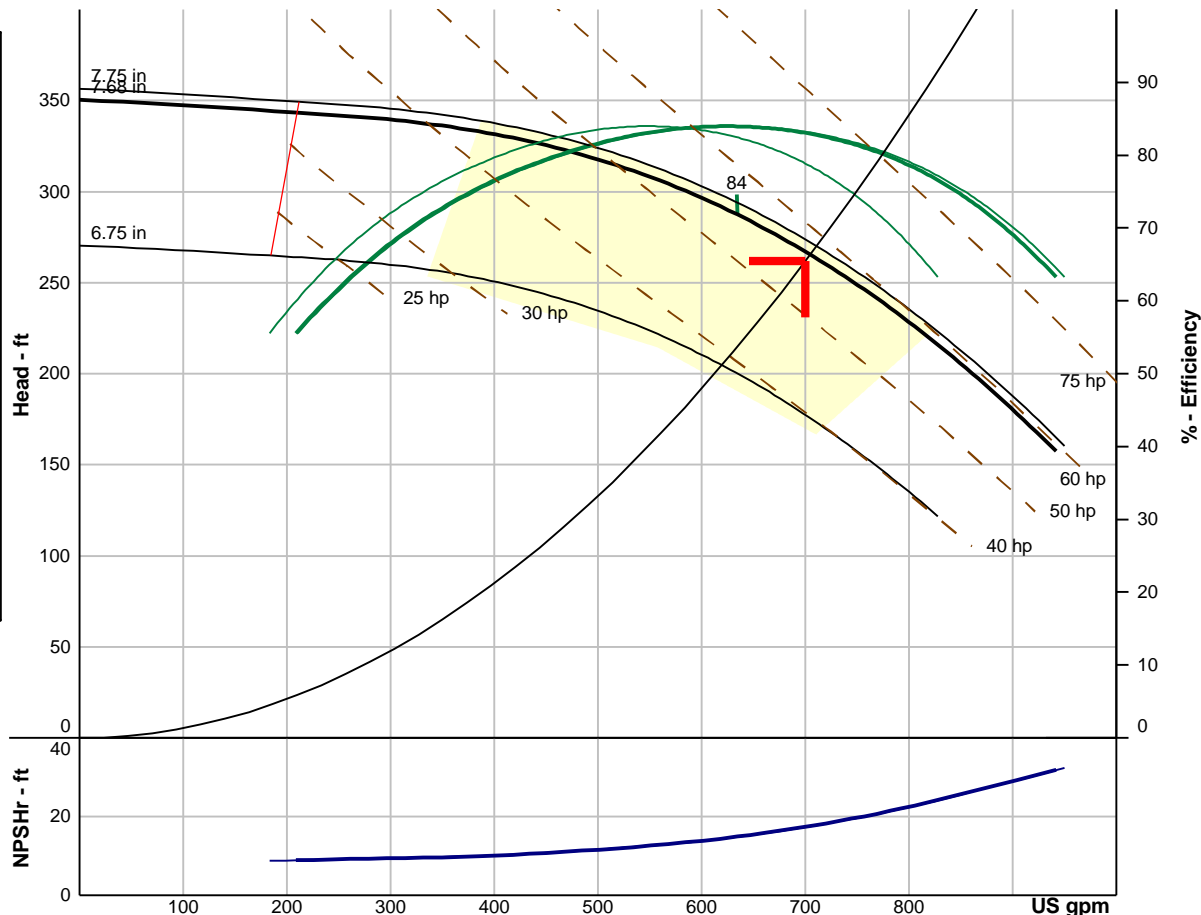
Motor:

Standard: NEMA
Enclosure: WP-I
Size: 60 hp
Speed: 1800 rpm
Frame: 364
Sizing Criteria: Max Power on Design Curve

Pump Limits:

Temperature: 180 °F
Pressure: 370 psi g
Sphere Size: 0.63 in
Power: 284 hp
Eye Area: 12.8 in²

---- Duty Point ----	
Flow:	700 US gpm
Head:	267 ft
Eff:	83%
Power:	56.8 hp
NPSHr:	17.5 ft
---- Design Curve ----	
Shutoff Head:	351 ft
Shutoff dP:	152 psi
Min Flow:	209 US gpm
BEP:	84% @ 634 US gpm
NOL Power:	59.2 hp @ 941 US gpm
-- Max Curve --	
Max Power:	60.8 hp @ 950 US gpm

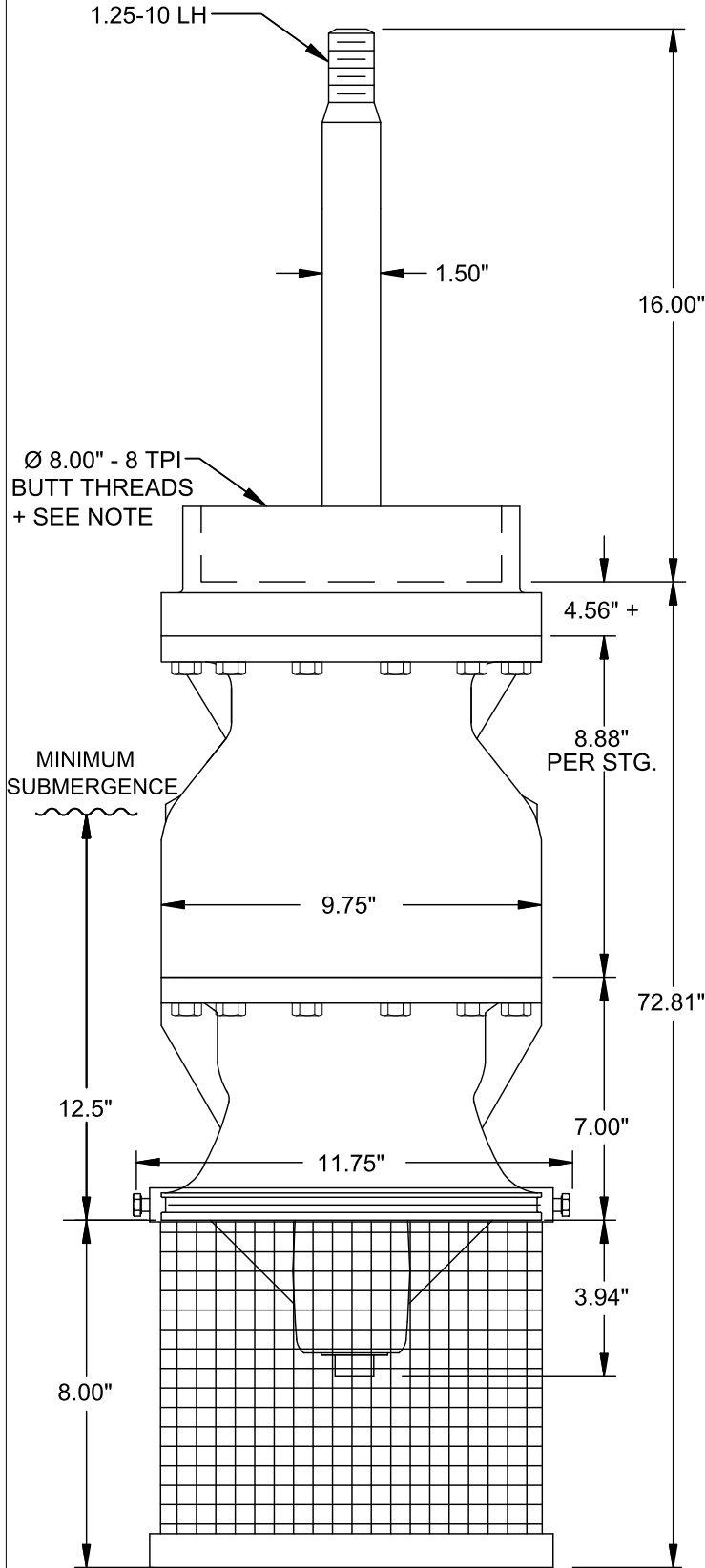


UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
840	1770	210	75	58.9	25.1
700	1770	267	83	56.8	17.5
560	1770	306	83	51.8	12.9
420	1770	329	78	44.8	10.5
280	1770	341	65	36.6	9.39

VERTICAL TURBINE PUMP



6	STAGE	BOWL	K10HC	BOWL ASSEMBLY
700 US GPM	FLOW	262 FT.	HEAD	
STRAINER	X YES	NO	TYPE	BASKET

MATERIALS

BOWL	CI EN
IMPELLER	876 BZ (STD); STATIC BAL.
COLUMN ADAPTER	CAST IRON
SUCTION BELL/CASE	CAST IRON
BOWL SHAFT	416 SS
COLLETS	SS (316)
SAND COLLAR	C876 BRONZE
SUCTION BEARING	C89835 (STD BZ)
INTERMEDIATE BEARING	C89835 (STD BZ)
TOP BEARING	C89835 (STD BZ)
BOLTING	SS
STRAINER	304SS
BOWL O-RING	NONE
WEAR RING (B)	N/A
WEAR RING (I)	N/A
BOWL ID SURFACE FINISH	VITREOUS ENAMEL
BOWL OD SURFACE FINISH	STD PAINT - OD

+ INCLUDES COLUMN EXPANDER (NOT ILLUSTRATED)

PROJECT NAME:

Q-136463-1

FURNISHED BY:

BOWL WEIGHT: 525 LBS

DRAWING NOT TO SCALE.

ALL DIMENSIONS IN INCHES.

SINGLE STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196629
BUILD - 1

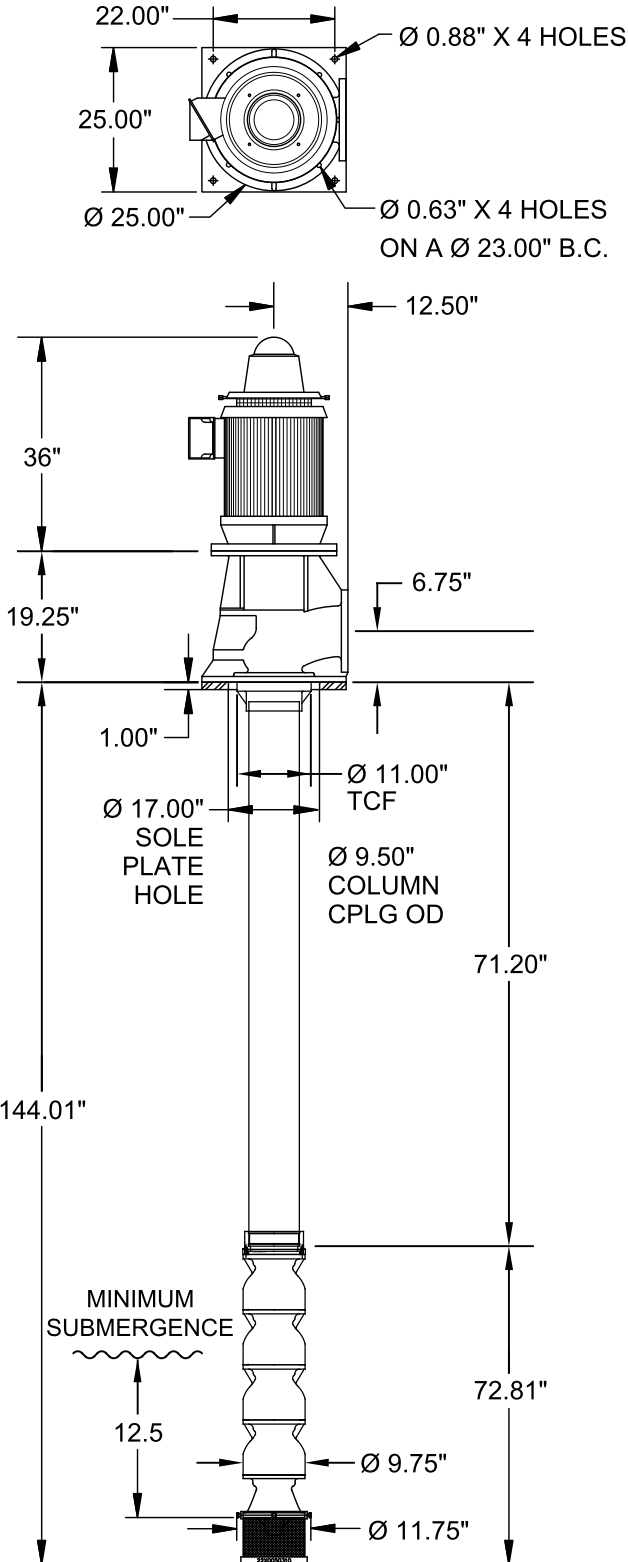
MFG. BY NATIONAL PUMP COMPANY

Quote #: Q-136463-B1

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VERTICAL TURBINE PUMP



MOTOR

MFGR US HP 60 ENCLOSURE WP1 RPM 1800
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 460 PWS
 S.F. 1.15 EFF. PRE BD 16.50" BX 1.25"
 KWT 0.25" CPLG NRR THRUST 5700 FRAME 364TP
 MODEL NO. HO60P2SLG CD 31.1562"

DISCHARGE HEAD

MODEL N-260 W/10.0", 12.0", & 16.5" BD
8" - ANSI CLASS 125-FF DISCHARGE FLANGE
X PACKING BOX STD BRZ PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY YES SOLE PLATE

COLUMN

8" X 0.277" WALL X THD N/A FLG'D
 LINESHAFT X OPEN (N/A) ENCLOSED
 SHAFT DIA 1.25" TPI 10 TPI TUBE DIA N/A

BOWL

6 STAGE K10HC BOWL ASSEMBLY
700 US GPM FLOW 262 FT. HEAD
 STRAINER X YES NO TYPE BASKET

MATERIALS

BOWLS CI EN COLUMN A53, GR B
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI
 BWL SFT 416 SS SHAFT TUBE N/A
 COLLETS 316 SS BRG RET BZ
 BOWL BRG BOWL DWG LINE SFT BRGS RUBBER
 BOLTING SS LINE SHAFT SS (416)
 TENSION BRG N/A SHAFT SLEEVES N/A
 MECH SEAL N/A SHAFT CPLG SS (304)
 SOLE PLATE A-36 PACKING GRAPHITE
 BOWL WR N/A STRAINER 304SS
 IMP WR N/A HEAD CI
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)
 BOWL SURFACE FINISH STD PAINT; OD
 COLUMN SURFACE FINISH STD PAINT; OD
 HEAD SURFACE FINISH STD PAINT; OD

PROJECT NAME

Q-136463-1

WEIGHT & THRUST ESTIMATES

BOWL 525 LBS COLUMN 164 LBS HEAD 415 LBS
 SHAFT 26 LBS TUBE 0 LBS DRIVER 700 LBS
 HYD THRUST 1762 LBS DRIVER MAX THRUST 5700 LBS

SPECIAL NOTE: ASSEMBLE AS A SCVT PUMP

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.
 FOUR STAGE ASSEMBLY SHOWN.
 NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196629
 BUILD - 1

MFG. BY NATIONAL PUMP COMPANY



7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **ANTHONY RENTERIA**

anthony.renteria@natlpump.com

www.nationalpumpcompany.com

623-979-3560

PRODUCT: DSVT

CONFIGURATION NAME: Q-136463-2

CONFIGURATION SN: C-196630-B2

Flow Rate: 1050 US GPM

Total Dynamic Head: 303 FT.

Fluid: WATER

Fluid Temp: 68 °F

Pump Selection Catalog: VERT.TURB.ENCLOSED

Pump Speed: 1800 RPM

Motor Selection Criteria: MAX POWER ON DESIGN CURVE

Selected Driver HP*: HP

**Selected Driver HP is based on the Driver HP selected in the configuration and may be different than the Motor HP listed on the Pump Data Sheet. Motor Enclosure is also based on the selection made in the configuration and may be different than the Motor Enclosure listed on the Pump Data Sheet.*

DESCRIPTION: C-196630 - ALTERNATIVE 1 FUTUR CONDITION 1050 GPM AT 303 FT TDH

QTY	ITEM	DESCRIPTION
1	J11HC-BA~	BWL.ASSY: J11HC~ DESIGN HP: 99.9 / NOL HP: 108 J11HC-06; PL.CA/SB CIEN BOWLS; 8 X 1.50-10 TPI; SS FIT IMPELLER (876 BZ) TRIM (1)(PER PUMP): FULL IMPELLER (876 BZ) TRIM (5)(PER PUMP): 8.39 IN. SHAFT PROJECTION: 16 IN. BRG MAT: SUC: BZ; INT: BZ; TOP: BZ 11" BOLT-ON BASKET STRAINER; 304SS
1	CAPLTHD08000150E~	THD COL ASM; PL 8 X 1.50 - 416~ 12 FT. (144.00 IN.) TOTAL PUMP LENGTH MAX COL LEN: 5' TOP & BTM W / 10' INT 0.277 COLUMN WALL; 10 TPI SHAFT THREADS
1	HDASSY-HI-PRO-08-CI~	DIS HEAD ASSY: HI-PRO; 08; CI~ 8" HI-PRO SOLE PLATE
1	HSASM15041600RH~	HEAD SHAFT ASM: 1.50 - 416 SS - RH~
1	PDV-USM125H146460P30	US,125HP,VHS,WPL,1800,460PWS,PRE
1	ASSEMBLY INSTRUCTIONS~	ASSEMBLE AS A SCVT PUMP
1	COATINGS~	COATINGS OPTIONS STD PAINT - BOWL OD STD PAINT - COLUMN OD STD PAINT - HEAD OD

Company:
Name:
Date: 12/6/2024

Q-136463-2

**Pump:**

Size: J11HC (6 stage)
Type: VERT.TURB.ENCLOSED
Synch Speed: 1800 rpm
Curve: CVJ11HC4P6CY
Specific Speeds:
Dimensions:
Vertical Turbine:
Speed: 1770 rpm
Dia: 8.46 in
Impeller: J11HC (1/16)
Ns: 2300
Nss: 7001
Suction: ---
Discharge: ---
Bowl Size: 11.1 in
Max Lateral: 1 in
Thrust K Factor: 7.9 lbf/ft

Search Criteria:

Flow: 1050 US gpm Head: 303 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP
NPSHa: ---
Temperature: 68 °F
Vapor Pressure: 0.3391 psi a
Atm Pressure: 14.7 psi a

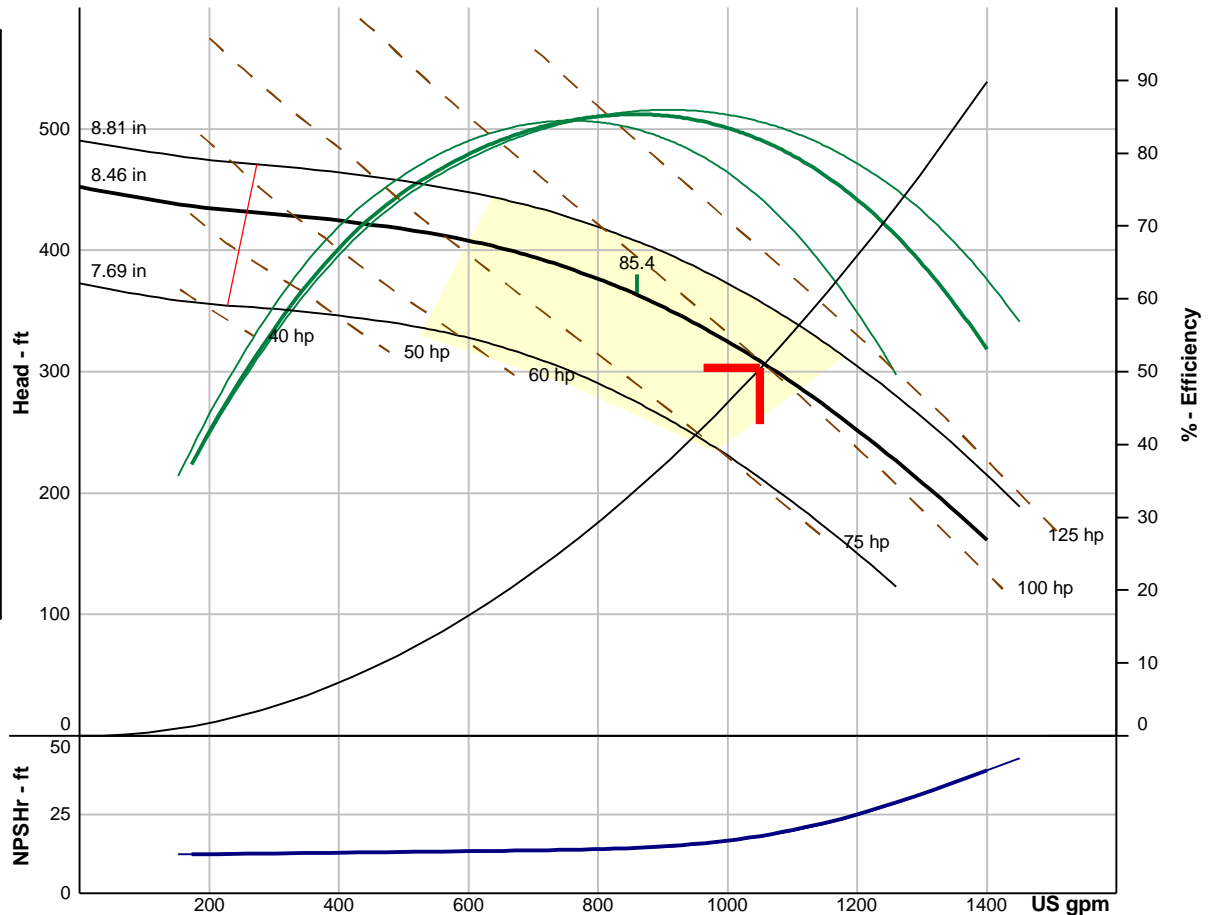
Motor:

Standard: NEMA
Enclosure: WP-I
Sizing Criteria: Max Power on Design Curve
Size: 125 hp
Speed: 1800 rpm
Frame: 405

Pump Limits:

Temperature: 180 °F
Pressure: 340 psi g
Sphere Size: 0.5 in
Power: 417 hp
Eye Area: 15.5 in²

---- Duty Point ----	
Flow:	1050 US gpm
Head:	308 ft
Eff:	82%
Power:	99.9 hp
NPSHr:	18.4 ft
---- Design Curve ----	
Shutoff Head:	453 ft
Shutoff dP:	196 psi
Min Flow:	258 US gpm
BEP:	85.4% @ 860 US gpm
NOL Power:	108 hp @ 1400 US gpm
-- Max Curve --	
Max Power:	122 hp @ 1450 US gpm

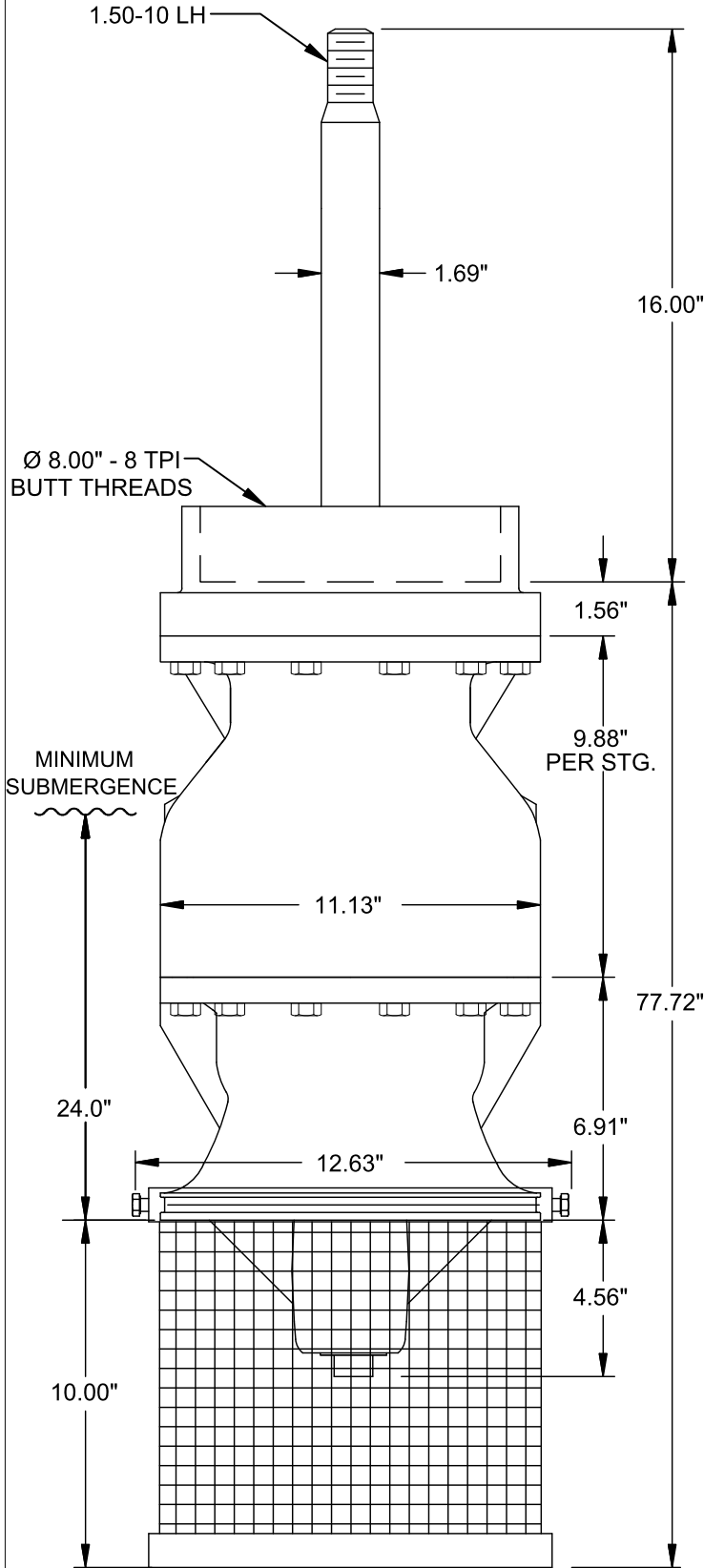


UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1260	1770	227	69	105	28.9
1050	1770	308	82	99.9	18.4
840	1770	368	85	91.4	14.4
630	1770	404	81	79.3	13.5
420	1770	423	68	65.4	13

VERTICAL TURBINE PUMP



6	STAGE	J11HC	BOWL ASSEMBLY
1050 US GPM	FLOW	303 FT.	HEAD
STRAINER	X YES	NO	TYPE BASKET

MATERIALS

BOWL CI EN
IMPELLER 876 BZ (STD); STATIC BAL.
COLUMN ADAPTER CAST IRON
SUCTION BELL/CASE CAST IRON
BOWL SHAFT 416 SS
COLLETS SS (316)
SAND COLLAR C876 BRONZE
SUCTION BEARING C89835 (STD BZ)
INTERMEDIATE BEARING C89835 (STD BZ)
TOP BEARING C89835 (STD BZ)
BOLTING SS
STRAINER 304SS
BOWL O-RING NONE
WEAR RING (B) N/A
WEAR RING (I) N/A
BOWL ID SURFACE FINISH VITREOUS ENAMEL
BOWL OD SURFACE FINISH STD PAINT - OD

PROJECT NAME:

Q-136463-2

FURNISHED BY:

BOWL WEIGHT: 710 LBS

DRAWING NOT TO SCALE.

ALL DIMENSIONS IN INCHES.

SINGLE STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196630
BUILD - 2

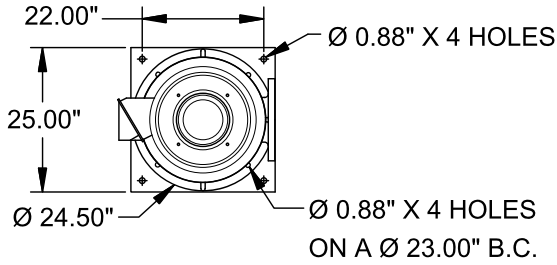
MFG. BY NATIONAL PUMP COMPANY

Quote #: Q-136463-B1

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VERTICAL TURBINE PUMP



MOTOR

MFGR US HP 125 ENCLOSURE WP1 RPM 1800
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 460 PWS
 S.F. 1.15 EFF. PRE BD 16.50" BX 1.50"
 KWT 0.38" CPLG NRR THRUST 6700 FRAME 405TP
 MODEL NO. HO125P2SLG CD 36.94"

DISCHARGE HEAD

MODEL HI-PRO (CI) W/16.5" & 20.0" BD
8" - ANSI CLASS 125-FF DISCHARGE FLANGE
X PACKING BOX STD BRZ PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY YES SOLE PLATE

COLUMN

8" X 0.277" WALL X THD N/A FLG'D
 LINESHAFT X OPEN (N/A) ENCLOSED
 SHAFT DIA 1.50" TPI 10 TPI TUBE DIA N/A

BOWL

6 STAGE J11HC BOWL ASSEMBLY
1050 US GPM FLOW 303 FT. HEAD
 STRAINER X YES NO TYPE BASKET

MATERIALS

BOWLS CI EN COLUMN A53, GR B
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI
 BWL SFT 416 SS SHAFT TUBE N/A
 COLLETS 316 SS BRG RET BZ
 BOWL BRG BOWL DWG LINE SFT BRGS RUBBER
 BOLTING SS LINE SHAFT SS (416)
 TENSION BRG N/A SHAFT SLEEVES N/A
 MECH SEAL N/A SHAFT CPLG SS (304)
 SOLE PLATE A-36 PACKING GRAPHITE
 BOWL WR N/A STRAINER 304SS
 IMP WR N/A HEAD CI
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)
 BOWL SURFACE FINISH STD PAINT; OD
 COLUMN SURFACE FINISH STD PAINT; OD
 HEAD SURFACE FINISH STD PAINT; OD

PROJECT NAME

Q-136463-2

WEIGHT & THRUST ESTIMATES

BOWL 710 LBS COLUMN 159 LBS HEAD 590 LBS
 SHAFT 36 LBS TUBE 0 LBS DRIVER 1100 LBS
 HYD THRUST 2433 LBS DRIVER MAX THRUST 6700 LBS

SPECIAL NOTE: ASSEMBLE AS A SCVT PUMP

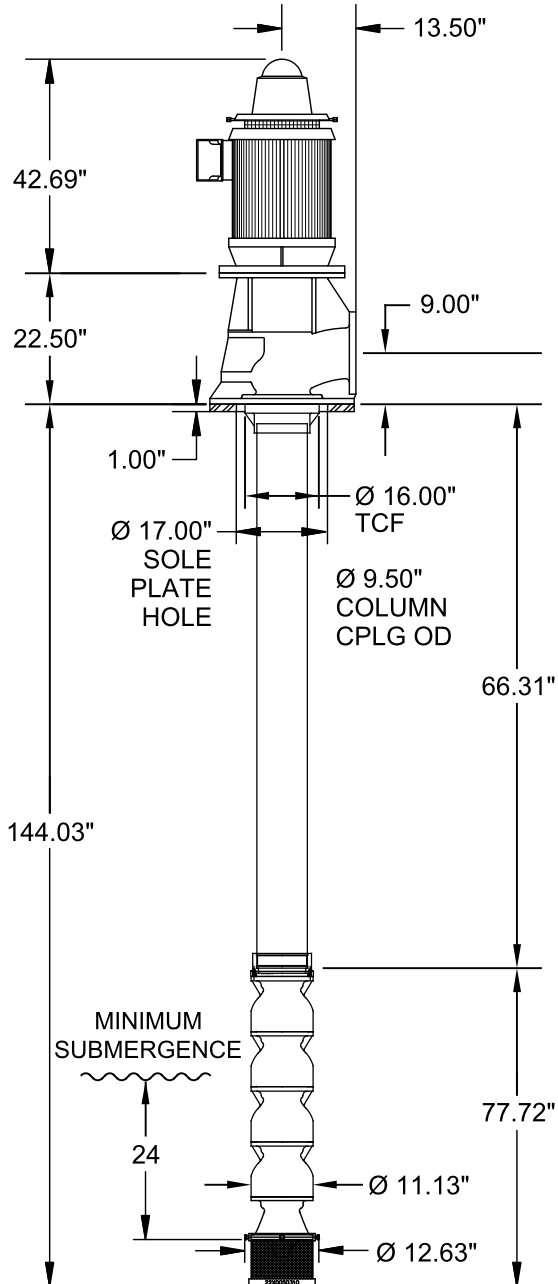
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.

FOUR STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196630

BUILD - 2



MFG. BY NATIONAL PUMP COMPANY



7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **ANTHONY RENTERIA**

anthony.renteria@natlpump.com

www.nationalpumpcompany.com

623-979-3560

PRODUCT: DSVT

CONFIGURATION NAME: Q-136463-3

CONFIGURATION SN: C-196631-B1

Flow Rate: 700 US GPM

Total Dynamic Head: 304 FT.

Fluid: WATER

Fluid Temp: 68 °F

Pump Selection Catalog: VERT.TURB.ENCLOSED

Pump Speed: 1800 RPM

Motor Selection Criteria: MAX POWER ON DESIGN CURVE

Selected Driver HP*: HP

*Selected Driver HP is based on the Driver HP selected in the configuration and may be different than the Motor HP listed on the Pump Data Sheet. Motor Enclosure is also based on the selection made in the configuration and may be different than the Motor Enclosure listed on the Pump Data Sheet.

DESCRIPTION: C-196631 - ALTERNATIVE 2: 700 GPM AT 304 FT TDH

QTY	ITEM	DESCRIPTION
1	J11LC-BA~	BWL.ASSY: J11LC~ DESIGN HP: 64.1 / NOL HP: 66.8 J11LC-06; PL.CA/SB CIEN BOWLS; 8 X 1.25-10 TPI; SS FIT IMPELLER (876 BZ) TRIM (6)(PER PUMP): 8.34 IN. SHAFT PROJECTION: 16 IN. BRG MAT: SUC: BZ; INT: BZ; TOP: BZ 11" BOLT-ON BASKET STRAINER; 304SS
1	CAPLTHD08000125E~	THD COL ASM; PL 8 X 1.25 - 416~ 12 FT. (144.00 IN.) TOTAL PUMP LENGTH MAX COL LEN: 5' TOP & BTM W / 10' INT 0.277 COLUMN WALL; 10 TPI SHAFT THREADS
1	HDASSY-HI-PRO-08-CI~	DIS HEAD ASSY: HI-PRO; 08; CI~ 8" HI-PRO SOLE PLATE
1	HSASM12541600RH~	HEAD SHAFT ASM: 1.25 - 416 SS - RH~
1	PDV-USM075H146460P30	US,75HP,VHS,WPL,1800,460PWS,PRE
1	ASSEMBLY INSTRUCTIONS~	ASSEMBLE AS A SCVT PUMP
1	COATINGS~	COATINGS OPTIONS STD PAINT - BOWL OD STD PAINT - COLUMN OD STD PAINT - HEAD OD

TOTAL PRICE EA.: \$ 24,478.13

Company:
Name:
Date: 12/6/2024

Q-136463-3



Pump:

Size: J11LC (6 stage)
Type: VERT.TURB.ENCLOSED
Synch Speed: 1800 rpm
Curve: CVJ11LC4P6CY
Specific Speeds:
Dimensions:
Vertical Turbine:
Speed: 1770 rpm
Dia: 8.34 in
Impeller: J11LC (1/16)
Ns: 2300
Nss: 6400
Suction: ---
Discharge: ---
Bowl Size: 11.1 in
Max Lateral: 1 in
Thrust K Factor: 7.9 lbf/ft

Search Criteria:

Flow: 700 US gpm Head: 304 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP
NPSHa: ---
Temperature: 68 °F
Vapor Pressure: 0.3391 psi a
Atm Pressure: 14.7 psi a

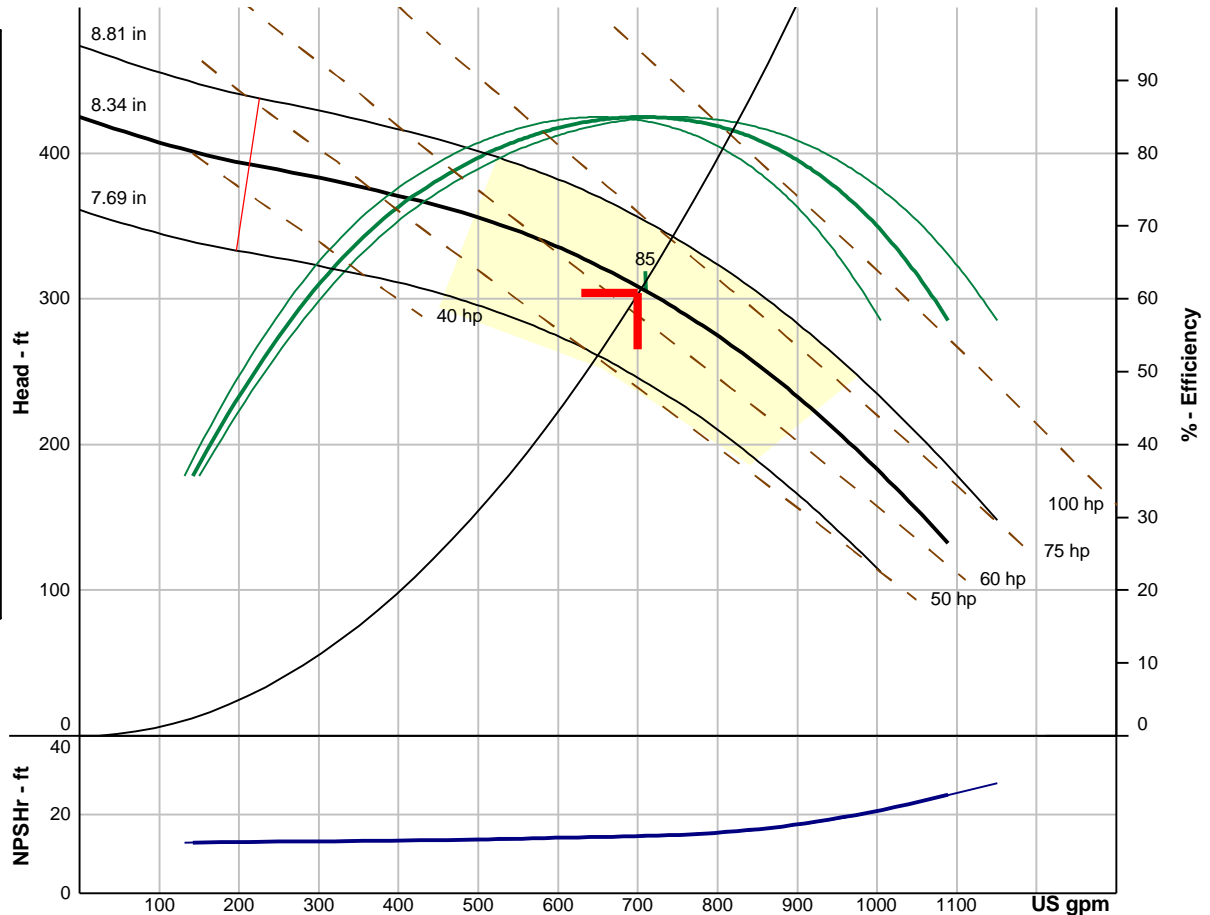
Motor:

Standard: NEMA
Enclosure: WP-I
Sizing Criteria: Max Power on Design Curve
Size: 75 hp
Speed: 1800 rpm
Frame: 365

Pump Limits:

Temperature: 180 °F
Pressure: 340 psi g
Sphere Size: 0.5 in
Power: 417 hp
Eye Area: 15.5 in²

---- Duty Point ----	
Flow:	700 US gpm
Head:	308 ft
Eff:	85%
Power:	64.1 hp
NPSHr:	14.6 ft
---- Design Curve ----	
Shutoff Head:	425 ft
Shutoff dP:	184 psi
Min Flow:	213 US gpm
BEP:	85% @ 710 US gpm
NOL Power:	66.8 hp @ 923 US gpm
-- Max Curve --	
Max Power:	78.8 hp @ 975 US gpm

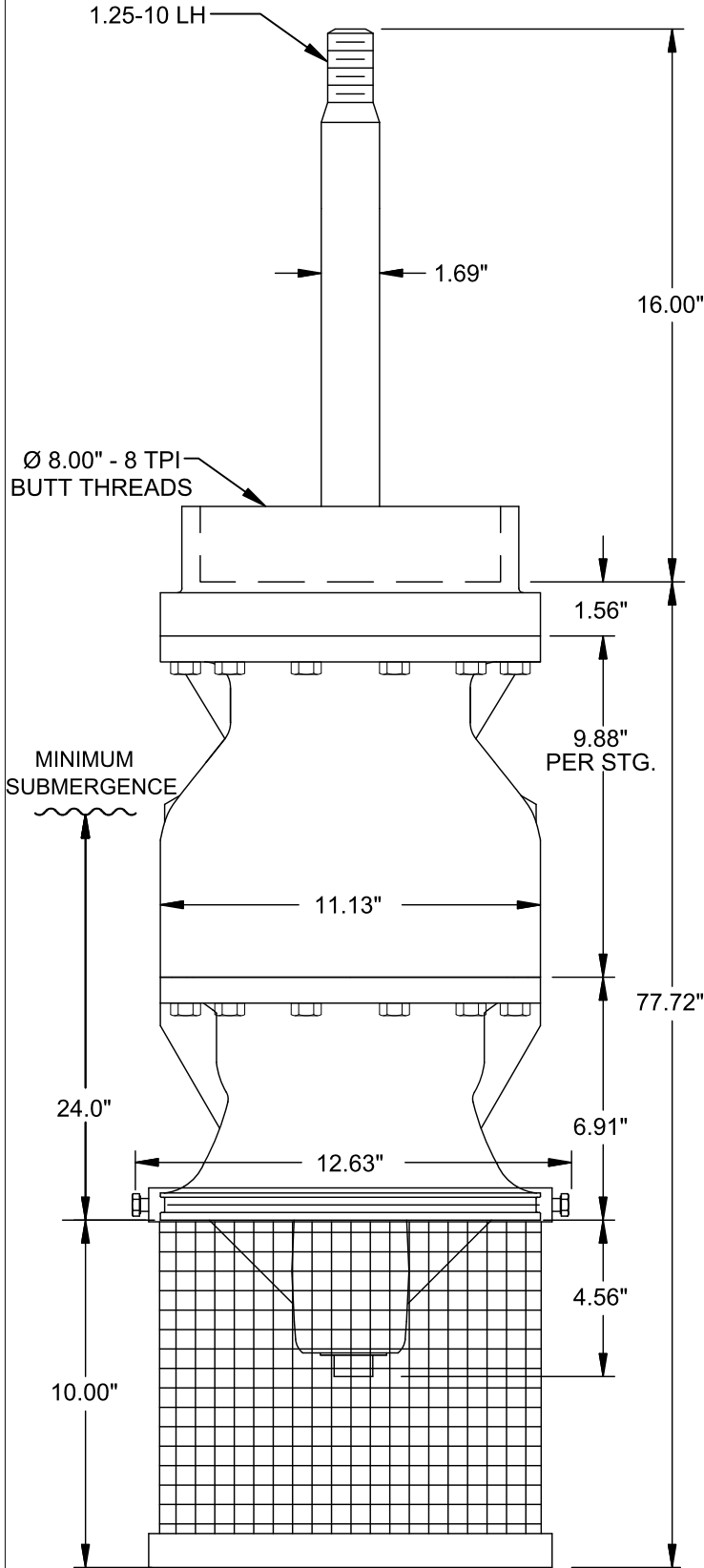


UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
840	1770	259	82	66.6	16.2
700	1770	308	85	64.1	14.6
560	1770	344	82	59.2	14
420	1770	367	73	52.6	13.5
280	1770	385	58	46	13.2

VERTICAL TURBINE PUMP



6	STAGE	J11LC	BOWL ASSEMBLY
700 US GPM	FLOW	304 FT.	HEAD
STRAINER	X YES	NO	TYPE BASKET

MATERIALS

BOWL CI EN
IMPELLER 876 BZ (STD); STATIC BAL.
COLUMN ADAPTER CAST IRON
SUCTION BELL/CASE CAST IRON
BOWL SHAFT 416 SS
COLLETS SS (316)
SAND COLLAR C876 BRONZE
SUCTION BEARING C89835 (STD BZ)
INTERMEDIATE BEARING C89835 (STD BZ)
TOP BEARING C89835 (STD BZ)
BOLTING SS
STRAINER 304SS
BOWL O-RING NONE
WEAR RING (B) N/A
WEAR RING (I) N/A
BOWL ID SURFACE FINISH VITREOUS ENAMEL
BOWL OD SURFACE FINISH STD PAINT - OD

PROJECT NAME:

Q-136463-3

FURNISHED BY:

BOWL WEIGHT: 710 LBS

DRAWING NOT TO SCALE.

ALL DIMENSIONS IN INCHES.

SINGLE STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196631
BUILD - 1

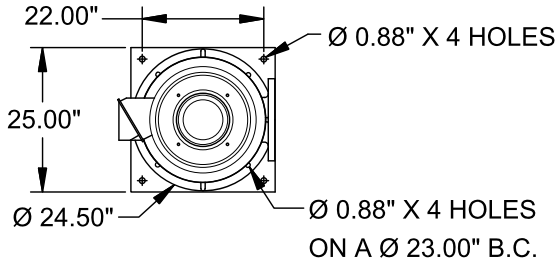
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Quote #: Q-136463-B1

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VERTICAL TURBINE PUMP



MOTOR

MFGR US HP 75 ENCLOSURE WP1 RPM 1800
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 460 PWS
 S.F. 1.15 EFF. PRE BD 16.50" BX 1.25"
 KWT 0.25" CPLG NRR THRUST 5700 FRAME 365TP
 MODEL NO. HO75P2SLG CD 31.1562"

DISCHARGE HEAD

MODEL HI-PRO (CI) W/16.5" & 20.0" BD
8" - ANSI CLASS 125-FF DISCHARGE FLANGE
X PACKING BOX STD BRZ PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY YES SOLE PLATE

COLUMN

8" X 0.277" WALL X THD N/A FLG'D
 LINESHAFT X OPEN (N/A) ENCLOSED
 SHAFT DIA 1.25" TPI 10 TPI TUBE DIA N/A

BOWL

6 STAGE J11LC BOWL ASSEMBLY
700 US GPM FLOW 304 FT. HEAD
 STRAINER X YES NO TYPE BASKET

MATERIALS

BOWLS CI EN COLUMN A53, GR B
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI
 BWL SFT 416 SS SHAFT TUBE N/A
 COLLETS 316 SS BRG RET BZ
 BOWL BRG BOWL DWG LINE SFT BRGS RUBBER
 BOLTING SS LINE SHAFT SS (416)
 TENSION BRG N/A SHAFT SLEEVES N/A
 MECH SEAL N/A SHAFT CPLG SS (304)
 SOLE PLATE A-36 PACKING GRAPHITE
 BOWL WR N/A STRAINER 304SS
 IMP WR N/A HEAD CI
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)
 BOWL SURFACE FINISH STD PAINT; OD
 COLUMN SURFACE FINISH STD PAINT; OD
 HEAD SURFACE FINISH STD PAINT; OD

PROJECT NAME

Q-136463-3

WEIGHT & THRUST ESTIMATES

BOWL 710 LBS COLUMN 159 LBS HEAD 590 LBS
 SHAFT 25 LBS TUBE 0 LBS DRIVER 700 LBS
 HYD THRUST 2433 LBS DRIVER MAX THRUST 5700 LBS

SPECIAL NOTE: ASSEMBLE AS A SCVT PUMP

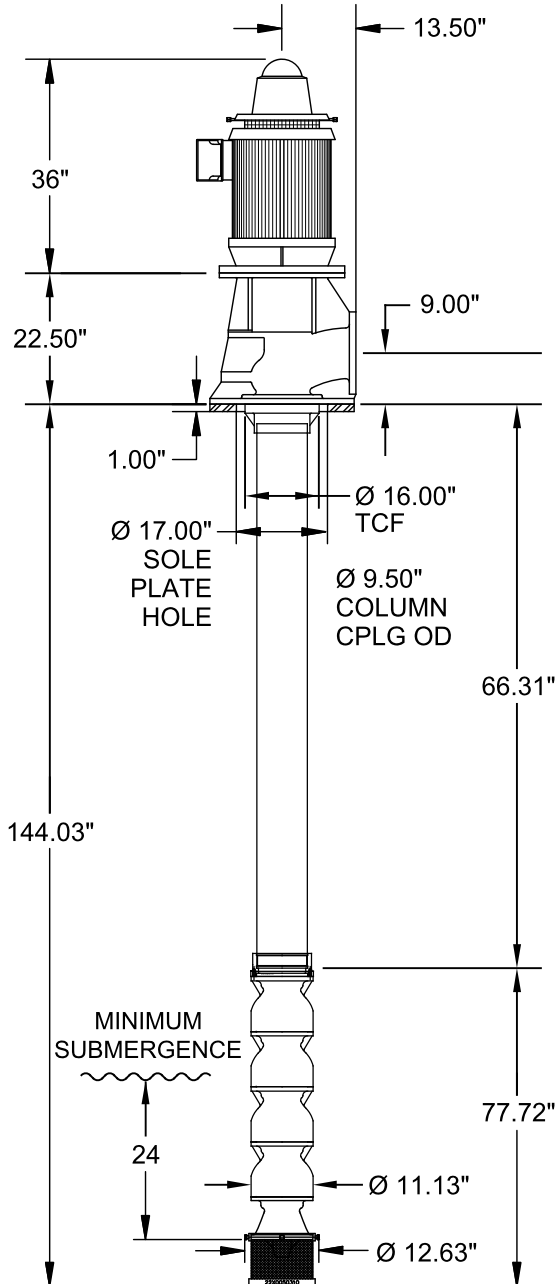
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.

FOUR STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196631

BUILD - 1



MFG. BY NATIONAL PUMP COMPANY



7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **ANTHONY RENTERIA**

anthony.renteria@natlpump.com

www.nationalpumpcompany.com

623-979-3560

PRODUCT: DSVT

CONFIGURATION NAME: Q-136463-4

CONFIGURATION SN: C-196632-B1

Flow Rate: 1050 US GPM

Total Dynamic Head: 325 FT.

Fluid: WATER

Fluid Temp: 68 °F

Pump Selection Catalog: VERT.TURB.ENCLOSED

Pump Speed: 1800 RPM

Motor Selection Criteria: MAX POWER ON DESIGN CURVE

Selected Driver HP*: HP

**Selected Driver HP is based on the Driver HP selected in the configuration and may be different than the Motor HP listed on the Pump Data Sheet. Motor Enclosure is also based on the selection made in the configuration and may be different than the Motor Enclosure listed on the Pump Data Sheet.*

DESCRIPTION: C-196632 - ALTERNATIVE 2: FUTURE CONDITION 1050 @ 325 TDH

QTY	ITEM	DESCRIPTION
1	J11HC-BA~	BWL.ASSY: J11HC~ DESIGN HP: 104 / NOL HP: 112 J11HC-06; PL.CA/SB CIEN BOWLS; 8 X 1.50-10 TPI; SS FIT IMPELLER (876 BZ) TRIM (2)(PER PUMP): FULL IMPELLER (876 BZ) TRIM (4)(PER PUMP): 8.46 IN. SHAFT PROJECTION: 16 IN. BRG MAT: SUC: BZ; INT: BZ; TOP: BZ 11" BOLT-ON BASKET STRAINER; 304SS
1	CAPLTHD08000150E~	THD COL ASM; PL 8 X 1.50 - 416~ 12 FT. (144.00 IN.) TOTAL PUMP LENGTH MAX COL LEN: 5' TOP & BTM W / 10' INT 0.277 COLUMN WALL; 10 TPI SHAFT THREADS
1	HDASSY-HI-PRO-08-CI~	DIS HEAD ASSY: HI-PRO; 08; CI~ 8" HI-PRO SOLE PLATE
1	HSASM15041600RH~	HEAD SHAFT ASM: 1.50 - 416 SS - RH~
1	PDV-USM125H146460P30	US,125HP,VHS,WPL,1800,460PWS,PRE
1	ASSEMBLY INSTRUCTIONS~	ASSEMBLE AS A SCVT PUMP
1	COATINGS~	COATINGS OPTIONS STD PAINT - BOWL OD STD PAINT - COLUMN OD STD PAINT - HEAD OD

Company:
Name:
Date: 12/6/2024

Q-136463-4



Pump:

Size: J11HC (6 stage)
Type: VERT.TURB.ENCLOSED
Synch Speed: 1800 rpm
Curve: CVJ11HC4P6CY
Specific Speeds:
Dimensions:
Vertical Turbine:
Speed: 1770 rpm
Dia: 8.58 in
Impeller: J11HC (1/16)
Ns: 2300
Nss: 7001
Suction: ---
Discharge: ---
Bowl Size: 11.1 in
Max Lateral: 1 in
Thrust K Factor: 7.9 lbf/ft

Search Criteria:

Flow: 1050 US gpm Head: 325 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP
NPSHa: ---
Temperature: 68 °F
Vapor Pressure: 0.3391 psi a
Atm Pressure: 14.7 psi a

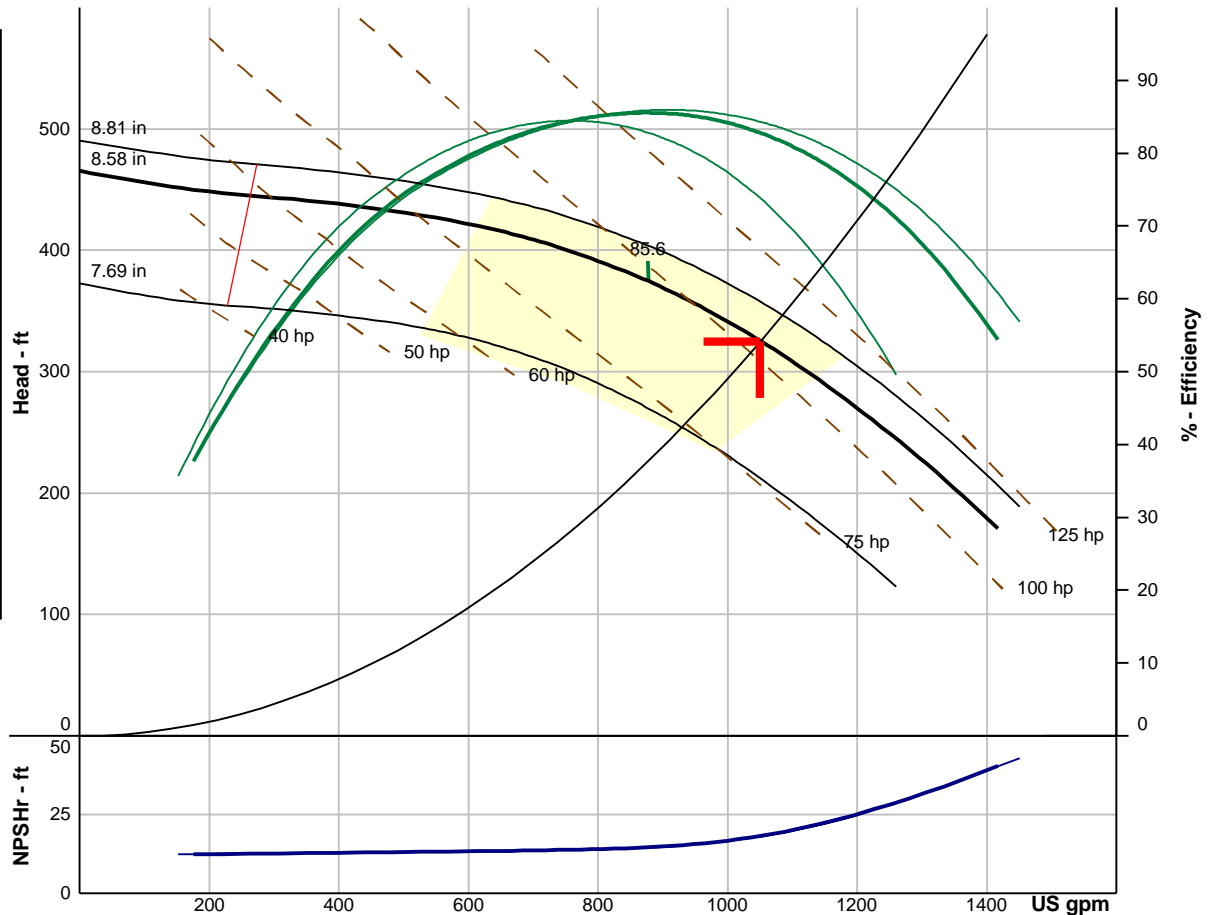
Motor:

Standard: NEMA
Enclosure: WP-I
Sizing Criteria: Max Power on Design Curve
Size: 125 hp
Speed: 1800 rpm
Frame: 405

Pump Limits:

Temperature: 180 °F
Pressure: 340 psi g
Sphere Size: 0.5 in
Power: 417 hp
Eye Area: 15.5 in²

---- Duty Point ----	
Flow:	1050 US gpm
Head:	326 ft
Eff:	83%
Power:	104 hp
NPSHr:	18.3 ft
---- Design Curve ----	
Shutoff Head:	466 ft
Shutoff dP:	202 psi
Min Flow:	263 US gpm
BEP:	85.6% @ 877 US gpm
NOL Power:	112 hp @ 1417 US gpm
-- Max Curve --	
Max Power:	122 hp @ 1450 US gpm

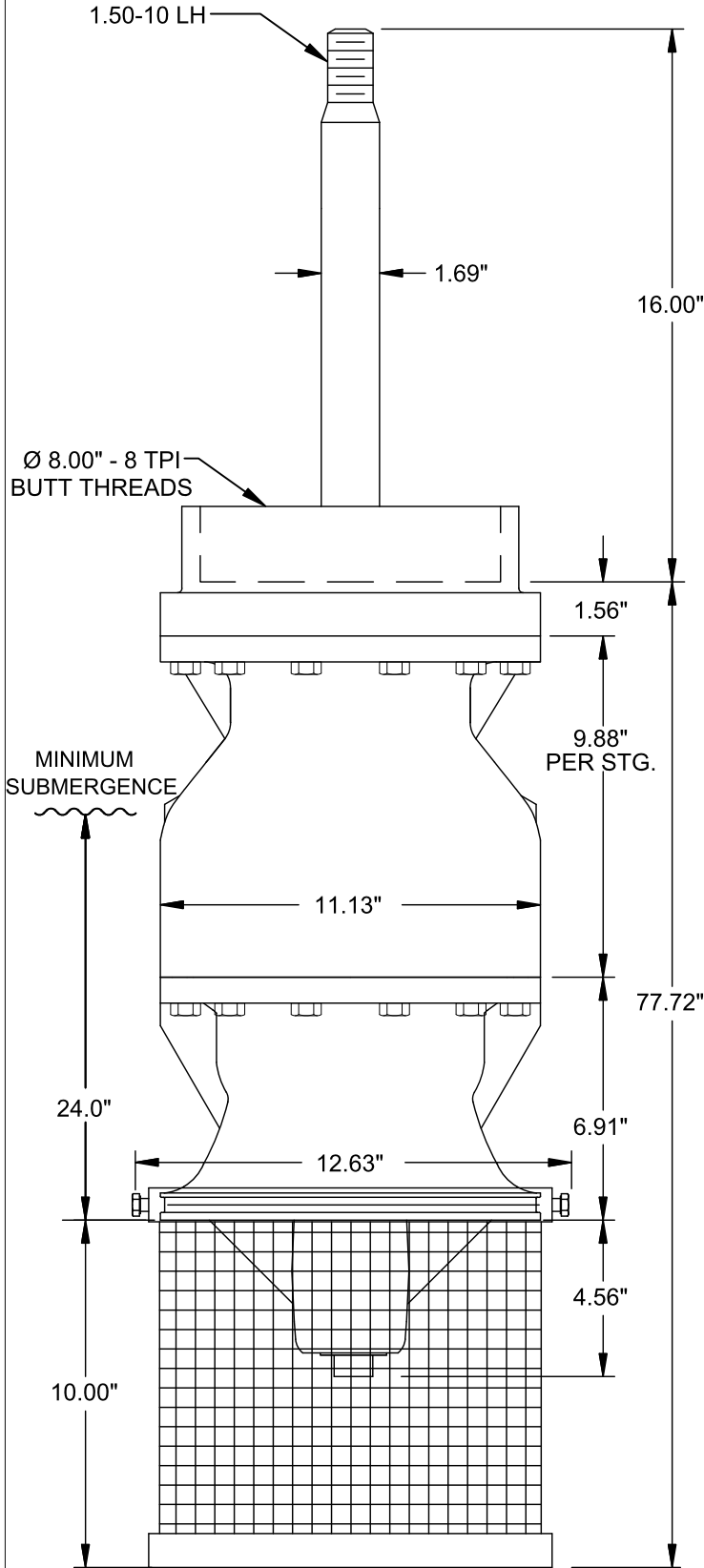


UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1260	1770	244	71	110	29.1
1050	1770	326	83	104	18.3
840	1770	383	85	94.9	14.4
630	1770	418	81	82.2	13.5
420	1770	437	68	67.8	13

VERTICAL TURBINE PUMP



6	STAGE	J11HC	BOWL ASSEMBLY
1050 US GPM	FLOW	325 FT.	HEAD
STRAINER	X YES	NO	TYPE BASKET

MATERIALS

BOWL CI EN
IMPELLER 876 BZ (STD); STATIC BAL.
COLUMN ADAPTER CAST IRON
SUCTION BELL/CASE CAST IRON
BOWL SHAFT 416 SS
COLLETS SS (316)
SAND COLLAR C876 BRONZE
SUCTION BEARING C89835 (STD BZ)
INTERMEDIATE BEARING C89835 (STD BZ)
TOP BEARING C89835 (STD BZ)
BOLTING SS
STRAINER 304SS
BOWL O-RING NONE
WEAR RING (B) N/A
WEAR RING (I) N/A
BOWL ID SURFACE FINISH VITREOUS ENAMEL
BOWL OD SURFACE FINISH STD PAINT - OD

PROJECT NAME:

Q-136463-4

FURNISHED BY:

BOWL WEIGHT: 710 LBS

DRAWING NOT TO SCALE.

ALL DIMENSIONS IN INCHES.

SINGLE STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-196632
BUILD - 1

MFG. BY NATIONAL PUMP COMPANY

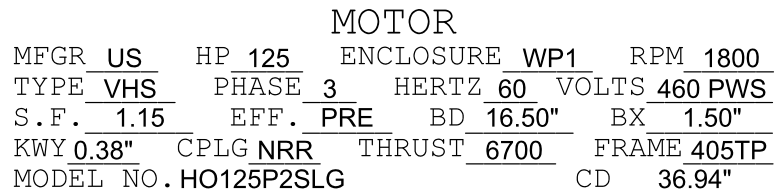
Quote #: Q-136463-B1

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NATIONAL PUMP COMPANY
A GORMAN-RUPP COMPANY



MODEL	HI-PRO (CI) W/16.5" & 20.0" BD		
8"	- ANSI CLASS 125-FF DISCHARGE FLANGE		
X	PACKING BOX	STD BRZ	PACKING GLAND
N/A	MECHANICAL SEAL		N/A
N/A	TENSION ASSEMBLY		YES SOLE PLATE

8" X	0.277" WALL	X THD	N/A FLG'D
LINESHAFT	X OPEN	(N/A)	ENCLOSED
SHAFT DIA	1.50" TPI 10 TPI	TUBE DIA	N/A

6 STAGE		J11HC		BOWL ASSEMBLY	
1050 US GPM		FLOW		325 FT. HEAD	
STRAINER	X	YES	NO	TYPE	BASKET

BOWLS	CI EN	COLUMN	A53, GR B
IMPELLERS	876 BZ (STD)	COLUMN	CPLG DI
BWL SFT	416 SS	SHAFT TUBE	N/A
COLLETS	316 SS	BRG RET	BZ
BOWL BRG	BOWL DWG	LINE SFT BRGS	RUBBER
BOLTING	SS	LINE SHAFT	SS (416)
TENSION BRG	N/A	SHAFT SLEEVES	N/A
MECH SEAL	N/A	SHAFT CPLG	SS (304)
SOLE PLATE	A-36	PACKING	GRAPHITE
BOWL WR	N/A	STRAINER	304SS
IMP WR	N/A	HEAD	CI
HEAD SHAFT	416 SS	HEAD SHAFT CPG	SS (304)
BOWL SURFACE FINISH		STD PAINT; OD	
COLUMN SURFACE FINISH		STD PAINT; OD	
HEAD SURFACE FINISH		STD PAINT; OD	

C-196632
BUILD - 1

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TERMS AND CONDITIONS OF SALE

The following general Terms and Conditions of Sale (the “Terms”) are applicable to the provision of all goods supplied and/or services rendered (“Goods”) by National Pump Company (“Seller”) to any purchaser thereof (“Buyer”).

1. **GENERAL.** These Terms, together with any quotation, proposal, acknowledgement or invoice from Seller, constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods by Seller to Buyer, unless otherwise agreed by Seller in writing. These Terms supersede all other communications, negotiations, and all prior oral or written statements, regarding the subject matter hereof.

If an order for Goods (“Order”) is deemed to be an offer by Buyer, then Seller’s acceptance of such offer is expressly conditioned on Buyer’s assent to the Terms. Any additional, different or conflicting terms proposed by Buyer in any Order, acceptance, confirmation, specifications or otherwise are hereby rejected and objected to by Seller and will not be binding in any way on Seller. Seller reserves the right in its sole discretion to refuse Orders.

2. **WARRANTY; LIMITATION OF REMEDY.** Seller warrants that its manufactured Goods are free from defects in workmanship and meet Seller’s specifications at the time of shipment (under the conditions of proper storage and installation, normal use, and regular service and maintenance) for a period of 12 months from the date of shipment of the goods by Seller or 18 months from the date of manufacture of the goods by Seller, whichever occurs sooner. All claims under this warranty with respect to any Goods must be made in writing and delivered to Seller within 30 days after the defect is discovered (or should have been discovered).

Seller’s obligation under this warranty is expressly limited to replacing or repairing, free of charge, F.O.B. point of manufacture, any defective part of its manufactured Goods; however, Seller shall have no liability except where it is shown to the satisfaction of Seller that the defect resulted from breach of this warranty. All parts claimed defective must be delivered to Seller, freight or express prepaid, unless otherwise agreed by Seller in writing.

Seller’s warranty does not cover those parts of its manufactured Goods that are not manufactured by Seller except to the extent that the seller of such parts extended its warranty to Seller as the purchaser of such parts.

SELLER MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER’S PRODUCTS ARE SPECIFICALLY DESIGNED

AND/OR MANUFACTURED BY SELLER FOR BUYER’S PURPOSE OR USE.

IT IS EXPRESSLY AGREED THAT THE ABOVE STATES BUYER’S EXCLUSIVE REMEDY for any breach of warranty and for any claim for personal injury, property damage or commercial loss, whether sounding in contract, tort, strict liability or negligence based on any defect in such Goods.

3. **LIMITATION OF LIABILITY.** IN NO EVENT SHALL SELLER BE LIABLE, WHETHER BY WAY OF INDEMNITY OR BREACH OF CONTRACT OR STATUTORY DUTY OR REASON OF TORT, FOR ANY LIQUIDATED, DIRECT, INDIRECT, SPECIAL, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR EXEMPLARY DAMAGES OR LOSS OF PROFIT, SAVINGS, REVENUE, INCOME, BUSINESS, PRODUCTION, OPPORTUNITY OR REPUTATION ARISING OUT OF OR RELATED TO THE ORDER OR THE GOODS WHETHER FORESEEABLE OR UNFORESEEABLE OR KNOWN OR UNKNOWN. The foregoing limitation of liability shall be effective without regard to Seller’s acts or omissions or negligence or strict liability in performance or non-performance hereunder.

Except as otherwise provided by law, in no event shall Seller’s liability under any Order or these Terms exceed the amount paid by Buyer under such related Order.

4. **DELIVERY; LIMITATION OF LIABILITY AND REMEDY.** Unless otherwise specified on any Order or as agreed by Seller in writing, all shipments are F.O.B. Seller’s plant and all risk of loss with respect to any Goods shipped shall pass to Buyer when such Goods are delivered to the carrier at Seller’s plant. Shipping dates are approximate and are based upon the prompt receipt of all necessary information. Seller shall not be liable for damages or delays in delivery or failure to manufacture or deliver due, directly or indirectly, to (a) causes beyond its reasonable control; (b) acts of God, acts of Buyer, acts of any civil or military authority, fires, labor disputes, earthquakes, floods or other weather conditions, accidents, epidemics, wars, riots or other civil disturbances, or delays in transportation; or (c) delays or defaults by Seller’s suppliers or subcontractors or other inability to obtain necessary labor, fuel, materials, components or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

Delivery dates cannot be altered by Buyer without Seller’s written consent. Any extension of the delivery date by Buyer will be subject to storage charges as determined by

Seller, interest charges as set forth below, and any applicable price increases.

Goods produced by Seller in compliance with the Order requirements which cannot be shipped solely due to missing information from Buyer, including but not limited to carrier arrangements, will be charged an additional 10% of the Order value within 5 business days after Seller notifies Buyer of same.

5. **PRICE AND PAYMENT.** The price of Goods sold shall be Seller's price in effect for such Goods on the date of shipment of such Goods. Unless otherwise agreed by Seller in writing, prices quoted do not include freight, insurance, installation costs, special packaging or any sales, use, excise, VAT or similar taxes. Taxes imposed by any federal, state, county, city or municipal law on the Goods will be added to the invoice unless a fully completed and executed tax exemption certificate is received by Seller with the Order. Unless otherwise agreed by Seller in writing, payment terms are net thirty (30) days from the date of Seller's invoice in U.S. dollars. BUYER SHALL PAY A LATE CHARGE OF ONE AND ONE-HALF PERCENT (1.5%) PER MONTH ON ALL AMOUNTS NOT PAID WHEN DUE. Buyer waives its right to set-off against claims it may have against Seller and acknowledges that it may not suspend its payment obligations to Seller.

Seller reserves the right to withhold shipment or to require other adequate assurances of performance of Buyer's payment obligations as Seller in its discretion may require, notwithstanding any Order confirmation issued by Seller. Buyer shall be liable for all expenses, including attorneys' fees, relating to the collection of past due amounts.

6. **SECURITY INTEREST.** Buyer hereby grants Seller a security interest in and a lien upon all Goods sold to Buyer by Seller and the proceeds therefor (including any insurance proceeds), which security interest shall continue until all such Goods are fully paid for in immediately available funds. Buyer, upon Seller's demand, will execute and deliver to Seller such instruments as Seller requests to protect and perfect such security interest. Buyer shall have no right to sell, encumber or dispose of the Goods until Seller receives full payment for such Goods.

7. **CANCELLATION; RETURN OF GOODS.** Buyer may not cancel any Order except upon reasonable advance written notice and upon payment to Seller of Seller's cancellation fee, which shall include all costs and expenses incurred by Seller prior to the receipt of the cancellation notice including, but not limited to, all commitments to its suppliers and subcontractors, all fully burdened labor and overhead expended by Seller, and a reasonable profit charge. Seller's determination of such cancellation fee shall be conclusive.

Return of Goods shall be in accordance with Seller's most current return authorization process and shall be subject to a minimum fifteen percent (15%) restocking fee.

8. **SUBSTITUTION.** Seller reserves the right to substitute materials and/or modify specifications of an Order to the extent required to comply with any governmental law or regulation.

9. **AMENDMENTS; CHANGES.** The Terms may be amended, modified or waived only as agreed by Seller and Buyer in writing. No changes to an Order may be made by Buyer unless approved by Seller in writing.

10. **FAIR LABOR STANDARDS.** Seller represents that any Goods to be delivered hereunder will be produced in compliance with the requirements of the Fair Labor Standards Act of 1938, as amended.

11. **EXPORT REGULATIONS.** The marketing, sale, use, export and release of the Goods are subject to applicable export laws and regulations of the United States and other countries. Buyer agrees to comply with all such applicable laws and regulations, including without limitation, U.S. Export Administration Regulations, regulations of the U.S. Office of Foreign Asset Control, the U.S. Foreign Corrupt Practices Act and comparable laws and regulations of other countries. Buyer shall be responsible for any breach of this Section.

12. **GOVERNING LAW.** These Terms and any Order hereunder shall be construed in accordance with the laws of the State of Ohio, without regard to conflicts of law principles. Any dispute arising hereunder shall be resolved in the federal or state courts of the State of Ohio, as applicable. The rights and obligations of Seller and Buyer shall not be governed by the U.N. Convention on Contracts for the International Sale of Goods.

13. **WAIVER OF JURY TRIAL. EACH OF SELLER AND BUYER IRREVOCABLY WAIVES ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL PROCEEDING ARISING OUT OF OR RELATED TO THESE TERMS OR ANY ORDER HEREUNDER.**

14. **MISCELLANEOUS.** The section titles in these Terms are for reference only and shall not limit or restrict the interpretation or construction of the Terms. Seller's failure to insist, in any one or more instances, upon Buyer's performance of any of the Terms, or to exercise any rights conferred by the Terms, shall not constitute a waiver of any such right to insist upon such performance or exercise such rights in the future. The partial or complete invalidity of any one or more provisions of these Terms shall not affect the validity or continuing force and effect of any other provision.



7706 NORTH 71ST AVE
GLENDALE, AZ 85303

QUOTATION

Quote Prepared by: **ANTHONY RENTERIA**

anthony.renteria@natlpump.com

www.nationalpumpcompany.com

623-979-3560

NATIONAL PUMP COMPANY CONTACTS

MISSISSIPPI

11176 Green Valley Drive
Olive Branch, MS 38654
Toll free: (866) 668-4914
Phone: (662) 895-1110
Fax: (622) 895-5083

APPLICATIONS / CUSTOMER SERVICE

Customer Service	Gayle Spencer	Gayle.Spencer@natlpump.com
Customer Service	Amanda Muncey	Amanda.Muncey@natlpump.com
Application Engineer	Anthony Renteria	Anthony.Renteria@natlpump.com
National Customer Service Manager	Greg Gountanis	Greg.Gountanis@natlpump.com

SALES

Regional Sales Manager		
National Sales Manager	Alan Hummer	alan.hummer@natlpump.com

OPERATIONS

Branch Manager	Cliff Mishoe	Cliff.Mishoe@natlpump.com
----------------	--------------	--

APPENDIX E – RAW WATER PUMP SELECTIONS

Company: PPC

Name:

Date: 8/20/2024

**Pump:**

Size: 8x6 MJ-A
 Type: HSC
 Synch speed: 1800 rpm
 Curve: 6MJ-A
 Specific Speeds:
 Dimensions:

Speed: 1770 rpm
 Dia: 9.25 in
 Impeller: B-6892
 Ns: 1945
 Nss: ---
 Suction: 8 in
 Discharge: 6 in

Pump Limits:

Temperature: 200 °F
 Pressure: 175 psi g
 Sphere size: 1 in

Power: ---
 Eye area: ---

Pump Selection Warnings:

Secondary operating point is not within the selection window.

Search Criteria:

Flow: 1042 US gpm
 Head: 75 ft
 Secondary Operating Point: 694 US gpm, 42 ft

Fluid:

Water
 Density: 62.32 lb/ft³
 Viscosity: 0.9946 cP
 NPSHa: ---

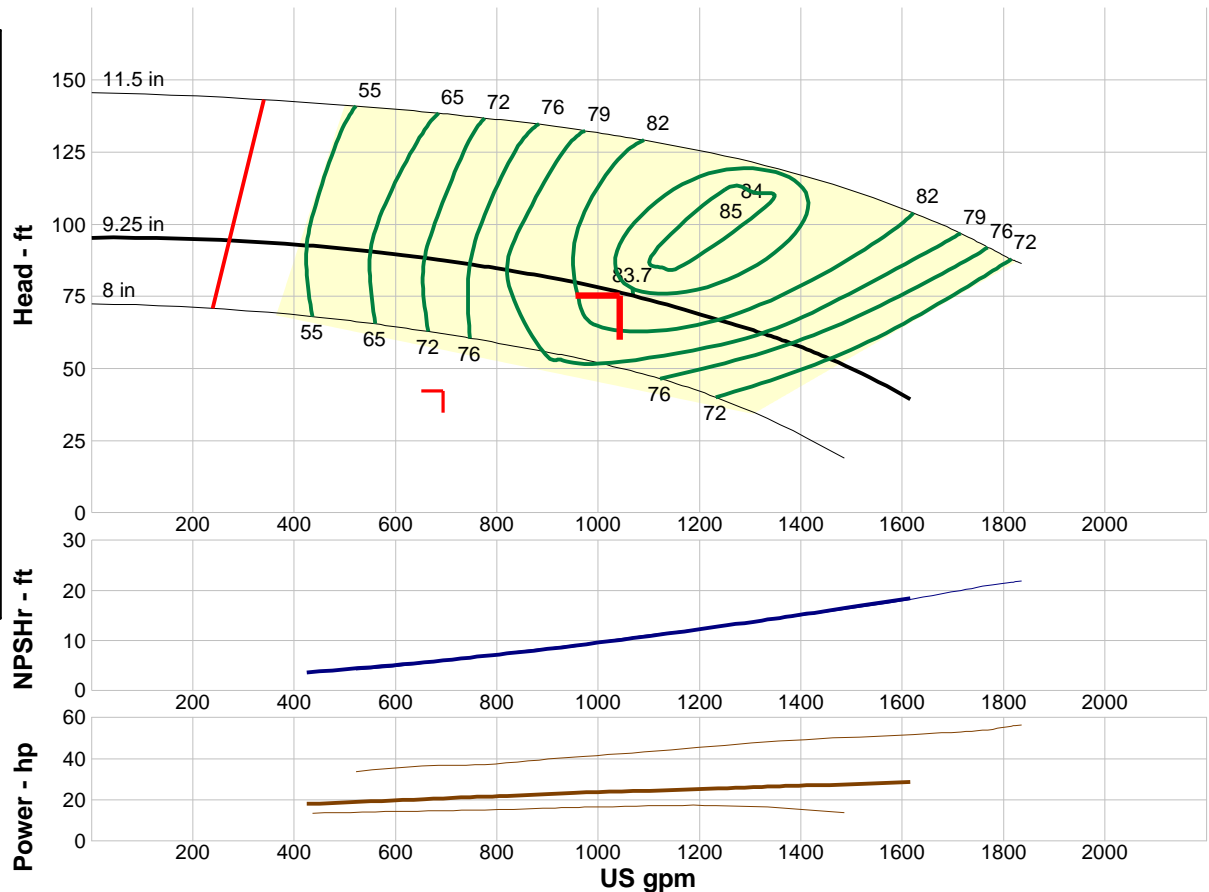
Temperature: 68 °F
 Vapor pressure: 0.3391 psi a
 Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
 Enclosure: TEFC
 Sizing criteria: Max Power on Design Curve

Size: 30 hp
 Speed: 1800
 Frame: 286T

---- Data Point ----	
Flow:	1042 US gpm
Head:	76.3 ft
Eff:	83.3%
Power:	24.1 hp
NPSHr:	10.1 ft
---- Design Curve ----	
Shutoff head:	95.4 ft
Shutoff dP:	41.3 psi
Min flow:	267 US gpm
BEP:	83.7% @ 1068 US gpm
NOL power:	28.9 hp @ 1615 US gpm
-- Max Curve --	
Max power:	56.4 hp @ 1834 US gpm



In accordance with the Hydraulic Institute Standards, pump is guaranteed for one set of conditions. Performance guarantees are based on shop test and when handling clear, cold, fresh water at sea level and at a temperature no greater than 85 degrees F. Suction lift must not exceed that shown on curve.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1250	1770	66.2	81.5	25.6	13
1042	1770	76.3	83.3	24.1	10.1
834	1770	83.6	79.3	22.2	7.59
625	1770	89	69.9	20	5.39
417	1770	92.7	54.5	18	3.64



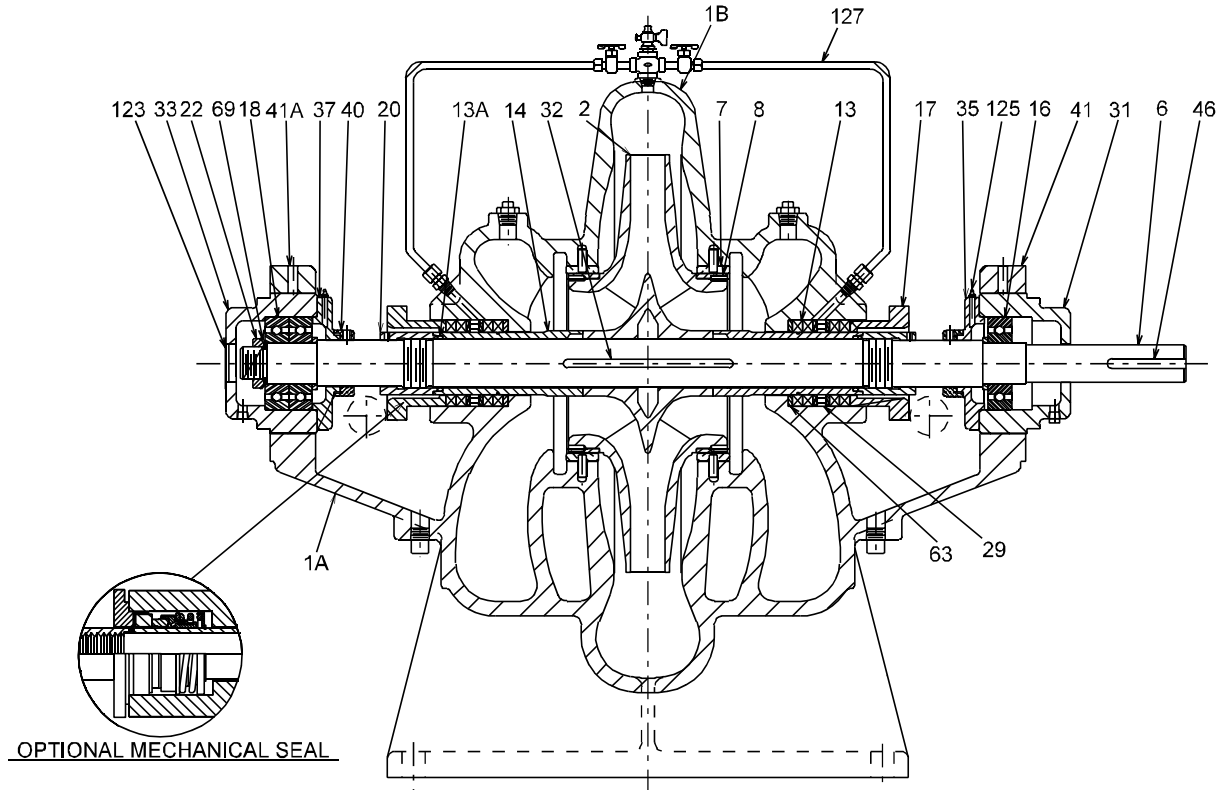
Toccoa, Georgia
U.S.A.

8 x 6 MI SPLIT CASE PUMP

SECTION A6

PAGE 13

DATE: JAN. 2,2000



FEATURES:

- REPLACEABLE PACKING BOX BUSHING PROVIDED TO PROTECT CASING FROM PACKING WEAR
- MACHINED MOUNTING SURFACES
- DEFLECTORS PROVIDED TO PREVENT PRODUCT FROM ENTERING BEARING HOUSINGS
- CASING RINGS PROVIDED TO PROTECT CASING FROM WEAR
- HYDROSTATICALLY TESTED TO 1 1/2 TIMES SHUT-OFF
- INTEGRALLY CAST BEARING SUPPORTS
- CONVERSION FROM PACKING TO MECHANICAL SEALS WITHOUT ADDITIONAL MACHINING
- INTEGRALLY CAST PACKING BOXES
- PREDRILLED AND TAPPED PACKING BOX DRIP POCKETS FOR REMOVAL OF PACKING BOX LEAKAGE
- DYNAMICALLY BALANCED IMPELLER
- SHAFT SLEEVES LOCKED AGAINST ROTATION BY IMPELLER KEY

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1A	LOWER CASING	Cast Iron - ASTM A48-CL40	31	INBOARD BRG HOUSING	Cast Iron - ASTM A48-CL30
1B	UPPER CASING	Cast Iron - ASTM A48-CL40	32	IMPELLER KEY	Stainless Steel - AISI 304
2	IMPELLER	Bronze - ASTM B584- 875	33	OUTBOARD BRG HSG	Cast Iron - ASTM A48-C30
6	SHAFT	Alloy Steel - AISI 1141	35	INBOARD BRG COVER	Cast Iron - ASTM A48-C30
7	CASING RING	Bronze - ASTM B505-927	37	OUTBOARD BRG COVER	Cast Iron - ASTM A48-CL30
8	IMPELLER RING	Bronze - ASTM B505-932	40	DEFLECTOR	Aluminum
13	PACKING	Graphite Impregnated Fiber	41	INBOARD BEARING CAP	Cast Iron - ASTM A48-CL30
13A	SHAFT SLEEVE O-RING	Nitrile	41A	OUTBOARD BEARING CAP	Cast Iron - ASTM A48-CL30
14	SHAFT SLEEVE	Bronze - ASTM B505-954	46	COUPLING KEY	Steel - ASTM A108-1018
16	INBOARD BEARING	Single Row Ball - Mfg. Standard	63	STUFFING BOX BUSHING	Bronze - ASTM B505-932
17	PACKING GLAND	Bronze - ASTM B584-836	68	SHAFT COLLAR	Steel - ASTM A108-1018
18	OUTBOARD BEARING	Back-to-Back Ball - Mfg. Standard	69	BEARING LOCKWASHER	Steel - Mfg. Standard
20	SHAFT SLEEVE NUT	Bronze - ASTM B505-932	123	BEARING END COVER	Steel - Mfg. Standard
22	BEARING LOCKNUT	Steel - Mfg. Standard	125	GREASE FITTING	Steel - Mfg. Standard
29	LANTERN RING	Teflon	127	SEAL WATER PIPING	Copper Tubing



Toccoa, Georgia
U.S.A.

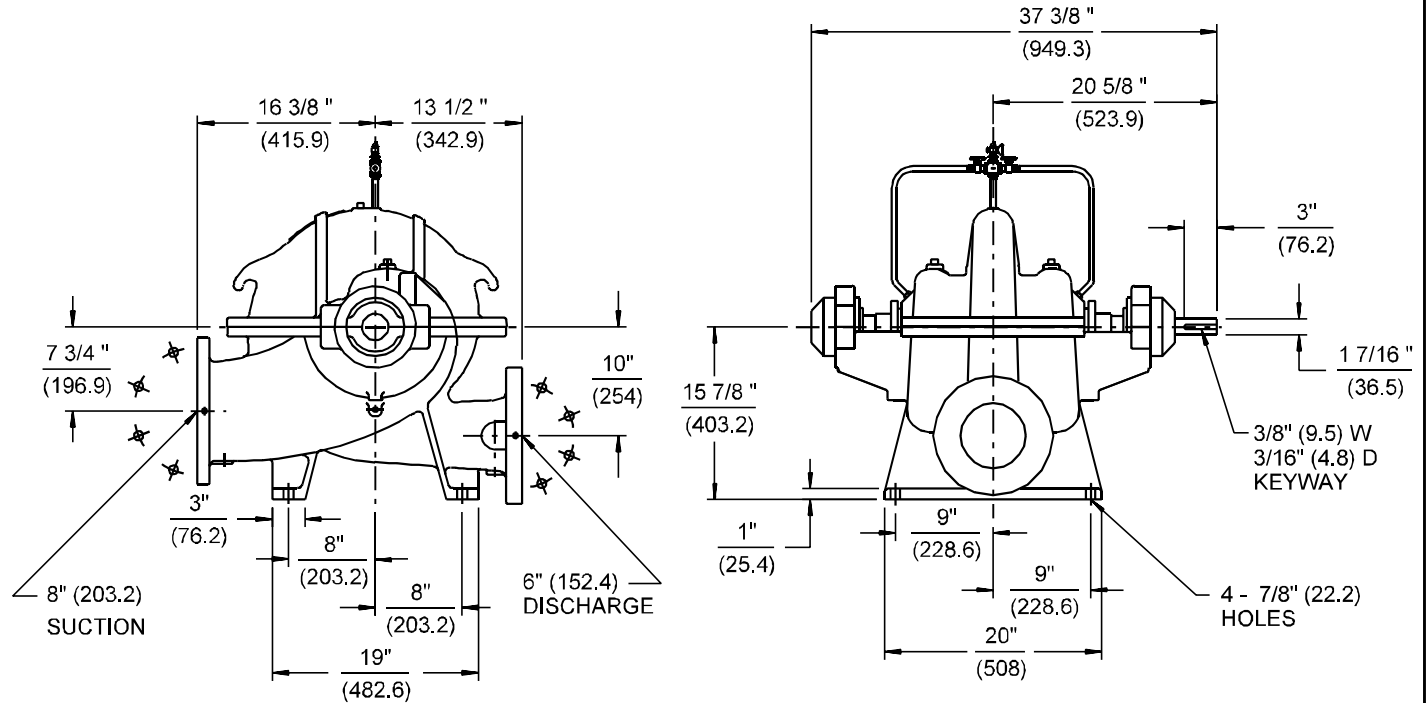
8 x 6 MI SPLIT CASE PUMP

SECTION A6

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DATE: JAN. 2, 2000

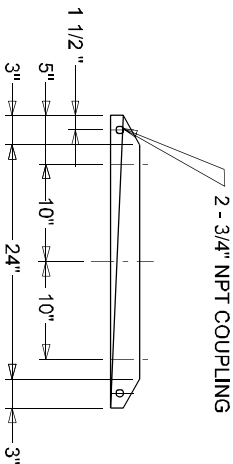
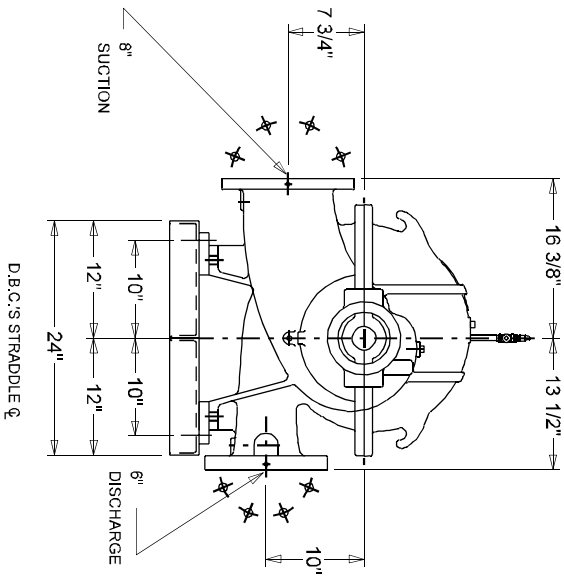
HOLES	SUCTION					DISCHARGE				
	O.D.	THK.	HOLES	SIZE	D.B.C.	O.D.	THK.	HOLES	SIZE	D.B.C.
125# FLANGE	13 1/2" (342.9)	1 1/8" (28.6)	8	7/8" (22.2)	11 3/4" (298.5)	11 1/4" (285.8)	1" (25.4)	8	7/8" (22.2)	9 1/2" (241.3)
250# FLANGE						12 1/2" (317.5)	1 7/16" (36.5)	12	7/8" (22.2)	10 5/8" (269.9)



UNIT _____ OUR ORDER NO. _____
JOB _____ CUSTOMER ORDER NO. _____
PUMP _____ CAPACITY _____ G.P.M. @ _____ FT. HD.
MOTOR _____ MAKE _____ FRAME _____
_____ H.P. _____ PHASE _____ CYCLE _____ VOLT _____ R.P.M.
CERTIFIED BY: _____ DATE _____

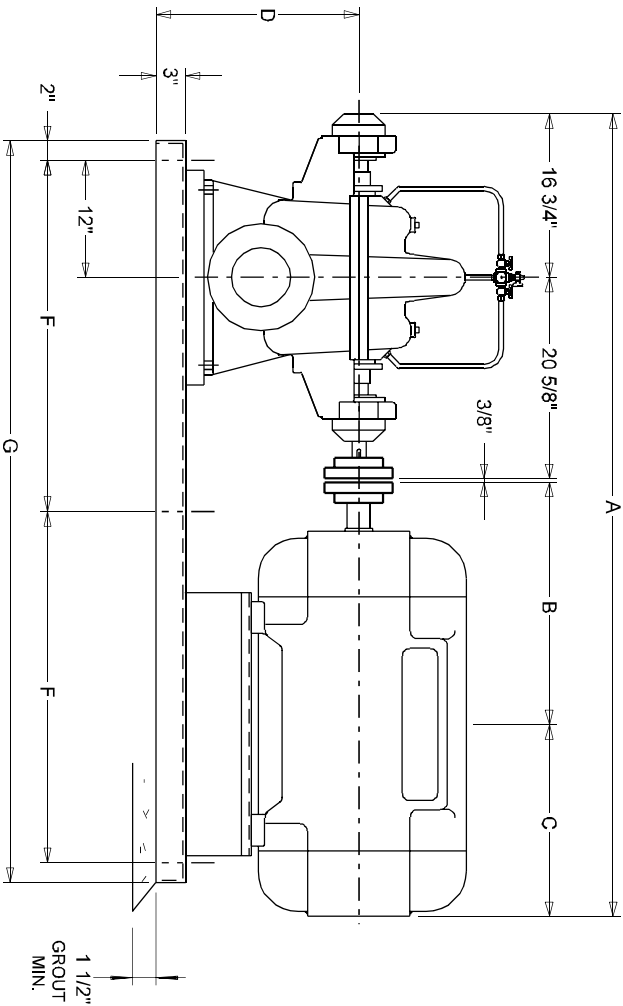
NOTE: 1) FOR CW ROT. SUCT. ON RIGHT, DISCH. ON LEFT
FOR CCW ROT. SUCT. ON LEFT, DISCH. ON RIGHT
WHEN VIEWED FROM DRIVER END.

2) 5" GROUT HOLES ARE PROVIDED




DRIP RIM BASE (OPTIONAL)

MOTOR FRAME	A	B	C	D	F	G
326 T	65.9/32"	16.1/2"	11.1/32"	19.3/4"	32"	68"
326 TS	63.3/4"	15"	11.3/4"	19.3/4"	32"	68"
364 T	66.9/32"	17.3/8"	11.5/32"	19.3/4"	32"	68"
366 T	67.3/8"	17.7/8"	11.3/4"	19.3/4"	32"	68"
365 TS	65.5/32"	15.3/4"	11.21/32"	19.3/4"	32"	68"
404 TS	67.3/32"	17"	12.11/32"	19.3/4"	32"	68"
405 T	75.3/4"	20.3/4"	17.1/4"	20.3/4"	34"	72"
405 TS	68.19/32"	17.3/4"	13.3/32"	19.3/4"	34"	72"
444 TS	71.1/2"	19.1/2"	14.1/4"	20.3/4"	34"	72"
445 TS	73.1/2"	20.1/2"	15.1/4"	20.3/4"	34"	72"
447 TS	77.1/4"	22.1/4"	17.1/4"	20.3/4"	36"	76"
364 TS	64.3/8"	15.1/4"	11.3/8"	19.3/4"	32"	68"



	SUCTION				DISCHARGE			
	H.O.L.S.	O.D.	THK.	HOLES SIZE	D.B.C.	O.D.	THK.	HOLES SIZE
125# FLANGE	13 1/2"	1 1/8"	8	7/8"	11 3/4"	11 1/4"	1"	8
250# FLANGE					12 1/2"	1 7/16"	12	7/8"



PATTERSON PUMP COMPANY
A SUBSIDIARY OF THE CORNMAN-PUMP COMPANY

OUTLINE DIMENSIONS
for
8x6 MIL/YS BARE PUMP

DRG. NO. B02 - 73485

DRAWN	DATE
ROYAL	1-18-00
SCALE	APPEND.
NONE	A.P.

8 x 6 MI SPLIT CASE PUMP

SECTION A6

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DATE: JAN. 2, 2000

ENGINEERING DATA:

GENERAL	
BARE PUMP WEIGHT	920#
MAXIMUM OPERATING TEMPERATURE - F °	200
MAXIMUM WORKING PRESSURE	150
HYDROSTATIC TEST PRESSURE	225

CASING	
CASING MATERIAL	CAST IRON
STANDARD DISCHARGE FLANGE RATING	125# - FF
STANDARD SUCTION FLANGE RATING	125# - FF
CASING WALL THICKNESS	9/16"
VENT/PRIMING NPT	3/4"
GAUGE NPT	1/4"
DRAIN NPT	1/2"

IMPELLER	C-3463	C-3463A	C-2889A	C-8705	C-1862A
MAXIMUM DIAMETER	15 3/8"	15 3/8"	12"	16"	16 1/2"
MINIMUM DIAMETER	12"	12"	9"	12 1/2"	12"
MAXIMUM SHPERE	1 1/4"	1 1/4"	1 1/4"	7/8"	1 1/4"
NUMBER OF VANES	7	7	8	7	6
EYE AREA SQ. IN.	36.4	36.4	36.7	36.6	29.5
WEIGHT	62#	62#	59#	95#	117#
WR ^2 for MAXIMUM DIAMETER (LBS-FT^2)	12.9	12.9	7.1	17.8	23.4
NOMINAL DIAMETRICAL WEAR RING CLEARANCE	.022"	.022"	.022"	.022"	.022"

SHAFT AND BEARING		
SHAFT DIAMETER	AT COUPLING	1 7/16"
	AT IMPELLER	1 7/8"
	AT SHAFT SLEEVE	1 7/8"
CENTER TO CENTER OF BEARINGS		27 1/4"
KEYWAYS	AT COUPLING	3/8" X 3/16"
	AT IMPELLER	5/16" X 5/32"
INBOARD BEARING		6308
OUTBOARD BEARING		7308 BYG

PACKING BOX		
SLEEVE O.D.		2 3/8"
PACKING BOX BORE		3 5/16"
PACKING BOX DEPTH		3"
BOX INLET NPT		1/4"
PACKING	SIZE	7/16"
	NUMBER OF RINGS	5
	WATER SEAL RING WIDTH	5/8"

Company: PPC
Name:
Date: 8/20/2024

Pump:

Size: 6x5 MAA-B
Type: HSC
Synch speed: 3600 rpm
Curve: 5MAA-B
Specific Speeds:
Dimensions:
Speed: 3560 rpm
Dia: 8.125 in
Impeller: B-11313
Ns: 1586
Nss: ---
Suction: 6 in
Discharge: 5 in

Search Criteria:

Flow: 1042 US gpm
Head: 240 ft
Secondary Operating Point: 694 US gpm, 212 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP
NPSHa: ---
Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

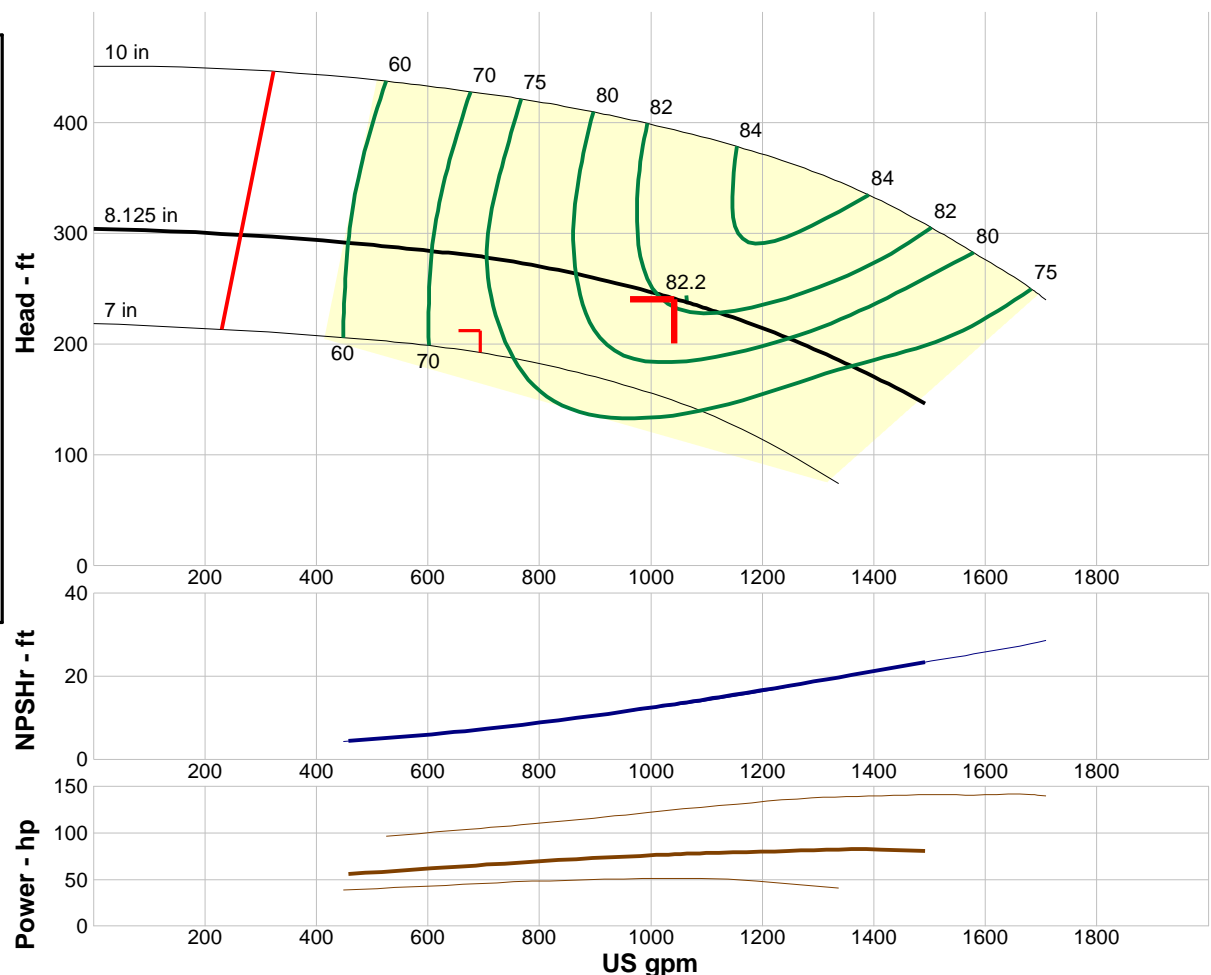
Pump Limits:

Temperature: 200 °F
Pressure: 175 psi g
Sphere size: 0.75 in
Power: ---
Eye area: ---

Motor:

Standard: NEMA
Enclosure: TEFC
Sizing criteria: Max Power on Design Curve
Size: 100 hp
Speed: 3600
Frame: 405TS

---- Data Point ----	
Flow:	1042 US gpm
Head:	241 ft
Eff:	82.1%
Power:	77.2 hp
NPSHr:	13.4 ft
---- Design Curve ----	
Shutoff head:	305 ft
Shutoff dP:	132 psi
Min flow:	266 US gpm
BEP:	82.2% @ 1064 US gpm
NOL power:	82.6 hp @ 1359 US gpm
-- Max Curve --	
Max power:	142 hp @ 1682 US gpm

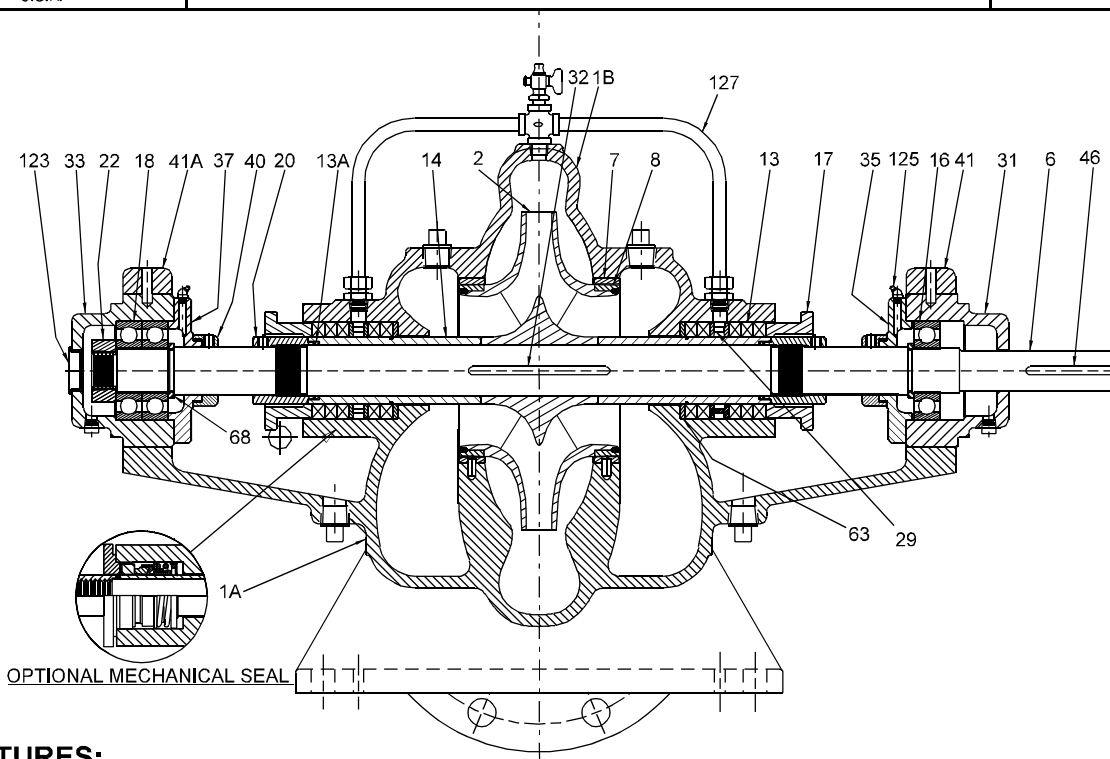


In accordance with the Hydraulic Institute Standards, pump is guaranteed for one set of conditions. Performance guarantees are based on shop test and when handling clear, cold, fresh water at sea level and at a temperature no greater than 85 degrees F. Suction lift must not exceed that shown on curve.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1250	3560	205	79.8	80.8	17.9
1042	3560	241	82.1	77.2	13.4
834	3560	266	79	70.8	9.53
625	3560	283	71	62.9	6.4
417	3560	293	57.4	54.4	4.11

6 x 5 MAA SPLIT CASE PUMP



FEATURES:

- REPLACEABLE PACKING BOX BUSHING PROVIDED TO PROTECT CASING FROM PACKING WEAR
- MACHINED MOUNTING SURFACES
- DEFLECTORS PROVIDED TO PREVENT PRODUCT FROM ENTERING BEARING HOUSINGS
- CASING RINGS PROVIDED TO PROTECT CASING FROM WEAR
- HYDROSTATICALLY TESTED TO 1 1/2 TIMES SHUT-OFF
- INTEGRALLY CAST BEARING SUPPORTS
- CONVERSION FROM PACKING TO MECHANICAL SEALS WITHOUT ADDITIONAL MACHINING
- INTEGRALLY CAST PACKING BOXES
- PREDRILLED AND TAPPED PACKING BOX DRIP POCKETS FOR REMOVAL OF PACKING BOX LEAKAGE
- DYNAMICALLY BALANCED IMPELLER
- SHAFT SLEEVES LOCKED AGAINST ROTATION BY IMPELLER KEY

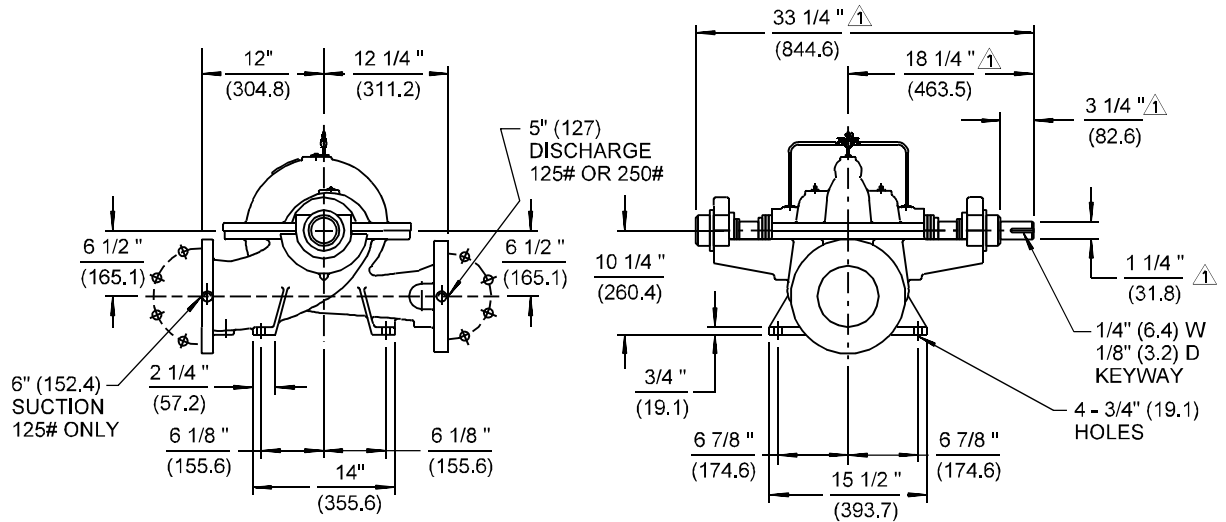
ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1A	LOWER CASING	Cast Iron - ASTM A48-CL40	31	INBOARD BRG HOUSING	Cast Iron - ASTM A48-CL30
1B	UPPER CASING	Cast Iron - ASTM A48-CL40	32	IMPELLER KEY	Stainless Steel - AISI 304
2	IMPELLER	Bronze - ASTM B584-875	33	OUTBOARD BRG HSG	Cast Iron - ASTM A48-C30
6	SHAFT	Alloy Steel - AISI 1141	35	INBOARD BRG COVER	Cast Iron - ASTM A48-C30
7	CASING RING	Bronze - ASTM B505-927	37	OUTBOARD BRG COVER	Cast Iron - ASTM A48-CL30
8	IMPELLER RING	Bronze - ASTM B505-932	40	DEFLECTOR	Aluminum - Mfg. Standard
13	PACKING	Graphite Impregnated Fiber	41	INBOARD BEARING CAP	Cast Iron - ASTM A48-CL30
13A	SHAFT SLEEVE O-RING	Nitrile	41A	OUTBOARD BEARING CAP	Cast Iron - ASTM A48-CL30
14	SHAFT SLEEVE	Bronze - ASTM B505-954	46	COUPLING KEY	Steel - ASTM A108-1018
16	INBOARD BEARING	Single Row Ball - Mfg. Standard	63	PACKING BOX BUSHING	Bronze - ASTM B505-932
17	PACKING GLAND	Bronze - ASTM B584-836	68	SHAFT COLLAR	Steel - ASTM A108-1018
18	OUTBOARD BEARING	Single Row Ball - Mfg. Standard	123	BEARING END COVER	Steel - Mfg. Standard
20	SHAFT SLEEVE NUT	Bronze - ASTM B505-932	125	GREASE FITTING	Steel - Mfg. Standard
22	BEARING LOCKNUT	Steel - Mfg. Standard	127	SEAL WATER PIPING	Copper Tubing
29	LANTERN RING	Teflon			



6 x 5 MAA SPLIT CASE PUMP

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	SUCTION					DISCHARGE				
HOLES	O.D.	THK	HOLES	SIZE	D.B.C.	O.D.	THK	HOLES	SIZE	D.B.C.
125# FLANGE	11 1/4" (285.8)	1 1/8" (28.6)	8	7/8" (22.2)	9 1/2" (241.3)	11" (279.4)	1 3/8" (34.9)	8	7/8" (22.2)	8 1/2" (215.9)
250# FLANGE						11" (279.4)	1 3/8" (34.9)	8	7/8" (22.2)	9 1/4" (235)





6 x 5 MAA SPLIT CASE PUMP

SECTION A5
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ENGINEERING DATA:

GENERAL	
BARE PUMP WEIGHT	415#
MAXIMUM OPERATING TEMPERATURE - F °	200
MAXIMUM WORKING PRESSURE	175
HYDROSTATIC TEST PRESSURE	263

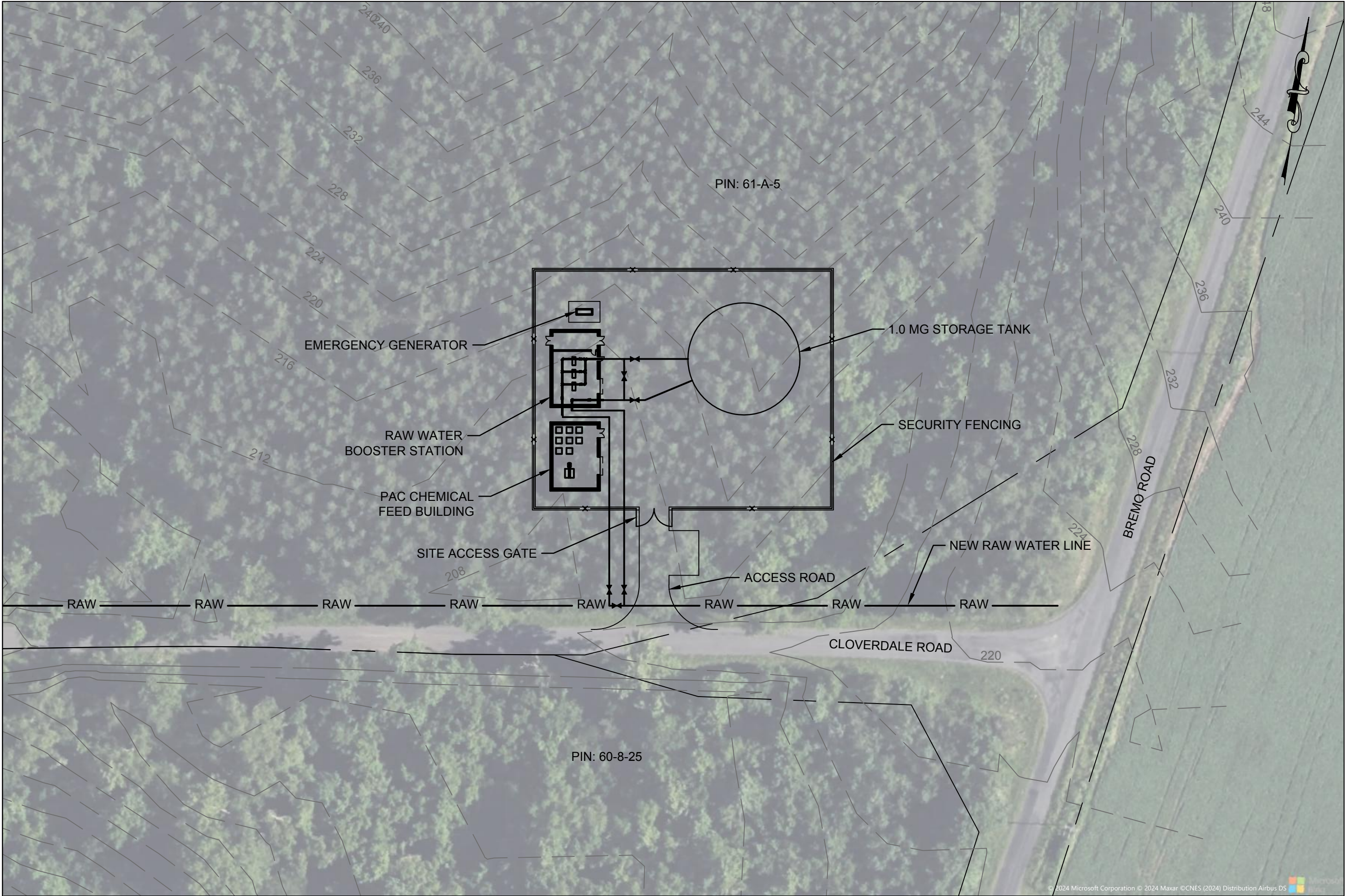
CASING	
CASING MATERIAL	CAST IRON
STANDARD DISCHARGE FLANGE RATING	125# - FF
STANDARD SUCTION FLANGE RATING	125# - FF
CASING WALL THICKNESS	3/8"
VENT/PRIMING NPT	1/2"
GAUGE NPT	1/4"
DRAIN NPT	1/2"


IMPELLER	B-11312	B-11313B
MAXIMUM DIAMETER	10"	11"
MINIMUM DIAMETER	7"	7"
MAXIMUM SHPERE	3/4"	3/4"
NUMBER OF VANES	7	7
EYE AREA SQ. IN.	15	23
WEIGHT	33#	38#
WR ^2 for MAXIMUM DIAMETER (LBS-FT^2)	2.6	3.3
NOMINAL DIAMETRICAL WEAR RING CLEARANCE	.015"	.015"

SHAFT AND BEARING		
SHAFT DIAMETER	AT COUPLING	1 1/4"
	AT IMPELLER	1 5/8"
	AT SHAFT SLEEVE	1 5/8"
CENTER TO CENTER OF BEARINGS		25"
KEYWAYS	AT COUPLING	1/4" X 1/8"
	AT IMPELLER	1/4" X 1/8"
INBOARD BEARING		6307
OUTBOARD BEARING		7307 BYG

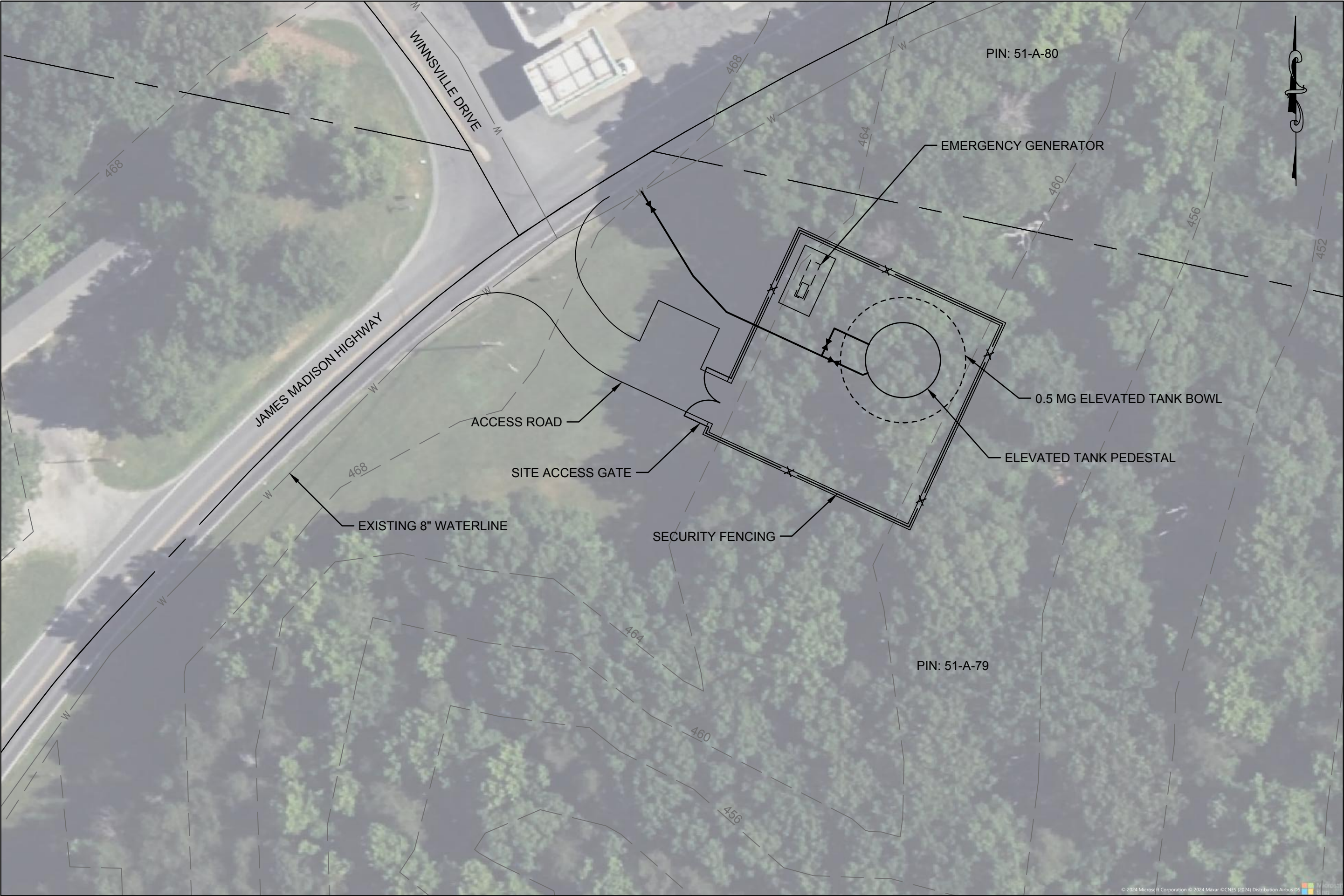
PACKING BOX		
SLEEVE O.D.		2 1/8"
PACKING BOX BORE		3 1/16"
PACKING BOX DEPTH		3"
BOX INLET NPT		1/4"
PACKING	SIZE	7/16"
	NUMBER OF RINGS	5
	WATER SEAL RING WIDTH	5/8"


APPENDIX F – RAW WATER PUMP STATION CONCEPTUAL FIGURE



 Dewberry Engineers Inc. 4805 Lake Brook Drive, Suite 200 Glen Allen, VA 23060 Phone: 804.290.7957 Fax: 804.290.7928	DATE DEC. 2024	SCALE 1" = 60'	TITLE RAW WATER BOOSTER PUMP STATION SITE LAYOUT		FIGURE NO. F.1
	PROJ. NO. 50150419	PROJECT			

APPENDIX G – ELEVATED WATER STORAGE TANK CONCEPTUAL FIGURE



 Dewberry Dewberry Engineers Inc. 4805 Lake Brook Drive, Suite 200 Glen Allen, VA 23060 Phone: 804.290.7957 Fax: 804.290.7928	DATE DEC. 2024 PROJ. NO. 50150419	SCALE 1" = 40' PROJECT	TITLE ELEVATED WATER STORAGE TANK SITE LAYOUT	FIGURE NO. G.1
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APPENDIX H – OPINION OF PROBABLE CONSTRUCTION COSTS

Fork Union Raw Water Storage Tank, Pump Station, and Raw Waterline
Preliminary Opinion of Probable Construction Cost
December 2024

Raw Water Pump Station Alternative #1

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 410,000
2	Site Preparation				\$ 135,000
	Clearing and Grubbing (Site and Waterline)	AC	27	\$ 5,000	\$ 135,000
3	Raw Waterline				\$ 3,565,500
	Furnish and Install 12" PVC Raw Waterline	LF	22200	\$ 150	\$ 3,330,000
	ARV Manholes and ARV Valves	EA	3	\$ 10,000	\$ 30,000
	Sitework, Erosion & Sediment Control	LF	22200	\$ 2.50	\$ 55,500
	Pavement Repair & Patching Allowance	LS	1	\$ 150,000	\$ 150,000
4	Pump Station Building				\$ 1,616,250
	Pump and PAC Buildings	SF	3100	\$ 200	\$ 620,000
	Ductile Iron Piping, Valves, and Fittings	LS	1	\$ 300,000	\$ 300,000
	Bridge Crane (3 Ton)	LS	1	\$ 85,000	\$ 85,000
	Booster Pumps	EA	3	\$ 70,000	\$ 210,000
	Permanganate Feed System	LS	1	\$ 25,000	\$ 25,000
	PAC Feed System	EA	1	\$ 125,000	\$ 125,000
	Plumbing Allowance	LS	1	\$ 30,000	\$ 30,000
	HVAC Allowance	LS	1	\$ 50,000	\$ 50,000
	Labor & Equipment (25%)	LS	1	\$ 171,250	\$ 171,250
5	Site Layout				\$ 589,875
	Asphalt Complete Site Area	SY	2750	\$ 40	\$ 110,000
	Asphalt Access Road	SY	300	\$ 40	\$ 12,000
	Furnish and Install Yard Piping and Valving	LS	1	\$ 250,000	\$ 250,000
	Sitework, Erosion & Sediment Control	LS	1	\$ 45,000	\$ 45,000
	Chainlink Fence	LF	715	\$ 25	\$ 17,875
	Chainlink Gate 24' wide - Front Access	EA	1	\$ 15,000	\$ 15,000
	Landscaping	LS	1	\$ 20,000	\$ 20,000
	Site Concrete	CY	120	\$ 1,000	\$ 120,000
6	Ground Storage Tank				\$ 1,000,000
	1.0 MG Ground Storage Tank (Bolted Steel)	LS	1	\$ 1,000,000	\$ 1,000,000
7	Electrical and Instrumentation				\$ 1,250,000
	Generator	LS	1	\$ 250,000	\$ 250,000
	Panelboards/Breakers/Transformer	LS	1	\$ 200,000	\$ 200,000
	Conduit and Wire	LS	1	\$ 120,000	\$ 120,000
	VFD	EA	3	\$ 50,000	\$ 150,000
	Instrumentation	LS	1	\$ 300,000	\$ 300,000
	Labor & Equipment to Install (25%)	LS	1	\$ 230,000	\$ 230,000
SUBTOTAL					\$ 8,566,700
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 856,700
SUBTOTAL					\$ 9,423,400
CONSTRUCTION CONTINGENCY (25%)					\$ 2,355,900
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 80,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 10,081,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 11,860,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 15,418,000
ENGINEERING (ESTIMATED, 10%)					\$ 1,186,000
EASEMENT / LAND ACQUISITION					\$ 435,000
CONSTRUCTION INSPECTION (18 months @ \$100/hr, 2 days per week)					\$ 123,500

Raw Water Pump Station Alternative #2

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 360,000
2	Site Preparation				\$ 180,000
	Clearing and Grubbing (Site and Waterline)	AC	18	\$ 10,000	\$ 180,000
3	Raw Waterline				\$ 2,437,000
	Furnish and Install 12" PVC Raw Waterline	LF	14800	\$ 150	\$ 2,220,000
	ARV Manholes and ARV Valves	EA	3	\$ 10,000	\$ 30,000
	Sitework, Erosion & Sediment Control	LF	14800	\$ 2.50	\$ 37,000
	Pavement Repair & Patching Allowance	LS	1	\$ 150,000	\$ 150,000
4	Pump Station Building				\$ 1,648,750
	Pump and PAC Buildings	SF	3100	\$ 200	\$ 620,000
	Ductile Iron Piping, Valves, and Fittings	LS	1	\$ 300,000	\$ 300,000
	Bridge Crane (3 Ton)	LS	1	\$ 85,000	\$ 85,000
	Booster Pumps	EA	3	\$ 80,000	\$ 240,000
	Permanganate Feed System	LS	1	\$ 25,000	\$ 25,000
	PAC Feed System	EA	1	\$ 125,000	\$ 125,000
	Plumbing Allowance	LS	1	\$ 30,000	\$ 30,000
	HVAC Allowance	LS	1	\$ 50,000	\$ 50,000
	Labor & Equipment (25%)	LS	1	\$ 173,750	\$ 173,750
5	Site Layout				\$ 589,875
	Asphalt Complete Site Area	SY	2750	\$ 40	\$ 110,000
	Asphalt Access Road	SY	300	\$ 40	\$ 12,000
	Furnish and Install Yard Piping and Valving	LS	1	\$ 250,000	\$ 250,000
	Sitework, Erosion & Sediment Control	LS	1	\$ 45,000	\$ 45,000
	Chainlink Fence	LF	715	\$ 25	\$ 17,875
	Chainlink Gate 24' wide - Front Access	EA	1	\$ 15,000	\$ 15,000
	Landscaping	LS	1	\$ 20,000	\$ 20,000
	Site Concrete	CY	120	\$ 1,000	\$ 120,000
6	Ground Storage Tank				\$ 1,000,000
	1.0 MG Ground Storage Tank (Bolted Steel)	LS	1	\$ 1,000,000	\$ 1,000,000
7	Electrical and Instrumentation				\$ 1,282,500
	Generator	LS	1	\$ 250,000	\$ 250,000
	Panelboards/Breakers/Transformer	LS	1	\$ 200,000	\$ 200,000
	Conduit and Wire	LS	1	\$ 120,000	\$ 120,000
	VFD	EA	3	\$ 60,000	\$ 180,000
	Instrumentation	LS	1	\$ 300,000	\$ 300,000
	Labor & Equipment to Install (25%)	LS	1	\$ 232,500	\$ 232,500
SUBTOTAL					\$ 7,498,200
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 749,900
SUBTOTAL					\$ 8,248,100
CONSTRUCTION CONTINGENCY (25%)					\$ 2,062,100
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 80,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 8,840,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 10,400,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 13,520,000
ENGINEERING (ESTIMATED, 10%)					\$ 1,040,000
EASEMENT / LAND ACQUISITION					\$ 435,000
CONSTRUCTION INSPECTION (16 months @ \$100/hr, 2 days per week)					\$ 109,800

Fork Union Finished Waterlines
Preliminary Opinion of Probable Construction Cost
December 2024

Finished Waterlines - WTP Alternative #1

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 652,000
2	Site Preparation				\$ 260,000
	Clearing and Grubbing (Site and Waterline)	AC	52	\$ 5,000	\$ 260,000
3	Finished Waterlines				\$ 12,775,800
	Furnish and Install 12" PVC Waterline	LF	18180	\$ 150	\$ 2,727,000
	Furnish and Install 8" PVC Waterline	LF	12110	\$ 120	\$ 1,453,200
	Furnish and Install 6" PVC Waterline	LF	25950	\$ 100	\$ 2,595,000
	ARV Manholes and ARV Valves	EA	18	\$ 10,000	\$ 180,000
	Sitework, Erosion & Sediment Control	LF	56240	\$ 2.50	\$ 140,600
	New Service Connections (Meter and Service Line)	EA	148	\$ 35,000	\$ 5,180,000
	Pavement Repair & Patching Allowance	LS	1	\$ 500,000	\$ 500,000
SUBTOTAL					\$ 13,687,800
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,368,800
SUBTOTAL					\$ 15,056,600
CONSTRUCTION CONTINGENCY (25%)					\$ 3,764,200
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 17,161,500
TOTAL ESTIMATED CONSTRUCTION COST					\$ 20,190,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 26,247,000
ENGINEERING (ESTIMATED, 10%)					\$ 2,019,000
EASEMENT / LAND ACQUISITION					\$ 562,400
CONSTRUCTION INSPECTION (32 months @ \$100/hr, 2 days per week)					\$ 219,500

Finished Waterlines - WTP Alternative #2

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 618,000
2	Site Preparation				\$ 240,000
	Clearing and Grubbing (Site and Waterline)	AC	48	\$ 5,000	\$ 240,000
3	Finished Waterlines				\$ 12,117,000
	Furnish and Install 12" PVC Waterline	LF	13860	\$ 150	\$ 2,079,000
	Furnish and Install 8" PVC Waterline	LF	12110	\$ 120	\$ 1,453,200
	Furnish and Install 6" PVC Waterline	LF	25950	\$ 100	\$ 2,595,000
	ARV Manholes and ARV Valves	EA	18	\$ 10,000	\$ 180,000
	Sitework, Erosion & Sediment Control	LF	51920	\$ 2.50	\$ 129,800
	New Service Connections (Meter and Service Line)	EA	148	\$ 35,000	\$ 5,180,000
	Pavement Repair & Patching Allowance	LS	1	\$ 500,000	\$ 500,000
SUBTOTAL					\$ 12,975,000
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,297,500
SUBTOTAL					\$ 14,272,500
CONSTRUCTION CONTINGENCY (25%)					\$ 3,568,200
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 16,269,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 19,140,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 24,882,000
ENGINEERING (ESTIMATED, 10%)					\$ 1,914,000
EASEMENT / LAND ACQUISITION					\$ 519,200
CONSTRUCTION INSPECTION (30 months @ \$100/hr, 2 days per week)					\$ 205,800

Fork Union Raw Water Storage Tank, Pump Station, and Raw Waterline
Preliminary Opinion of Probable Construction Cost
December 2024

Elevated Storage Tank

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 216,000
2	Site Preparation				\$ 10,000
	Clearing and Grubbing (Site and Waterline)	AC	1	\$ 10,000	\$ 10,000
3	Elevated Storage Tank				\$ 3,707,000
	0.5 MG Pedosphere EST	LS	1	\$ 3,300,000	\$ 3,300,000
	Tank Coating	LS	1	\$ 200,000	\$ 200,000
	Ductile Iron Piping, Valves, and Fittings	LS	1	\$ 150,000	\$ 150,000
	Cathodic Protection System	LS	1	\$ 25,000	\$ 25,000
	Unit Heaters	LS	2	\$ 1,000	\$ 2,000
	Tank Mixer	EA	1	\$ 30,000	\$ 30,000
4	Site Layout				\$ 304,200
	Asphalt Complete Site Area	SY	1100	\$ 40	\$ 44,000
	Asphalt Access Road	SY	380	\$ 40	\$ 15,200
	Furnish and Install Yard Piping and Valving	LS	1	\$ 100,000	\$ 100,000
	Sitework, Erosion & Sediment Control	LS	1	\$ 30,000	\$ 30,000
	Chainlink Fence	LF	400	\$ 25	\$ 10,000
	Chainlink Gate 24' wide - Front Access	EA	1	\$ 15,000	\$ 15,000
	Landscaping	LS	1	\$ 10,000	\$ 10,000
	Site Concrete	CY	80	\$ 1,000	\$ 80,000
5	Electrical and Instrumentation				\$ 287,500
	Generator	LS	1	\$ 75,000	\$ 75,000
	Panelboards/Breakers	LS	1	\$ 55,000	\$ 55,000
	Instrumentation	LS	1	\$ 40,000	\$ 40,000
	Conduit and Wire	LS	1	\$ 60,000	\$ 60,000
	Labor & Equipment to Install (25%)	LS	1	\$ 57,500	\$ 57,500
SUBTOTAL					\$ 4,524,700
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 452,500
SUBTOTAL					\$ 4,977,200
CONSTRUCTION CONTINGENCY (25%)					\$ 1,244,300
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 30,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 5,321,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 6,260,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 8,138,000
ENGINEERING (ESTIMATED, 10%)					\$ 626,000
EASEMENT / LAND ACQUISITION					\$ 15,000
CONSTRUCTION INSPECTION (18 months @ \$150/hr, 2 days per week)					\$ 185,200

Fork Union Water Treatment Plant
Preliminary Opinion of Probable Construction Cost
December 2024

WTP Alternative #1

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 700,000
2	Site				\$ 1,759,000
	Clearing and Grubbing (Medium)	AC	5	\$ 7,000	\$ 35,000
	Site Grading and Excavation	LS	1	\$ 800,000	\$ 800,000
	Fencing	LF	1400	\$ 25	\$ 35,000
	Motorized Access Gate	EA	1	\$ 35,000	\$ 35,000
	Asphalt Pavement Site	SY	2700	\$ 40	\$ 108,000
	Paved Access Road	SY	6900	\$ 40	\$ 276,000
	Lagoons	LS	1	\$ 150,000	\$ 150,000
	Exterior Concrete	CY	320	\$ 1,000	\$ 320,000
3	Building				\$ 3,070,000
	Concrete Walls, Basins, Slabs	CY	1800	\$ 1,300	\$ 2,340,000
	CMU Block w/ Brick Veneer Exterior Walls	LF	430	\$ 450	\$ 193,500
	CMU Block Interior Walls	LF	490	\$ 250	\$ 122,500
	Asphalt Shingle Roof	SF	7500	\$ 8.00	\$ 60,000
	Doors	EA	28	\$ 2,000	\$ 56,000
	Overhead Doors	EA	4	\$ 10,000	\$ 40,000
	Windows	EA	10	\$ 800	\$ 8,000
	Furnishings (Desks, Computers, Lab Equipment, etc)	LS	1	\$ 250,000	\$ 250,000
	Paintings and Coatings	LS	1	\$ 400,000	\$ 400,000
4	Treatment Equipment				\$ 5,321,250
	Yard Piping and Static Mixer	LS	1	\$ 250,000	\$ 250,000
	Flocculators, Plate Settlers, Hoseless Sludge Collectors	LS	1	\$ 435,000	\$ 435,000
	Filters	LS	1	\$ 185,000	\$ 185,000
	Process Piping, Valves, and Gates	LS	1	\$ 750,000	\$ 750,000
	Chemical Storage Tanks	EA	3	\$ 35,000	\$ 105,000
	Chemical Feed Pumps	EA	18	\$ 5,000	\$ 90,000
	Chemical Feed Piping and Tubing	LS	1	\$ 300,000	\$ 300,000
	Lime Feed Silo	EA	1	\$ 1,500,000	\$ 1,500,000
	Finished Water and Backwash Pumps	EA	4	\$ 48,000	\$ 192,000
	Plumbing Allowance	LS	1	\$ 200,000	\$ 200,000
	HVAC Allowance	LS	1	\$ 250,000	\$ 250,000
	Labor & Equipment (25%)	LS	1	\$ 1,064,250	\$ 1,064,250
5	Electrical and Instrumentation				\$ 3,750,000
	Generator	LS	1	\$ 1,000,000	\$ 1,000,000
	Panelboards/Breakers/Transformer	LS	1	\$ 800,000	\$ 800,000
	Conduit and Wire	LS	1	\$ 500,000	\$ 500,000
	VFD for Finished Water Pumps	EA	2	\$ 80,000	\$ 160,000
	Backwash Pump Motor Starters	EA	2	\$ 20,000	\$ 40,000
	Instrumentation	LS	1	\$ 500,000	\$ 500,000
	Labor & Equipment to Install (25%)	LS	1	\$ 750,000	\$ 750,000
SUBTOTAL					\$ 14,600,300
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,460,100
SUBTOTAL					\$ 16,060,400
CONSTRUCTION CONTINGENCY (25%)					\$ 4,015,100
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 250,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 17,280,500
TOTAL ESTIMATED CONSTRUCTION COST					\$ 20,330,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 26,429,000
ENGINEERING (ESTIMATED, 10%)					\$ 2,033,000
EASEMENT / LAND ACQUISITION (WTP Location Alt #2 ONLY)					\$ 25,000
CONSTRUCTION INSPECTION (24 months @ \$100/hr, 3 days per week)					\$ 246,900

WTP Alternative #2

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 790,000
2	Site				\$ 1,518,000
	Clearing and Grubbing (Heavy)	AC	3	\$ 10,000	\$ 30,000
	Site Grading and Excavation	LS	1	\$ 800,000	\$ 800,000
	Fencing	LF	1400	\$ 25	\$ 35,000
	Motorized Access Gate	EA	1	\$ 35,000	\$ 35,000
	Asphalt Pavement Site	SY	2700	\$ 40	\$ 108,000
	Paved Access Road	SY	1000	\$ 40	\$ 40,000
	Lagoons	LS	1	\$ 150,000	\$ 150,000
	Exterior Concrete	CY	320	\$ 1,000	\$ 320,000
3	Building				\$ 3,070,000
	Concrete Walls, Basins, Slabs	CY	1800	\$ 1,300	\$ 2,340,000
	CMU Block w/ Brick Veneer Exterior Walls	LF	430	\$ 450	\$ 193,500
	CMU Block Interior Walls	LF	490	\$ 250	\$ 122,500
	Asphalt Shingle Roof	SF	7500	\$ 8.00	\$ 60,000
	Doors	EA	28	\$ 2,000	\$ 56,000
	Overhead Doors	EA	4	\$ 10,000	\$ 40,000
	Windows	EA	10	\$ 800	\$ 8,000
	Furnishings (Desks, Computers, Lab Equipment, etc)	LS	1	\$ 250,000	\$ 250,000
	Paintings and Coatings	LS	1	\$ 400,000	\$ 400,000
4	Treatment Equipment				\$ 6,702,500
	Yard Piping and Static Mixer	LS	1	\$ 250,000	\$ 250,000
	Flocculators, Plate Settlers, Hoseless Sludge Collectors	LS	1	\$ 435,000	\$ 435,000
	Filters	LS	1	\$ 185,000	\$ 185,000
	Process Piping, Valves, and Gates	LS	1	\$ 825,000	\$ 825,000
	Chemical Storage Tanks	EA	3	\$ 35,000	\$ 105,000
	Chemical Feed Pumps	EA	18	\$ 5,000	\$ 90,000
	Chemical Feed Piping and Tubing	LS	1	\$ 330,000	\$ 330,000
	Lime Feed Silo	EA	1	\$ 1,500,000	\$ 1,500,000
	Nanofiltration System	LS	1	\$ 1,000,000	\$ 1,000,000
	Finished Water and Backwash Pumps	EA	4	\$ 48,000	\$ 192,000
	Plumbing Allowance	LS	1	\$ 200,000	\$ 200,000
	HVAC Allowance	LS	1	\$ 250,000	\$ 250,000
	Labor & Equipment (25%)	LS	1	\$ 1,340,500	\$ 1,340,500
5	Electrical and Instrumentation				\$ 4,450,000
	Generator	LS	1	\$ 1,200,000	\$ 1,200,000
	Panelboards/Breakers/Transformer	LS	1	\$ 960,000	\$ 960,000
	Conduit and Wire	LS	1	\$ 600,000	\$ 600,000
	VFD for Finished Water Pumps	EA	2	\$ 80,000	\$ 160,000
	Backwash Pump Motor Starters	EA	2	\$ 20,000	\$ 40,000
	Instrumentation	LS	1	\$ 600,000	\$ 600,000
	Labor & Equipment to Install (25%)	LS	1	\$ 890,000	\$ 890,000
SUBTOTAL					\$ 16,530,500
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,653,100
SUBTOTAL					\$ 18,183,600
CONSTRUCTION CONTINGENCY (25%)					\$ 4,545,900
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 250,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 19,533,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 22,980,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 29,874,000
ENGINEERING (ESTIMATED, 10%)					\$ 2,298,000
EASEMENT / LAND ACQUISITION (WTP Location Alt #2 ONLY)					\$ 25,000
CONSTRUCTION INSPECTION (24 months @ \$100/hr, 3 days per week)					\$ 246,900

APPENDIX I – NET PRESENT WORTH COST ANALYSIS

Raw Water Pump Station Alternative Net Present Worth Cost Analysis

Raw Water Pump Station Alternative #1

Pumping Energy Costs (yearly)	\$16,100
Staffing Costs (1 operator, 5 hrs per week)	\$13,000
Chemical Costs Covered Under WTP	-
Maintenance Costs (yearly, 3% of capital equipment)	\$12,700
O&M Replacement Costs NPWC	\$28,600

Net Present Worth Cost for RWPS Alternative #1

Initial Capital Cost (CC)	\$11,860,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$536,000
NPWC of Yearly Maintenance Costs	\$234,000
NPWC of Major Equipment Replacement	\$28,600
Total Present Worth Cost (CC + P)	\$12,659,000

Raw Water Pump Station Alternative #2

Pumping Energy Costs (yearly)	\$52,800
Staffing Costs (1 operator, 5 hrs per week)	\$13,000
Chemical Costs Covered Under WTP	-
Maintenance Costs (yearly, 3% of capital equipment)	\$13,600
O&M Replacement Costs NPWC	\$34,314

Net Present Worth Cost for RWPS Alternative #2

Initial Capital Cost (CC)	\$10,400,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$1,211,000
NPWC of Yearly Maintenance Costs	\$251,000
NPWC of Major Equipment Replacement	\$34,314
Total Present Worth Cost (CC + P)	\$11,897,000

Elevated Storage Tank Net Present Worth Cost Analysis

Staffing Costs (1 operator, 5 hrs per week)	\$13,000
Maintenance Costs (yearly, 6% of capital equipment)	\$9,000
O&M Replacement Costs NPWC	\$230,700

Net Present Worth Cost for EST

Initial Capital Cost (CC)	\$6,260,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$240,000
NPWC of Yearly Maintenance Costs	\$166,000
NPWC of Major Equipment Replacement	\$230,700
Total Present Worth Cost (CC + P)	\$6,897,000

Water Treatment Plant Net Present Worth Cost Analysis

WTP Alternative #1

Yearly O&M Costs WTP Process Alt. #1

Pumping Energy Costs (yearly)	\$66,000
Staffing Costs (250 manhours per week)	\$619,000
Chemical Costs (yearly)	\$343,000
Maintenance Costs (yearly, 2% of capital equipment)	\$97,100

Total \$1,125,100

Net Present Worth Cost for WTP Process Alt. #1

Initial Capital Cost (CC)	\$20,330,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$18,908,000
NPWC of Yearly Maintenance Costs	\$1,786,000
NPWC of Major Equipment Replacement	\$219,300
Total Present Worth Cost (CC + P)	\$41,244,000

WTP Alternative #2

Yearly O&M Costs WTP Process Alt. #2

Pumping Energy Costs (yearly)	\$106,100
Staffing Costs (250 manhours per week)	\$619,000
Chemical Costs (yearly)	\$394,600
Maintenance Costs (yearly, 2% of capital equipment)	\$124,600

Total \$1,244,300

Net Present Worth Cost for WTP Process Alt. #2

Initial Capital Cost (CC)	\$22,980,000
Duration (n) in years	30
Discount rate (i%)	3.5%
Capital Recovery Factor (P/A, i%, n)	18.3920
NPWC of Yearly Staffing, Energy, and Chemical Costs	\$20,594,000
NPWC of Yearly Maintenance Costs	\$2,292,000
NPWC of Major Equipment Replacement	\$393,300
Total Present Worth Cost (CC + P)	\$46,260,000

APPENDIX J – PFAS SAMPLING AND TESTING RESULTS

Dewberry Engineers Inc.

8401 Arlington Blvd.
Fairfax, VA 22031

Fluvanna Raw Water VA

Client Project# 25004645
Samples Received: 2/21/2025

Analytical Report 0225-874R

DOD QSM Table B-24 (EPA 1633) - non-potable water

Report Issue Date: 3/28/2025

I certify that to the best of my knowledge all analytical data presented in this report have been checked for completeness, accuracy, errors and legibility in addition to having been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s). This analytical report was prepared in Portable Document Format (.PDF) and contains 32 pages. This report shall not be reproduced except in full without approval of the laboratory. This will provide assurance that parts of the report are not taken out of context.

Amendment(s): 0225-874; per client request, raw data for all samples added to Appendix of the final report & sample collector updated. No data has been changed. This report supersedes any previous version(s).

Signature:



Alexandra Mejia, Quality Assurance Associate I



Enthalpy Analytical, LLC – Wilmington
Christina Kurnath, Project Manager
chkurnath@montrose-env.com / www.enthalpy.com
O: 910-876-6895
2714 Exchange Drive, Wilmington, NC 28405

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Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Dewberry Engineers Inc.
Job No.	0225-874-1
Client ID.	25004645 Site: Fluvanna Raw Water

1. Custody

Apex Companies, LLC collected the samples between February 10th and 14th of 2025 and relinquished the samples via FedEx for shipment to Enthalpy Analytical, LLC. Jayson-Shane Santos received the samples at 0.4 °C.

The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC.

Table 1 - Sample Inventory

EU Lab Sample ID	Client Sample ID	Matrix	Received
0225-874-001-1A	RS-1	Aqueous	2025-02-21
0225-874-002-1A	RS-2	Aqueous	2025-02-21
0225-874-003-1A	RS-3	Aqueous	2025-02-21
0225-874-004-1A	RS-4	Aqueous	2025-02-21
0225-874-005-1A	RS-5	Aqueous	2025-02-21

2. Methods and Analytes

A list of analytes of interest and corresponding methods of analysis is shown in Table 3. Abbreviations are defined in the listed Appendices.

Table 3 - Methods and Analytes

EU Method	Analytes	Cleanup Method
EU062	Custom List	ENVI-Carb

3. Analysis

The samples were analyzed using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS "Frodo").

Samples were initially screened by direct inject analysis to determine extraction volume.

Subsampling and centrifugation was performed due to sample turbidity where necessary to facilitate extraction.

4. Calibration

In the initial calibration, the reported analytes exhibited an RSD or RSE of = 20%. The reported analytes in the calibration standards, and Initial Calibration Verification (ICV), continuing calibration (concal), and sensitivity check met the accuracy and S/N criterion for native analytes.

Enthalpy Analytical Narrative Summary

Company	Dewberry Engineers Inc.
Job No.	0225-874-1
Client ID.	25004645 Site: Fluvanna Raw Water

5. QC Notes

The QC sample analyses passed all method criteria.

DOD QSM Table B-24 (EPA 1633) - non-potable water samples were extracted within 28 days, and extracts analyzed within 28 days.

6. Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

The ion ratios for all compounds were within tolerance.

These analyses met the requirements of the DoD QSM 5.4. Any deviations from the requirements of the reference method or the QSM have been stated above.

Enthalpy Analytical, LLC in Wilmington NC is accredited by ANAB to perform testing to the DOD ELAP QSM 5.4 standards under certificate number ADE-2835.

General Reporting Notes – Data Qualifiers

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC - Wilmington, NC data reports, unless specifically noted otherwise.

General Data Qualifiers

- Ac - Alternate calculation flag indicates the es recovery was calculated using the opening concal when either of the following situations is encountered in the data processing software: the ES recovery is over 400% or the JS is not detected.
- B – The analyte was found in the method blank, at a concentration that was at least 10% of the amount in the sample.
- Cxx – Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group ('xx') are shown with the number of the lowest IUPAC co-eluter.
- E – The reported concentration exceeds the calibration range (upper point of the calibration curve). For HRMS data, this condition does not imply additional measurement uncertainty. For LC-MS/MS data, these values should be considered as having measurement uncertainty higher than values within the calibration range.
- EDL – Estimated Detection Level: The EDL is unique to isotope dilution methods and reflects the conditions of analysis at the time of analysis, including the equipment used. Where the MDL is a static value, the EDL is a dynamic value.
- EMPC – Estimated Maximum Possible Concentration: EMPC is specific to Dioxin/Furan tests to indicate the determined ion-abundance ratio was outside the allowed theoretical range (usually due to being near the detection limit, although it can very rarely be caused by a co-eluting interference). The EMPC concentration is adjusted to reflect the value at the theoretical ion-abundance ratio.
- I/IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria. The analyte concentration may be inaccurate due to interference.
- J – The analyte has a concentration below the minimum calibration level (LOQ value) but greater than the LOD. These values should be considered as having measurement uncertainty higher than values within the calibration range
- L - For reports containing PFAS analytes only, this flag indicates that an analyte has a concentration below the Minimum Detection Limit (MDL) . The reported concentration is not recommended for regulatory use as the analyte signal may have a signal-to-noise ratio less than the criteria deemed necessary to be considered a detected analyte.
- LOD – Limit of Detection: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOD. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the minimum detection limit (MDL). The LOD is adjusted for sample weight or volume.

General Reporting Notes – Data Qualifiers

- LOQ – Limit of Quantitation: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOQ. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the reporting limit (RL). The LOQ is adjusted for sample weight or volume.
- <LOD() – Analyte was not found at a concentration high enough to be reported as detected. It is reported as less than the LOD, and the LOD is given in the parentheses.
- <LOQ() – Analyte was not found at a concentration high enough to be reported as above the QSM-defined LOQ or TNI defined Reporting Limit. It is reported as less than the LOQ, and the LOQ is given in the parentheses.
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable due to issues observed in sample preparation or analysis.
- PR – The associated congener(s) is(are) poorly resolved.
- QI – Indicates the presence of a quantitative interference.
- RL – Reporting Limit. Lowest reportable value. The level is higher than the MDL.
- SI – Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
- U – The analyte was not detected.
- V / Q – The labeled standard recovery is not within method control limits.
- X – Indicates the result is from re-injection/repeat/second-column analysis.

Lab Identifiers/ Data Attributes

- AR – Indicates use of the archived portion of the sample extract.
- CU – Indicates a sample that required additional clean-up prior to HRMS injection/processing.
- D – Dilution Data. Result was obtained from the analysis of a dilution. The number that follows the “D” indicates the dilution factor.
- DE – Indicates a dilution performed with the addition of ES (Extraction Standard) solution.
- DUP – Designation for a duplicate sample.
- MS – Designation for a matrix spike.
- MSD – Designation for a matrix spike duplicate.



General Reporting Notes – Data Qualifiers

- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.
- S – Indicates a sample split. The number that follows the “S” indicates the split factor.
- SAT – Indicates an analyte saturated the detector.

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
* accredited for SOP EU047 / EPA method 1633 # Method 537.1 Accredited ^ Method 533 Accredited ~EPA 1633 extended list		
Target Analytes		
*, ^ PFBA	375-22-4	Perfluorobutanoic Acid
*, #, ^ PFPeA	2706-90-3	Perfluoropentanoic Acid
*, #, ^ PFHxA	307-24-4	Perfluorohexanoic Acid
*, #, ^ PFHpA	375-85-9	Perfluoroheptanoic Acid
*, #, ^ PFOA	335-67-1	Perfluorooctanoic Acid
*, #, ^ PFNA	375-95-1	Perfluorononanoic Acid
*, #, ^ PFDA	335-76-2	Perfluorodecanoic acid
*, #, ^ PFUnA (PFUnDA)	2058-94-8	Perfluoroundecanoic acid
*, #, ^ PFDoA (PFDoDA)	307-55-1	Perfluorododecanoic acid
*, #, ^ PFTrDA (PFTrIA)	72629-94-8	Perfluorotridecanoic acid
*, #, ^ PFTeDA (PFTA)	376-06-7	Perfluorotetradecanoic acid
*, ^ PFBS	375-73-5	Perfluorobutane sulfonic acid
*, #, ^ PFPeS	2706-91-4	Perfluoropentane sulfonic acid
*, ^ PFHxS	355-46-4	Perfluorohexane sulfonic acid
*, #, ^ PFHpS	375-92-8	Perfluoroheptane sulfonic acid
*, #, ^ PFOS	1763-23-1	Perfluorooctane sulfonic acid
*, ^ PFNS	68259-12-1	Perfluorononane sulfonic acid
*, ^ PFDS	335-77-3	Perfluorodecane sulfonic acid
*, ^ 4:2 FTS	757124-72-4	4:2 fluorotelomer sulfonic acid
*, ^ 6:2 FTS	27619-97-2	6:2 fluorotelomer sulfonic acid
*, ^ 8:2 FTS	39108-34-4	8:2 fluorotelomer sulfonic acid
*, ~ 10:2 FTS	120226-60-0	Fluorotelomer sulfonate 10:2
*, ~ FHxSA	41997-13-1	Perfluorohexanesulfonamide
*, ^ PFOSA (FOSA)	754-91-6	Perfluorooctane sulfonamide
*, #, ^ N-MeFOSAA	2355-31-9	N-methyl perfluorooctane sulfonamido acetic acid
*, ^ N-MeFOSA	31506-32-8	N-methylperfluoro-1-octanesulfonamide
*, ^ N-MeFOSE	24448-09-7	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
*, #, ^ N-EtFOSAA	2991-50-6	N-ethyl perfluorooctane sulfonamido acetic acid
*, ^ N-EtFOSA	4151-50-2	N-ethylperfluoro-1-octanesulfonamide
*, ^ N-EtFOSE	1691-99-2	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
*, #, ^ HFPO-DA	13252-13-6	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)
*, #, ^ 11Cl-PF3OUdS	763051-92-9	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
*, #, ^ 9Cl-PF3ONS	756426-58-1	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
*, #, ^ ADONA	919005-14-4	4,8-dioxa-3H-perfluorononanoic acid
*, ^ PFEESA	113507-82-7	Perfluoro(2-ethoxyethane)sulphonic acid
*, ^ PFMOBA (PFMBA)	863090-89-5	Perfluoro-4-methoxybutanoic acid
*, ^ NFDHA	151772-58-6	Nonafluoro-3,6-dioxaheptanoic acid
*, ^ PFMOPrA (PFMPA)	377-73-1	Perfluoro-3-methoxypropanoic acid
*, ~ PFPrA	422-64-0	2,2,3,3,3-Pentafluoropropionic acid
*, ~ PFPrS (PFPS)	423-41-6	Perfluoropropanesulfonic acid
*, ~ PFMOAA	674-13-5	Perfluoro-2-methoxyacetic acid
*, ~ PFO2HxA	39492-88-1	Perfluoro (3,5-dioxahexanoic) acid
*, ~ PFO3OA	39492-89-2	Perfluoro (3,5,7-trioxaoctanoic) acid
*, ~ PFO4DA	39492-90-5	Perfluoro (3,5,7,9-tetraoxadecanoic) acid
*, ~ PFO5DA	39492-91-6	Perfluoro(3,5,7,9,11-pentaoxadodecanoic) acid
*, ~ Nafion Byproduct 1 (PS Acid)	29311-67-9	Nafion Byproduct 1
*, ~ Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	Nafion Byproduct 2
*, ~ PEPA	267239-61-2	Perfluoro-2-ethoxypropanoic acid
*, ~ PMPA	13140-29-9	Perfluoro-2-methoxypropanoic acid

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
* accredited for SOP EU047 / EPA method 1633 # Method 537.1 Accredited ^ Method 533 Accredited ~EPA 1633 extended list		
~ PFECA-G	801212-59-9	4-(Heptafluoroisopropoxy)hexafluorobutanoic acid
~ PFHxDA	67905-19-5	Perfluorohexadecanoic acid
~ R-PSDA (Nafion Byproduct 4)	2416366-18-0	Perfluoro-4-(2-sulfoethoxy)pentanoic acid
Hydrolyzed PSDA (Nafion Byproduct 5)	2416366-19-1	2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]-acetic acid
~ R-PSDCA (Nafion Byproduct 6)	2416366-21-5	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy] ethanesulfonic acid
~ EVE Acid	69087-46-3	2,2,3,3-tetrafluoro-3-({1,1,1,2,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propan-2-yl)oxy}propionic acid
~ FBSA	30334-69-1	Perfluorobutylsulfonamide
~ MeFBSA	68298-12-4	1-Butanesulfonamide; (N-(Methyl)nonafluorobutanesulfonamide)
~ Hydro-EVE Acid	773804-62-9	2,2,3,3-Tetrafluoro-3-{{1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl}oxy}propanoic acid
~ R-EVE Acid	2416366-22-6	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid
~ NVHOS	1132933-86-8	Perfluoroethoxysulfonic acid
*~ PFDoS	79780-39-5	Perfluorododecane sulfonic acid
~ PFODA	16517-11-6	Perfluorooctadecanoic acid
* 3:3 FTCA	356-02-5	2H,2H,3H,3H-Perfluorohexanoic acid
* 5:3 FTCA	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid
* 7:3 FTCA	812-70-4	2H,2H,3H,3H-Perfluorodecanoic acid
~ N-AP-FHxSA	50598-28-2	N-(3-(Dimethylamino)propyl)tridecafluoro-1-hexanesulfonamide
~ N-CMAmP-6:2 FOSA	34455-29-3	N-(Carboxymethyl)-N,N-dimethyl-3-(((3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl)amino)1-propanaminium
~ BPAF	1478-61-1	Bisphenol AF
~ HQ-115	90076-65-6	Bis(trifluoromethane)sulfonimide lithium salt

Results

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water

Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Summary

	Compound	CAS	RS-1 ng/L	RS-2 ng/L	RS-3 ng/L	RS-4 ng/L	RS-5 ng/L
Acids	PFBA	375-22-4	<LOQ (40.0) U	<LOQ (40.0) U	<LOQ (40.0) U	<LOQ (66.7) U	<LOQ (66.7) U
	PFPeA	2706-90-3	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (33.3) U	<LOQ (33.3) U
	PFHxA	307-24-4	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFHpA	375-85-9	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFOA	335-67-1	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFNA	375-95-1	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFDA	335-76-2	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFUnDA	2058-94-8	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFDoA	307-55-1	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFTTrDA	72629-94-8	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFTeDA	376-06-7	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFTeDA	376-06-7	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
Sulfonates	PFBS	375-73-5	<LOQ (8.87) U	<LOQ (8.87) U	<LOQ (8.87) U	<LOQ (14.8) U	<LOQ (14.8) U
	PFPeS	2706-91-4	<LOQ (9.41) U	<LOQ (9.41) U	<LOQ (9.41) U	<LOQ (15.7) U	<LOQ (15.7) U
	PFHxS	355-46-4	<LOQ (9.14) U	<LOQ (9.14) U	<LOQ (9.14) U	<LOQ (15.2) U	<LOQ (15.2) U
	PFHpS	375-92-8	<LOQ (9.53) U	<LOQ (9.53) U	<LOQ (9.53) U	<LOQ (15.9) U	<LOQ (15.9) U
	PFOS	1763-23-1	<LOQ (9.28) U	<LOQ (9.28) U	<LOQ (9.28) U	<LOQ (15.5) U	<LOQ (15.5) U
	4:2 FTS	757124-72-4	<LOQ (37.5) U	<LOQ (37.5) U	<LOQ (37.5) U	<LOQ (62.5) U	<LOQ (62.5) U
	6:2 FTS	27619-97-2	<LOQ (38.0) U	<LOQ (38.0) U	<LOQ (38.0) U	<LOQ (63.3) U	<LOQ (63.3) U
	8:2 FTS	39108-34-4	<LOQ (38.4) U	<LOQ (38.4) U	<LOQ (38.4) U	<LOQ (64.0) U	<LOQ (64.0) U
PFECAs	HFPO-DA	13252-13-6	<LOQ (40.0) U	<LOQ (40.0) U	<LOQ (40.0) U	<LOQ (66.7) U	<LOQ (66.7) U
	PFMBA	863090-89-5	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (33.3) U	<LOQ (33.3) U
	PFMPA	377-73-1	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (33.3) U	<LOQ (33.3) U
	NFDHA	151772-58-6	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (20.0) U	<LOQ (33.3) U	<LOQ (33.3) U
Other	ADONA	919005-14-4	<LOQ (37.8) U	<LOQ (37.8) U	<LOQ (37.8) U	<LOQ (63.0) U	<LOQ (63.0) U
	9Cl-PF3ONS	756426-58-1	<LOQ (37.4) U	<LOQ (37.4) U	<LOQ (37.4) U	<LOQ (62.3) U	<LOQ (62.3) U
	N-MeFOSAA	2355-31-9	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	11Cl-PF3OUdS	763051-92-9	<LOQ (37.8) U	<LOQ (37.8) U	<LOQ (37.8) U	<LOQ (63.0) U	<LOQ (63.0) U
	N-EiFOSAA	2991-50-6	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (10.0) U	<LOQ (16.7) U	<LOQ (16.7) U
	PFEESA	113507-82-7	<LOQ (17.8) U	<LOQ (17.8) U	<LOQ (17.8) U	<LOQ (29.7) U	<LOQ (29.7) U

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water

Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-001-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-1	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:09	Split Factor	N/A
Sampling Date	2025-02-10 15:45	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frdo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325028	<LOQ	36.0	40.0	9.40				U
	PFPeA	2706-90-3	FR110325028	<LOQ	18.0	20.0	3.14				U
	PFHxA	307-24-4	FR110325028	<LOQ	9.00	10.0	3.30				U
	PFHpA	375-85-9	FR110325028	<LOQ	9.00	10.0	3.02				U
	PFOA	335-67-1	FR110325028	<LOQ	9.00	10.0	2.45				U
	PFNA	375-95-1	FR110325028	<LOQ	9.00	10.0	1.92				U
	PFDA	335-76-2	FR110325028	<LOQ	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325028	<LOQ	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325028	<LOQ	9.00	10.0	3.38				U
	PFTeDA	72629-94-8	FR110325028	<LOQ	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325028	<LOQ	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325028	<LOQ	7.98	8.87	1.92				U
	PFPeS	2706-91-4	FR110325028	<LOQ	8.47	9.41	2.56				U
Sulfonates	PFHxS	355-46-4	FR110325028	<LOQ	8.23	9.14	3.86				U
	PFHpS	375-92-8	FR110325028	<LOQ	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325028	<LOQ	8.35	9.28	3.52				U
	4:2 FTS	757124-72-4	FR110325028	<LOQ	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325028	<LOQ	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325028	<LOQ	34.6	38.4	24.0				U
PFECAs	HFPO-DA	13252-13-6	FR110325028	<LOQ	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325028	<LOQ	18.0	20.0	8.18				U
	PFMPA	377-73-1	FR110325028	<LOQ	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325028	<LOQ	18.0	20.0	10.1				U
Other	ADONA	919005-14-4	FR110325028	<LOQ	34.0	37.8	8.40				U
	9Cl-PF3ONS	756426-58-1	FR110325028	<LOQ	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325028	<LOQ	9.00	10.0	5.10				U
	11Cl-PF3OUdS	763051-92-9	FR110325028	<LOQ	34.0	37.8	8.50				U
	N-EiFOSAA	2991-50-6	FR110325028	<LOQ	9.00	10.0	4.84				U
ES	PFEESA	113507-82-7	FR110325028	<LOQ	16.0	17.8	3.16				U
	M4PFBA		FR110325028					12.5	5-130%	89.6%	
	M5PFPeA		FR110325028					12.5	40-130%	89.4%	
	M5PFHxA		FR110325028					12.5	40-130%	87.2%	
	M4PFHpA		FR110325028					12.5	40-130%	82.6%	
	M8PFOA		FR110325028					12.5	40-130%	77.0%	
	M9PFNA		FR110325028					12.5	40-130%	88.5%	
	M6PFDA		FR110325028					12.5	40-130%	82.3%	
	M7PFUDa		FR110325028					12.5	30-130%	77.8%	
	M2-PFDoA		FR110325028					12.5	10-130%	76.8%	
	13C2-PFTeDA		FR110325028					12.5	10-130%	65.7%	
	M3PFBS		FR110325028					12.5	40-135%	91.8%	
	M3PFHxS		FR110325028					12.5	40-130%	90.0%	
	M8PFOS		FR110325028					12.5	40-130%	89.4%	
	M2-4:2 FTS		FR110325028					12.5	40-200%	102%	
	M2-6:2 FTS		FR110325028					12.5	40-200%	85.7%	
	M2-8:2 FTS		FR110325028					12.5	40-300%	77.7%	
	M8PFOSA		FR110325028					12.5	40-130%	79.7%	
	d3-N-MeFOSAA		FR110325028					12.5	40-170%	79.5%	
	d5-N-EiFOSAA		FR110325028					12.5	25-135%	74.8%	
	M3HFPO-DA		FR110325028					12.5	40-130%	97.4%	
JS	M3PFBA		FR110325028					12.5	50-200%	120%	
	M2-PFHxA		FR110325028					12.5	50-200%	119%	
	M4-PFOA		FR110325028					12.5	50-200%	138%	
	M5-PFNA		FR110325028					12.5	50-200%	119%	
	M2-PFDA		FR110325028					12.5	50-200%	120%	
	18O2PFHxS		FR110325028					12.5	50-200%	119%	
	M4-PFOS		FR110325028					12.5	50-200%	118%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-002-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-2	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:32	Split Factor	N/A
Sampling Date	2025-02-11 08:20	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325029	<LOQ	36.0	40.0	9.40				U
	PFPeA	2706-90-3	FR110325029	<LOQ	18.0	20.0	3.14				U
	PFHxA	307-24-4	FR110325029	<LOQ	9.00	10.0	3.30				U
	PFHpA	375-85-9	FR110325029	<LOQ	9.00	10.0	3.02				U
	PFOA	335-67-1	FR110325029	<LOQ	9.00	10.0	2.45				U
	PFNA	375-95-1	FR110325029	<LOQ	9.00	10.0	1.92				U
	PFDA	335-76-2	FR110325029	<LOQ	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325029	<LOQ	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325029	<LOQ	9.00	10.0	3.38				U
	PFTeDA	72629-94-8	FR110325029	<LOQ	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325029	<LOQ	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325029	<LOQ	7.98	8.87	1.92				U
Sulfonates	PFPeS	2706-91-4	FR110325029	<LOQ	8.47	9.41	2.56				U
	PFHxS	355-46-4	FR110325029	<LOQ	8.23	9.14	3.86				U
	PFHpS	375-92-8	FR110325029	<LOQ	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325029	<LOQ	8.35	9.28	3.52				U
	4:2 FTS	757124-72-4	FR110325029	<LOQ	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325029	<LOQ	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325029	<LOQ	34.6	38.4	24.0				U
PFECAs	HFPO-DA	13252-13-6	FR110325029	<LOQ	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325029	<LOQ	18.0	20.0	8.18				U
	PFMPA	377-73-1	FR110325029	<LOQ	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325029	<LOQ	18.0	20.0	10.1				U
Other	ADONA	919005-14-4	FR110325029	<LOQ	34.0	37.8	8.40				U
	9CI-PF3ONS	756426-58-1	FR110325029	<LOQ	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325029	<LOQ	9.00	10.0	5.10				U
	11CI-PF3OUdS	763051-92-9	FR110325029	<LOQ	34.0	37.8	8.50				U
	N-EiFOSAA	2991-50-6	FR110325029	<LOQ	9.00	10.0	4.84				U
ES	PFEESA	113507-82-7	FR110325029	<LOQ	16.0	17.8	3.16				U
	M4PFBA		FR110325029					12.5	5-130%	92.7%	
	M5PFPeA		FR110325029					12.5	40-130%	91.9%	
	M5PFHxA		FR110325029					12.5	40-130%	91.6%	
	M4PFHpA		FR110325029					12.5	40-130%	84.8%	
	M8PFOA		FR110325029					12.5	40-130%	78.1%	
	M9PFNA		FR110325029					12.5	40-130%	91.3%	
	M6PFDA		FR110325029					12.5	40-130%	81.9%	
	M7PFUDa		FR110325029					12.5	30-130%	76.3%	
	M2-PFDoA		FR110325029					12.5	10-130%	71.8%	
	13C2-PFTeDA		FR110325029					12.5	10-130%	59.1%	
	M3PFBS		FR110325029					12.5	40-135%	90.5%	
	M3PFHxS		FR110325029					12.5	40-130%	91.3%	
	M8PFOS		FR110325029					12.5	40-130%	87.5%	
	M2-4:2 FTS		FR110325029					12.5	40-200%	98.3%	
	M2-6:2 FTS		FR110325029					12.5	40-200%	89.1%	
	M2-8:2 FTS		FR110325029					12.5	40-300%	81.6%	
	M8PFOSA		FR110325029					12.5	40-130%	80.4%	
	d3-N-MeFOSAA		FR110325029					12.5	40-170%	79.8%	
	d5-N-EiFOSAA		FR110325029					12.5	25-135%	71.3%	
	M3HFPO-DA		FR110325029					12.5	40-130%	103%	
JS	M3PFBA		FR110325029					12.5	50-200%	116%	
	M2-PFHxA		FR110325029					12.5	50-200%	115%	
	M4-PFOA		FR110325029					12.5	50-200%	133%	
	M5-PFNA		FR110325029					12.5	50-200%	114%	
	M2-PFDA		FR110325029					12.5	50-200%	117%	
	18O2PFHxS		FR110325029					12.5	50-200%	117%	
	M4-PFOS		FR110325029					12.5	50-200%	118%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-003-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-3	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:55	Split Factor	N/A
Sampling Date	2025-02-12 14:20	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325030	<LOQ	36.0	40.0	9.40				U
	PFPeA	2706-90-3	FR110325030	<LOQ	18.0	20.0	3.14				U
	PFHxA	307-24-4	FR110325030	<LOQ	9.00	10.0	3.30				U
	PFHpA	375-85-9	FR110325030	<LOQ	9.00	10.0	3.02				U
	PFOA	335-67-1	FR110325030	<LOQ	9.00	10.0	2.45				U
	PFNA	375-95-1	FR110325030	<LOQ	9.00	10.0	1.92				U
	PFDA	335-76-2	FR110325030	<LOQ	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325030	<LOQ	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325030	<LOQ	9.00	10.0	3.38				U
	PFTeDA	72629-94-8	FR110325030	<LOQ	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325030	<LOQ	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325030	<LOQ	7.98	8.87	1.92				U
	PFPeS	2706-91-4	FR110325030	<LOQ	8.47	9.41	2.56				U
Sulfonates	PFHxS	355-46-4	FR110325030	<LOQ	8.23	9.14	3.86				U
	PFHpS	375-92-8	FR110325030	<LOQ	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325030	<LOQ	8.35	9.28	3.52				U
	4:2 FTS	757124-72-4	FR110325030	<LOQ	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325030	<LOQ	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325030	<LOQ	34.6	38.4	24.0				U
PFECAs	HFPO-DA	13252-13-6	FR110325030	<LOQ	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325030	<LOQ	18.0	20.0	8.18				U
	PFMPA	377-73-1	FR110325030	<LOQ	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325030	<LOQ	18.0	20.0	10.1				U
Other	ADONA	919005-14-4	FR110325030	<LOQ	34.0	37.8	8.40				U
	9Cl-PF3ONS	756426-58-1	FR110325030	<LOQ	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325030	<LOQ	9.00	10.0	5.10				U
	11Cl-PF3OUdS	763051-92-9	FR110325030	<LOQ	34.0	37.8	8.50				U
	N-EiFOSAA	2991-50-6	FR110325030	<LOQ	9.00	10.0	4.84				U
ES	PFEESeA	113507-82-7	FR110325030	<LOQ	16.0	17.8	3.16				U
	M4PFBA		FR110325030					12.5	5-130%	94.2%	
	M5PFPeA		FR110325030					12.5	40-130%	96.4%	
	M5PFHxA		FR110325030					12.5	40-130%	92.8%	
	M4PFHpA		FR110325030					12.5	40-130%	91.9%	
	M8PFOA		FR110325030					12.5	40-130%	79.2%	
	M9PFNA		FR110325030					12.5	40-130%	92.4%	
	M6PFDA		FR110325030					12.5	40-130%	82.9%	
	M7PFUDa		FR110325030					12.5	30-130%	76.5%	
	M2-PFDaA		FR110325030					12.5	10-130%	74.6%	
	13C2-PFTeDA		FR110325030					12.5	10-130%	61.9%	
	M3PFBS		FR110325030					12.5	40-135%	96.4%	
	M3PFHxS		FR110325030					12.5	40-130%	92.6%	
	M8PFOS		FR110325030					12.5	40-130%	92.6%	
	M2-4:2 FTS		FR110325030					12.5	40-200%	101%	
	M2-6:2 FTS		FR110325030					12.5	40-200%	82.1%	
	M2-8:2 FTS		FR110325030					12.5	40-300%	77.6%	
	M8PFOSA		FR110325030					12.5	40-130%	83.5%	
	d3-N-MeFOSAA		FR110325030					12.5	40-170%	79.7%	
	d5-N-EiFOSAA		FR110325030					12.5	25-135%	72.4%	
	M3HFPO-DA		FR110325030					12.5	40-130%	106%	
JS	M3PFBA		FR110325030					12.5	50-200%	110%	
	M2-PFHxA		FR110325030					12.5	50-200%	105%	
	M4-PFOA		FR110325030					12.5	50-200%	127%	
	M5-PFNA		FR110325030					12.5	50-200%	108%	
	M2-PFDA		FR110325030					12.5	50-200%	110%	
	18O2PFHxS		FR110325030					12.5	50-200%	109%	
	M4-PFOS		FR110325030					12.5	50-200%	108%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water

Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-004-1A	Prep Batch	eu19072	Sample Vol (mL)	60
Sample Name	RS-4	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 03:18	Split Factor	N/A
Sampling Date	2025-02-13 12:30	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frdo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325031	<LOQ	60.0	66.7	15.7				U
	PFPeA	2706-90-3	FR110325031	<LOQ	30.0	33.3	5.24				U
	PFHxA	307-24-4	FR110325031	<LOQ	15.0	16.7	5.50				U
	PFHpA	375-85-9	FR110325031	<LOQ	15.0	16.7	5.02				U
	PFOA	335-67-1	FR110325031	<LOQ	15.0	16.7	4.08				U
	PFNA	375-95-1	FR110325031	<LOQ	15.0	16.7	3.19				U
	PFDA	335-76-2	FR110325031	<LOQ	15.0	16.7	7.59				U
	PFUnDA	2058-94-8	FR110325031	<LOQ	15.0	16.7	5.63				U
	PFDoA	307-55-1	FR110325031	<LOQ	15.0	16.7	5.63				U
	PFTeDA	72629-94-8	FR110325031	<LOQ	15.0	16.7	5.73				U
	PFTeDA	376-06-7	FR110325031	<LOQ	15.0	16.7	4.29				U
	PFBS	375-73-5	FR110325031	<LOQ	13.3	14.8	3.19				U
Sulfonates	PFPeS	2706-91-4	FR110325031	<LOQ	14.1	15.7	4.27				U
	PFHxS	355-46-4	FR110325031	<LOQ	13.7	15.2	6.44				U
	PFHpS	375-92-8	FR110325031	<LOQ	14.3	15.9	5.50				U
	PFOS	1763-23-1	FR110325031	<LOQ	13.9	15.5	5.87				U
	4:2 FTS	757124-72-4	FR110325031	<LOQ	56.2	62.5	26.2				U
	6:2 FTS	27619-97-2	FR110325031	<LOQ	57.0	63.3	15.8				U
	8:2 FTS	39108-34-4	FR110325031	<LOQ	57.6	64.0	40.1				U
PFECAs	HFPO-DA	13252-13-6	FR110325031	<LOQ	60.0	66.7	19.3				U
	PFMBA	863090-89-5	FR110325031	<LOQ	30.0	33.3	13.6				U
	PFMPA	377-73-1	FR110325031	<LOQ	30.0	33.3	6.26				U
	NFDHA	151772-58-6	FR110325031	<LOQ	30.0	33.3	16.8				U
Other	ADONA	919005-14-4	FR110325031	<LOQ	56.7	63.0	14.0				U
	9Cl-PF3ONS	756426-58-1	FR110325031	<LOQ	56.1	62.3	17.8				U
	N-MeFOSAA	2355-31-9	FR110325031	<LOQ	15.0	16.7	8.50				U
	11Cl-PF3OUdS	763051-92-9	FR110325031	<LOQ	56.7	63.0	14.2				U
	N-EiFOSAA	2991-50-6	FR110325031	<LOQ	15.0	16.7	8.07				U
ES	PFEESA	113507-82-7	FR110325031	<LOQ	26.7	29.7	5.27				U
	M4PFBA		FR110325031					12.5	5-130%	87.0%	
	M5PFPeA		FR110325031					12.5	40-130%	87.0%	
	M5PFHxA		FR110325031					12.5	40-130%	86.6%	
	M4PFHpA		FR110325031					12.5	40-130%	81.7%	
	M8PFOA		FR110325031					12.5	40-130%	69.7%	
	M9PFNA		FR110325031					12.5	40-130%	84.4%	
	M6PFDA		FR110325031					12.5	40-130%	75.6%	
	M7PFUDa		FR110325031					12.5	30-130%	69.7%	
	M2-PFDoA		FR110325031					12.5	10-130%	62.3%	
	13C2-PFTeDA		FR110325031					12.5	10-130%	45.4%	
	M3PFBS		FR110325031					12.5	40-135%	91.0%	
	M3PFHxS		FR110325031					12.5	40-130%	88.1%	
	M8PFOS		FR110325031					12.5	40-130%	82.5%	
	M2-4:2 FTS		FR110325031					12.5	40-200%	91.8%	
	M2-6:2 FTS		FR110325031					12.5	40-200%	80.8%	
	M2-8:2 FTS		FR110325031					12.5	40-300%	80.5%	
	M8PFOSA		FR110325031					12.5	40-130%	71.5%	
	d3-N-MeFOSAA		FR110325031					12.5	40-170%	69.9%	
	d5-N-EiFOSAA		FR110325031					12.5	25-135%	62.5%	
	M3HFPO-DA		FR110325031					12.5	40-130%	94.3%	
JS	M3PFBA		FR110325031					12.5	50-200%	116%	
	M2-PFHxA		FR110325031					12.5	50-200%	114%	
	M4-PFOA		FR110325031					12.5	50-200%	141%	
	M5-PFNA		FR110325031					12.5	50-200%	117%	
	M2-PFDA		FR110325031					12.5	50-200%	116%	
	18O2PFHxS		FR110325031					12.5	50-200%	117%	
	M4-PFOS		FR110325031					12.5	50-200%	116%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-005-1A	Prep Batch	eu19072	Sample Vol (mL)	60
Sample Name	RS-5	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 03:41	Split Factor	N/A
Sampling Date	2025-02-14 10:05	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325032	<LOQ	60.0	66.7	15.7				U
	PFPeA	2706-90-3	FR110325032	<LOQ	30.0	33.3	5.24				U
	PFHxA	307-24-4	FR110325032	<LOQ	15.0	16.7	5.50				U
	PFHpA	375-85-9	FR110325032	<LOQ	15.0	16.7	5.02				U
	PFOA	335-67-1	FR110325032	<LOQ	15.0	16.7	4.08				U
	PFNA	375-95-1	FR110325032	<LOQ	15.0	16.7	3.19				U
	PFDA	335-76-2	FR110325032	<LOQ	15.0	16.7	7.59				U
	PFUnDA	2058-94-8	FR110325032	<LOQ	15.0	16.7	5.63				U
	PFDoA	307-55-1	FR110325032	<LOQ	15.0	16.7	5.63				U
	PFTeDA	72629-94-8	FR110325032	<LOQ	15.0	16.7	5.73				U
	PFTeDA	376-06-7	FR110325032	<LOQ	15.0	16.7	4.29				U
	PFBS	375-73-5	FR110325032	<LOQ	13.3	14.8	3.19				U
Sulfonates	PFPeS	2706-91-4	FR110325032	<LOQ	14.1	15.7	4.27				U
	PFHxS	355-46-4	FR110325032	<LOQ	13.7	15.2	6.44				U
	PFHpS	375-92-8	FR110325032	<LOQ	14.3	15.9	5.50				U
	PFOS	1763-23-1	FR110325032	<LOQ	13.9	15.5	5.87				U
	4:2 FTS	757124-72-4	FR110325032	<LOQ	56.2	62.5	26.2				U
	6:2 FTS	27619-97-2	FR110325032	<LOQ	57.0	63.3	15.8				U
	8:2 FTS	39108-34-4	FR110325032	<LOQ	57.6	64.0	40.1				U
PFECAs	HFPO-DA	13252-13-6	FR110325032	<LOQ	60.0	66.7	19.3				U
	PFMBA	863090-89-5	FR110325032	<LOQ	30.0	33.3	13.6				U
	PFMPA	377-73-1	FR110325032	<LOQ	30.0	33.3	6.26				U
	NFDHA	151772-58-6	FR110325032	<LOQ	30.0	33.3	16.8				U
Other	ADONA	919005-14-4	FR110325032	<LOQ	56.7	63.0	14.0				U
	9Cl-PF3ONS	756426-58-1	FR110325032	<LOQ	56.1	62.3	17.8				U
	N-MeFOSAA	2355-31-9	FR110325032	<LOQ	15.0	16.7	8.50				U
	11Cl-PF3OUdS	763051-92-9	FR110325032	<LOQ	56.7	63.0	14.2				U
	N-EtFOSAA	2991-50-6	FR110325032	<LOQ	15.0	16.7	8.07				U
ES	PFEESA	113507-82-7	FR110325032	<LOQ	26.7	29.7	5.27				U
	M4PFBA		FR110325032					12.5	5-130%	89.9%	
	M5PFPeA		FR110325032					12.5	40-130%	93.4%	
	M5PFHxA		FR110325032					12.5	40-130%	93.0%	
	M4PFHpA		FR110325032					12.5	40-130%	87.1%	
	M8PFOA		FR110325032					12.5	40-130%	76.0%	
	M9PFNA		FR110325032					12.5	40-130%	92.3%	
	M6PFDA		FR110325032					12.5	40-130%	83.3%	
	M7PFUDa		FR110325032					12.5	30-130%	73.1%	
	M2-PFDoA		FR110325032					12.5	10-130%	69.3%	
	13C2-PFTeDA		FR110325032					12.5	10-130%	53.8%	
	M3PFBS		FR110325032					12.5	40-135%	97.1%	
	M3PFHxS		FR110325032					12.5	40-130%	93.6%	
	M8PFOS		FR110325032					12.5	40-130%	90.0%	
	M2-4:2 FTS		FR110325032					12.5	40-200%	97.3%	
	M2-6:2 FTS		FR110325032					12.5	40-200%	87.1%	
	M2-8:2 FTS		FR110325032					12.5	40-300%	69.4%	
	M8PFOSA		FR110325032					12.5	40-130%	75.4%	
	d3-N-MeFOSAA		FR110325032					12.5	40-170%	74.5%	
	d5-N-EtFOSAA		FR110325032					12.5	25-135%	62.4%	
	M3HFPO-DA		FR110325032					12.5	40-130%	106%	
JS	M3PFBA		FR110325032					12.5	50-200%	112%	
	M2-PFHxA		FR110325032					12.5	50-200%	107%	
	M4-PFOA		FR110325032					12.5	50-200%	131%	
	M5-PFNA		FR110325032					12.5	50-200%	108%	
	M2-PFDA		FR110325032					12.5	50-200%	110%	
	18O2PFHxS		FR110325032					12.5	50-200%	111%	
	M4-PFOS		FR110325032					12.5	50-200%	108%	

QC Data

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	MB_19072_PFAS	Prep Batch	eu19072	Sample Vol (mL)	500
Sample Name	MB_19072_PFAS	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-11 23:07	Split Factor	N/A
Sampling Date		Analyst	zoeamndt	Method Code	Eu-062
Received Date		Instrument	Prodo	Sample Type	Blank
		Bottle ID	-		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325020	<LOQ	7.20	8.00	1.88				U
	PFPeA	2706-90-3	FR110325020	<LOQ	3.60	4.00	0.629				U
	PFHxA	307-24-4	FR110325020	<LOQ	1.80	2.00	0.660				U
	PFHpA	375-85-9	FR110325020	<LOQ	1.80	2.00	0.603				U
	PFOA	335-67-1	FR110325020	<LOQ	1.80	2.00	0.490				U
	PFNA	375-95-1	FR110325020	<LOQ	1.80	2.00	0.383				U
	PFDA	335-76-2	FR110325020	<LOQ	1.80	2.00	0.911				U
	PFUnDA	2058-94-8	FR110325020	<LOQ	1.80	2.00	0.676				U
	PFDoA	307-55-1	FR110325020	<LOQ	1.80	2.00	0.676				U
	PFTeDA	72629-94-8	FR110325020	<LOQ	1.80	2.00	0.688				U
	PFTeDA	376-06-7	FR110325020	<LOQ	1.80	2.00	0.515				U
	PFBS	375-73-5	FR110325020	<LOQ	1.60	1.77	0.383				U
Sulfonates	PFPeS	2706-91-4	FR110325020	<LOQ	1.69	1.88	0.512				U
	PFHxS	355-46-4	FR110325020	<LOQ	1.65	1.83	0.773				U
	PFHpS	375-92-8	FR110325020	<LOQ	1.72	1.91	0.660				U
	PFOS	1763-23-1	FR110325020	<LOQ	1.67	1.86	0.704				U
	4:2 FTS	757124-72-4	FR110325020	<LOQ	6.75	7.50	3.14				U
	6:2 FTS	27619-97-2	FR110325020	<LOQ	6.84	7.60	1.89				U
	8:2 FTS	39108-34-4	FR110325020	<LOQ	6.91	7.68	4.81				U
PFECAs	HFPO-DA	13252-13-6	FR110325020	<LOQ	7.20	8.00	2.32				U
	PFMBA	863090-89-5	FR110325020	<LOQ	3.60	4.00	1.64				U
	PFMPA	377-73-1	FR110325020	<LOQ	3.60	4.00	0.751				U
	NFDHA	151772-58-6	FR110325020	<LOQ	3.60	4.00	2.02				U
Other	ADONA	919005-14-4	FR110325020	<LOQ	6.80	7.56	1.68				U
	9Cl-PF3ONS	756426-58-1	FR110325020	<LOQ	6.73	7.48	2.13				U
	N-MeFOSAA	2355-31-9	FR110325020	<LOQ	1.80	2.00	1.02				U
	11Cl-PF3OUdS	763051-92-9	FR110325020	<LOQ	6.80	7.56	1.70				U
	N-EiFOSAA	2991-50-6	FR110325020	<LOQ	1.80	2.00	0.968				U
ES	PFEESeA	113507-82-7	FR110325020	<LOQ	3.20	3.56	0.632				U
	M4PFBA		FR110325020					12.5	5-130%	90.7%	
	M5PFPeA		FR110325020					12.5	40-130%	92.0%	
	M5PFHxA		FR110325020					12.5	40-130%	89.7%	
	M4PFHpA		FR110325020					12.5	40-130%	89.2%	
	M8PFOA		FR110325020					12.5	40-130%	75.0%	
	M9PFNA		FR110325020					12.5	40-130%	91.8%	
	M6PFDA		FR110325020					12.5	40-130%	88.8%	
	M7PFUDa		FR110325020					12.5	30-130%	87.2%	
	M2-PFDoA		FR110325020					12.5	10-130%	85.6%	
	13C2-PFTeDA		FR110325020					12.5	10-130%	71.0%	
	M3PFBS		FR110325020					12.5	40-135%	94.8%	
	M3PFHxS		FR110325020					12.5	40-130%	87.8%	
	M8PFOS		FR110325020					12.5	40-130%	89.8%	
	M2-4:2 FTS		FR110325020					12.5	40-200%	89.1%	
	M2-6:2 FTS		FR110325020					12.5	40-200%	80.4%	
	M2-8:2 FTS		FR110325020					12.5	40-300%	85.6%	
	M8PFOSA		FR110325020					12.5	40-130%	84.3%	
	d3-N-MeFOSAA		FR110325020					12.5	40-170%	80.0%	
	d5-N-EiFOSAA		FR110325020					12.5	25-135%	82.8%	
	M3HFPO-DA		FR110325020					12.5	40-130%	105%	
JS	M3PFBA		FR110325020					12.5	50-200%	142%	
	M2-PFHxA		FR110325020					12.5	50-200%	141%	
	M4-PFOA		FR110325020					12.5	50-200%	166%	
	M5-PFNA		FR110325020					12.5	50-200%	137%	
	M2-PFDA		FR110325020					12.5	50-200%	141%	
	18O2PFHxS		FR110325020					12.5	50-200%	146%	
	M4-PFOS		FR110325020					12.5	50-200%	147%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	LLOPR_19072_PFAS	Prep Batch	eu19072	Sample Vol (mL)	500
Sample Name	LLOPR_19072_PFAS	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-11 23:30	Split Factor	N/A
Sampling Date		Analyst	zoeamndt	Method Code	Eu-062
Received Date		Instrument	Frodo	Sample Type	Control
		Bottle ID	-		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325021	17.7	7.20	8.00	1.88	8.00	70-140%	110%	
	PFPeA	2706-90-3	FR110325021	8.60	3.60	4.00	0.629	4.00	65-135%	107%	
	PFHxA	307-24-4	FR110325021	4.33	1.80	2.00	0.660	2.00	70-145%	108%	
	PFHpA	375-85-9	FR110325021	4.47	1.80	2.00	0.603	2.00	70-150%	112%	
	PFOA	335-67-1	FR110325021	4.29	1.80	2.00	0.490	2.00	70-150%	107%	
	PFNA	375-95-1	FR110325021	4.19	1.80	2.00	0.383	2.00	70-150%	105%	
	PFDA	335-76-2	FR110325021	4.28	1.80	2.00	0.911	2.00	70-140%	107%	
	PFUnDA	2058-94-8	FR110325021	4.18	1.80	2.00	0.676	2.00	70-145%	104%	
	PFDoA	307-55-1	FR110325021	4.27	1.80	2.00	0.676	2.00	70-140%	107%	
	PFTeDA	72629-94-8	FR110325021	4.18	1.80	2.00	0.688	2.00	65-140%	105%	
	PFTeDA	376-06-7	FR110325021	4.31	1.80	2.00	0.515	2.00	60-140%	108%	
	PFBS	375-73-5	FR110325021	3.60	1.60	1.77	0.383	1.77	60-145%	101%	
Sulfonates	PFPeS	2706-91-4	FR110325021	3.75	1.69	1.88	0.512	1.88	65-140%	99.5%	
	PFHxS	355-46-4	FR110325021	3.82	1.65	1.83	0.773	1.83	65-145%	105%	
	PFHpS	375-92-8	FR110325021	4.23	1.72	1.91	0.660	1.91	70-150%	111%	
	PFOS	1763-23-1	FR110325021	3.86	1.67	1.86	0.704	1.86	55-150%	104%	
	4:2 FTS	757124-72-4	FR110325021	16.9	6.75	7.50	3.14	7.50	70-145%	112%	
	6:2 FTS	27619-97-2	FR110325021	16.4	6.84	7.60	1.89	7.60	65-155%	108%	
PFECAs	8:2 FTS	39108-34-4	FR110325021	16.0	6.91	7.68	4.81	7.68	60-150%	104%	
	HFPO-DA	13252-13-6	FR110325021	16.0	7.20	8.00	2.32	8.00	70-140%	99.8%	
	PFMBA	863090-89-5	FR110325021	8.86	3.60	4.00	1.64	4.00	60-150%	111%	
	PFMPA	377-73-1	FR110325021	8.82	3.60	4.00	0.751	4.00	55-140%	110%	
Other	NFHA	151772-58-6	FR110325021	8.93	3.60	4.00	2.02	4.00	50-150%	112%	
	ADONA	919005-14-4	FR110325021	15.2	6.80	7.56	1.68	7.56	65-145%	101%	
	9Cl-PF3ONS	756426-58-1	FR110325021	16.3	6.73	7.48	2.13	7.48	70-155%	109%	
	N-MeFOSAA	2355-31-9	FR110325021	3.84	1.80	2.00	1.02	2.00	50-140%	96.0%	
	11Cl-PF3OUdS	763051-92-9	FR110325021	14.8	6.80	7.56	1.70	7.56	55-160%	97.9%	
	N-EiFOSAA	2991-50-6	FR110325021	4.01	1.80	2.00	0.968	2.00	70-145%	100%	
ES	PFEESeA	113507-82-7	FR110325021	7.72	3.20	3.56	0.632	3.56	70-140%	108%	
	M4PFBA		FR110325021					12.5	5-130%	89.1%	
	M5PFPeA		FR110325021					12.5	40-130%	90.4%	
	M5PFHxA		FR110325021					12.5	40-130%	87.4%	
	M4PFHpA		FR110325021					12.5	40-130%	83.9%	
	M8PFOA		FR110325021					12.5	40-130%	74.0%	
	M9PFNA		FR110325021					12.5	40-130%	90.8%	
	M6PFDA		FR110325021					12.5	40-130%	83.9%	
	M7PFUDa		FR110325021					12.5	30-130%	85.2%	
	M2-PFDoA		FR110325021					12.5	10-130%	81.1%	
	13C2-PFTeDA		FR110325021					12.5	10-130%	66.8%	
	M3PFBS		FR110325021					12.5	40-135%	96.8%	
	M3PFHxS		FR110325021					12.5	40-130%	90.6%	
	M8PFOS		FR110325021					12.5	40-130%	89.0%	
	M2-4:2 FTS		FR110325021					12.5	40-200%	87.6%	
	M2-6:2 FTS		FR110325021					12.5	40-200%	93.6%	
	M2-8:2 FTS		FR110325021					12.5	40-300%	92.7%	
	M8PFOSA		FR110325021					12.5	40-130%	86.0%	
	d3-N-MeFOSAA		FR110325021					12.5	40-170%	86.1%	
	d5-N-EiFOSAA		FR110325021					12.5	25-135%	82.3%	
	M3HFPO-DA		FR110325021					12.5	40-130%	97.2%	
JS	M3PFBA		FR110325021					12.5	50-200%	127%	
	M2-PFHxA		FR110325021					12.5	50-200%	127%	
	M4-PFOA		FR110325021					12.5	50-200%	151%	
	M5-PFNA		FR110325021					12.5	50-200%	126%	
	M2-PFDA		FR110325021					12.5	50-200%	129%	
	18O2PFHxS		FR110325021					12.5	50-200%	124%	
	M4-PFOS		FR110325021					12.5	50-200%	126%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	OPR_19072_PFAS	Prep Batch	eu19072	Sample Vol (mL)	500
Sample Name	OPR_19072_PFAS	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-11 23:53	Split Factor	N/A
Sampling Date		Analyst	zoeamndt	Method Code	Eu-062
Received Date		Instrument	Frodo	Sample Type	Control
		Bottle ID	-		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325022	111	7.20	8.00	1.88	50.0	70-140%	111%	
	PFPeA	2706-90-3	FR110325022	54.8	3.60	4.00	0.629	25.0	65-135%	110%	
	PFHxA	307-24-4	FR110325022	27.2	1.80	2.00	0.660	12.5	70-145%	109%	
	PFHpA	375-85-9	FR110325022	27.4	1.80	2.00	0.603	12.5	70-150%	110%	
	PFOA	335-67-1	FR110325022	28.2	1.80	2.00	0.490	12.5	70-150%	113%	
	PFNA	375-95-1	FR110325022	26.6	1.80	2.00	0.383	12.5	70-150%	107%	
	PFDA	335-76-2	FR110325022	27.8	1.80	2.00	0.911	12.5	70-140%	111%	
	PFUnDA	2058-94-8	FR110325022	27.4	1.80	2.00	0.676	12.5	70-145%	110%	
	PFDaA	307-55-1	FR110325022	27.1	1.80	2.00	0.676	12.5	70-140%	108%	
	PFTeDA	72629-94-8	FR110325022	27.1	1.80	2.00	0.688	12.5	65-140%	108%	
Sulfonates	PFTeDA	376-06-7	FR110325022	27.7	1.80	2.00	0.515	12.5	60-140%	111%	
	PFBS	375-73-5	FR110325022	24.2	1.60	1.77	0.383	11.1	60-145%	109%	
	PFPeS	2706-91-4	FR110325022	24.3	1.69	1.88	0.512	11.8	65-140%	103%	
	PFHxS	355-46-4	FR110325022	23.2	1.65	1.83	0.773	11.4	65-145%	102%	
	PFHpS	375-92-8	FR110325022	25.1	1.72	1.91	0.660	11.9	70-150%	105%	
	PFOS	1763-23-1	FR110325022	22.8	1.67	1.86	0.704	11.6	55-150%	98.2%	
	4:2 FTS	757124-72-4	FR110325022	102	6.75	7.50	3.14	46.9	70-145%	109%	
PFECAs	6:2 FTS	27619-97-2	FR110325022	102	6.84	7.60	1.89	47.5	65-155%	107%	
	8:2 FTS	39108-34-4	FR110325022	118	6.91	7.68	4.81	48.0	60-150%	123%	
	HFPO-DA	13252-13-6	FR110325022	103	7.20	8.00	2.32	50.0	70-140%	103%	
	PFMBA	863090-89-5	FR110325022	56.2	3.60	4.00	1.64	25.0	60-150%	112%	
	PFMPA	377-73-1	FR110325022	57.5	3.60	4.00	0.751	25.0	55-140%	115%	
Other	NFDHA	151772-58-6	FR110325022	56.9	3.60	4.00	2.02	25.0	50-150%	114%	
	ADONA	919005-14-4	FR110325022	93.6	6.80	7.56	1.68	47.3	65-145%	99.1%	
	9Cl-PF3ONS	756426-58-1	FR110325022	97.3	6.73	7.48	2.13	46.8	70-155%	104%	
	N-MeFOSAA	2355-31-9	FR110325022	25.1	1.80	2.00	1.02	12.5	50-140%	101%	
	11Cl-PF3OUdS	763051-92-9	FR110325022	94.0	6.80	7.56	1.70	47.3	55-160%	99.5%	
ES	N-EtFOSAA	2991-50-6	FR110325022	26.6	1.80	2.00	0.968	12.5	70-145%	107%	
	PFEESeA	113507-82-7	FR110325022	49.4	3.20	3.56	0.632	22.3	70-140%	111%	
	M4PFBA		FR110325022					12.5	5-130%	84.4%	
	M5PFPeA		FR110325022					12.5	40-130%	87.9%	
	M5PFHxA		FR110325022					12.5	40-130%	85.4%	
	M4PFHpA		FR110325022					12.5	40-130%	83.5%	
	M8PFOA		FR110325022					12.5	40-130%	67.0%	
	M9PFNA		FR110325022					12.5	40-130%	85.6%	
	M6PFDA		FR110325022					12.5	40-130%	83.5%	
	M7PFUDa		FR110325022					12.5	30-130%	85.7%	
	M2-PFDaA		FR110325022					12.5	10-130%	84.8%	
	13C2-PFTeDA		FR110325022					12.5	10-130%	71.8%	
	M3PFBS		FR110325022					12.5	40-135%	85.7%	
	M3PFHxS		FR110325022					12.5	40-130%	86.6%	
	M8PFOS		FR110325022					12.5	40-130%	87.1%	
	M2-4:2 FTS		FR110325022					12.5	40-200%	88.0%	
	M2-6:2 FTS		FR110325022					12.5	40-200%	82.7%	
	M2-8:2 FTS		FR110325022					12.5	40-300%	74.9%	
	M8PFOSA		FR110325022					12.5	40-130%	77.4%	
	d3-N-MeFOSAA		FR110325022					12.5	40-170%	79.5%	
	d5-N-EtFOSAA		FR110325022					12.5	25-135%	77.0%	
JS	M3HFPO-DA		FR110325022					12.5	40-130%	96.9%	
	M3PFBA		FR110325022					12.5	50-200%	131%	
	M2-PFHxA		FR110325022					12.5	50-200%	127%	
	M4-PFOA		FR110325022					12.5	50-200%	160%	
	M5-PFNA		FR110325022					12.5	50-200%	131%	
	M2-PFDA		FR110325022					12.5	50-200%	129%	
	18O2PFHxS		FR110325022					12.5	50-200%	130%	
	M4-PFOS		FR110325022					12.5	50-200%	132%	

Sample Custody



Enthalpy Ultratrace Job#: _____ COC Page 1 of 1

Special Handling:

- ☒ Standard Turn Around Time
- ☐ Rush Turn Around Time – Date Needed _____
- All Fast TATs Subject to Approval by Enthalpy Analytical, LLC
- All Samples Disposed of After 45 days unless otherwise instructed.

Enthalpy Analytical-Wilmington, NC has added enhancements to standard methods to improve accuracy, precision and permit an assessment of laboratory performance in the context of your specific data needs.

Client Name: Dewberry
Project Manager: Brett Heim
Report To: same

Project Number: 25007645
Site Name: Fluvanna River Water
Origin State: VA

PO#: _____
Telephone#: 804-205-3346
Email: bheem@jewberry.com

This Chain of Custody is applicable to Non-Air samples. Standard TAT differ per analysis and are provided by request.

Client Special Instructions:

Matrix: GW-Groundwater, WW-Wastewater, NW-Non-Potable Water, DW-Drinking Water, S-Soil, SL-Sludge, BT-Biological Tissue, O-Other

Type: G=Grab C=Composite Q=Quality Control

SAMPLED BY: JW

[illegible]

Analyte List and Notes:

Analyte list selections for PFAS by Isotope Dilution

PF = PFOA/PFOS

L24 = Legacy 24 + GenX

P49 = PFAS 49 List

CL = custom list attached

Refinanced By

References

Received By:

Die

TIME

Sample Temperature Upon Receipt: _____

John Wright

2-18-25	900
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[Handwritten signature]

2/21/25

12:23

☒ Iced ☐ Ambient °C 0.4☐ Iced ☐ Ambient °C☐ Iced ☐ Ambient °C

Ship samples to: 2712A Exchange Drive • Wilmington, NC 28405

Office: 2714 Exchange Drive • Wilmington, NC 28405 • (910) 212-5858 • www.enthalpy.com

JOB ID: 0225-874 Date / Time: 2/21/25 12:23 Initials: S.S.
OR
Client: Apex Companies

Cooler 1 of 1

Temp °C: 0.4 Thermometer ID: T15

Received via	<i>Check one</i>		<i>Check one</i>			
	On ice:	<input checked="" type="checkbox"/>	in a Box:	<input type="checkbox"/>	Yes	No
	Melted ice:	<input type="checkbox"/>	in a Cooler:	<input checked="" type="checkbox"/>		
	Ambient:	<input type="checkbox"/>	Cooler in Box:	<input type="checkbox"/>	Cooler seals:	<input type="checkbox"/> <input checked="" type="checkbox"/>
					Sample seals:	<input type="checkbox"/> <input checked="" type="checkbox"/>
FedEx	<input checked="" type="checkbox"/>				Good condition:	<input checked="" type="checkbox"/> <input type="checkbox"/>
UPS	<input type="checkbox"/>					
DHL	<input type="checkbox"/>					
USPS	<input type="checkbox"/>					
Courier	<input type="checkbox"/>					
Other	<input type="checkbox"/>					

Comment:

Temp °C: Thermometer ID: Cooler of

Received via	<i>Check one</i>		<i>Check one</i>			
	On ice:	<input type="checkbox"/>	in a Box:	<input type="checkbox"/>	Yes	No
	Melted ice:	<input type="checkbox"/>	in a Cooler:	<input type="checkbox"/>		
	Ambient:	<input type="checkbox"/>	Cooler in Box:	<input type="checkbox"/>	Cooler seals:	<input type="checkbox"/> <input type="checkbox"/>
					Sample seals:	<input type="checkbox"/> <input type="checkbox"/>
FedEx	<input type="checkbox"/>				Good condition:	<input type="checkbox"/> <input type="checkbox"/>
UPS	<input type="checkbox"/>					
DHL	<input type="checkbox"/>					
USPS	<input type="checkbox"/>					
Courier	<input type="checkbox"/>					
Other	<input type="checkbox"/>					

Comment:

Temp °C: Thermometer ID: Cooler of

Received via	<i>Check one</i>		<i>Check one</i>			
	On ice:	<input type="checkbox"/>	in a Box:	<input type="checkbox"/>	Yes	No
	Melted ice:	<input type="checkbox"/>	in a Cooler:	<input type="checkbox"/>		
	Ambient:	<input type="checkbox"/>	Cooler in Box:	<input type="checkbox"/>	Cooler seals:	<input type="checkbox"/> <input type="checkbox"/>
					Sample seals:	<input type="checkbox"/> <input type="checkbox"/>
FedEx	<input type="checkbox"/>				Good condition:	<input type="checkbox"/> <input type="checkbox"/>
UPS	<input type="checkbox"/>					
DHL	<input type="checkbox"/>					
USPS	<input type="checkbox"/>					
Courier	<input type="checkbox"/>					
Other	<input type="checkbox"/>					

Comment:

ORIGIN ID: GVEA (804) 855-4564
MICHAEL MAY
APEX COMPANIES, LLC
203 WYLDEROSE COURT

MIDLOTHIAN, VA 23113
UNITED STATES US

SHIP DATE: 18FEB25
ACTWGT: 30.00 LB
CAD: 5706985/NET4820

BILL SENDER

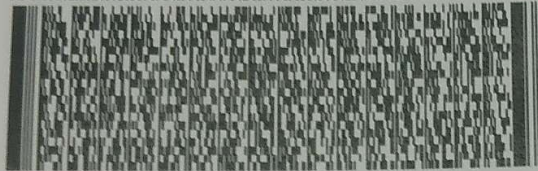
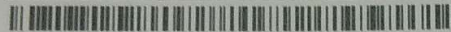
TO **SAMPLE RECEIVING**
EMTHALPY ANALYTICAL
2714 EXCHANGE DRIVE

WILMINGTON NC 28405

(910) 212-5858
INV
PO

REF: DEW003-0526025-25004645

DEPT



FedEx
Express

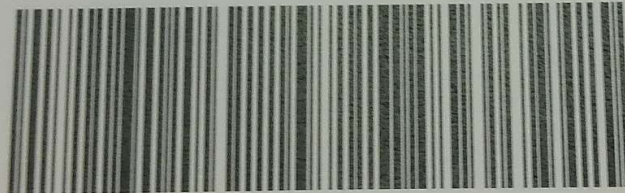


WED - 19 FEB 10:30A
PRIORITY OVERNIGHT

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Appendix

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water

Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Summary

	Compound	CAS	RS-1 ng/L	RS-2 ng/L	RS-3 ng/L	RS-4 ng/L	RS-5 ng/L
Acids	PFBA	375-22-4	1.65 L	1.29 L	1.27 L	2.73 L	2.37 L
	PFPeA	2706-90-3	0.639 L	0.556 L	0.685 L	0.931 L	0.758 L
	PFHxA	307-24-4	1.02 L	ND U	1.13 L	ND U	ND U
	PFHpA	375-85-9	0.421 L	0.222 L	0.322 L	0.469 L	0.600 L
	PFOA	335-67-1	1.27 L	0.944 L	1.16 L	1.44 L	1.67 L
	PFNA	375-95-1	0.313 L	ND U	0.317 L	0.553 L	0.465 L
	PFDA	335-76-2	ND U	ND U	ND U	ND U	ND U
	PFUnDA	2058-94-8	ND U	ND U	ND U	ND U	ND U
	PFDoA	307-55-1	ND U	0.536 L	0.374 L	0.626 L	ND U
	PFTTrDA	72629-94-8	ND U	ND U	ND U	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U	ND U	ND U	ND U
Sulfonates	PFBS	375-73-5	0.327 L	0.288 L	ND U	0.921 L	0.668 L
	PFPeS	2706-91-4	ND U	ND U	ND U	ND U	ND U
	PFHxS	355-46-4	0.747 L	0.594 L	0.636 L	0.777 L	0.944 L
	PFHpS	375-92-8	ND U	ND U	ND U	ND U	ND U
	PFOS	1763-23-1	0.826 L	1.06 L	0.846 L	1.96 L	1.18 L
	4:2 FTS	757124-72-4	ND U	ND U	ND U	ND U	ND U
	6:2 FTS	27619-97-2	ND U	ND U	ND U	ND U	ND U
	8:2 FTS	39108-34-4	ND U	ND U	ND U	ND U	ND U
PFECAs	HFPO-DA	13252-13-6	ND U	ND U	ND U	ND U	ND U
	PFMBA	863090-89-5	ND U	ND U	ND U	ND U	ND U
	PFMPA	377-73-1	ND U	ND U	ND U	ND U	ND U
	NFDHA	151772-58-6	ND U	ND U	ND U	ND U	ND U
Other	ADONA	919005-14-4	0.196 L	ND U	ND U	ND U	ND U
	9Cl-PF3ONS	756426-58-1	ND U	ND U	ND U	ND U	ND U
	N-MeFOSAA	2355-31-9	ND U	ND U	ND U	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	0.218 L	0.433 L	0.320 L	0.351 L	ND U
	N-EtFOSAA	2991-50-6	ND U	ND U	ND U	ND U	ND U
	PFEESA	113507-82-7	ND U	ND U	ND U	ND U	ND U

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-001-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-1	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:09	Split Factor	N/A
Sampling Date	2025-02-10 15:45	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325028	1.65	36.0	40.0	9.40				L
	PFPeA	2706-90-3	FR110325028	0.639	18.0	20.0	3.14				L
	PFHxA	307-24-4	FR110325028	1.02	9.00	10.0	3.30				L
	PFHpA	375-85-9	FR110325028	0.421	9.00	10.0	3.02				L
	PFOA	335-67-1	FR110325028	1.27	9.00	10.0	2.45				L
	PFNA	375-95-1	FR110325028	0.313	9.00	10.0	1.92				L
	PFDA	335-76-2	FR110325028	ND	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325028	ND	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325028	ND	9.00	10.0	3.38				U
	PFTeDA	72629-94-8	FR110325028	ND	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325028	ND	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325028	0.327	7.98	8.87	1.92				L
	PFPeS	2706-91-4	FR110325028	ND	8.47	9.41	2.56				U
Sulfonates	PFHxS	355-46-4	FR110325028	0.747	8.23	9.14	3.86				L
	PFHpS	375-92-8	FR110325028	ND	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325028	0.826	8.35	9.28	3.52				L
	4:2 FTS	757124-72-4	FR110325028	ND	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325028	ND	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325028	ND	34.6	38.4	24.0				U
	HFPO-DA	13252-13-6	FR110325028	ND	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325028	ND	18.0	20.0	8.18				U
PFECAs	PFMPA	377-73-1	FR110325028	ND	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325028	ND	18.0	20.0	10.1				U
	ADONA	919005-14-4	FR110325028	0.196	34.0	37.8	8.40				L
Other	9Cl-PF3ONS	756426-58-1	FR110325028	ND	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325028	ND	9.00	10.0	5.10				U
	11Cl-PF3OUdS	763051-92-9	FR110325028	0.218	34.0	37.8	8.50				L
	N-EiFOSAA	2991-50-6	FR110325028	ND	9.00	10.0	4.84				U
	PFEESeA	113507-82-7	FR110325028	ND	16.0	17.8	3.16				U
ES	M4PFBA		FR110325028					12.5	5-130%	89.6%	
	M5PFPeA		FR110325028					12.5	40-130%	89.4%	
	M5PFHxA		FR110325028					12.5	40-130%	87.2%	
	M4PFHpA		FR110325028					12.5	40-130%	82.6%	
	M8PFOA		FR110325028					12.5	40-130%	77.0%	
	M9PFNA		FR110325028					12.5	40-130%	88.5%	
	M6PFDA		FR110325028					12.5	40-130%	82.3%	
	M7PFUdA		FR110325028					12.5	30-130%	77.8%	
	M2-PFDoA		FR110325028					12.5	10-130%	76.8%	
	13C2-PFTeDA		FR110325028					12.5	10-130%	65.7%	
	M3PFBS		FR110325028					12.5	40-135%	91.8%	
	M3PFHxS		FR110325028					12.5	40-130%	90.0%	
	M8PFOS		FR110325028					12.5	40-130%	89.4%	
	M2-4:2 FTS		FR110325028					12.5	40-200%	102%	
	M2-6:2 FTS		FR110325028					12.5	40-200%	85.7%	
	M2-8:2 FTS		FR110325028					12.5	40-300%	77.7%	
	M8PFOSA		FR110325028					12.5	40-130%	79.7%	
	d3-N-MeFOSAA		FR110325028					12.5	40-170%	79.5%	
	d5-N-EiFOSAA		FR110325028					12.5	25-135%	74.8%	
	M3HFPO-DA		FR110325028					12.5	40-130%	97.4%	
JS	M3PFBA		FR110325028					12.5	50-200%	120%	
	M2-PFHxA		FR110325028					12.5	50-200%	119%	
	M4-PFOA		FR110325028					12.5	50-200%	138%	
	M5-PFNA		FR110325028					12.5	50-200%	119%	
	M2-PFDA		FR110325028					12.5	50-200%	120%	
	18O2PFHxS		FR110325028					12.5	50-200%	119%	
	M4-PFOS		FR110325028					12.5	50-200%	118%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-002-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-2	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:32	Split Factor	N/A
Sampling Date	2025-02-11 08:20	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325029	1.29	36.0	40.0	9.40				L
	PFPeA	2706-90-3	FR110325029	0.556	18.0	20.0	3.14				L
	PFHxA	307-24-4	FR110325029	ND	9.00	10.0	3.30				U
	PFHpA	375-85-9	FR110325029	0.222	9.00	10.0	3.02				L
	PFOA	335-67-1	FR110325029	0.944	9.00	10.0	2.45				L
	PFNA	375-95-1	FR110325029	ND	9.00	10.0	1.92				U
	PFDA	335-76-2	FR110325029	ND	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325029	ND	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325029	0.536	9.00	10.0	3.38				L
	PFTeDA	72629-94-8	FR110325029	ND	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325029	ND	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325029	0.288	7.98	8.87	1.92				L
Sulfonates	PFPeS	2706-91-4	FR110325029	ND	8.47	9.41	2.56				U
	PFHxS	355-46-4	FR110325029	0.594	8.23	9.14	3.86				L
	PFHpS	375-92-8	FR110325029	ND	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325029	1.06	8.35	9.28	3.52				L
	4:2 FTS	757124-72-4	FR110325029	ND	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325029	ND	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325029	ND	34.6	38.4	24.0				U
PFECAs	HFPO-DA	13252-13-6	FR110325029	ND	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325029	ND	18.0	20.0	8.18				U
	PFMPA	377-73-1	FR110325029	ND	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325029	ND	18.0	20.0	10.1				U
Other	ADONA	919005-14-4	FR110325029	ND	34.0	37.8	8.40				U
	9Cl-PF3ONS	756426-58-1	FR110325029	ND	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325029	ND	9.00	10.0	5.10				U
	11Cl-PF3OUdS	763051-92-9	FR110325029	0.433	34.0	37.8	8.50				L
	N-EiFOSAA	2991-50-6	FR110325029	ND	9.00	10.0	4.84				U
ES	PFEESA	113507-82-7	FR110325029	ND	16.0	17.8	3.16				U
	M4PFBA		FR110325029					12.5	5-130%	92.7%	
	M5PFPeA		FR110325029					12.5	40-130%	91.9%	
	M5PFHxA		FR110325029					12.5	40-130%	91.6%	
	M4PFHpA		FR110325029					12.5	40-130%	84.8%	
	M8PFOA		FR110325029					12.5	40-130%	78.1%	
	M9PFNA		FR110325029					12.5	40-130%	91.3%	
	M6PFDA		FR110325029					12.5	40-130%	81.9%	
	M7PFUDa		FR110325029					12.5	30-130%	76.3%	
	M2-PFDoA		FR110325029					12.5	10-130%	71.8%	
	13C2-PFTeDA		FR110325029					12.5	10-130%	59.1%	
	M3PFBS		FR110325029					12.5	40-135%	90.5%	
	M3PFHxS		FR110325029					12.5	40-130%	91.3%	
	M8PFOS		FR110325029					12.5	40-130%	87.5%	
	M2-4:2 FTS		FR110325029					12.5	40-200%	98.3%	
	M2-6:2 FTS		FR110325029					12.5	40-200%	89.1%	
	M2-8:2 FTS		FR110325029					12.5	40-300%	81.6%	
	M8PFOSA		FR110325029					12.5	40-130%	80.4%	
	d3-N-MeFOSAA		FR110325029					12.5	40-170%	79.8%	
	d5-N-EiFOSAA		FR110325029					12.5	25-135%	71.3%	
	M3HFPO-DA		FR110325029					12.5	40-130%	103%	
JS	M3PFBA		FR110325029					12.5	50-200%	116%	
	M2-PFHxA		FR110325029					12.5	50-200%	115%	
	M4-PFOA		FR110325029					12.5	50-200%	133%	
	M5-PFNA		FR110325029					12.5	50-200%	114%	
	M2-PFDA		FR110325029					12.5	50-200%	117%	
	18O2PFHxS		FR110325029					12.5	50-200%	117%	
	M4-PFOS		FR110325029					12.5	50-200%	118%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-003-1A	Prep Batch	eu19072	Sample Vol (mL)	100
Sample Name	RS-3	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 02:55	Split Factor	N/A
Sampling Date	2025-02-12 14:20	Analyst	zoeamrdt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325030	1.27	36.0	40.0	9.40				L
	PFPeA	2706-90-3	FR110325030	0.685	18.0	20.0	3.14				L
	PFHxA	307-24-4	FR110325030	1.13	9.00	10.0	3.30				L
	PFHpA	375-85-9	FR110325030	0.322	9.00	10.0	3.02				L
	PFOA	335-67-1	FR110325030	1.16	9.00	10.0	2.45				L
	PFNA	375-95-1	FR110325030	0.317	9.00	10.0	1.92				L
	PFDA	335-76-2	FR110325030	ND	9.00	10.0	4.56				U
	PFUnDA	2058-94-8	FR110325030	ND	9.00	10.0	3.38				U
	PFDoA	307-55-1	FR110325030	0.374	9.00	10.0	3.38				L
	PFTeDA	72629-94-8	FR110325030	ND	9.00	10.0	3.44				U
	PFTeDA	376-06-7	FR110325030	ND	9.00	10.0	2.58				U
	PFBS	375-73-5	FR110325030	ND	7.98	8.87	1.92				U
Sulfonates	PFPeS	2706-91-4	FR110325030	ND	8.47	9.41	2.56				U
	PFHxS	355-46-4	FR110325030	0.636	8.23	9.14	3.86				L
	PFHpS	375-92-8	FR110325030	ND	8.58	9.53	3.30				U
	PFOS	1763-23-1	FR110325030	0.846	8.35	9.28	3.52				L
	4:2 FTS	757124-72-4	FR110325030	ND	33.8	37.5	15.7				U
	6:2 FTS	27619-97-2	FR110325030	ND	34.2	38.0	9.45				U
	8:2 FTS	39108-34-4	FR110325030	ND	34.6	38.4	24.0				U
PFECAs	HFPO-DA	13252-13-6	FR110325030	ND	36.0	40.0	11.6				U
	PFMBA	863090-89-5	FR110325030	ND	18.0	20.0	8.18				U
	PFMPA	377-73-1	FR110325030	ND	18.0	20.0	3.76				U
	NFDHA	151772-58-6	FR110325030	ND	18.0	20.0	10.1				U
Other	ADONA	919005-14-4	FR110325030	ND	34.0	37.8	8.40				U
	9Cl-PF3ONS	756426-58-1	FR110325030	ND	33.7	37.4	10.6				U
	N-MeFOSAA	2355-31-9	FR110325030	ND	9.00	10.0	5.10				U
	11Cl-PF3OUdS	763051-92-9	FR110325030	0.320	34.0	37.8	8.50				L
	N-EiFOSAA	2991-50-6	FR110325030	ND	9.00	10.0	4.84				U
ES	PFEESA	113507-82-7	FR110325030	ND	16.0	17.8	3.16				U
	M4PFBA		FR110325030					12.5	5-130%	94.2%	
	M5PFPeA		FR110325030					12.5	40-130%	96.4%	
	M5PFHxA		FR110325030					12.5	40-130%	92.8%	
	M4PFHpA		FR110325030					12.5	40-130%	91.9%	
	M8PFOA		FR110325030					12.5	40-130%	79.2%	
	M9PFNA		FR110325030					12.5	40-130%	92.4%	
	M6PFDA		FR110325030					12.5	40-130%	82.9%	
	M7PFUdA		FR110325030					12.5	30-130%	76.5%	
	M2-PFDoA		FR110325030					12.5	10-130%	74.6%	
	13C2-PFTeDA		FR110325030					12.5	10-130%	61.9%	
	M3PFBS		FR110325030					12.5	40-135%	96.4%	
	M3PFHxS		FR110325030					12.5	40-130%	92.6%	
	M8PFOS		FR110325030					12.5	40-130%	92.6%	
	M2-4:2 FTS		FR110325030					12.5	40-200%	101%	
	M2-6:2 FTS		FR110325030					12.5	40-200%	82.1%	
	M2-8:2 FTS		FR110325030					12.5	40-300%	77.6%	
	M8PFOSA		FR110325030					12.5	40-130%	83.5%	
	d3-N-MeFOSAA		FR110325030					12.5	40-170%	79.7%	
	d5-N-EiFOSAA		FR110325030					12.5	25-135%	72.4%	
	M3HFPO-DA		FR110325030					12.5	40-130%	106%	
JS	M3PFBA		FR110325030					12.5	50-200%	110%	
	M2-PFHxA		FR110325030					12.5	50-200%	105%	
	M4-PFOA		FR110325030					12.5	50-200%	127%	
	M5-PFNA		FR110325030					12.5	50-200%	108%	
	M2-PFDA		FR110325030					12.5	50-200%	110%	
	18O2PFHxS		FR110325030					12.5	50-200%	109%	
	M4-PFOS		FR110325030					12.5	50-200%	108%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-004-1A	Prep Batch	eu19072	Sample Vol (mL)	60
Sample Name	RS-4	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 03:18	Split Factor	N/A
Sampling Date	2025-02-13 12:30	Analyst	zoeamndt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325031	2.73	60.0	66.7	15.7				L
	PFPeA	2706-90-3	FR110325031	0.931	30.0	33.3	5.24				L
	PFHxA	307-24-4	FR110325031	ND	15.0	16.7	5.50				U
	PFHpA	375-85-9	FR110325031	0.469	15.0	16.7	5.02				L
	PFOA	335-67-1	FR110325031	1.44	15.0	16.7	4.08				L
	PFNA	375-95-1	FR110325031	0.553	15.0	16.7	3.19				L
	PFDA	335-76-2	FR110325031	ND	15.0	16.7	7.59				U
	PFUnDA	2058-94-8	FR110325031	ND	15.0	16.7	5.63				U
	PFDaA	307-55-1	FR110325031	0.626	15.0	16.7	5.63				L
	PFTeDA	72629-94-8	FR110325031	ND	15.0	16.7	5.73				U
	PFTeDA	376-06-7	FR110325031	ND	15.0	16.7	4.29				U
	PFBs	375-73-5	FR110325031	0.921	13.3	14.8	3.19				L
Sulfonates	PFPeS	2706-91-4	FR110325031	ND	14.1	15.7	4.27				U
	PFHxS	355-46-4	FR110325031	0.777	13.7	15.2	6.44				L
	PFHpS	375-92-8	FR110325031	ND	14.3	15.9	5.50				U
	PFOS	1763-23-1	FR110325031	1.96	13.9	15.5	5.87				L
	4:2 FTS	757124-72-4	FR110325031	ND	56.2	62.5	26.2				U
	6:2 FTS	27619-97-2	FR110325031	ND	57.0	63.3	15.8				U
	8:2 FTS	39108-34-4	FR110325031	ND	57.6	64.0	40.1				U
PFECAs	HFPO-DA	13252-13-6	FR110325031	ND	60.0	66.7	19.3				U
	PFMBA	863090-89-5	FR110325031	ND	30.0	33.3	13.6				U
	PFMPA	377-73-1	FR110325031	ND	30.0	33.3	6.26				U
	NFDHA	151772-58-6	FR110325031	ND	30.0	33.3	16.8				U
Other	ADONA	919005-14-4	FR110325031	ND	56.7	63.0	14.0				U
	9Cl-PF3ONS	756426-58-1	FR110325031	ND	56.1	62.3	17.8				U
	N-MeFOSAA	2355-31-9	FR110325031	ND	15.0	16.7	8.50				U
	11Cl-PF3OUdS	763051-92-9	FR110325031	0.351	56.7	63.0	14.2				L
	N-EiFOSAA	2991-50-6	FR110325031	ND	15.0	16.7	8.07				U
ES	PFEESA	113507-82-7	FR110325031	ND	26.7	29.7	5.27				U
	M4PFBA		FR110325031					12.5	5-130%	87.0%	
	M5PFPeA		FR110325031					12.5	40-130%	87.0%	
	M5PFHxA		FR110325031					12.5	40-130%	86.6%	
	M4PFHpA		FR110325031					12.5	40-130%	81.7%	
	M8PFOA		FR110325031					12.5	40-130%	69.7%	
	M9PFNA		FR110325031					12.5	40-130%	84.4%	
	M6PFDA		FR110325031					12.5	40-130%	75.6%	
	M7PFUDa		FR110325031					12.5	30-130%	69.7%	
	M2-PFDaA		FR110325031					12.5	10-130%	62.3%	
	13C2-PFTeDA		FR110325031					12.5	10-130%	45.4%	
	M3PFBS		FR110325031					12.5	40-135%	91.0%	
	M3PFHxS		FR110325031					12.5	40-130%	88.1%	
	M8PFOS		FR110325031					12.5	40-130%	82.5%	
	M2-4:2 FTS		FR110325031					12.5	40-200%	91.8%	
	M2-6:2 FTS		FR110325031					12.5	40-200%	80.8%	
	M2-8:2 FTS		FR110325031					12.5	40-300%	80.5%	
	M8PFOSA		FR110325031					12.5	40-130%	71.5%	
	d3-N-MeFOSAA		FR110325031					12.5	40-170%	69.9%	
	d5-N-EiFOSAA		FR110325031					12.5	25-135%	62.5%	
	M3HFPO-DA		FR110325031					12.5	40-130%	94.3%	
JS	M3PFBA		FR110325031					12.5	50-200%	116%	
	M2-PFHxA		FR110325031					12.5	50-200%	114%	
	M4-PFOA		FR110325031					12.5	50-200%	141%	
	M5-PFNA		FR110325031					12.5	50-200%	117%	
	M2-PFDA		FR110325031					12.5	50-200%	116%	
	18O2PFHxS		FR110325031					12.5	50-200%	117%	
	M4-PFOS		FR110325031					12.5	50-200%	116%	

Enthalpy Analytical

Job No.: 0225-874-1 DOD QSM Table B-24 (EPA 1633) - non-potable water
Dewberry Engineers Inc. 25004645 Fluvanna Raw Water

Enthalpy ID	0225-874-005-1A	Prep Batch	eu19072	Sample Vol (mL)	60
Sample Name	RS-5	Prep Date	2025-03-10 13:15	Extract Vol (mL)	5
Matrix	Aqueous	Analysis Date	2025-03-12 03:41	Split Factor	N/A
Sampling Date	2025-02-14 10:05	Analyst	zoeamndt	Method Code	Eu-062
Received Date	2025-02-21	Instrument	Frodo	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Sample Concentration ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	FR110325032	2.37	60.0	66.7	15.7				L
	PFPeA	2706-90-3	FR110325032	0.758	30.0	33.3	5.24				L
	PFHxA	307-24-4	FR110325032	ND	15.0	16.7	5.50				U
	PFFHpA	375-85-9	FR110325032	0.600	15.0	16.7	5.02				L
	PFOA	335-67-1	FR110325032	1.67	15.0	16.7	4.08				L
	PFNA	375-95-1	FR110325032	0.465	15.0	16.7	3.19				L
	PFDA	335-76-2	FR110325032	ND	15.0	16.7	7.59				U
	PFUnDA	2058-94-8	FR110325032	ND	15.0	16.7	5.63				U
	PFDaA	307-55-1	FR110325032	ND	15.0	16.7	5.63				U
	PFTeDA	72629-94-8	FR110325032	ND	15.0	16.7	5.73				U
	PFTeDA	376-06-7	FR110325032	ND	15.0	16.7	4.29				U
	PFBS	375-73-5	FR110325032	0.668	13.3	14.8	3.19				L
Sulfonates	PFPeS	2706-91-4	FR110325032	ND	14.1	15.7	4.27				U
	PFFHxS	355-46-4	FR110325032	0.944	13.7	15.2	6.44				L
	PFFHpS	375-92-8	FR110325032	ND	14.3	15.9	5.50				U
	PFOS	1763-23-1	FR110325032	1.18	13.9	15.5	5.87				L
	4:2 FTS	757124-72-4	FR110325032	ND	56.2	62.5	26.2				U
	6:2 FTS	27619-97-2	FR110325032	ND	57.0	63.3	15.8				U
	8:2 FTS	39108-34-4	FR110325032	ND	57.6	64.0	40.1				U
PFECAs	HFPO-DA	13252-13-6	FR110325032	ND	60.0	66.7	19.3				U
	PFMBA	863090-89-5	FR110325032	ND	30.0	33.3	13.6				U
	PFMPA	377-73-1	FR110325032	ND	30.0	33.3	6.26				U
	NFDHA	151772-58-6	FR110325032	ND	30.0	33.3	16.8				U
Other	ADONA	919005-14-4	FR110325032	ND	56.7	63.0	14.0				U
	9CI-PF3ONS	756426-58-1	FR110325032	ND	56.1	62.3	17.8				U
	N-MeFOSAA	2355-31-9	FR110325032	ND	15.0	16.7	8.50				U
	11CI-PF3OUdS	763051-92-9	FR110325032	ND	56.7	63.0	14.2				U
	N-EiFOSAA	2991-50-6	FR110325032	ND	15.0	16.7	8.07				U
ES	PFEESA	113507-82-7	FR110325032	ND	26.7	29.7	5.27				U
	M4PFBA		FR110325032					12.5	5-130%	89.9%	
	M5PFPeA		FR110325032					12.5	40-130%	93.4%	
	M5PFFHxA		FR110325032					12.5	40-130%	93.0%	
	M4PFFHpA		FR110325032					12.5	40-130%	87.1%	
	M8PFOA		FR110325032					12.5	40-130%	76.0%	
	M9PFNA		FR110325032					12.5	40-130%	92.3%	
	M6PFDA		FR110325032					12.5	40-130%	83.3%	
	M7PFUDa		FR110325032					12.5	30-130%	73.1%	
	M2-PFDaA		FR110325032					12.5	10-130%	69.3%	
	13C2-PFTeDA		FR110325032					12.5	10-130%	53.8%	
	M3PFBS		FR110325032					12.5	40-135%	97.1%	
	M3PFFHxS		FR110325032					12.5	40-130%	93.6%	
	M8PFOS		FR110325032					12.5	40-130%	90.0%	
	M2-4:2 FTS		FR110325032					12.5	40-200%	97.3%	
	M2-6:2 FTS		FR110325032					12.5	40-200%	87.1%	
	M2-8:2 FTS		FR110325032					12.5	40-300%	69.4%	
	M8PFOSA		FR110325032					12.5	40-130%	75.4%	
	d3-N-MeFOSAA		FR110325032					12.5	40-170%	74.5%	
	d5-N-EiFOSAA		FR110325032					12.5	25-135%	62.4%	
	M3HFPO-DA		FR110325032					12.5	40-130%	106%	
JS	M3PFBA		FR110325032					12.5	50-200%	112%	
	M2-PFFHxA		FR110325032					12.5	50-200%	107%	
	M4-PFOA		FR110325032					12.5	50-200%	131%	
	M5-PFNA		FR110325032					12.5	50-200%	108%	
	M2-PFDA		FR110325032					12.5	50-200%	110%	
	18O2PFFHxS		FR110325032					12.5	50-200%	111%	
	M4-PFOS		FR110325032					12.5	50-200%	108%	

APPENDIX K – VDH COMMENTS AND RESPONSES



Outlook

Re: Fluvanna County - Fork Union Water Supply System PER

From Heim, Brett <bheim@Dewberry.com>**Date** Tue 4/22/2025 11:36 AM**To** Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>; Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>**Cc** Villhauer, Danylo <dvillhauer@Dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>; Robert Popowicz <rpopowicz@fluvannacounty.org>

Hi Steve - thanks for weighing in and great comment. We are planning to conduct a pilot test of a nanofiltration system during the early stages of the detailed design to dial in the chlorine disinfectant. The County does not wish to utilize chloramines either so our plan is to stick with chlorine for the residual disinfectant. I will add some language to the PER clarifying this and Karen's comments and send you an updated copy of the PER.

Thanks!

Brett Heim, PE, PSAP

Senior Project Manager

D 804.205.3346

LICENSED PE: VA, MD

www.dewberry.com

From: Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>**Sent:** Tuesday, April 22, 2025 11:32 AM**To:** Heim, Brett <bheim@Dewberry.com>; Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>**Cc:** Villhauer, Danylo <dvillhauer@Dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>; Robert Popowicz <rpopowicz@fluvannacounty.org>**Subject:** RE: Fluvanna County - Fork Union Water Supply System PER

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Good Afternoon, Brett.

I am concerned about designing a smaller system like this for chloramines as a secondary disinfectant and precise control necessary to maintain proper levels. Nanofiltration was implemented at the LCWA's Northeast Creek plant and effectively got TTHM and HAA5 levels down to single digits from over 100 ppb at times, while still using free chlorine as a residual disinfectant. There is time to consider this down the road in the design phase. Otherwise I don't have any specific comments to add.

Steve

From: Heim, Brett <bheim@Dewberry.com>**Sent:** Tuesday, April 22, 2025 11:26 AM**To:** Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>**Cc:** Villhauer, Danylo <dvillhauer@Dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>; Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>; Robert Popowicz <rpopowicz@fluvannacounty.org>**Subject:** Re: Fluvanna County - Fork Union Water Supply System PER

Hi Steve - I wanted to follow up and see if you had any comments on our PER in addition to Karen's. We would like to finalize the PER and present it to the Fluvanna County Board of Supervisors.

Thanks!

Brett Heim, PE, PSAP

Senior Project Manager

D [804.205.3346](tel:804.205.3346)

LICENSED PE: VA, MD

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From: Heim, Brett <bheim@dewberry.com>

Sent: Tuesday, April 1, 2025 1:04 PM

To: Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>

Cc: Villhauer, Danylo <dvillhauer@dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>; Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>

Subject: Re: Fluvanna County - Fork Union Water Supply System PER

Hi Karen,

Great questions and thanks for the quick review! I've provided some draft responses below. I'm happy to jump on a call to discuss! I'll wait to update the PER until we hear back from Steve and you confirm our answers below provide an acceptable resolution.

Thanks!

Brett Heim, PE, PSAP

Senior Project Manager

D [804.205.3346](tel:804.205.3346)

LICENSED PE: VA, MD

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From: Austin, Karen (VDH)

Sent: Tuesday, April 1, 2025 11:38 AM

To: Heim, Brett

Cc: Villhauer, Danylo; Eric Dahl; Kvech, Steve (VDH)

Subject: RE: Fluvanna County - Fork Union Water Supply System PER

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Brett,

I only have a couple of questions.

In your Value Engineering section, you said you can delay the installation of the raw water pump station and raw storage tank, but unless I've missed something I can only find an elevation for the JRWA raw water connection (I'm just looking at the recommended WTP location at this point). I didn't see a

hydraulic analysis to support your recommendation to forego the raw water PS in the initial project. Is there one I missed?

- There is a planned JRWA Raw Water Pump Station that will be located at the raw water intake on the James River that will be used to fill the LCWA WTP raw water tank. While the JRWA RW PS is operating the HGL will be high enough to provide water to the Fluvanna Fork Union WTP. While the JRWA RW PS is not pumping we believe that the HGL at the LCWA WTP raw water tank will be able to backfill the Fluvanna Fork Union WTP. We do not have the final details of the operation of the JRWA RW PS as that was completed by another consultant and we are still working to obtain this information, but we will further evaluate the operation of the system during the detailed design when we also hopefully have the information from the other consultant. My proposed resolution to this for the PER would be to add the following language:
 - *The planned JRWA RWPS will provide sufficient flow and pressure at the connection point to the Fluvanna raw waterline to allow for the delay of the raw water pump station and ground storage tank. The operation of the JRWA RWPS is still unknown but will be coordinated with the consultant who is designing that system during the detailed design of the Fluvanna Fork Union WTP. This may require a ground storage tank or pre-sedimentation basin to be added at the head of the Fork Union WTP which will be confirmed during the detailed design stage.*

Is the 12" dia. of the raw water transmission piping the only thing that will designate its raw water status? How will people in the future know what it is? Will finished water pipes be located along East River Road?

- This project will not extend finished water down East River Rd, but the County has it in their master plan to potentially run finished water to this area. The Fluvanna County Utility Standards Manual requires above-ground markers along waterlines, gravity sewer lines, and sewage force mains. The color and labeling of these markers will be typical of raw waterlines.

On page 57, you include the possibility of using ammonium sulfate even for the recommended option. Do you think with nanofiltration the probability of DBP formation still remains significant enough to recommend the use of chloramines instead of hypochlorite, even with the complexity of a blended system?

- Yes - we believe that the modeled water age in the system will likely require conversion to chloramines for residual disinfection. In this case the wells would also be converted to chloramine residual. The County only intends to keep the existing wells online in the event of an emergency where they would need supplemental water. If you look at the percentage of water from the wells compared to the WTP, it is very low (the wells would make up only 6% of the total flow into the system at buildout) which we believe would minimize any issues with blending. Furthermore, we plan to do additional testing during the design stage to confirm the requirements for utilizing chloramines and any effects from the blending of water sources. My proposed resolution to this for the PER would be to add the following language:
 - *Additional bench scale testing will be completed to confirm the need for using chloramines for residual disinfection and its effects on blending water sources. The information needed to evaluate the blending of sources was not available at the time of this PER, but additional testing will be completed on the wells to mitigate any issues with blending.*

Can the operation of the Omohundro tank be modified to allow for a larger operational range for greater turnover, or is mixing the best option?

- With the removal of the new EST from the project based on the value-engineering, this will likely improve the turnover in the Omohundro tank. However, the operation of the tank and will be evaluated during the detailed design.

Thank you for your time and assistance.

Karen

From: Heim, Brett <bheim@dewberry.com>

Sent: Tuesday, April 1, 2025 8:42 AM

To: Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>; Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>

Cc: Villhauer, Danylo <dvillhauer@dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>

Subject: Re: Fluvanna County - Fork Union Water Supply System PER

Hi Karen - sorry about that! It looks like it didn't make it into that version. Please see the version

uploaded here: [2025.04.01 FUSD PER.pdf](#)

Thanks!

Brett Heim, PE, PSAP

Senior Project Manager

D [804.205.3346](tel:804.205.3346)

LICENSED PE: VA, MD

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From: Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>

Sent: Tuesday, April 1, 2025 7:18 AM

To: Heim, Brett <bheim@dewberry.com>; Kvech, Steve (VDH) <Steve.Kvech@vdh.virginia.gov>

Cc: Villhauer, Danylo <dvillhauer@dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>

Subject: RE: Fluvanna County - Fork Union Water Supply System PER

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Good morning, Brett.

I'm looking through the PER and don't have Figure 6.3, which depicts possible WTP sites. Those sites are shown on other figures, but I would like to have the figure to make my version complete.

Will you please send it to me?

Thank you. I hope to be finished my review this week.

Best wishes,

Karen

From: Heim, Brett <bheim@dewberry.com>

Sent: Friday, March 28, 2025 3:37 PM

To: Austin, Karen (VDH) <Karen.Austin@vdh.virginia.gov>; Kvech, Steve (VDH) <steve.kvech@vdh.virginia.gov>
Cc: Villhauer, Danylo <dvillhauer@Dewberry.com>; Eric Dahl <edahl@fluvannacounty.org>
Subject: Fluvanna County - Fork Union Water Supply System PER

Good afternoon Karen and Steve,

Below is a link to the final, signed and sealed version of the Fork Union Water Supply System PER. Can you please let me know your typical review period?

[2025.03.28 FUSD PER 1.pdf](#)

Thanks and have a great weekend!

Brett Heim, PE, PSAP
Senior Project Manager
Water Market Segment
4805 Lake Brook Drive, Suite 200
Glen Allen, VA 23060-9278
D [804.205.3346](tel:804.205.3346)
LICENSED PE: VA, MD



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TECHNICAL MEMORANDUM

PREPARED FOR: Fluvanna County

PREPARED BY: Dewberry Engineers Inc.

DATE: June 13, 2025

SUBJECT: Addendum to the Fork Union Water Supply System PER



1. Background

Dewberry completed the Fork Union Water Supply System Preliminary Engineering Report (PER) in May 2025 and submitted the final copy to the Virginia Department of Health and Fluvanna County (County) for record. After submitting the PER to VDH, the County requested additional value engineering of the project to better meet available budgets for the project. A meeting was held on May 27, 2025 to discuss options for reducing the project budget. This memorandum serves to memorialize the final, agreed upon project prior to design and to provide revised opinion of probable construction costs (OPCC).

2. Recommended Project and Cost from PER

The PER concluded that the final water treatment plant (WTP) would be sized initially for 1 MGD and be expandable to 1.5 MGD. Additionally, 4.8 miles of raw waterlines, 11 miles of finished waterline, a new elevated storage tank, raw water pump station and ground water storage tank were included in the project. The WTP process would include the following:

- Rapid Mix (static mixer)
- Flocculation (2-stage)
- Sedimentation (with plate settlers and hoseless sludge collectors)
- Gravity Media Filters
- Nanofiltration
- Disinfection (chlorine contact basin)
- Clear Well
- Finished Water Pumps
- Chemical Systems
 - Raw Water Chemicals
 - PAC and permanganate, polymer, PACL, and lime dosed at the front of the WTP
 - Filtered Water Chemicals
 - Sodium hydroxide and sodium hypochlorite dosed at chlorine contact basin
 - Finished Water Chemicals
 - Ammonium sulfate for the formation of chloramines may be required depending on the DBP formation potential
 - Fluoride and corrosion inhibitor dosed at WTP finished waterline
- Residuals lagoon for collection of settled solids, backwash waste, and nanofiltration reject waste

The initial estimated project cost was approximately \$70 million, which exceeded the County's budget. To reduce project costs, the elevated storage tank and raw water pump station were removed from the project in the PER submitted and approved by the Virginia Department of Health (VDH). This reduced the total estimated project cost to approximately \$56 million.

3. Additional Value Engineering

A meeting was held with the County on May 27, 2025 to discuss additional value engineering options to further reduce project costs. Based on discussions at this meeting, the following revisions will be implemented for this project:

- The WTP would be sized for 0.75 MGD. Space will be left on site for a future initial water treatment plant but the initial facilities will not be expandable to save on construction costs.
- The WTP building space would be minimized and extra spaces like the conference room, kitchen/breakroom, and office space would be removed.
- The WTP's lime feed system was updated from a self-contained lime silo to a more economical bag feeder system.
- The PAC system was removed.
- The WTP was moved closer to the road frontage which reduced the waterline linear footage by 1,000 linear feet.
- The cost estimate for the finished waterlines was reduced as the estimate for the service connections was revised from \$35,000 to \$25,000 per connection.

Based on these revisions, the updated total project cost was reduced to approximately \$49 million. **Table 3.1** summarizes the updated project cost. The updated cost estimate by project is included below in **Table 3.2** through **Table 3.4**.

Table 3.1 - Revised Value-Engineered Total Project Cost

PROJECT	DESCRIPTION	CAPITAL CONSTRUCTION COST \$, millions			CONST. INSPECTION	LAND ACQU.	ENGINEERING \$, millions
		COST	LOW RANGE (-15%)	HIGH RANGE (+30%)			
Raw Waterline - Alt 1	Based on WTP Location 1	\$5.10	\$4.34	\$6.63	\$110,000	\$410,000	\$0.77
FW - Alt 1	Based on WTP Location 1	\$17.61	\$14.97	\$22.89	\$219,500	\$562,400	\$2.64
WTP Alt 2	WTP Process Alternative 2	\$19.38	\$16.47	\$25.19	\$246,900	-	\$2.91
TOTAL		\$42.09	\$35.78	\$54.72	\$576,200	\$972,400	\$6.31

Table 3.2 – Raw Waterline Alternative 1 OPCC

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 180,000
2	Site Preparation				\$ 112,500
	Clearing and Grubbing (Site and Waterline)	AC	23	\$ 5,000	\$ 112,500
3	Raw Waterline				\$ 3,413,000
	Furnish and Install 12" PVC Raw Waterline	LF	21200	\$ 150	\$ 3,180,000
	ARV Manholes and ARV Valves	EA	3	\$ 10,000	\$ 30,000
	Sitework, Erosion & Sediment Control	LF	21200	\$ 2.50	\$ 53,000
	Pavement Repair & Patching Allowance	LS	1	\$ 150,000	\$ 150,000
SUBTOTAL					\$ 3,705,500
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 370,600
SUBTOTAL					\$ 4,076,100
CONSTRUCTION CONTINGENCY (25%)					\$ 1,019,100
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 4,335,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 5,100,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 6,630,000
ENGINEERING (ESTIMATED, 15%)					\$ 765,000
EASEMENT / LAND ACQUISITION					\$ 410,000
CONSTRUCTION INSPECTION (16 months @ \$100/hr, 2 days per week)					\$ 110,000

Table 3.3 – Finished Waterlines - WTP Alternative 1 OPCC

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 569,000
2	Site Preparation				\$ 255,000
	Clearing and Grubbing (Site and Waterline)	AC	51	\$ 5,000	\$ 255,000
3	Finished Waterlines				\$ 11,113,300
	Furnish and Install 12" PVC Waterline	LF	17180	\$ 150	\$ 2,577,000
	Furnish and Install 8" PVC Waterline	LF	12110	\$ 120	\$ 1,453,200
	Furnish and Install 6" PVC Waterline	LF	25950	\$ 100	\$ 2,595,000
	ARV Manholes and ARV Valves	EA	15	\$ 10,000	\$ 150,000
	Sitework, Erosion & Sediment Control	LF	55240	\$ 2.50	\$ 138,100
	New Service Connections (Meter and Service Line)	EA	148	\$ 25,000	\$ 3,700,000
	Pavement Repair & Patching Allowance	LS	1	\$ 500,000	\$ 500,000
SUBTOTAL					\$ 11,937,300
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,193,800
SUBTOTAL					\$ 13,131,100
CONSTRUCTION CONTINGENCY (25%)					\$ 3,282,800
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 14,968,500
TOTAL ESTIMATED CONSTRUCTION COST					\$ 17,610,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 22,893,000
ENGINEERING (ESTIMATED, 15%)					\$ 2,641,500
EASEMENT / LAND ACQUISITION					\$ 562,400
CONSTRUCTION INSPECTION (32 months @ \$100/hr, 2 days per week)					\$ 219,500

Table 3.4 – Water Treatment Plant Alternative #2

Line Item	Description	Unit	Quantity	Unit Price	Total Price
1	Mobilization/General Conditions (5%)				\$ 670,000
2	Site				\$ 1,518,000
	Clearing and Grubbing (Heavy)	AC	3	\$ 10,000	\$ 30,000
	Site Grading and Excavation	LS	1	\$ 800,000	\$ 800,000
	Fencing	LF	1400	\$ 25	\$ 35,000
	Motorized Access Gate	EA	1	\$ 35,000	\$ 35,000
	Asphalt Pavement Site	SY	2700	\$ 40	\$ 108,000
	Paved Access Road	SY	1000	\$ 40	\$ 40,000
	Lagoons	LS	1	\$ 150,000	\$ 150,000
	Exterior Concrete	CY	320	\$ 1,000	\$ 320,000
3	Building				\$ 2,798,400
	Concrete Walls, Basins, Slabs	CY	1620	\$ 1,300	\$ 2,106,000
	CMU Block w/ Brick Veneer Exterior Walls	LF	387	\$ 450	\$ 174,150
	CMU Block Interior Walls	LF	441	\$ 250	\$ 110,250
	Asphalt Shingle Roof	SF	6750	\$ 8.00	\$ 54,000
	Doors	EA	28	\$ 2,000	\$ 56,000
	Overhead Doors	EA	4	\$ 10,000	\$ 40,000
	Windows	EA	10	\$ 800	\$ 8,000
	Furnishings (Desks, Computers, Lab Equipment, etc)	LS	1	\$ 250,000	\$ 250,000
	Paintings and Coatings	LS	1	\$ 360,000	\$ 360,000
4	Treatment Equipment				\$ 4,975,500
	Yard Piping and Static Mixer	LS	1	\$ 250,000	\$ 250,000
	Flocculators, Plate Settlers, Hoseless Sludge Collectors	LS	1	\$ 391,500	\$ 391,500
	Filters	LS	1	\$ 166,500	\$ 166,500
	Process Piping, Valves, and Gates	LS	1	\$ 742,500	\$ 742,500
	Chemical Storage Tanks	EA	3	\$ 35,000	\$ 105,000
	Chemical Feed Pumps	EA	20	\$ 5,000	\$ 100,000
	Chemical Feed Piping and Tubing	LS	1	\$ 342,000	\$ 342,000
	Lime Feed Equipment	LS	1	\$ 385,900	\$ 385,900
	Nanofiltration System	LS	1	\$ 900,000	\$ 900,000
	Finished Water and Backwash Pumps	EA	4	\$ 48,000	\$ 192,000
	Plumbing Allowance	LS	1	\$ 180,000	\$ 180,000
	HVAC Allowance	LS	1	\$ 225,000	\$ 225,000
	Labor & Equipment (25%)	LS	1	\$ 995,100	\$ 995,100
5	Electrical and Instrumentation				\$ 3,950,000
	Generator & ATS	LS	1	\$ 800,000	\$ 800,000
	Panelboards/Breakers/Transformer	LS	1	\$ 960,000	\$ 960,000
	Conduit and Wire	LS	1	\$ 600,000	\$ 600,000
	VFD for Finished Water Pumps	EA	2	\$ 80,000	\$ 160,000
	Backwash Pump Motor Starters	EA	2	\$ 20,000	\$ 40,000
	Instrumentation	LS	1	\$ 600,000	\$ 600,000
	Labor & Equipment to Install (25%)	LS	1	\$ 790,000	\$ 790,000
SUBTOTAL					\$ 13,911,900
CONTRACTOR OVERHEAD & PROFIT (10%)					\$ 1,391,200
SUBTOTAL					\$ 15,303,100
CONSTRUCTION CONTINGENCY (25%)					\$ 3,825,800
ESTIMATED CONTROLS AND SCADA INTEGRATION (ON-CALL INTEGRATOR)					\$ 250,000
LOW END CONSTRUCTION COST RANGE (-15%)					\$ 16,473,000
TOTAL ESTIMATED CONSTRUCTION COST					\$ 19,380,000
LOW END CONSTRUCTION COST RANGE (+30%)					\$ 25,194,000
ENGINEERING (ESTIMATED, 15%)					\$ 2,907,000
EASEMENT / LAND ACQUISITION (WTP Location Alt #2 ONLY)					\$ -
CONSTRUCTION INSPECTION (24 months @ \$100/hr, 3 days per week)					\$ 246,900

4. Conclusion

The additional value engineering performed will not compromise or diminish the quality of the finished water leaving the WTP nor will it hinder the County's ability to deliver finished water to those customers within the 1.5-mile radius from the sanitary landfill. The value engineering changes will give the County flexibility to meet their current budget while delivering high quality finished water throughout the Fork Union Service Area. Through the value engineering completed, the total cost of the project was reduced from approximately \$70 million to \$49 million (over 30% reduction). It should be noted that these cost estimates are based on the conceptual plans developed in the PER and are considered a Class IV Opinion of Probable Construction Cost according to the Association for the Advancement of Cost Engineering (AACE). The cost estimates will be further refined and additional opportunities for value engineering will be identified as the detailed design progresses.

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB C

MEETING DATE:	June 18, 2025					
AGENDA TITLE:	James River Water Authority (JRWA) Update					
MOTION(s):	N/A					
BOS WORKPLAN?	Yes	No	If yes, which item(s):			
		X				
AGENDA CATEGORY:	Presentation	Action Matter	Public Hearing	Consent Agenda	Other	
	X					
STAFF CONTACT(S):	Eric Dahl, County Administrator					
PRESENTER(S):	Eric Dahl, County Administrator					
RECOMMENDATION:	Information only					
TIMING:	Routine					
DISCUSSION:	Provide an update on the JRWA Raw Waterline project.					
FISCAL IMPACT:	N/A					
POLICY IMPACT:	N/A					
LEGISLATIVE HISTORY:	N/A					
ENCLOSURES:	None.					
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other	
					X	

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB D

MEETING DATE:	June 18, 2025					
AGENDA TITLE:	James River Water Authority - Fluvanna Citizen Representative					
MOTION(s):	N/A					
BOS WORKPLAN?	Yes	No	If yes, which item(s):			
		X				
AGENDA CATEGORY:	Presentation	Action Matter	Public Hearing	Consent Agenda	Other	
	X					
STAFF CONTACT(S):	Eric Dahl, County Administrator					
PRESENTER(S):	Eric Dahl, County Administrator					
RECOMMENDATION:						
TIMING:	Normal					
DISCUSSION:	<p>Appointment History: Joe Chesser – resigned Sept 2023, term exp: Dec 31, 2025 Patricia Eager appointed Sept 6, 2023 to fill unexpired term; resigned June 2025. New appointment would complete the unexpired term, expiration Dec 31, 2025.</p> <p>The individuals listed above served as Fluvanna County Board of Supervisors while also serving on the James River Water Authority (JRWA) board. After they left their Fluvanna County Board of Supervisors seats, they remained on the JRWA Board until they resigned.</p> <p>For the Louisa County representatives on the JRWA, they have a Louisa County Board of Supervisor and a citizen representative. The decision before the Fluvanna County Board of Supervisors is to either appointment a Board of Supervisor to the JRWA or open it up for citizen representatives.</p>					
FISCAL IMPACT:	None.					
POLICY IMPACT:	Fill 1 of 2 required Fluvanna Citizen Representative positions.					
LEGISLATIVE HISTORY:	N/A					
ENCLOSURES:	None.					
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other	
	X				X	

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB E

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Authorization to Advertise State-funded Bonuses for Registrar's Office, Electoral Board				
MOTION(s):	I move the Board of Supervisors authorize staff to advertise an ordinance for a public hearing to be held July 2, 2025 authorizing monetary bonuses to the Fluvanna County Registrar and to members of the Fluvanna Electoral Board pursuant to § 15.2-1508 of the Code of Virginia.				
BOS WORKPLAN?	Yes	No	If yes, which item(s):		
AGENDA CATEGORY:	Presentation	Action Matter	Public Hearing	Consent Agenda	Other
		X			
STAFF CONTACT(S):	Dan Whitten, County Attorney				
PRESENTER(S):	Dan Whitten, County Attorney				
RECOMMENDATION:	Motion to approve advertisement for public hearing				
TIMING:	Advertise for public hearing on July 2, 2025				
DISCUSSION:	<ul style="list-style-type: none"> In May the state budget bill was signed by the Governor; the budget includes a one-time bonus for local Registrars, and for members of local Electoral Boards. These bonuses do not require a local funding match; Fluvanna County will be reimbursed by the state Department of Elections for authorized salary payments, which include these bonuses. 				
FISCAL IMPACT:	Bonuses will require no local match.				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	<ul style="list-style-type: none"> Letter from VA Department of Elections to Fluvanna Registrar and Finance Director, dated June 6, 2025. Ordinance authorizing the bonuses. 				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
	X				

**AN ORDINANCE TO PROVIDE FOR A STATE FUNDED 1.5% BONUS TO ELIGIBLE
DEPARTMENT OF SOCIAL SERVICES EMPLOYEES, TO THE REGISTRAR, AND
TO MEMBERS OF THE ELECTORAL BOARD IN ACCORDANCE WITH § 15.2-1508
OF THE CODE OF VIRGINIA**

WHEREAS the Virginia Department of Social Services is implementing a performance-based bonus structure designed to incentivize efficiency and accuracy in reducing Medical Assistance Renewal backlogs; and

WHEREAS the approved Virginia budget for FY2026 includes a one-time bonus for local Registrars and members of local Electoral Boards, and

WHEREAS Virginia Code § 15.2-1508 authorizes local governments to provide by ordinance for payments of bonuses to its officers and employees; and

WHEREAS the Board of Supervisors, after public notice, public hearing and due deliberation in accordance with law approved the said ordinance authorizing bonuses on **July 2, 2025**.

NOW THEREFORE BE IT ORDAINED by the Board of Supervisors of Fluvanna County:

1. That a one-time state-funded bonus of 1.5% for eligible employees of the Fluvanna County Department of Social Services is approved, and
2. That a one-time state funded bonus of 1.5% for the Fluvanna County Registrar is approved, and
3. That a one-time state funded bonus of 1.5% for members of the Fluvanna Electoral Board is approved, and
4. That this Ordinance shall be effective immediately upon adoption.

Adopted this 2nd day of July, 2025
by the Fluvanna County Board of Supervisors



★ VIRGINIA ★
DEPARTMENT *of* ELECTIONS

TO: Joyce Wells Pace and Victoria Melton, Fluvanna County

FROM: Kevin A. Hill
Business Manager
Department of Elections (ELECT)

DATE: June 6, 2025

SUBJECT: 2025-2026 Authorized General Registrar and Local Electoral Board Member Salaries Update for Fluvanna County

The Code of Virginia Chapter 1 (§24.2-108 and §24.2-111) mandates the governing body of each county or city to pay compensation to their general registrar and electoral board members in accordance with the compensation expense plan established in the *Annual Virginia Acts of Assembly*. This correspondence sets the authorized state compensation to be paid to your general registrar and electoral board members effective July 1, 2025 through June 30, 2026 as shown in table 1. The tables include the amount authorized for the period of March 1, 2025 through February 28, 2026 to help with your 2026 reimbursement request. The authorized general registrar salary and electoral board compensation are computed using the latest (Published January 2025) population estimates from the University of Virginia's Weldon Cooper Center for Public Service, Demographics & Workforce.

Authorized Salary for General Registrar

The authorized salary rates for your local general registrar are shown in table 1 and only reflect annual salary as locality's process payrolls differently. Your local governing body will be reimbursed by the Department of Elections for state authorized salary payments to the extent of funds provided in the *Annual Virginia Acts of Assembly*. **The authorized salary takes into account changes made by the General Assembly and Governor to adjust General Registrar salaries by three-percent effective July 1, 2025 and a one-time bonus payment, equal to 1.5 percent of their base salary, on July 1, 2025.**

Your local governing body is also required to provide benefits to the general registrar, deputy registrars and the registrar's staff as provided to other employees of your locality. Local governments are also required to pay the reasonable expenses of the general registrar, including reimbursement for mileage at the rate payable to members of the General Assembly. Reasonable expenses include, but are not limited to, costs for: (i) an adequately trained registrar's staff, including training in the use of computers and technology to the extent provided to other local employees with similar job responsibilities, and reasonable costs for the general registrar to attend annual training offered by the Department of Elections; (ii) adequate training for officers of election; (iii) conducting elections as required; and (iv) voter education. Local governing bodies may supplement the annual salary of the general registrar. However, the supplement, expenses, and mileage of the general registrar, are not reimbursable from the State Treasury.

Electoral Board Authorized Compensation

Table 1 shows the authorized state annual salary rates for your Electoral Board (EB) members. These amounts are to be paid by your local government during the period of July 1, 2025 through June 30, 2026. Also included in the table is the amount authorized for the period of March 1, 2025 through February 28,

2026 to help with your 2026 reimbursement request. The authorized salaries include a three-percent salary increase effective July 1, 2025 and a one-time bonus payment, equal to 1.5 percent of their base salary, on July 1, 2025.

Mileage & Expenses

The governing body of any county or city may pay the secretary of its electoral board additional allowance for expenses as it deems appropriate but there shall be no reimbursement out of the State Treasury for such expenses.

The authorized mileage rate for general registrars, their staff and local electoral board members is to be paid at the rate listed by the federal government at the IRS website (<http://www.irs.gov/Tax-Professionals/Standard-Mileage-Rates/>) at the time of travel, counties and cities shall not be reimbursed from State Treasury for mileage paid to general registrars or members of electoral boards.

Reimbursements from State Treasury

Annually, the Department of Elections reimburses your local government for the state authorized salaries based on population paid to the general registrar and your local electoral board members. As stated, the reimbursements will not include local supplements, mileage and expenses of the general registrar or local electoral board only the state authorized amount contingent to the extent of funds provided.

The Appropriations Act permits the governing body of any county or city to pay the secretary of its electoral board additional allowance for expenses as it deems appropriate. However, the Department of Elections will not reimburse the additional allowances.

If you have any questions regarding the above information, please contact the Department of Elections Fiscal staff at (804) 864-8950 or send an email to fiscal@elections.virginia.gov.

cc: General Registrar



★ VIRGINIA ★
DEPARTMENT *of* ELECTIONS

			Reimbursement Period (3/1/2025-2/28/2026) – Annual Amounts												Next Reimbursement Period				Reimbursement -ment Period Amount (including Bonus)	Fiscal Year 2026 (FY26) Amount (NOT including Bonus)
			2025-2026 Calendar Year												2026 Calendar Year					
		March FY25	April FY25	May FY25	June FY25	July FY26	Bonus FY26	Aug FY26	Sept FY26	Oct FY26	Nov FY26	Dec FY26	Jan FY26	Feb FY26	March FY26	April FY26	May FY26	June FY26		
GENERAL REGISTRAR		\$8,058	\$8,058	\$8,058	\$8,058	\$8,300	\$1,494	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300	\$100,126	\$99,599	
ELECTORAL BOARD	Secretary	\$448	\$448	\$448	\$448	\$462	\$83	\$462	\$462	\$462	\$462	\$462	\$462	\$462	\$462	\$462	\$462	\$11,144	\$11,085	
	Chairman	\$224	\$224	\$224	\$224	\$231	\$42	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231			
	Vice-Chair	\$224	\$224	\$224	\$224	\$231	\$42	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231	\$231			

Table 1: Authorized Salaries (Annual Amounts) – GR and Electoral Board Members for Fluvanna County (51065)

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB F

MEETING DATE:	June 18, 2025																
AGENDA TITLE:	Board of Supervisors Salary																
MOTION(s):	<p>I move to approve the pay increase for each Fluvanna County Board of Supervisors' to the new pay rates of:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>Position</u></th> <th style="text-align: left;"><u>New Annual</u></th> </tr> </thead> <tbody> <tr> <td>Chair</td> <td>\$ _____</td> </tr> <tr> <td>Vice-Chair</td> <td>\$ _____</td> </tr> <tr> <td>Members</td> <td>\$ _____</td> </tr> </tbody> </table> <p>with such increase to be effective January 1, 2026 and the amount to come from the FY26 BOS Contingency.</p>					<u>Position</u>	<u>New Annual</u>	Chair	\$ _____	Vice-Chair	\$ _____	Members	\$ _____				
<u>Position</u>	<u>New Annual</u>																
Chair	\$ _____																
Vice-Chair	\$ _____																
Members	\$ _____																
BOS WORKPLAN?	Yes	No	If yes, which item(s):														
		X															
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other												
		X															
STAFF CONTACT(S):	Eric Dahl, County Administrator																
PRESENTER(S):	Eric Dahl, County Administrator																
RECOMMENDATION:	Board to take action prior to July 1, 2025.																
TIMING:	Per State Code, must be approved prior to July 1, 2025.																
DISCUSSION:	<p>On May 17, 2023, a proposal for Board of Supervisor salary increases were last discussed and would have been effective for January 1, 2024. The motion for the salary increase failed for lack of a second.</p> <p>Board of Supervisor salaries were last increased on June 16, 2021. The Board voted 3-2 (Eager, Weaver) to increase the pay of Supervisors, effective January 1, 2022, to:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>Position</u></th> <th style="text-align: left;"><u>New Monthly</u></th> <th style="text-align: left;"><u>New Annual</u></th> </tr> </thead> <tbody> <tr> <td>Chair</td> <td>\$901</td> <td>\$10,812</td> </tr> <tr> <td>Vice-Chair</td> <td>\$848</td> <td>\$10,176</td> </tr> <tr> <td>Members</td> <td>\$795</td> <td>\$ 9,540</td> </tr> </tbody> </table>					<u>Position</u>	<u>New Monthly</u>	<u>New Annual</u>	Chair	\$901	\$10,812	Vice-Chair	\$848	\$10,176	Members	\$795	\$ 9,540
<u>Position</u>	<u>New Monthly</u>	<u>New Annual</u>															
Chair	\$901	\$10,812															
Vice-Chair	\$848	\$10,176															
Members	\$795	\$ 9,540															

Board of Supervisor Salary History

Position	2022	2020	2008
Chair	\$10,812	\$10,200	\$9,000
Vice-Chair	\$10,176	\$ 9,600	\$8,400
Members	\$ 9,540	\$ 9,000	\$7,800

A review of FY25 salaries for Board of Supervisors of surrounding and similar sized counties in the Commonwealth shows the following:

Group	July 1, 2024 Est. Pop.*	Chair	BoS	Chair Per Capita	BoS Per Capita
7 Local Comp. Counties Avg.	22,487	\$11,441	\$ 9,892	\$0.51	\$0.44
21 Counties 20K-35K Pop. Avg.	28,596	\$10,621	\$ 9,214	\$0.37	\$0.32
All 28 Counties Average	25,542	\$10,826	\$ 9,383	\$0.42	\$0.37
Fluvanna - Current	28,382	\$10,812	\$ 9,540	\$0.38	\$0.34

For previous Board of Supervisor salary increases, the methodology has been to adjust salaries based upon the average amount for Chair/BOS or to adjust by per capita amounts. The “All 28 Counties Average” from the chart above has been the primary counties to compare with (all County comparisons are included in the attached document).

1. If you use the average annual amounts for the “All 28 Counties Average”, it shows a \$14 annual increase for the Chair and no increase for other BOS from the “Fluvanna – Current”.
2. If you use the per capita amounts for the “All 28 Counties Average”, the average difference between “Fluvanna - Current” per capita amounts (\$0.38 Chair and \$0.34 BOS) and the “All 28 Counties Average” per capita amounts (\$0.42 Chair and \$0.37 BOS) is 9.65%. The change of a 9.65% increase is reflected below:

Position	Current Annual	New Annual
Chair	\$10,812	\$11,855
Vice-Chair	\$10,176	\$11,158
Members	\$ 9,540	\$10,461

If the board decides to take action, the proposed pay increases and timing thereof complies with Virginia Code § 15.2-1414.2 - Salaries to be fixed by board; limits; reimbursement in addition to salary.

FISCAL IMPACT:	It would be determined once annual salary amounts were selected. Funds needed in FY26 would be covered with BOS Contingency. The total annual cost increase would begin in FY27.				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	BOS member increases occurred January 1, 2008, January 1, 2020 and January 1, 2022. Raise proposal is in compliance with Virginia Code § 15.2-1414.2 - Salaries to be fixed by board; limits; reimbursement in addition to salary.				
ENCLOSURES:	<ul style="list-style-type: none">• Locality Comparisons Chart• Virginia Code § 15.2-1414.2				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
	X	X			

State Code for BOS Compensation

§ 15.2-1414.2. Salaries to be fixed by board; limits; reimbursement in addition to salary.

The annual compensation to be allowed each member of the board of supervisors of a county shall be determined by the board of supervisors of such county but such compensation shall not be more than a maximum determined in the following manner. Prior to July 1 of each year, the current board, by a recorded vote of a majority present, shall set a maximum annual compensation, which will become effective as of January 1 of the year following the next regularly scheduled elections.

Until the board is able to set a maximum compensation as provided above, the maximum compensations for the several counties shall be as authorized on July 1, 1981.

Any board of supervisors may fix a higher salary for the chairman, or the vice-chairman, or both, than for the other members of the board without respect to the limits herein set forth.

A member of the board of supervisors of any county may accept in lieu of salary, reimbursement for actual expenses incurred in maintaining an office and secretarial assistance necessary for the proper performance of his duties. Such reimbursement shall be subtracted from the amount of the salary due such official and the remaining sum shall be paid to him at his option; however, such expense shall not exceed the salary. In addition to the salary, members of each governing body may receive the same fringe benefits which are given to county employees generally, and all prior grants of such benefits are validated.

A county may provide a member of its board of supervisors in addition to salary, reimbursement for actual expenses incurred in purchasing, operating, maintaining and using a telephone, including a car

telephone or other portable telephone, provided the expenses are attributable directly to the proper performance of the member's official duties.

No increase in the salary of a member of the board of supervisors shall take effect during the incumbent supervisor's term in office; however, this restriction shall not apply to boards of supervisors when the supervisors are elected for staggered terms nor to corrections to the above listed compensation.

1976, c. 590, § 14.1-46.01; 1977, cc. 391, 416; 1978, cc. 319, 435, 572; 1979, c. 256; 1980, cc. 3, 450; 1981, cc. 13, 623; 1982, c. 376; 1990, c. 518; 1996, c. [371](#); 1998, c. [872](#); 2000, c. [299](#); 2022, c. [616](#).

6/12/2025

County	July 1, 2024 Est. Pop.*	Chair	BoS	# of Supervisors	Chair Per Capita	BoS Per Capita
7 Local Comparable Counties Avg.	22,487	\$ 11,441	\$ 9,892	5.6	\$0.51	\$0.44
21 Counties 20K-35K Population Avg.	28,596	\$ 10,621	\$ 9,214	6.3	\$0.37	\$0.32
All 28 Counties Avg.	25,542	\$ 10,826	\$ 9,383	5.8	\$0.42	\$0.37
Fluvanna - Current	28,382	\$ 10,812	\$ 9,540	5	\$0.38	\$0.34
Buckingham ****	16,736	\$ 15,000	\$ 12,000	7	\$0.90	\$0.72
Cumberland ****	9,982	\$ 8,174	\$ 6,812	5	\$0.82	\$0.68
Greene	21,717	\$ 11,001	\$ 9,779	5	\$0.51	\$0.45
Louisa****	41,428	\$ 10,710	\$ 9,450	7	\$0.26	\$0.23
Madison	13,982	\$ 10,000	\$ 9,000	5	\$0.72	\$0.64
Nelson****	14,788	\$ 7,200	\$ 7,200	5	\$0.49	\$0.49
Orange	38,778	\$ 18,000	\$ 15,000	5	\$0.46	\$0.39
Accomack	33,498	\$ 9,072	\$ 7,210	9	\$0.27	\$0.22
Amherst****	31,448	\$ 5,000	\$ 5,000	5	\$0.16	\$0.16
Botetourt ****	33,416	\$ 10,000	\$ 8,200	5	\$0.30	\$0.25
Caroline	33,758	\$ 19,500	\$ 19,500	6	\$0.58	\$0.58
Carroll	28,772	\$ 7,300	\$ 5,500	6	\$0.25	\$0.19
Dinwiddie	28,411	\$ 12,041	\$ 11,267	5	\$0.42	\$0.40
Halifax	32,817	\$ 13,000	\$ 11,000	8	\$0.40	\$0.34
King George	28,250	\$ 15,000	\$ 15,000	5	\$0.53	\$0.53
Lee	21,610	\$ 7,200	\$ 5,400	5	\$0.33	\$0.25
Mecklenburg	30,333	\$ 9,730	\$ 8,402	9	\$0.32	\$0.28
New Kent ****	26,808	\$ 11,500	\$ 11,000	5	\$0.43	\$0.41
Page ****	23,523	\$ 7,711	\$ 5,890	6	\$0.33	\$0.25
Powhatan	31,873	\$ 15,000	\$ 12,000	5	\$0.47	\$0.38
Prince Edward ****	22,548	\$ 12,411	\$ 10,953	8	\$0.55	\$0.49
Pulaski	33,108	\$ 11,550	\$ 9,240	5	\$0.35	\$0.28
Rockbridge	22,583	\$ 15,157	\$ 13,219	5	\$0.67	\$0.59
Russell****	24,965	\$ 8,200	\$ 7,000	7	\$0.33	\$0.28
Scott ****	21,274	\$ 5,000	\$ 4,500	7	\$0.24	\$0.21
Smyth	28,790	\$ 9,000	\$ 7,000	7	\$0.31	\$0.24
Wise	34,820	\$ 10,147	\$ 8,644	8	\$0.29	\$0.25
Wythe	27,915	\$ 9,517	\$ 7,571	7	\$0.34	\$0.27
Albemarle	117,790	\$ 21,603	\$ 19,803	6	\$0.18	\$0.17
Alleghany****	14,984	\$ 7,000	\$ 7,000	7	\$0.47	\$0.47
Amelia****	13,629	\$ 12,600	\$ 12,000	5	\$0.92	\$0.88
Appomattox****	16,992	\$ 8,500	\$ 7,300	5	\$0.50	\$0.43
Arlington****	245,004	\$ 95,734	\$ 89,851	5	\$0.39	\$0.37
Augusta	77,901	\$ 12,192	\$ 10,392	7	\$0.16	\$0.13
Bath	4,255	\$ 6,000	\$ 6,000	5	\$1.41	\$1.41

6/12/2025

County	July 1, 2024 Est. Pop.*	Chair	BoS	# of Supervisors	Chair Per Capita	BoS Per Capita
Bedford	80,880	\$ 9,000	\$ 10,800	7	\$0.11	\$0.13
Bland	6,244	\$ 8,000	\$ 8,000	4	\$1.28	\$1.28
Brunswick****	14,867	\$ 14,000	\$ 12,000	5	\$0.94	\$0.81
Buchanan	19,056	\$ 8,800	\$ 7,000	7	\$0.46	\$0.37
Campbell	56,472	\$ 8,557	\$ 7,049	7	\$0.15	\$0.12
Charles City****	6,488	\$ 13,915	\$ 12,523	3	\$2.14	\$1.93
Charlotte	11,444	\$ 6,600	\$ 6,000	7	\$0.58	\$0.52
Chesterfield	394,825	\$ 48,542	\$ 43,542	5	\$0.12	\$0.11
Clarke	15,565	\$ 3,000	\$ 2,700	5	\$0.19	\$0.17
Craig**	4,766	\$ 6,500	\$ 5,000	5	\$1.36	\$1.05
Culpeper****	55,770	\$ 17,343	\$ 15,709	7	\$0.31	\$0.28
Dickenson	13,432	\$ 7,300	\$ 5,500	5	\$0.54	\$0.41
Essex	10,411	\$ 7,200	\$ 6,000	5	\$0.69	\$0.58
Fairfax****	1,149,595	\$ 138,283	\$ 123,283	10	\$0.12	\$0.11
Fauquier****	74,563	\$ 21,378	\$ 18,267	5	\$0.29	\$0.24
Floyd****	15,090	\$ 7,300	\$ 5,500	5	\$0.48	\$0.36
Franklin	54,127	\$ 13,019	\$ 11,835	7	\$0.24	\$0.22
Frederick****	98,977	\$ 10,800	\$ 9,000	7	\$0.11	\$0.09
Giles****	16,605	\$ 6,000	\$ 6,000	5	\$0.36	\$0.36
Gloucester	39,019	\$ 10,000	\$ 8,200	7	\$0.26	\$0.21
Grayson****	15,206	\$ 3,000	\$ 2,700	5	\$0.20	\$0.18
Greensville****	10,852	\$ 13,883	\$ 12,617	4	\$1.28	\$1.16
Hanover****	114,420	\$ 31,576	\$ 29,576	7	\$0.28	\$0.26
Henrico	345,973	\$ 78,241	\$ 68,036	5	\$0.23	\$0.20
Henry	48,726	\$ 8,635	\$ 8,181	6	\$0.18	\$0.17
Highland****	2,285	\$ 3,000	\$ 3,000	3	\$1.31	\$1.31
Isle of Wight	41,048	\$ 15,398	\$ 12,800	5	\$0.38	\$0.31
James City	81,826	\$ 13,075	\$ 11,275	5	\$0.16	\$0.14
King and Queen	6,763	\$ 5,000	\$ 5,000	5	\$0.74	\$0.74
King William	18,826	\$ 12,320	\$ 11,000	5	\$0.65	\$0.58
Lancaster****	10,908	\$ 12,000	\$ 10,000	5	\$1.10	\$0.92
Loudoun****	439,217	\$ 91,063	\$ 75,916	9	\$0.21	\$0.17
Lunenburg	12,059	\$ 6,000	\$ 4,800	7	\$0.50	\$0.40
Mathews	8,407	\$ 8,200	\$ 7,700	5	\$0.98	\$0.92
Middlesex	10,883	\$ 8,600	\$ 8,000	5	\$0.79	\$0.74
Montgomery	102,125	\$ 16,000	\$ 14,000	7	\$0.16	\$0.14
Northampton****	12,150	\$ 10,000	\$ 9,000	5	\$0.82	\$0.74
Northumberland	11,813	\$ 10,000	\$ 10,000	5	\$0.85	\$0.85
Nottoway	15,647	\$ 6,000	\$ 5,000	5	\$0.38	\$0.32
Patrick	16,985	\$ 7,742	\$ 6,777	5	\$0.46	\$0.40
Pittsylvania****	58,913	\$ 10,800	\$ 9,000	7	\$0.18	\$0.15
Prince George****	42,657	\$ 7,500	\$ 6,900	5	\$0.18	\$0.16
Prince William	497,853	\$ 84,739	\$ 74,282	8	\$0.17	\$0.15

6/12/2025

County	July 1, 2024 Est. Pop.*	Chair	BoS	# of Supervisors	Chair Per Capita	BoS Per Capita
Rappahannock ****	7,469	\$ 4,800	\$ 2,400	5	\$0.64	\$0.32
Richmond	9,290	\$ 9,000	\$ 8,000	5	\$0.97	\$0.86
Roanoke	96,497	\$ 21,022	\$ 19,222	5	\$0.22	\$0.20
Rockingham ****	87,051	\$ 20,242	\$ 15,744	5	\$0.23	\$0.18
Shenandoah	44,942	\$ 12,000	\$ 10,200	6	\$0.27	\$0.23
Southampton	17,769	\$ 7,300	\$ 5,500	6	\$0.41	\$0.31
Spotsylvania****	149,920	\$ 25,750	\$ 24,000	7	\$0.17	\$0.16
Stafford ****	167,455	\$ 21,500	\$ 20,500	7	\$0.13	\$0.12
Surry	6,558	\$ 8,500	\$ 7,500	5	\$1.30	\$1.14
Sussex****	9,897	\$ 8,568	\$ 7,344	6	\$0.87	\$0.74
Tazewell****	38,572	\$ 9,000	\$ 6,000	5	\$0.23	\$0.16
Warren ****	41,732	\$ 12,000	\$ 10,200	5	\$0.29	\$0.24
Washington****	53,369	\$ 10,800	\$ 9,000	7	\$0.20	\$0.17
Westmoreland****	19,487	\$ 13,000	\$ 12,000	5	\$0.67	\$0.62
York	72,789	\$ 10,800	\$ 9,000	5	\$0.15	\$0.12
Goochland	27,486	N/A	N/A	N/A	#VALUE!	#VALUE!

***Population, 2024 Weldon Cooper Center**

**** Information from 2024

Not included, no information provided

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB G

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Public Hearing an Ordinance Amendment to Amend §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15 regarding the Food and Beverage Tax				
MOTION(s):	I move that Board of Supervisors approve amendments to the County Code by amending §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15.				
BOS WORKPLAN?	Yes	No	If yes, which item(s):		
		X			
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
	X				
STAFF CONTACT(S):	Dan Whitten, County Attorney				
PRESENTER(S):	Dan Whitten, County Attorney				
RECOMMENDATION:	Approve ordinance				
TIMING:	Ordinance effective August 1, 2025				
DISCUSSION:	<ul style="list-style-type: none"> • Fifty percent (50%) of the revenues collected from the county's food and beverage tax shall be used solely for public school construction projects in accordance with the policy approved by the Board of Supervisors on May 21, 2025. • The ordinance would authorize sellers to deduct three percent of the amount owed for the food and beverage tax, not to exceed \$100, to compensate for the collection and reporting of such taxes. If sellers are paying the food and beverage tax to the Treasurer, they are required to pay an approximately 3% credit card fee. • The ordinance would clarify that mobile food units shall collect the food and beverage tax even when they are selling at farmers markets. • The ordinance would clarify the duties of the Treasurer and Commissioner of Revenue regarding the administration of the tax. • Authorized by VA Code § 58.1-3833 				
FISCAL IMPACT:	Estimate revenue of \$300,000- \$600,000 would decreased by 3% for the Deduction for Seller to cover administrative costs.				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	<ul style="list-style-type: none"> • Fluvanna County Code Amendments 				

REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
	X				

ORDINANCE TO AMEND “THE CODE OF THE COUNTY OF FLUVANNA, VIRGINIA”, BY AMENDING §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, AND 20-13-11 AND ENACTING § 20-13-15 TO CLARIFY THAT MOBILE FOOD UNITS SHALL COLLECT THE FOOD AND BEVERAGE TAX AND TO AUTHORIZE 50 PERCENT OF THE REVENUE FROM THE FOOD AND BEVERAGE TAX TO BE USED SOLELY FOR PUBLIC SCHOOL CONSTRUCTION PROJECTS IN ACCORDANCE WITH A POLICY APPROVED BY THE BOARD OF SUPERVISORS AND TO ALLOW THE SELLER TO DEDUCT 3% OF THE AMOUNT OF TAX DUE TO COMPENSATE SELLERS FOR THE COLLECTION OF THE TAX

BE IT ORDAINED by the Board of Supervisors of Fluvanna County:

(1) That The Code of the County of Fluvanna, Virginia is amended by amending §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting 20-13-15, as follows:

CHAPTER 20 TAXATION

ARTICLE 13. – FOOD AND BEVERAGE TAX

Sec. 20-13-1. Definitions.

The words and phrases used in this article, shall have, for the purposes of this article, the meanings set forth in Virginia Code Sec. 58.1-3833, as the same may be amended from time to time.

Sec. 20-13-2. Levy of tax; amount.

In addition to all other taxes and fees of any kind now or hereafter imposed by law, a tax is hereby levied and imposed on the purchaser of all food and beverages served, sold or delivered for human consumption in the County in or from a restaurant, whether prepared in such restaurant or not, or prepared by a caterer. Grocery stores and convenience stores selling prepared foods ready for human consumption at a delicatessen counter shall be subject to the tax, for that portion of the grocery store or convenience store selling such items. The rate of this tax shall be four percent (4%) of the amount paid for such food or beverage. In the computation of this tax, any fraction of one-half cent (\$0.005) or more shall be treated as one cent (\$0.01).

Sec. 20-13-3. Exemptions.

The tax levied under this article shall not apply to food and beverages served, sold or delivered which are declared to be exempt pursuant to Virginia Code Sec. 58.1-3833, subsections A. and C., as the same may be amended from time to time. **However, the exemption from the tax detailed in Virginia Code Sec. 58.1-3833(A)(1)(xi) shall not apply to food and beverages served or sold from a mobile food unit, as defined in Virginia Code Sec. 58.1-3715.1.**

Sec. 20-13-4. Payment and collection of tax.

Every seller of food with respect to which a tax is levied under this article shall collect the amount of tax imposed under this article from the purchaser on whom the same is levied at the time payment for such food becomes due and payable, whether payment is to be made in cash or on credit by means of a credit card or otherwise. The amount of tax owed by the purchaser shall be added to the cost

of the food and beverages by the seller who shall pay the taxes collected to the County as provided in this article. Taxes collected by the seller shall be held in trust by the seller until remitted to the County.

Sec. 20-13-5. Use of food and beverage tax revenues.

Fifty percent (50%) of the revenues collected from the county's food and beverage tax shall be used solely for public school construction projects **in accordance with a policy approved by the Board of Supervisors.**

Sec. 20-13-6. Reports and remittances generally.

Every seller of food with respect to which a tax is levied under this article shall make out a report, upon such forms and setting forth such information as the **Commissioner of Revenue** ~~Treasurer~~ may prescribe and require, showing the amount of food charges collected and the tax required to be collected, ~~and~~ **The seller** shall sign and deliver such report to the Treasurer with a remittance of such tax. It shall be presumed that all food served, sold or delivered in the County in or from a restaurant is taxable under this article and the burden shall be upon the seller of food to establish by records what food is not taxable. Such reports and remittance shall be made on or before the twentieth day of each month, covering the amount of tax collected during the preceding month.

Sec. 20-13-7. Preservation of records.

It shall be the duty of any seller of food liable for collection and remittance of the taxes imposed by this article to keep and preserve for a period of three (3) years records showing gross sales of all food and beverages, the amount charged the purchaser for each such purchase, the date thereof, the taxes collected thereon and the amount of tax required to be collected by this article. The Treasurer **and the Commissioner of Revenue** shall have the power to examine such records at reasonable times and without unreasonable interference with the business of the seller for the purpose of administering and enforcing the provisions of this article and to make copies of all or any parts thereof.

Sec. 20-13-8. Duty of seller when going out of business.

Whenever any seller required to collect or pay to the County a tax under this article shall cease to operate or otherwise dispose of his business, any tax payable under this article shall become immediately due and payable and such person shall immediately make a report and pay the tax due.

Sec. 20-13-9. Advertising payment or absorption of tax prohibited.

No seller shall advertise or hold out to the public in any manner, directly or indirectly, that all or any part of the tax imposed under this article will be paid or absorbed by the seller or anyone else, or that the seller or anyone else will relieve the purchaser of the payment of all or any part of the tax.

Sec. 20-13-10. Enforcement; duty of Commissioner of Revenue

It shall be the duty of the Commissioner of Revenue to ascertain the name of every seller liable for the collection of the tax imposed by this article. The Commissioner of Revenue shall have all of the enforcement powers as authorized by article 1, chapter 31 of title 58.1 of the Code of Virginia (Code of Virginia, § 58.1-3100) for the purposes of this article.

Sec. 20-13-11. Enforcement; duty of Treasurer.

The Treasurer shall have the power and the duty of collecting the taxes imposed and levied hereunder and shall cause the same to be paid into the general treasury for the County. ~~It shall also be the duty of the Treasurer to ascertain the name of every seller liable for the collection of the tax imposed by this article who fails, refuses or neglects to collect such tax or to make the reports and remittances required by this article.~~ The Treasurer shall have all of the enforcement powers as authorized by Article 2, Chapter 31 of Title 58.1 of the Code of Virginia **to proceed against any seller who fails, refuses or neglects to collect such tax or to make the reports and remittances required by this article.** ~~for purposes of this article.~~ In so acting, the Treasurer may promulgate reasonable rules and regulations for the interpretation, administration and enforcement of this article.

Sec. 20-13-12. Procedure upon failure to collect, report, etc.

If any seller whose duty it is to do so shall fail or refuse to collect the tax imposed under this article and to make, within the time provided in this article, the reports and remittances mentioned in this article, the Treasurer shall proceed in such manner as he may deem best to obtain facts and information on which to base his estimate of the tax due. As soon as the Treasurer shall procure such facts and information as he is able to obtain upon which to base the assessment of any tax payable by any seller who has failed or refused to collect such tax and to make such report and remittance, he shall proceed to determine and assess against such seller the tax and penalties provided for by this article and shall notify such seller, by registered mail sent to his last known place of address, of the total amount of such tax and penalties and the total amount thereof shall be payable within ten (10) days from the date such notice is sent.

Sec. 20-13-13. Penalty for late remittance or false return.

A. If any seller whose duty it is to do so shall fail or refuse to remit to the Treasurer the tax required to be collected and paid under this article within the time and in the amount specified in this article, there shall be added to such tax by the Treasurer a penalty in the amount of ten percent (10%) of the total amount of the tax owed if the failure is not for more than one month, with an additional penalty of five percent (5%) of the total amount of the tax owed for each additional month or fraction thereof during which the failure continues, such penalty not to exceed twenty-five percent (25%) of the taxes collected but not remitted, provided, however, the minimum penalty shall be ten dollars (\$10.00), or the amount of the tax assessable, whichever is less.

B. If any seller whose duty it is to do so shall fail or refuse to file any return required by this article within the time specified in this article, there shall be added to such tax by the Treasurer a penalty in the amount of ten percent (10%) of the tax assessable on such return or \$10, whichever is greater; provided, however, that the penalty shall in no case exceed the amount of the tax assessable.

Sec. 20-13-14. Violations of article.

Any corporate or partnership officer as defined in Virginia Code § 58.1-3906, or any other person required to collect, account for and pay over tax under this article, who willfully fails to collect or truthfully account for and pay over such tax, and any person who willfully evades or attempts to evade any such tax or payment thereof, shall be punished in accordance with Sec. 1-10 of this Code. Conviction of such violation shall not relieve any person from the payment, collection or remittance of the taxes or penalties provided for in this article. Any agreement by any person to pay the taxes or

penalties provided for in this article by a series of installment payments shall not relieve any person of criminal liability for violation of this article until the full amount of taxes and penalties agreed to be paid by such person is received by the Treasurer.

Sec. 20-13-15. Deduction for seller.

For the purpose of compensating sellers for the collection of the tax imposed by this article, every seller shall be allowed three percent (3%) of the amount of the tax due and accounted for in the form of a deduction on his monthly return not to exceed one hundred dollars (\$100.00) per monthly return; provided, the full amount shall be due if any part of the payment is delinquent at the time of payment.

(2) That the Ordinance shall be effective on August 1, 2025.

(Seal)

PUBLIC HEARING
Fluvanna County Board of Supervisors
Wednesday, June 18, 2025, at 7:00 p.m.

Pursuant to Virginia Code § 15.2-1427, a Public Hearing will be held in the Fluvanna County Circuit Court, at 72 Main Street, Palmyra, VA 22963 Virginia for citizens of the County to have the opportunity to appear before and be heard by the Board of Supervisors for the following item:

Ordinance to Amend “The Code of the County of Fluvanna, Virginia,” by amending §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15 to clarify the duties of the Commissioner of Revenue and Treasurer in the administration of the food and beverage tax and to authorize 50 percent of the revenue from the food and beverage tax to be used solely for public school construction projects in accordance with a policy approved by the Board of Supervisors and to allow the seller to deduct 3% of the amount of tax due to compensate sellers for the collection of the tax

A copy of the full text of the ordinance is available for review by the public at www.fluvannacounty.org and in the office of the County Administrator during regular office hours. All interested persons wishing to be heard are invited to attend the public hearing.

TO: Fluvanna Review

Advertise on the following dates: May 29 & June 5, 2025

Authorized by: Fluvanna County Board of Supervisors

Bill to: Board of Supervisors

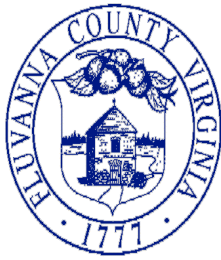
CONTACT INFORMATION:

Caitlin Solis
Clerk, Board of Supervisors
Fluvanna County
P. O. Box 540
Palmyra, VA 22963
csolis@fluvannacounty.org
434-591-1910
434-591-1913

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB H

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	ZTA 25:05 – Amendment to the Fluvanna County Zoning Ordinance by adding §§ 22-1-3 to identify the County’s GIS Map as the official zoning map of Fluvanna County.				
MOTION(s):	I move that the Board of Supervisors (approve / deny / defer) ZTA 25:05, an ordinance to amend and reordain “The Code of the County of Fluvanna, Virginia” by amending § 22-1-3 to identify the County’s GIS Map as the official zoning map of Fluvanna County.				
BOS WORKPLAN?	Yes	No	If yes, which item(s):		
		X			
AGENDA CATEGORY:	Presentation	Action Matter	Public Hearing	Consent Agenda	Other
			X		
STAFF CONTACT(S):	Jason Overstreet, Senior Planner				
PRESENTER(S):	Jason Overstreet, Senior Planner				
RECOMMENDATION:	Approve				
TIMING:	Routine				
DISCUSSION:	§ 22-1-2 requires a map to accompany Chapter 22 of the Code of the County of Fluvanna. Currently this map exists as a hard copy document based on static parcel boundaries. It is updated manually as changes to zoning districts are approved. This amendment will establish the County’s GIS map as the official zoning map of Fluvanna County thereby replacing the existing hard copy map.				
FISCAL IMPACT:	None				
POLICY IMPACT:	This change, if approved, would add a section to article 1 of the zoning ordinance that establishes the GIS map as the source of the zoning districts. All future changes in zoning would be updated through changes to the GIS map and data.				
LEGISLATIVE HISTORY:	This proposed Zoning Text Amendment was presented to the Planning Commission for review on May 13, 2025. The Commission, by a vote of 5-0, recommended approval of the proposed amendment.				
ENCLOSURES:	<ul style="list-style-type: none"> • Staff Report • Proposed Ordinance Amendment 				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
	X				X



COUNTY OF FLUVANNA

"Responsive & Responsible Government"

132 Main Street
P.O. Box 540
Palmyra, VA 22963
(434) 591-1910
Fax (434) 591-1911
www.fluvannacounty.org

BOS STAFF REPORT

To: Fluvanna County Board of Supervisors
From: Jason Overstreet, Senior Planner
Case Number: ZTA 25:05
District: Countywide Amendment

General Information: This public hearing is to be held on Wednesday, June 18, 2025 at 7:00 pm by the Fluvanna County Board of Supervisors in the Fluvanna Circuit Court, 72 Main Street, Palmyra VA 22963.

Requested Action: Recommend approval of ZTA 25:05, an amendment to the Fluvanna County Zoning Ordinance by adding § 22-1-3 to identify the County's GIS Map as the official zoning map of Fluvanna County.

Background Information: § 22-1-2 requires a map to accompany Chapter 22 of the Code of the County of Fluvanna. Currently this map exists as a hard copy document based on static parcel boundaries. It is updated manually as changes to zoning districts are approved. This amendment will identify the County's GIS map as the official zoning map of Fluvanna County thereby replacing the existing hard copy map.

Recommended Motion:

I MOVE THAT THE BOARD OF SUPERVISORS (APPROVE/ DENY / DEFER) ZTA 25:05 – AN ORDINANCE TO AMEND REORDAIN "THE CODE OF THE COUNTY OF FLUVANNA, VIRGINIA" BY ADDING § 22-1-3 TO IDENTIFY THE COUNTY'S GIS AS THE OFFICIAL ZONING MAP OF FLUVANNA COUNTY.

ORDINANCE TO AMEND AND REORDAIN “THE CODE OF THE COUNTY OF
FLUVANNA, VIRGINIA” BY ADDING §22-1-3 TO IDENTIFY THE COUNTY’S GIS MAP
AS THE OFFICIAL ZONING MAP OF FLUVANNA COUNTY.

BE IT ORDAINED by the Board of Supervisors of Fluvanna County:

- (1) *That the Code of the County of Fluvanna, Virginia is amended by adding § 22-1-3 as follows:*

CHAPTER 22 ZONING

ARTICLE 1. - IN GENERAL

Sec. 22-1-1. - Title.

This chapter shall be known and may be cited as "The Zoning Ordinance of the County of Fluvanna, Virginia."

State Law reference— For state law as to zoning, see Code of Va., § 15.2-2280 et seq.

Sec. 22-1-2. - Purpose.

This chapter, together with the accompanying map, is adopted for the purpose of promoting the health, safety, or general welfare of the public and of further accomplishing the objectives of section 15.2-2283 of the Code of Virginia. This chapter has been designed (1) to provide for adequate light, air, convenience of access, and safety from fire, flood, impounding structure failure, crime and other dangers; (2) to reduce or prevent congestion in the public streets; (3) to facilitate the creation of a convenient, attractive and harmonious community; (4) to expedite the provision of adequate police and fire protection, disaster evacuation, civil defense, transportation, water, sewerage, flood protection, schools, parks, forests, playgrounds, recreational facilities, and other public requirements; (5) to protect against destruction of or encroachment upon historic areas; (6) to protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light and air, danger and congestion in travel and transportation, or loss of life, health or property from fire, flood, impounding structure failure, panic or other dangers; (7) to encourage economic development activities that provide desirable employment and enlarge the tax base; (8) to provide for the preservation of agricultural and forestal lands and other lands of significance for the protection of the natural environment; and (9) to promote the creation and preservation of affordable housing suitable for meeting the current and future needs of the locality as well as a reasonable proportion of the current and future needs of the planning district within which the County is situated.

Sec. 22-1-3. – Zoning Map

The zoning map is composed of the digital GIS map, which is maintained by the Department of Planning and Zoning, and is incorporated by reference as part of this chapter. The zoning map is available on the Fluvanna County website for public access. The location and boundaries of the districts created by this chapter are hereby established as shown on the zoning map. The zoning map also includes references to case numbers for rezonings, special use permits, site development plans, and other zoning cases processed by the County.

- (2) *That the Ordinance shall be effective upon adoption.*

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB I

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Adoption of the Fluvanna County Board of Supervisors May 21, 2025 Meeting Minutes.				
MOTION(s):	I move the meeting minutes of the Fluvanna County Board of Supervisors Regular Meeting on Wednesday May 21, 2025, be adopted.				
BOS WORKPLAN?	Yes	No	If yes, list item(s):		
		X			
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
				XX	
STAFF CONTACT(S):	Caitlin Solis, Clerk to the Board				
PRESENTER(S):	Eric Dahl, County Administrator				
RECOMMENDATION:	Approve				
TIMING:	Routine				
DISCUSSION:	None.				
FISCAL IMPACT:	N/A				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	Draft Minutes May 21, 2025.				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
					X

FLUVANNA COUNTY BOARD OF SUPERVISORS
REGULAR MEETING MINUTES
Circuit Courtroom, Fluvanna Courts Building
72 Main Street, Palmyra, VA 22963
May 21, 2025
Regular Meeting 6:00pm

MEMBERS PRESENT: Chris Fairchild, Cunningham District, Chair
Tony O’Brien, Rivanna District, Vice Chair
Mike Goad, Fork Union District
Timothy M. Hodge, Palmyra District
John M. (Mike) Sheridan, Columbia District

ABSENT: None.

ALSO PRESENT: Eric M. Dahl, County Administrator
Kelly Harris, Assistant County Administrator
Dan Whitten, County Attorney
Caitlin Solis, Clerk for the Board of Supervisors

1 - CALL TO ORDER, PLEDGE OF ALLEGIANCE, & MOMENT OF SILENCE

At 6:01pm, Chair Fairchild called to order the Regular Meeting of May 21, 2025. After the recitation of the Pledge of Allegiance, a moment of silence was observed.

3 - ADOPTION OF AGENDA

- Mr. Dahl asked to add Revocation of the Special Use Permit (SUP) 06:04 to New Business.

MOTION:	Accept the Agenda, for the May 21, 2025 Regular Meeting of the Board of Supervisors, as amended.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

4 - COUNTY ADMINISTRATOR’S REPORT

Mr. Dahl reported on the following topics:

Announcements and Updates - New Employees

- Kirby Baughn, Commonwealth’s Attorney Office, Victim / Witness Manager, Started May 12th

Hazardous Waste and Tire Collection

- On April 26, 2025 Fluvanna County held its annual tire collection and bi-annual hazardous waste collection.
- Tires were collected from 9 - 11am and we filled one trailer. Thanks to Wayne Bates, Mike Sharpe and Chris Payne from Public Works for the help along with Brendan Krett and Matt Stancil from Parks and Rec.
- Hazardous waste collection was from 10am - 2pm. We collected 21,405 pounds of hazardous waste totaling \$15,401.00. Thanks to Parks and Recreation staff for making the event run smoothly.

May Carnival and Groovin At the Grove

- The 2025 May Carnival was held May 7 - 10. The County’s portion of the carnival revenue received was \$12,895.00, which \$800.00 of that was for games.
- Our first Groovin at the Grove of the season was held on May 10 from 4 - 7pm with approximately 425 in attendance. Mama Tried was the musical group and Fluvanna Youth Baseball sponsored the beer garden. We also had Simply Trending and Monntero Crepes as our food trucks.
 - Next Groovin is June 14, following Art in the Park from 10am - 3pm.
 - Musical guest is the Jen Tal Band (5 - 7pm) with FLDP sponsoring the beer garden (4 - 7pm). D’Marys and The Bartista Baker will be the food trucks (4 - 7pm).

Next BOS Meetings

Day	Date	Time	Purpose	Location
Wed	Jun 4	5:00 PM	Regular Meeting	Circuit Court
Wed	Jun 18	6:00 PM	Regular Meeting	Circuit Court
Wed	Jul 2	5:00 PM & 6:00 PM	Regular Meeting	Circuit Court

5 – PUBLIC COMMENTS #1

At 6:08pm, Chair Fairchild opened the first round of Public Comments.

- Don Reynard, 3531 Union Mills Rd., commented on land use.
- Patti Reynard, 3531 Union Mills Rd., commented on land use

With no one else wishing to speak, Chair Fairchild closed the first round of Public Comments at 6:13pm.

6 – BOARDS AND COMMISSIONS

None.

7 – PRESENTATIONS

None.

8 - ACTION MATTERS

Dissolution of the Economic Development and Tourism Advisory Council (EDTAC) – Dan Whitten, County Attorney

- The Economic Development and Tourism Advisory Council (EDTAC), established in 2016, was created to advise Fluvanna County on matters related to economic development and tourism.
- EDTAC has contributed by promoting the county as a business and tourism destination, supporting business retention, and advocating for community events and marketing initiatives.
- Comprised of diverse community stakeholders, EDTAC was instrumental in supporting a vision of balanced economic and tourism growth, in alignment with the County’s rural heritage and development goals.

Future Needs of the County

- As the County’s strategic priorities evolve and the tourism sector becomes more central to economic development efforts, the existing EDTAC structure has proven to be too broad in scope to effectively address specialized tourism needs. The dual focus on both economic development and tourism has led to diluted attention and limited effectiveness in advancing targeted tourism initiatives.
- A more focused and responsive advisory structure is now required. A Tourism Advisory Committee (TAC) has been designed to better serve this function by concentrating exclusively on tourism-related matters. This includes advising County leadership on tourism marketing strategies, project planning, and long-range goals specific to tourism growth and visitor engagement.

Resolution to Dissolve EDTAC

- In recognition of expiring EDTAC member terms in June 2025, it is recommended that the Fluvanna County Board of Supervisors approve the resolution to formally dissolve EDTAC effective May 31, 2025. This timing ensures an orderly conclusion to EDTAC’s current structure while providing a seamless transition to a more focused body.
- Staff will bring forward proposed bylaws for the creation of the Tourism Advisory Committee (TAC) in June 2025 for review and approval by the Board of Supervisors.

MOTION:	Approve the Resolution to dissolve the Economic Development and Tourism Advisory Council.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Motion	Second	
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

Authorization to Advertise for a Public Hearing an Ordinance Amendment to Amend §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15 regarding the Food and Beverage Tax – Dan Whitten, County Attorney

- The County adopted a Food and Beverage Tax on March 19, 2025.
- The 4% Food and Beverage Tax will be effective August 1, 2025.
- Certain amendments have been requested to the Food and Beverage Tax Ordinance.

Proposed Amendments Regarding Sellers

- Fifty percent (50%) of the revenues collected from the food and beverage tax shall be used solely for public school construction projects in accordance with a policy to be approved by the Board of Supervisors (the policy is in your packet).
- Sellers can deduct three percent of the amount owed for the food and beverage tax, not to exceed \$100, to compensate for the collection and reporting of such taxes (this would cover the approximately 3% credit card fee when sellers remit the tax by credit card).
- Mobile food units shall collect the food and beverage tax even when they are selling at farmers markets.

Proposed Amendments Regarding Administration

- The Commissioner of Revenue will send out the application form and remittance form to sellers.
- The Seller shall deliver the remittance form to the Treasurer along with the remittance of the tax.
- The Treasurer and the Commissioner of Revenue shall have the authority to examine records of the seller.
- The Commissioner of Revenue shall ascertain the name of every seller responsible for the tax.

MOTION:	Advertise amendments to the County Code related to the Food and Beverage Tax by amending §§ 20-13-3, 20-13-5, 20-13-6, 20-13-7, 20-13-10, and 20-13-11 and enacting § 20-13-15 for a public hearing to be held June 18, 2025.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:				Second	Motion
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

- After some discussion the Board agreed to strike the words “and/or renovations” and set a \$10,000,000.00 threshold on expansions in the School Construction Fund Policy 3.13.

MOTION:	Approve the School Construction Fund Policy 3.13, by striking the words “and/or renovations” and setting a \$10,000,000.00 threshold on expansions.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

- Reappropriation of CIP - FY25 FMS Track Project Funding – Don Stribling, Executive Director
- FCPS is requesting that the remaining funding \$149,661.25 in the CIP FY25 FMS Track project line be reappropriated to the FMS Stadium and Track complex projects starting with the three paving projects listed below:

FMS Track Paving Project		
\$7,500 Parking Lot patching and edging at track like a curtain to a garage.	\$17,500 Grade roadway going to the track and pave 2.5 inches of SM9.5A topping mix compacted to 2 inches. Pave inside of the gated areas from brick building to the track. Pave a sidewalk going to the stairs up to the tennis courts.	\$13,000 Grade the area in-between the bleachers and fence to the white building and the handicap sidewalk to the bathrooms. Pave walking path to steps beside handicap sidewalk. Topping asphalt 2.5 inches compacted to 2 inches.
Additional FMS Track and Field Project Requests		
Bleacher Inspection	Bleacher mechanical updates	Bleacher cleaning
Update Press Box/Scoreboard	Updated fencing for entrance	Storage building roofing
Update concession stand	Addition of cameras/WIFI	ADA access to bleachers

- At the April 2, 2025 Board of Supervisors meeting, the board requested additional information for the above “Additional FMS Track and Field Project Request” items prior to making a funding decision, to include project specifics and associated costs for the requests.

Paving Project	
Parking Lot patching and edging at track like a curtain to a garage.	7,500
Grade roadway going to the track and pave 2.5 inches of SM9.5A topping mix compacted to 2 inches. Pave inside of the gated areas from brick building to the track. Pave a sidewalk going to the stairs up to the tennis courts	17,500
Grade the area in-between the bleachers and fence to the white building and the handicap sidewalk to the bathrooms. Pave walking path to steps beside handicap sidewalk	13,000
	38,000

Bleacher Project	
Bleacher inspection (Mechanical and Structural - Dunbar Engineering)	4,000 - completed
Engineered plans/specs for repairs	10,000
Find a contractor(s) and get quotes based on the plans and specs	TBD
Bleacher inspection (Safety and ADA compliance - TJ Distributors)	1,500 - completed
Option A: repairs for safety and ADA ONLY	200,000
Option B: Full replacement with smaller system	300,000
Option C: Full replacement	1,500,000
FCPS Option: Pad poured and new bleachers	TBD@75,000-125,000
No press box	-10,000
No bleacher cleaning	-3,000
No engineered plans	10,000
No structural repairs	
Bleacher Removal	
Storage building (roof, siding, windows - houses electrical for well)	12,000
Storage building (split unit, interior, and ceiling repairs)	5,000
Updated Concession Stand (updated electrical, repairs, ice machine, and split unit for IT server	12,000
Updated Fencing for Entrance	TBD
Handrails from field to the bathroom	TBD
Updated Scoreboard (updated electrical and controller)	5,000
Additional Cameras and WIFI	10,000

- Mr. Obrien made a motion to approve a reappropriation of the FY25 FMS Track project to the FMS Stadium and Track project for the remaining amount of \$75,000.00, Mr. Sheridan seconded. After some discussion by the Board, Mr. O’Brien amended his motion.

MOTION:	Approve a reappropriation of the FY25 FMS Track project to the FMS Stadium and Track project for the amount of \$67,000.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:				Motion	Second
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

9 - PUBLIC HEARING

VDOT Secondary Six Year Plan— Mr. Willie Gordon, Assistant Residency Administrator - Louisa VDOT, presented the SSYP for approval.

At 7:06pm, Chair Fairchild opened the Public Hearing. With no one wishing to speak, Chair Fairchild closed the Public Hearing at 7:06pm.

MOTION:	Accept the Resolution for the VDOT Secondary Six-Year Plan (2025/26 through 2030/31) and VDOT Construction Priority List (2025/26) as required by sections 33.1-23 and 33.1-23.4 of the 1950 Code of Virginia.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second		Motion
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

SUP 25:01 – Sprouse Specialty Retail Store – Jason Overstreet, Senior Planner

- A Special Use Permit request in the A-1, Agricultural, General District for a specialty retail store on an approximately 7-acre parcel located on North Boston Road approximately 1.5 miles west of Troy Road.
- This parcel is located in the Rural Residential Planning Area and in the Columbia Magisterial District.
- Retail store, specialty: A retail sales establishment of not more than 4,000 square feet that specializes in one type or line of merchandise or service including, but not limited to, antique stores, bookstores, shoe stores, stationary stores, jewelry stores, auto parts stores, and hardware stores.
- The applicant is proposing to operate a specialty retail store in order to sell and service hunting and fishing supplies. Has been operating for 20+ years in the Keswick area of Albemarle.
- Will have an enclosed outdoor archery sighting range. The shooting of firearms will not be permitted.

- Will use an existing 1 story cinder block building that was previously used as a school of music and the arts – SUP 06:04.
- ADA accessible onsite parking is available and no additional parking will be required.
- Minimal impact to existing traffic volumes.
- Use is in accordance with the Comprehensive Plan as it will not change the character of the established community nor will it have an adverse effect on neighboring property. “Some commercial services...may be considered if designed and arranged to complement the rural character of the area...”

SUP 25:01 Recommended Conditions

1. The SUP will be abandoned and deemed revoked if the proposed use has been discontinued for period of two years.
2. All outdoor artificial illuminating devices shall conform with applicable codes and ordinances.
3. The store shall only operate Monday through Saturday from 9:00 am until 5:00 pm.
4. There shall be no shooting of firearms on the site.
5. The applicant will work with VDH as needed in order to obtain any required permits.
6. The entrance shall conform to VDOT low-volume commercial entrance requirements.
7. The site shall be maintained in a neat and orderly manner so that the visual appearance from the road and adjacent properties is acceptable to County officials.
8. The Board of Supervisors, or representative, reserves the right to inspect the business for compliance with these conditions at any time.
9. Under Sec. 22-17-4 F (2) of the Fluvanna County Code, the Board of Supervisors has the authority to revoke a Special Use Permit if the property owner has substantially breached the conditions of the Special Use Permit.

At 7:15pm, Chair Fairchild opened the Public Hearing.

- Don Reynard, 3531 Union Mills Rd, spoke in favor of SUP 25:01.
- Patti Reynard, 3531 Union Mills Rd, spoke in favor of SUP 25:01.

With no one else wishing to speak, Chair Fairchild closed the Public Hearing at 7:25pm.

- The Board asked for clarification on the first condition, it was explained that the Planning Commission recommended a length of five years before being discontinued but staff had recommended the length of two years.

MOTION:	Approve SUP 25:01, a special use permit request in the A-1, Agricultural, General District to operate a specialty retail store on a 7-acre parcel located at 1474 North Boston Road, also known as Tax Map Parcel 10-A-60A, subject to the conditions as described in the staff report with the amendment to condition #1 as stated.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second			Motion
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

SUP 25:02 – Seven Islands Riverfront Campsites – Todd Fortune, Director of Planning

- A Special Use Permit request in the A-1, Agricultural, General District to operate a primitive campground under §22-4-2.2, with two campsites, on 6 acres of a parcel totaling 80 ± aces and known as Tax Map 57-A-34. The subject property is located in Fluvanna County; however, as it is on the south side of the James River, it would be accessed from Route 652 (Bridgeport Road) in Buckingham County. The subject property is located in the Rural Preservation Area and in the Fork Union Election District.
- The applicant is proposing two primitive campsites, each of which will consist of a picnic area and firepit. The applicant may place porta johns on the property, but no other buildings are planned.
- The Virginia Department of Forestry (VDOF) holds a conservation easement on the property, which restricts development on the property.
- As the property is accessed from Buckingham County, emergency response would be provided by the Buckingham County Sheriff’s Office and the Arvonía Volunteer Fire Department (in northern Buckingham County).
- Fluvanna County staff visited the site on the morning of March 18 and placed test 911 calls from each of the proposed campsites. In each case, the call went to Buckingham County Emergency Dispatch.

SUP 25:02 Recommended Conditions

- The applicant will work with VDH and VDOF as needed to obtain any needed permits, and on compliance with requirements of the conservation easement and the Cultural Resource Protection Area.
- The site shall be maintained in a neat and orderly manner so that the visual appearance from the James River and adjacent properties is acceptable to County officials.
- The applicant shall ensure compliance with the Noise Ordinance of the Code of the County of Fluvanna, as adopted and as enforced by the Fluvanna County Sheriff’s Office.

- The Board of Supervisors, or representative, reserves the right to inspect the business for compliance with these conditions at any time.
- Under Sec. 22-17-4 F (2) of the Fluvanna County Code, the Board of Supervisors has the authority to revoke a Special Use Permit if the property owner has substantially breached the conditions of the Special Use Permit.

At 7:42pm, Chair Fairchild opened the Public Hearing.

- Mike Callahan, spoke in favor of SUP 25:02.

With no one else wishing to speak, Chair Fairchild closed the Public Hearing at 7:42pm.

MOTION:	Approve SUP 25:02, a special use permit request in the A-1, Agricultural, General District to operate a primitive campground under §22-4-2.2, with three campsites, on 6 acres of a parcel totaling 80 + aces and known as Tax Map 57-A-34, with the conditions as described in the staff report with the addition of the condition limiting the SUP to three campsites on six acres.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O'Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

Public hearing to enact County Code § 20-13-1 to codify that there shall be a biennial reassessment – Dan Whitten, County Attorney

- Virginia Code Sec. 58.1-3253 authorizes the Board of Supervisors to provide for the biennial reassessment and equalization of assessments of all real estate in the County.
- All real estate shall be assessed as of January 1.
- The County started biennial reassessments in 2013, and this proposed amendment to the County Code will codify the practice.

Proposed Code Language

- Sec. 20-13-1: Biennial Assessment and reassessment of real estate.
Pursuant to § 58.1-3253 of the Code of Virginia, as amended, there shall be a biennial assessment, reassessment and equalization of assessments of all real estate in the County, such real estate to be assessed as of January 1.
- If the Board decided to change the assessment interval, the code section could be amended in the future.

Approval of Ordinance

- Public hearing was properly advertised.
- Ordinance would be effective immediately.
- The next reassessment would allow for real estate to be assessed as of January 1, 2027.

At 7:49pm, Chair Fairchild opened the Public Hearing.

- Don Reynard, 3531 Union Mills Rd, spoke in opposition.
- Patti Reynard, 3531 Union Mills Rd, spoke in opposition.

With no one else wishing to speak, Chair Fairchild closed the Public Hearing at 7:52pm.

MOTION:	Approve the amendments to the County Code to enact § 20-13-1 to codify that there shall be a biennial assessment, reassessment, and equalization of assessments of all real estate in the County, such real estate to be assessed as of January 1.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O'Brien	Mr. Sheridan
ACTION:			Motion		Second
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

10 - CONSENT AGENDA

The following items were approved under the Consent Agenda for May 21, 2025:

- Minutes of May 7, 2025 – Caitlin Solis, Clerk to the Board
- Accounts Payable Report for March 2025 – Tori Melton, Director of Finance
- Accounts Payable Report for April 2025 – Tori Melton, Director of Finance
- FY24 to FY25 JRWA Carryover Request – Tori Melton, Director of Finance
- FY25 IT CAMA Supplemental Appropriation – Tori Melton, Director of Finance
- Palmyra Sewer Fund VRA Rate Covenant Supplemental Appropriation – Tori Melton, Director of Finance
- VJCCCA Supplemental Appropriation – Tori Melton, Director of Finance
- FY25 Circuit Court Technology Trust Fund Supplemental Appropriation – Tristana P. Treadway, Clerk of the Circuit Court

MOTION:	Approve the consent agenda, for the May 21, 2025 Board of Supervisors meeting, and to ratify Accounts Payable and Payroll for March 2025, in the amount of \$3,104,164.74; and Accounts Payable and Payroll for April 2025, in the amount of \$2,896,038.45.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second	Motion	
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

11 - UNFINISHED BUSINESS

None.

12 - NEW BUSINESS

Revocation of the Special Use Permit (SUP) 06:04 – Dan Whitten, County Attorney

- The Special Use Permit from the Stevens School of Music needs to be revoked now that the business is no longer operating.

MOTION:	In accordance with County Code section 22-17-4(F), revoke Special Use Permit (SUP) 06:04 for a music and dance studio				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second		Motion	
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

13 - PUBLIC COMMENTS #2

At 7:57pm, Chair Fairchild opened the second round of Public Comments. With no one wishing to speak, Chair Fairchild closed the second round of Public Comments at 7:57pm.

14 - CLOSED MEETING

MOTION:	At 7:58pm, move the Fluvanna County Board of Supervisors enter into a closed meeting, pursuant to the provisions of Section 2.2-3711 A.1, A.6, & A.8 of the Code of Virginia, 1950, as amended, for the purpose of discussing Personnel – Employees of the Sheriff’s Office; Investment of Funds – contract user grant under the water and sewer ordinance in Zion Crossroads, contract user grant under the Fork union Sanitary District ordinance; Legal Matters – contract user grant under the water and sewer ordinance in Zion Crossroads, contract user grant under the Fork union Sanitary District ordinance, personnel policy.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:				Motion	Second
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

MOTION:	At 9:34 pm, move Closed Meeting be adjourned and the Fluvanna County Board of Supervisors convene again in open session and “BE IT RESOLVED, the Board of Supervisors does hereby certify to the best of each member’s knowledge (i) only public business matters lawfully exempted from open meeting requirements under Section 2.2-3711-A of the Code of Virginia, 1950, as amended, and (ii) only such public business matters as were identified in the motion by which the closed meeting was convened were heard, discussed, or considered in the meeting.”				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:				Motion	Second
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

MOTION:	Increase the Zion 3 Notch current estimate for sanitary sewer up to \$316,655.00.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Motion		Second
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

MOTION:	Adjourn the regular meeting of Wednesday, May 21, 2025 at 9:35pm.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second			Motion
VOTE:	Yes	Yes	Yes	Yes	Yes
RESULT:	5-0				

ATTEST:

FLUVANNA COUNTY BOARD OF SUPERVISORS

Caitlin Solis
Clerk to the Board

Christopher S. Fairchild
Chair

DRAFT



BOARD OF SUPERVISORS
County of Fluvanna
Palmyra, Virginia

RESOLUTION No. 12-2025

**A RESOLUTION TO APPROVE VDOT SECONDARY SIX-YEAR PLAN
(2025/26 through 2030/31) and
VDOT CONSTRUCTION PRIORITY LIST (2025/26)**

At a regular monthly meeting of the Fluvanna County Board of Supervisors held at 7:00 p.m. on Wednesday, May 21, 2025 in Palmyra, Virginia, the following action was taken:

WHEREAS, Sections 33.2-331 of the 1950 Code of Virginia as amended, provides the opportunity for each county to work with the Virginia Department of Transportation in developing a Secondary Six-Year Road Plan; and

WHEREAS, this Board had previously agreed to assist in the preparation of this Plan, in accordance with the Virginia Department of Transportation policies and procedures, and participated in a public hearing on the proposed Plan (2025/26 through 2030/31) as well as the Construction Priority List (2025/26) on May 21, 2025 after duly advertised so that all citizens of the County had the opportunity to participate in said hearing and to make comments and recommendations concerning the proposed Plan and Priority List; and

WHEREAS, Scott Thornton, Residency Administrator, Virginia Department of Transportation - Louisa Residency, appeared before the Board and recommended approval of the Six-Year Plan for Secondary Roads (2025/26 through 2030/31) AND Construction Priority List (2025/26) for Fluvanna County.

NOW, THEREFORE, BE IT RESOLVED that since said Plan appears to be in the best interest of the Secondary Road System in Fluvanna County and of the citizens residing on the Secondary System, said Secondary Six-Year Plan (2025/26 through 2030/31) and Construction Priority List (2025/26) are hereby approved as presented at the public hearing.

THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED by the Fluvanna County Board of Supervisors at a meeting of the Board held on the 21st day of May 2025.

	AYE	NAY	ABSTAIN	ABSENT	MOTION	SECOND
Chris Fairchild, Cunningham District, Chair	X					
Anthony P. O’Brien, Rivanna District, Vice Chair	X					
John M. Sheridan, Columbia District	X				X	
Mike Goad, Fork Union District	X					
Tim Hodge, Palmyra District	X					X

Adopted this 21st day of May, 2025
by the Fluvanna County Board of Supervisors

ATTEST:

Christopher Fairchild, Chair
Fluvanna County
Board of Supervisors



BOARD OF SUPERVISORS
County of Fluvanna
Palmyra, Virginia

RESOLUTION No. 13-2025

**A RESOLUTION DISSOLVING THE FLUVANNA ECONOMIC DEVELOPMENT
AND TOURISM ADVISORY COUNCIL**

WHEREAS, the Economic Development and Tourism Advisory Council (EDTAC) was established in 2016 to advise Fluvanna County on matters related to economic development and tourism; and

WHEREAS, the Council has contributed by promoting the County as a business and tourism destination, supporting business retention, and advocating for community events and marketing initiatives; and

WHEREAS, in recent years, tourism has emerged as a more prominent and strategic component of the County’s overall economic development efforts, requiring a more specialized and focused advisory approach; and

WHEREAS, the dual-purpose structure of EDTAC has become increasingly broad in scope and less effective in addressing the specific and growing needs of the tourism sector; and

WHEREAS, present EDTAC member terms expire in June 2025

WHEREAS, it is in the best interest of Fluvanna County to dissolve EDTAC.

NOW THEREFORE, BE IT RESOLVED, that the Board of Supervisors of Fluvanna County:

- 1. Dissolves the Economic Development and Tourism Advisory Council effective May 31, 2025; and
- 2. Heartily thanks the EDTAC members, both past and present, for their service and good counsel.
- 3. This Resolution shall be in effect upon adoption.

THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED by the Fluvanna County Board of Supervisors at a meeting of the Board held on the 21st day of May 2025:

	AYE	NAY	ABSTAIN	ABSENT	MOTION	SECOND
Christopher Fairchild, Cunningham District	X					
D. Mike Goad, Fork Union District	X					
Timothy M. Hodge, Palmyra District	X				X	
Anthony P. O’Brien, Rivanna District	X					
John M. Sheridan, Columbia District	X					X

Attest:

Christopher Fairchild, Chair
Fluvanna County Board of Supervisors

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB J

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Adoption of the Fluvanna County Board of Supervisors June 4, 2025 Meeting Minutes.				
MOTION(s):	I move the meeting minutes of the Fluvanna County Board of Supervisors Regular Meeting on Wednesday June 4, 2025, be adopted.				
BOS WORKPLAN?	Yes	No	If yes, list item(s):		
		X			
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
				XX	
STAFF CONTACT(S):	Caitlin Solis, Clerk to the Board				
PRESENTER(S):	Eric Dahl, County Administrator				
RECOMMENDATION:	Approve				
TIMING:	Routine				
DISCUSSION:	None.				
FISCAL IMPACT:	N/A				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	Draft Minutes June 4, 2025.				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
					X

FLUVANNA COUNTY BOARD OF SUPERVISORS
REGULAR MEETING MINUTES
Circuit Courtroom, Fluvanna Courts Building
72 Main Street, Palmyra, VA 22963
June 4, 2025
Regular Meeting 5:00pm

MEMBERS PRESENT: Chris Fairchild, Cunningham District, Chair
Tony O’Brien, Rivanna District, Vice Chair
Mike Goad, Fork Union District
Timothy M. Hodge, Palmyra District

ABSENT: John M. (Mike) Sheridan, Columbia District

ALSO PRESENT: Eric M. Dahl, County Administrator
Kelly Harris, Assistant County Administrator
Dan Whitten, County Attorney
Caitlin Solis, Clerk for the Board of Supervisors

1 - CALL TO ORDER, PLEDGE OF ALLEGIANCE, & MOMENT OF SILENCE

At 5:00pm, Chair Fairchild called to order the Regular Meeting of June 4, 2025. After the recitation of the Pledge of Allegiance, a moment of silence was observed.

3 - ADOPTION OF AGENDA

- Mr. Dahl requested the addition of CRMF – Courts Boiler #1 to the Consent Agenda; BOS Salary Increase and TJPDC Housing Study Participants to New Business.

MOTION:	Accept the Agenda, for the June 4, 2025 Regular Meeting of the Board of Supervisors, as amended.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

4 - COUNTY ADMINISTRATOR’S REPORT

Mr. Dahl reported on the following topics:
Announcements and Updates

- Happy Birthday to Mr. Fairchild! - June 10th

New Employees

- Robert Flowers, EMS Department, Part-Time EMT-BLS, Started May 27th
- Brian McPherson, EMS Department, Part-Time EMT-ALS, Started May 27th

Join us Saturday, June 14, 2025 at Pleasant Grove Park for Groovin’ at the Grove and Art in the Park.

- Art in the Park 10am-3pm
- Food and Beer Garden 4-7pm
- Live music 5-7pm

Next BOS Meetings

Day	Date	Time	Purpose	Location
Wed	Jun 18	6:00 PM	Regular Meeting	Circuit Court
Wed	Jul 2	5:00 PM & 6:00 PM	Regular Meeting	Circuit Court
Wed	Aug 6	5:00 PM	Regular Meeting	Circuit Court

5 - PUBLIC COMMENTS #1

At 5:13pm, Chair Fairchild opened the first round of Public Comments.

- Patti Reynard, 3531 Union Mills Rd, Commented on the land use program and the Commissioner’s Office.
- Don Reynard, 3531 Union Mills Rd, Commented on land use and taxes.
- Debbie Rittenhouse, Treasurer, thanked the Board for hearing *Advertise for a public hearing to amend Sections 4-2-1 and 4-2-1.1 to provide for lifetime individual dog licenses*, on this agenda.

With no one else wishing to speak, Chair Fairchild closed the first round of Public Comments at 5:21pm.

<u>MOTION:</u>	Move the Board of Supervisors approve the following Board, Commission, or Committee appointment(s)/reappointments(s):				
BOARD/COMMISSION/COMMITTEE	APPOINTEES		APPT/ REAPPT	BEGINS TERM	ENDS TERM
JABA Advisory Council – Fluvanna County Representative	Allison Pace (I)		Reappt	July 1, 2025	June 30, 2027
JAUNT Board – Fluvanna County Representative	Iscella Wittich (I)		Reappt	July 1, 2025	June 30, 2028
Planning Commission – Fork Union District	Kathleen Kilpatrick (I)		Reappt	July 1, 2025	June 30, 2029
Social Services Board – Fork Union District	Charles Haden Thomas Parrish		Appt	July 1, 2025	June 30, 2029
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

7 – PRESENTATIONS

Historic Courthouse Restoration Update – Eric Dahl, County Administrator

- The County has been working with our architectural/engineering consultants MTFA on 100% Design Development plans. This will be the basis of the work towards developing construction documents.
- County staff and consultants meet today for a landscaping and logistics review meeting (laydown areas, material access, pedestrian access)
- It has been determined that there is only one suitable quarry to supply the Buckingham slate for the roof. There is a significant lead time for the slate and only one Buckingham slate quarrying operation remains today (located near Arvonias). Because of this, the County will be moving forward with a sole source purchase to order the needed roof slate.
- Kathleen Kilpatrick and consultants MTFA took a fieldtrip late this afternoon to the James River Slate quarrying operation.

Timeline

- Through July 2025 - the architectural/engineering consultants will complete the Construction Document (CD) Drawings, specifications, bid sets and working to complete the IFB.
 - August 2025 – County issues Invitation For Bid (IFB)
 - September 2025 – IFB due to the County
 - October 2025 – Construction contract to the BOS
 - October 2025 – Commence construction
- Mr. Goad asked for Staff to provide a Historic Courthouse renovation update during the September 17, 2025 meeting.

Fire Training Building Update – Eric Dahl, County Administrator

- TRC (County Engineers) completed the final engineering plans for the site and submitted them to the Fluvanna County Planning Department for review. Due to the changes, they were required to go through the review process again.
 - Technical Review Committee (TRC) reviewed the plans on May 8th
 - Planning Commission will consider acceptance of the Site Development Plan and a Sidewalk Waiver request at their June 10th meeting.
- We will be working to issue the IFB for site work and an RFP for the prototype 4 structure no later than June 2025.
- The critical date with the Virginia Department of Fire Programs is the completion date of March 2026.

8 - ACTION MATTERS

Commonwealth Attorney Case Management System – Jeff Haislip, Commonwealth Attorney

In 2011, the Commonwealth Attorney’s office was looking for a program to replace VCAIS, a State provided case management system that was obsolete and was going away. Software Unlimited (SU) was the most cost effective option. They were looking to expand into VA and we were the second office to go with them.

SU was not web based and we had to get IT to dedicate a large server just for that program. It was and is not very intuitive or user friendly. There are five sections of the program; one for data entry, one for the main program, a dashboard for individuals, as well as sections to update law enforcement agencies and statutes.

Most of the staff in the Commonwealth Attorney’s Office use one of the five, and one person does not use the program at all because of its clunkiness.

Below are some advantages that we put together to show the necessity to change over. As Spartan is looking to break into Virginia and is offering to do the data migration for no cost, this is the prime time to go with them.

- 1). In SU, due to the above-mentioned five sections of the program, it is often necessary to enter the same information multiple times.
- 2). In SU if one person is working on a casefile, other users are blocked from opening that file.
- 3). In Spartan information is updated instantly for all users as entered. Currently the Commonwealth Attorney’s office has to reopen the program to get the most recent information.
- 4). Spartan allows for instant electronic discovery. the Commonwealth Attorney’s office now has to use ShareFile on the County server and once the CA office grant access to the file, the attorney can do what they want with the information. Spartan will also notify the CA office when the defense has accessed the file. Currently the link can expire causing the CA office to have to resend the discovery. GOVERNOR YOUNGKIN HAS VETOED MANDATORY E-DISCOVERY THE LAST TWO YEARS SO IT IS COMNG SOON. THIS IS THE MAIN REASON FOR NEEDING A CHANGE AT THIS TIME.
- 5). Spartan allows for searches throughout the program. For example, the CA office could search for a person and every case with that person involved will come up. The same for any word like Fentanyl for example. the CA office cannot currently do that.
- 6). This allows the CA office to run reports for any statistic.
- 7). Spartan allows for easy redaction of documents within the program.
- 8). Spartan has the ability to email or text people with updates automatically after court hearings. Currently, the Victim/Witness Manager has to email each witness and victim to give individual updates. Spartan has a feature that sends messages to any number of people upon the happening of an event. So, when a case gets a new date for any event, all preselected individuals are automatically notified. This will save so much time.
- 9). When a Spartan user clicks on an address the Google street view pops up in a new screen inset on the program.
- 10). Spartan will allow the CA office to access our information anywhere the web can be accessed. The CA office have to be on the County system to access SU.
- 11). When SU is updated their IT has to remote in to each user causing disruption. Spartan will update without the CA office being affected.

MOTION:	Approve the Commonwealth Attorney to move forward with a case management system with Spartan, for an initial amount of \$27,600.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

MOTION:	Approve a budget transfer in the amount of \$24,200 from the FY25 BOS Contingency Budget to the FY25 Commonwealth Attorney Budget.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

- Establishment of the Fluvanna County Tourism Advisory Committee (TAC) – Eric Dahl, County Administrator*
- Since its creation in 2016, the Economic Development and Tourism Advisory Council (EDTAC) provided guidance on both business and tourism issues in the County. As tourism has become a more central component of the County’s economic development strategy, the need for a more specialized advisory body became evident. In response, the Board of Supervisors voted on May 21, 2025, to dissolve EDTAC and directed staff to bring forward bylaws to establish a dedicated Tourism Advisory Committee.
 - The purpose of the TAC is to serve in an advisory capacity to the Economic Development Director, Parks and Recreation Director, and Board of Supervisors, offering recommendations on tourism marketing, project initiatives, and long-term strategies for strengthening the County’s tourism sector. The committee will also investigate and evaluate tourism-related opportunities to increase visitation and local tax revenues. TAC members will not set policy but will provide strategic input and recommendations.
 - Membership of the TAC will consist of industry experts representing key sectors of the local tourism economy, including arts and culture, history, recreation, restaurants, Lake Monticello, wineries and craft beverages, agribusiness and agritourism, and retail. The Economic Development Director and the Director of Parks and

- Recreation will serve as voting members, and a member of the Board of Supervisors will serve as a non-voting liaison.
- Upon adoption of the bylaws, a public application period will open for a minimum of two months to solicit interest from qualified candidates. Applications will be reviewed, and appointments to the committee are scheduled to be made by the Board of Supervisors on August 20, 2025.
 - At the first meeting on September 8, 2025, TAC will consider approval of the Remote Participation Policy.

MOTION:	Approve the Resolution to Establish a Tourism Advisory Committee, and I move that the Board of Supervisors approve the Bylaws for the Tourism Advisory Committee.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

- Advertise for a public hearing to amend Sections 4-2-1 and 4-2-1.1 to provide for lifetime individual dog licenses*
– Dan Whitten, County Attorney
- Virginia Code § 3.2-6528 authorizes local governments to impose either an annual or lifetime license tax on individual dogs at least four months old. An annual individual tax may not exceed \$10; a lifetime tax may not exceed \$50.
 - Under our current County Code, a tax of between \$4 and \$8 is assessed annually. This amendment provides instead for a \$10 license tax, with the license to remain valid for the lifetime of the dog as long as rabies vaccination is kept current.
 - This change will decrease the administrative burden on the Treasurer’s Office, and on Fluvanna citizens.
 - Kennel licenses will continue to be issued for one year only.

MOTION:	Advertise a public hearing to be held July 2, 2025 to amend County Code Sections 4-2-1 and 4-2-1.1 to provide for lifetime individual dog licenses.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

- FY26 Compression Pay Adjustments* – Eric Dahl, County Administrator
- On March 5, 2025, the County adjusted General Government and Law Enforcement Pay Rates and Classifications to remain competitive in the marketplace and to continue to attract and retain a talented workforce at market rates. During the presentation to the Board of Supervisors at that time, it was noted that new employees hired after the March 5, 2025 date when the Pay Rates and Classifications were adjusted, compression pay with existing staff would need to be addressed. It was discussed that funding would be included in the FY26 budget to address additional compensation and compression pay.
 - In the FY26 budget, the Board of Supervisors approved a 3% Cost Of Living Adjustment (COLA) for all staff that were hired prior to the Pay Raise Inclusion Policy eligibility date of March 1, 2025. The amount budgeted was \$496,347 for the COLA.
 - In addition, \$250,000 funding was allocated in the FY26 budget for additional compensation and to address compression pay. A plan has been formulated for the additional compensation and compression pay by making adjustments after the 3% COLA has been made, to adjust hourly rates and salaries based upon the percent above the current Law Enforcement, General Government and Department of Social Services Pay Rate minimums in each Pay Band. All current employees hired prior to March 1, 2025 will be eligible for the compression pay adjustments. The chart below on the next page reflects the compression pay adjustments:

Percent Above Pay Band/Pay Rate Minimum	Percent Pay Adjustment
0 - 5 %	3.00%
5.01 - 10%	2.50%
10.01 - 15%	2.00%
15.01 - 20%	1.50%
20.01% or greater	1.00%

Law Enforcement Compression Pay Adjustments

For all employees that fall under the Law Enforcement Pay Rates and Classifications with a hire date prior to March 1, 2025, the approximate average of the percent above Pay Band/Pay Rate minimums is 18.1% and the average percent pay adjustment is 1.9%.

General Government Compression Pay Adjustments

For all employees that fall under the General Government Pay Rates and Classifications with a hire date prior to March 1, 2025, the approximate average of the percent above Pay Band/Pay Rate minimums is 12.7% and the average percent pay adjustment is 2.2%.

Department of Social Services Compression Pay Adjustments

For all employees that fall under the Fluvanna County Department of Social Services Salary Ranges with a hire date prior to March 1, 2025, the approximate average of the percent above Grade/Salary Range minimums is 59.6% and the average percent pay adjustment is 1.0%.

- *The Chair requested staff bring a presentation on step programs within pay bands back to the Board.*

MOTION:	Approve the FY26 budget compression pay adjustments plan, as presented, effective June 15, 2025.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

Amendments to Personnel Policy 2.13, Leave and Holidays – Dan Whitten, County Attorney

Policy Update Summary:

- 2.13.2 defines the term “immediate family” for purposes of sick leave and authorizes increased payout of sick leave up to certain dollar amounts.
- 2.13.4 changes the Military Leave limit from 15 days to 21 days in conformance with 2022 amendments to Virginia Code §§ 44-93 and 44-204.
- 2.13.6 provides that Leave Without Pay is limited to 80 hours per fiscal year, with certain exceptions authorized by the County Administrator or Constitutional Officer.
- 2.13.9 clarifies Sick Leave Sharing restrictions:
 - Limits the maximum amount of sick leave that can be received to 80 hours per fiscal year, with certain exceptions authorized by the County Administrator or Constitutional Officer.
 - The employee donating or receiving the sick leave must have worked for the County for a minimum of 1 year, with certain exceptions authorized by the County Administrator or Constitutional Officer.
 - An employee may not donate leave after submitting a resignation notice.
 - An employee that donates leave must have a minimum remaining balance of at least 40 hours of sick leave.
 - After 1 year of employment, Hybrid employees are not authorized to receive donated leave during the period when they are on short-term disability.
- 2.13.9 also clarifies Sick Leave Sharing procedures:
 - After receiving the request, the Human Resources Director shall email the request to all employees.
 - If a requester receives more leave than what is needed for the pay period, the amount of excess leave will be returned.
 - The Finance Director and County Administrator shall sign the leave sharing form, and the Finance Director shall process the form.
- *Mr. Whitten suggested amending the policy to include 2.13.9 sec A8 to clarify what constitutes an extenuating circumstance for the County Administrator or Constitutional Officer to approve a leave share exception.*

MOTION:	Approve the amendments to County Personnel Policy 2.13, <i>Leave and Holidays</i> , as amended.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second	Motion	
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

Social Services Performance-Based Bonus Opportunity for Medical Assistance Renewals – Kim Mabe, Director of Social Services

- VDSS announced a new initiative to recognize and reward Local Departments of Social Services and those employees who consistently exceed expectations in processing Medical Assistance Renewals while also maintaining high-quality standards.

- VDSS is implementing a performance-based bonus structure designed to incentivize efficiency and accuracy in reducing Medical Assistance Renewals backlogs.
- In order for VDSS to distribute these bonuses, the locality must have an ordinance in place authorizing such payments.
- Fluvanna County does not currently have this ordinance.
- These bonuses do not require a local funding match.

MOTION:	Authorize staff to advertise an ordinance for a public hearing to be held July 2, 2025 authorizing monetary bonuses to eligible Fluvanna County Department of Social Services employees per § 15.2-1508 of the Code of Virginia.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Second	Motion		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

Authorization to Advertise a Public Hearing for the First Amendment to the Lease Agreement with Cellco Partnership d/b/a Verizon Wireless – Dan Whitten, County Attorney

- This amendment contemplates a proposed increase in rent and a modified Exhibit C to reflect the updated equipment listing and depiction of equipment layout.
- Cityscape Consultants has reviewed the amendment and also included updated language to modify the provisions related to Access, Public Safety, and the Water Supply Facility and Protection of Public in this amendment.
- Current Rent as of 3/1/2025: \$2,643.36 (\$31,720.32)
- Proposed Adjusted New Rent: \$2,749.10 (\$32,989.20)
- Next Increase 3/1/2026: \$2,831.57 (\$33,978.84)

MOTION:	Advertise a public hearing to be held July 2, 2025 for the First Amendment to the Water Tower Lease Agreement with Cellco Partnership d/b/a Verizon Wireless.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

9 - PUBLIC HEARING

None.

10 - CONSENT AGENDA

The following items were discussed before approval:

- CRMF - Courts Boiler #1*
- Temporary Staff Stipend for Additional Duties*
- FY25 Public Works Insurance Claim – 2014 Ford F-150 – 0539*
- FY25 Emergency Services Insurance Claim – 2008 Yukon – 5120*

The following items were approved under the Consent Agenda for June 4, 2025:

- *Temporary Staff Stipend for Additional Duties – Mitchell – Eric Dahl, County Administrator*
- *FY25 Public Works Insurance Claim – 2014 Ford F-150 – 0539 – Tori Melton, Director of Finance*
- *Virginia Department of Health Generator MOU – Eric Dahl, County Administrator*
- *Pleasant Grove Park Playground Purchase Order Contract with Landscape Structures, Inc. and Sparks@Play, LLC – Dan Whitten, County Attorney*
- *FY25 Emergency Services Insurance Claim – 2008 Yukon – 5120 – Tori Melton, Director of Finance*
- *Zion Crossroads Water and Sewer Fund Capital Budget Carryover – Tori Melton, Director of Finance*
- *Department of Emergency Services Ambulance Purchase Agreement with FESCO Emergency Sales – Dan Whitten, County Attorney*
- *CRMF – FCPS Division Blacktop Fill and Sealcoat – Don Stribling, FCPS Executive Director*
- *CRMF - Commonwealth’s Attorney Basement – Dale Critzer, Director of Public Works*
- *CRMF - Courts Boiler #1 – Dale Critzer, Director of Public Works*

MOTION:	Approve the consent agenda, for the June 4, 2025 Board of Supervisors meeting.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:		Motion	Second		
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

11 - UNFINISHED BUSINESS

- *Mr. O’Brien asked if the Commissioner of the Revenue could come to a future BOS meeting to discuss the Land Use Program. The Board agreed to add a Land Use presentation to the second August Board meeting, and have the County Attorney give a Land Use presentation at the first Board meeting in August.*

12 - NEW BUSINESS

BOS Salary Increase – Mr. Dahl asked the Board if they would like to see the BOS Salary Increase on a future agenda. The Board asked to see the data from VACo at the next meeting.

TJPDC Housing Study Participants – Mr. Dahl asked if any Board members would like to participate in the TJPDC Housing Study. Mr. Fairchild and Mr. O’Brien agreed to serve.

- *Mr. Hodge asked about working with LMOA and VDOT to take down two trees next to the road along the road at the Crofton Section of Lake Monticello. Mr. Dahl will bring it to VDOT.*

13 - PUBLIC COMMENTS #2

At 7:04pm, Chair Fairchild opened the second round of Public Comments.

- Don Reynard, 3531 Union Mills Rd, commented on land use.
- Patti Reynard, 3531 Union Mills Rd, commented on the Historic Courthouse renovation.
- Tom Diggs, 947 Jefferson Dr, commented on tree removal along roadways.

With no one else wishing to speak, Chair Fairchild closed the second round of Public Comments at 7:11pm.

RECESS FOR DINNER AND CLOSED SESSION

14 - CLOSED MEETING

MOTION:	At 7:11pm, move the Fluvanna County Board of Supervisors enter into a closed meeting, pursuant to the provisions of Section 2.2-3711 A.3, A.5, A.6 & A.8 of the Code of Virginia, 1950, as amended, for the purpose of discussing Real Estate – acquisition of property in the Columbia District, Prospective Industry – prospective business in the Columbia and Cunningham Districts, Investment of Funds – Contract User Grant under the Water and Sewer Ordinance in Zion Crossroads, Legal Matters – Contract User Grant under the Water and Sewer Ordinance in Zion Crossroads; Department of Human Resources; personnel policy; special election.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second	Motion	
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

MOTION:	At 10:12pm, move Closed Meeting be adjourned and the Fluvanna County Board of Supervisors convene again in open session and “BE IT RESOLVED, the Board of Supervisors does hereby certify to the best of each member’s knowledge (i) only public business matters lawfully exempted from open meeting requirements under Section 2.2-3711-A of the Code of Virginia, 1950, as amended, and (ii) only such public business matters as were identified in the motion by which the closed meeting was convened were heard, discussed, or considered in the meeting.”				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second	Motion	
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

MOTION TO EXTEND

- *At 10:13pm, a motion was made to extend the Board of Supervisors meeting.*

MOTION:	Approve a motion to extend the June 4, 2025 Regular Board of Supervisors meeting to 10:15pm.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Motion	Second	
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

MOTION:	Adjourn the regular meeting of Wednesday, June 4, 2025 at 10:13pm.				
MEMBER:	Mr. Fairchild	Mr. Goad	Mr. Hodge	Mr. O’Brien	Mr. Sheridan
ACTION:			Second	Motion	
VOTE:	Yes	Yes	Yes	Yes	Absent
RESULT:	4-0				

ATTEST:

FLUVANNA COUNTY BOARD OF SUPERVISORS

Caitlin Solis
Clerk to the Board

Christopher S. Fairchild
Chair

DRAFT



BOARD OF SUPERVISORS
County of Fluvanna
Palmyra, Virginia

RESOLUTION No. 14-2025

A RESOLUTION ESTABLISHING THE FLUVANNA COUNTY TOURISM ADVISORY COMMITTEE AND APPROVING THE BYLAWS THEREOF

WHEREAS, the Economic Development and Tourism Advisory Council (EDTAC) was established in 2016 to advise Fluvanna County on matters related to economic development and tourism; and

WHEREAS, the existing EDTAC structure has proven to be too broad in scope to effectively address specialized tourism needs; and

WHEREAS, a Tourism Advisory Committee (TAC), governed by proposed bylaws, has been designed to serve by concentrating exclusively on tourism-related matters; and

WHEREAS, the Fluvanna County Board of Supervisors voted on May 21, 2025 to dissolve the EDTAC and directed staff to bring forward bylaws to establish a dedicated Tourism Advisory Committee.

NOW THEREFORE, BE IT RESOLVED, that the Board of Supervisors of Fluvanna County:

- 1. Establishes the Fluvanna County Tourism Advisory Committee; and
- 2. Directs that the Tourism Advisory Committee shall serve in an advisory capacity to the Economic Development Director, Parks and Recreation Director, and Board of Supervisors, and shall investigate and evaluate tourism-related opportunities to increase visitation and local tax revenues; and
- 3. Approves the Bylaws of the Tourism Advisory Committee.
- 4. This Resolution shall take effect upon adoption.

THE FOREGOING RESOLUTION WAS DULY AND REGULARLY ADOPTED by the Fluvanna County Board of Supervisors at a meeting of the Board held on the 4th day of June, 2025:

	AYE	NAY	ABSTAIN	ABSENT	MOTION	SECOND
Christopher Fairchild, Cunningham District						
D. Mike Goad, Fork Union District						
Timothy M. Hodge, Palmyra District						
Anthony P. O’Brien, Rivanna District						
John M. Sheridan, Columbia District						

Attest:

Christopher Fairchild, Chair

Fluvanna County Board of Supervisors

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB K

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	FY25 Voluntary Contributions				
MOTION(s):	I move the Board of Supervisors approve the following supplemental appropriations for FY25 Voluntary Contributions Program: <ol style="list-style-type: none"> 1. \$375.00 – Transfer to Emergency Services FY25 Budget 2. \$500.00 – Transfer to Parks & Recreation FY25 Budget 3. \$360.00 – Transfer to Sheriff FY25 Budget 				
BOS WORKPLAN?	Yes	No	If yes, list item(s):		
		X			
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
				X	
STAFF CONTACT(S):	Theresa McAllister, Management Analyst				
PRESENTER(S):	Theresa McAllister, Management Analyst				
RECOMMENDATION:	I recommend approval of the motion as stated above.				
TIMING:	Effective: June 18, 2025				
DISCUSSION:	<p>The Board of Supervisors approved the “Fluvanna County Voluntary Contributions Program Policy” on August 7th, 2013, with the program to become effective September 1st, 2013.</p> <p>The Voluntary Contributions Program has 100% of your contribution going to the department/agency selected – The money donated goes to directly support the area selected after it is appropriated by the Board of Supervisors.</p> <p>Contributions can be designated for any one of the seven department/agencies noted below.</p> <ol style="list-style-type: none"> (1) County Government General Fund (2) Fluvanna County Public Schools (FCPS) (3) Parks and Recreation Department (4) Social Services Special Welfare Fund (5) Sheriff’s Department (6) County Library (7) Emergency Services 				
FISCAL IMPACT:	This supplemental appropriation would authorize staff to appropriate the revenue to the specific donation general ledger account and expenditures as indicated above.				

POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	None				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
		X			

**FLUVANNA COUNTY BOARD OF SUPERVISORS
AGENDA ITEM STAFF REPORT**

TAB L

MEETING DATE:	June 18, 2025				
AGENDA TITLE:	Environmental Monitoring and Reporting Services for County Landfill				
MOTION(s):	I move the Board of Supervisors approve Project Agreement #03 between Fluvanna County and TRC Engineers, Inc. for environmental services at the Fluvanna County Closed Landfill totaling \$38,050, and further authorize the County Administrator to execute the agreement subject to approval as to form by the County Attorney.				
BOS WORKPLAN?	Yes	No	If yes, list item(s):		
		X			
AGENDA CATEGORY:	Public Hearing	Action Matter	Presentation	Consent Agenda	Other
				X	
STAFF CONTACT(S):	Dan Whitten, County Attorney				
PRESENTER(S):	Dan Whitten, County Attorney				
RECOMMENDATION:	Approve				
TIMING:	Routine				
DISCUSSION:	<ul style="list-style-type: none"> The County signed a General Professional Engineering & Architectural Services Term Contract with TRC Engineers, Inc. on January 31, 2024. Under this Project Agreement #03, TRC will: <ul style="list-style-type: none"> In October 2025 and April 2026 – sample and analyze groundwater from monitoring wells at the County Landfill, and report findings to the County and to DEQ; Prepare the Annual Groundwater Monitoring Report for delivery to the County and to DEQ; Measure, analyze and report landfill gases quarterly to the County and to DEQ; Conduct four quarterly site inspections and report to the County Provide additional regulatory compliance assistance on an as-needed basis Not-to-exceed cost of \$38,050 				
FISCAL IMPACT:	N/A				
POLICY IMPACT:	N/A				
LEGISLATIVE HISTORY:	N/A				
ENCLOSURES:	<ul style="list-style-type: none"> TRC Project Agreement #03 TRC Proposal dated 05/28/2025 				
REVIEWS COMPLETED:	Legal	Finance	Purchasing	HR	Other
	X	X	X		

PROJECT AGREEMENT # 03
TERM CONTRACT BETWEEN COUNTY AND ARCHITECT/ENGINEER FOR
PROFESSIONAL SERVICES
Environmental Monitoring and Reporting Services

This Project Agreement #03 (the "Project Agreement") made this ____ day of _____, 2025 between Fluvanna County, Virginia (the "County"), a political subdivision of the Commonwealth of Virginia, and TRC Engineers Inc. (the "Consultant"), a New Jersey corporation authorized to transact business in Virginia, is an addendum to that TERM CONTRACT BETWEEN COUNTY AND ARCHITECT/ENGINEER FOR PROFESSIONAL SERVICES dated the 31st day of January, 2024 (including all exhibits, and as modified by any amendments or addendums thereto the "Agreement"). All defined terms in the Agreement shall have the same meaning in this Project Agreement unless the context used herein requires otherwise.

Whereas, pursuant to the Agreement the County shall issue written task orders to the Consultant as services are needed;

Whereas, the Consultant submitted a proposal letter dated May 28, 2025 entitled "Fluvanna County Closed Landfill Environmental Monitoring Programs Proposal: FY 2025-2026" (the "Proposal") which is attached hereto as **Exhibit 1** and made a material part hereof;

Whereas, the County desires that the Consultant complete the work and services set forth in the Proposal, including, without limitation, the services described in the "Scope of Services" section are generally described therein as:

- The purpose of this task order is for the Consultant to perform environmental monitoring and reporting services at the solid waste facility operated by Fluvanna County.

Now therefore, for good and valuable consideration, the parties hereby agree as follows:

ARTICLE I: THE AGREEMENT

The foregoing recitations are incorporated by reference into this Project Agreement.

This Project Agreement is an addendum to and made a material part of the Agreement. The parties hereto agree that except as specifically and expressly modified hereby that Agreement remains in full force and effect and the provisions of the Agreement are incorporated herein and are a material part hereof.

ARTICLE II: TASK ORDER

Consultant shall provide all work and services as needed and necessary or desired to complete Services on the Task Order consistent with all provisions of this Project Agreement, the Proposal, and the Agreement.

The County's project manager for technical inquiries relating to this Project Agreement shall be:

Dale Critzer
Director of Public Works
197 Main Street
Palmyra, VA 22963
(434) 591-1908

Billing inquiries should be directed to Victoria Melton, Finance Director, whose contact information appears below in Article VI.

ARTICLE III: EXHIBITS AND RESOLVING CONFLICTS

The rights and duties of the County and Consultant applicable to the County's projects under this Project Agreement are set forth in the following Agreement Documents:

- i. This Project Agreement;
- ii. Exhibit 1 hereto;
- iii. The Agreement including exhibits thereto; and
- iv. The County of Fluvanna General Terms Conditions and Instructions to Bidders and Contractors, being a portion of Attachment 1 which is attached to and a part of the Agreement.

Whenever possible, the terms of the above Agreement Documents shall be read together, however in the event of a conflict, the order of preference above shall govern which Document will control. In other words, (i) shall control over (ii) to (iv) above, and (ii) shall control over (iii) and (iv) and so forth.

ARTICLE IV: FEES

The Consultant shall receive up to a not-to-exceed total of THIRTY-EIGHT THOUSAND FIFTY DOLLARS AND NO/100 (\$38,050.00) based on actual time worked; and which shall be payable by the County MONTHLY based on actual time worked upon Final Completion of the Services.

The flat fee is a not-to exceed amount. The hourly fees up to the not-to-exceed total per task shall be payable by the County upon proper invoice by the Consultant as described herein. The Consultant shall submit invoices to the County monthly for services actually rendered on each subtask and upon final completion. The invoice shall describe the services rendered to date with specificity. The Consultant will be paid within forty-five (45) days of receipt of a valid invoice following final acceptance of all work by the County in the County's sole discretion ("Final Completion"). No invoice may be provided by the Consultant to the County until the items or services purchased have been delivered to, inspected by and accepted by the County. In no event shall the fees invoiced or due under this Project Agreement exceed \$38,050.00 total.

Notwithstanding anything to the contrary contained in the Proposal, the Consultant shall be paid the lower of the hourly rate for the title/type of person actually performing the work set forth in the Proposal hereto or the hourly rate set forth in Exhibit 3 to the Agreement (being that Term Contract between County and Architect/Engineer for Professional Services dated January 31, 2024); up to the not-to-exceed fees for the Task Order Services set forth in this Project Agreement. The County shall be billed for increments of an hour based on Consultant's standard procedure except as otherwise required by the Agreement.

The fee includes all fees, costs and charges of any kind to perform all the services and work, including supplying at its own cost and expense any necessary tools, equipment or materials necessary or desirable for completion of the task specified.

ARTICLE V: TERM

Consultant shall with due diligence and dispatch assiduously pursue this Task Order to completion. The Services and work on this Task Order must be completed to the sole satisfaction of the County during the 12-month period between July 1, 2025 to June 30, 2026 (FY 2025-2026).

ARTICLE VI: COUNTERPARTS AND ELECTRONIC SIGNATURES

This Agreement may be executed in counterparts, each of which shall be deemed an original, but such counterparts, when taken together, shall constitute one agreement. This Agreement may be executed by a Party's signature transmitted by facsimile or email, and copies of this Agreement executed and delivered by means of faxed or emailed signatures shall have the same force and effect as copies hereof executed and delivered with original signatures.

ARTICLE VII: MISCELLANEOUS

As appropriate to the context, the singular will include the plural and vice versa, and reference to one gender will include the others. This Project Agreement may be executed in one or more counterparts, each of which will be considered the Project Agreement for all purposes of proof. In addition to allowing electronic signatures upon an electronic copy of this Project Agreement, as provided by Virginia law, facsimile signatures upon any signature page will be considered to be original signatures. This Project Agreement contains the entire understanding of the parties with respect to the subject matter hereof and is to be modified only by a writing signed by the parties to this Project Agreement. This Project Agreement will be binding upon and inure to the benefit of the respective parties and their successors. This Project Agreement is not assignable by either party, except by operation of law. The legal address for the County and for the Consultant and the addresses for delivery of Notices and other documents related to the administration of this Project Agreement are as follows:

County:

ATTN: Victoria Melton, Finance Director
Fluvanna County
P.O. Box 540
Palmyra, VA 22963
Telephone (434) 591-1930
FAX (434) 591-1931

With copies to:

Ms. Linda Mills,
Procurement Officer
P.O. Box 540
Palmyra VA 22963

Mr. Dan Whitten,
County Attorney
P.O. Box 540
Palmyra VA 22963

Consultant:

TRC Engineers, Inc.
ATTN: Thomas R. Laughlin, Environmental Services Division
1030 Wilmer Ave., Suite 100
Richmond, VA 23227
Telephone: (804) 264-2228

Any party may substitute another address for the one set forth above by giving a notice in the manner required. Any notice given by mail will be deemed to be received on the fifth (5th) day after deposit in the United States mail. Any notice given by hand will be deemed to be received when delivered. Notice by courier will be deemed to have been received on the date shown on any certificate of delivery.

[Signature page to follow.]

In witness whereof the undersigned duly authorized representatives have executed this Project Agreement on the dates set forth beside their respective signatures.

Consultant:
TRC Engineers, Inc.

County:
Fluvanna County:

By: _____

Date: _____

By: _____

Date: _____

Name: _____

Name: Eric M. Dahl

Title: _____

Title: County Administrator

Approved as to form:


By: _____
Fluvanna County Attorney



1030 Wilmer Avenue, Ste. 100
Richmond, VA 23227

T 804.264.2228
TRCcompanies.com

TO: Mr. Dale Critzer
Fluvanna County

FROM: Thomas R. Laughlin 
Environmental Services Division

DATE: 05-28-25

SUBJECT: **Fluvanna County Closed Landfill**
Environmental Monitoring Programs
Proposal: FY 2025-2026 (July 2025 to June 2026)

DEQ Permit No. 429
TRC Project No. PENDING [TASKS 1 TO 7]

TRC Engineers, Inc., proposes to provide professional engineering and environmental services to Fluvanna County in accordance with the existing Services Agreement between Fluvanna County and TRC (Term Contract for RFP #2017-01; signed January 31, 2025) and TRC's 2024 Labor EV P-Codes.

The subject proposal is intended to encompass services that will be provided during the 12-month period between *July 1, 2025, to June 31, 2026 (FY 2025-2026)*.

More specifically, TRC shall provide the following services pertaining to environmental programs at solid waste facilities operated by Fluvanna County:

[TASK 1] - Groundwater Sampling Event 2025 S2 (October 2025)

Task. TRC proposes to obtain groundwater samples from monitoring wells at the Fluvanna County closed landfill (groundwater sampling event 2025 S2, scheduled to occur during October 2025), chemically analyze the groundwater samples, and prepare a report suitable for direct submission to DEQ. More specifically, TRC proposes to:

- Obtain groundwater samples from monitoring wells MW-02R, MW-03R, and MW-04R and have them analyzed for VSWMR Table 3.1, Column A constituents.
- Obtain groundwater samples from monitoring wells MW-07R, MW-08, and MW-10 and have them analyzed for VSWMR Table 3.1, Column A constituents, plus previously detected Table 3.1, Column B constituents, including tin; 2-chlorophenol; bis(2-ethylhexyl)phthalate; dichlorodifluoromethane, diethyl phthalate; and di-n-octyl phthalate.

Budget. The cost of the referenced task shall be **\$10,200** (*lump sum*).

- The cost of environmental services (TRC = **\$7,200**) is based upon a review of the costs associated with past sampling events.
- The cost of chemical analyses (**\$3,000**) is based on a fee schedule previously provided by the contracted laboratory. Laboratory services are provided in accordance with a contract between TRC and the laboratory. Laboratory fees shall be billed at cost.

Deliverables. TRC will provide *one digital copy* of the report to Fluvanna County (Adobe Acrobat or functional equivalent) and *one digital copy* of the report to DEQ.

[TASK 2] - 2025 Annual Groundwater Report

Task. TRC proposes to prepare the Annual Groundwater Monitoring Report pertaining to the Fluvanna County closed landfill for the year 2025 (due **120 days** from the completion of sampling and analysis for the second semi-annual groundwater sampling event conducted for the calendar year).

Budget. The cost of the referenced task shall be **\$5,100** (*lump sum*). The cost of the proposed services is based upon a review of the effort associated with preparing prior Annual Groundwater Monitoring Reports for similar facilities.

Deliverables. TRC will provide *one digital copy* of the report to Fluvanna County (Adobe Acrobat or functional equivalent) and *one digital copy* of the report to DEQ.

[TASK 3] - Groundwater Sampling Event 2026 S1 (April 2026)

Task. TRC proposes to obtain groundwater samples from monitoring wells at the Fluvanna County closed landfill (groundwater sampling event 2026 S1, scheduled to occur during April 2026), chemically analyze the groundwater samples, and prepare a report suitable for direct submission to DEQ. More specifically, TRC proposes to:

- obtain groundwater samples from monitoring wells MW-2R, MW-3R, and MW-4R and have them analyzed for VSWMR Table 3.1, Column A constituents
- obtain groundwater samples from monitoring wells MW-7R, MW-8, and MW-10 and have them analyzed for VSWMR Table 3.1, Column B constituents

Budget. The cost of the referenced task shall be **\$11,300** (*lump sum*).



- The cost of environmental services (TRC = **\$7,200**) is based upon a review of the costs associated with past sampling events.
- The cost of chemical analyses (**\$4,100**) is based on a fee schedule previously provided by the contracted laboratory. Laboratory services are provided in accordance with a contract between TRC and the laboratory. Laboratory fees shall be billed at cost.

Deliverables. TRC will provide *one digital copy* of the report to Fluvanna County (Adobe Acrobat or functional equivalent) and *one digital copy* of the report to DEQ.

[TASK 4] - Gas Monitoring Services (July 2025 - June 2026)

Scope of services. TRC proposes to measure landfill gases (using a LANDTEC gas analyzer, or functional equivalent), on *four* occasions, at *six* gas probes and *five* on-site structures at the Fluvanna County closed landfill, prepare data tables, and prepare a report of findings (to include an assessment of regulatory compliance) during the period between July, 2025, to June, 2026 (inclusive; second half of calendar year 2025 = first half of FY 2025-2026; includes *four monitoring events*).

Schedule. The inspections shall occur during the following intervals:

- **third quarter 2025:** between July and September 2025
- **fourth quarter 2025:** between October and December 2025
- **first quarter 2026:** between January and March 2026
- **second quarter 2026:** between April and June 2026

Budget. The cost of the referenced task shall be **\$4,700** (*lump sum / includes four monitoring events*).

The cost of professional environmental services is based upon a review of the costs associated with past gas monitoring events.

Comment. The facility is currently required to monitor landfill gases on a **quarterly** schedule; however, if concentrations of methane are found to be greater than 80% of its lower explosive limit (LEL) during any monitoring event, then the County may have to revert to a **monthly** monitoring schedule. In the event that concentrations of methane exceed 80% of the LEL at the property boundary during the referenced monitoring period, we will prepare a *revised* cost estimate to accommodate monthly monitoring.

Deliverables. TRC will provide one *digital* copy of each report to the Fluvanna County (Adobe Acrobat or functional equivalent) and will provide one *digital* copy of each report to DEQ.



[TASK 5] - Quarterly Site Inspections (July 2025 - June 2026)

Scope of services. TRC proposes to conduct *four quarterly site inspections* meeting the Post-Closure Care Plan requirements at the Fluvanna County closed landfill during the period between July 2025, and June 2026 (inclusive; second half of calendar year 2025 = first half of FY 2025-2026; includes *four site inspections*).

Schedule. The inspections shall occur during the following intervals:

- **third quarter 2025:** between July and September 2025
- **fourth quarter 2025:** between October and December 2025
- **first quarter 2026:** between January and March 2026
- **second quarter 2026:** between April and June 2026

Budget. The cost of the referenced task shall be **\$2,200** (*lump sum / includes four quarterly events*).

The cost of the proposed services is based upon a review of the costs associated with past inspection events. The proposed fee is based upon the assumption that we will be able to inspect the facility while performing other work at that location.

Deliverables. TRC will provide one *digital* copy (Adobe Acrobat or functional equivalent) of each inspection report to Fluvanna County.

[TASK 6] - Regulatory Compliance (July 2025 - June 2026) – Upon Request

Scope of services. [*required, but cost is not well constrained*]. TRC will respond to “*unanticipated*” issues concerning regulatory compliance (for example, responding to DEQ comments pertaining to the Annual Groundwater Report) that may arise at the Fluvanna County Closed Landfill during the period between July 1, 2025 and July 31, 2026 (inclusive).

Budget. The cost of the referenced task shall be **\$2,500** (*time and materials*).

Deliverables. TRC will provide one *digital* copy (Adobe Acrobat or functional equivalent) of each response letter to Fluvanna County.

[TASK 7] - Verification Groundwater Sampling Event - As Needed

Scope of services. Upon authorization from the County, TRC shall obtain additional groundwater samples in order to either verify or refute reported exceedances, or otherwise suspect data, if warranted, after one regularly scheduled (semi-annual) groundwater sampling event, and chemically analyze the samples for the affected constituents. The results of verification sampling will be incorporated into the report of groundwater sampling and chemical analysis for the associated regularly scheduled sampling event.

Budget. The cost of the referenced task shall be **\$2,050** (*time and materials*).

Deliverables. TRC will include the results of verification sampling with the routine groundwater sampling event report.



EXCLUSIONS. Deliverables do not include digital source files used in preparing documents (for example, MS Word, MS Excel, AutoCAD files).

This proposal does not include potential changes to the groundwater monitoring program pending the approval of *Virginia Solid Waste Management Regulations*, Amendment 9. Potential changes include increased statistical analysis for facility background concentrations and the addition of sampling for emergent contaminants, such as PFOA and PFOS compounds. PFOA and PFOS requirements will require additional field time and laboratory fees associated with chemical analysis. TRC will provide Fluvanna County with a change order to accommodate required changes to the monitoring program should Amendment 9 be approved during FY25-26.

OWNER'S RESPONSIBILITIES. Owner shall provide access to TRC personnel to enter the landfill during normal operating hours, or on other days or times as mutually agreed, in order to provide the field services associated with the tasks outlined above.



COMPENSATION. TRC shall be compensated for performing the above Services as follows.

TASK	DESCRIPTION	FEE	FEE STRUCTURE
TASK 1	GW Sampling Event 2025 S2	\$10,200	lump sum
TASK 2	2025 Annual Groundwater Report	\$5,100	lump sum
TASK 3	GW Sampling Event 2026 S1	\$11,300	lump sum
TASK 4	Gas Monitoring (FY25-26)	\$4,700	lump sum
TASK 5	Post-Closure Insp. (FY25-26)	\$2,200	lump sum
TASK 6	Regulatory Compliance (FY25-26)	\$2,500	T&M
TASK 7	Verification Event (as needed)	\$2,050	T&M

Total Fee under this proposal = **\$38,050**



**AUTHORIZATION TO PROCEED
FY2025 - 2026**

for Fluvanna County

date

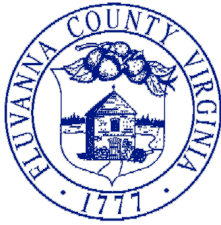
Attachment



FACILITY: FLUVANNA COUNTY CLOSED LANDFILL				update: 05-27-2025			TRC WORK ORDER = Pending											
FY 2025-2026	TRC	TRC	Status	summary			YEAR 2025						YEAR 2026					
task				project no.	phase no.	TRC	others	TRC + others	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
groundwater monitoring																		
sampling event 2025 S2 (Table 3.1 Column A)		PHASE 1		\$7,200	\$3,000	\$10,200												
annual report 2025		PHASE 2		\$5,100	\$0	\$5,100												
sampling event 2026 S1 (Table 3.1 Column B)		PHASE 3		\$7,200	\$4,100	\$11,300												
landfill gas																		
gas mon event		PHASE 4		\$4,700	\$0	\$4,700												
engineering services																		
post closure inspection		PHASE 5		\$2,200	\$0	\$2,200												
supplemental services																		
regulatory compliance - (if necessary)		PHASE 6		\$2,500	\$0	\$2,500												
verification event 2025-2026 - (if necessary)		PHASE 7		\$1,800	\$250	\$2,050												
column totals =		PHASE column		\$30,700	\$7,350	\$38,050												
NOTES: \$ black = TRC fees \$ red = fees paid to others (laboratory, well driller)																		

**FLUVANNA COUNTY BOARD OF SUPERVISORS
MEETING PACKAGE ATTACHMENTS**

Incl?	Item
<input checked="" type="checkbox"/>	BOS Contingency Balance Report
<input checked="" type="checkbox"/>	Building Inspections Report
<input checked="" type="checkbox"/>	Capital Reserve Balances Memo
<input type="checkbox"/>	Fluvanna County Bank Balance and Investment Report
<input checked="" type="checkbox"/>	Unassigned Fund Balance Report
<input type="checkbox"/>	VDOT Monthly Report & 2020 Resurfacing List
<input type="checkbox"/>	ARPA Fund Balance Memo
<input type="checkbox"/>	The Board of Supervisors Work Plan



COUNTY OF FLUVANNA

"Responsive & Responsible Government"

P.O. Box 540
Palmyra, VA 22963
(434) 591-1910
Fax (434) 591-1911
www.fluvannacounty.org

MEMORANDUM

Date: June 18, 2025
From: Theresa McAllister – Management Analyst
To: Board of Supervisors
Subject: FY25 BOS Contingency Balance

The FY25 BOS Contingency line balance is as follows:

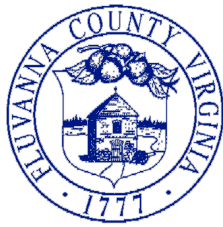
Beginning Original Budget:	\$248,824
Less: Position Upgrades for COR's Office – 07.03.24	-\$19,721
Less: TJPDC Spring Regional Housing Summit – 07.03.24	-\$2,500
Less: BOS Leadership Retreat – 07.03.24	-\$4,500
Less: Position Upgrade from EMS Supervisor to Director – 07.03.24	-\$22,670
Less: Command Structure in Emergency Services – 07.03.24	-\$22,025
Reassessment Budget Transfer – 08.07.24	\$49,284.47
Less: Dewberry Engr Svc for Comms Twr Inspect and Mapping – 09.04.24	-\$5,300
Less: Prelim Engg Rpt PG & Comm Blvd Wtr & Sewer Service – 10.16.24	-\$31,555
Less: Position Upgrades for Treasurer Office – 11.06.24	-\$13,076
Less: TJPDC Regional Housing Study Participation – 05.07.25	-\$6,000
Less: Employee Engagement Survey – 05.07.25	-\$23,120
Less: Palmyra Sewer Redemption – 05.21.25	-\$20,000
Less: Commonwealth Atty Case Management System with Spartan – 06.04.25	-\$24,200
Available:	\$103,441.47

County of Fluvanna

Building Official:	Period:
Andrew Wills	May-2025

Category	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
BUILDING PERMITS ISSUED														
NEW - Single Family Detached (incl. Trades permits & SWMH)	2021	15	9	19	20	16	22	15	11	8	22	13	8	178
	2022	17	11	20	11	18	32	10	9	11	12	9	4	164
	2023	5	6	6	12	12	6	10	5	7	8	9	7	93
	2024	9	7	13	7	8	12	16	8	11	12	16	6	125
	2025	11	6	12	8	12	0	0	0	0	0	0	0	49
NEW - Single Family Attached (Town Homes)	2021	0	0	0	0	1	6	0	0	6	0	0	0	6
	2022	0	0	0	0	0	0	0	0	6	0	0	0	0
	2023	0	8	0	0	0	0	0	0	0	0	0	7	15
	2024	0	0	0	0	0	0	0	6	0	6	0	7	12
	2025	0	7	5	6	6	0	0	0	0	0	0	0	24
Multi Family (Apartment, Duplex)	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	5	0	0	0	0	5
	2023	1	0	0	0	0	0	0	0	0	0	0	0	1
	2024	0	0	0	0	0	0	0	0	0	0	0	0	0
	2025	0	0	0	0	0	0	0	0	0	0	0	0	0
Additions and Alterations	2021	28	14	43	39	31	40	30	29	26	30	35	33	378
	2022	33	48	60	45	47	50	51	63	45	63	51	44	600
	2023	52	34	51	34	36	28	36	35	45	39	43	37	470
	2024	39	33	45	31	43	29	39	27	38	32	36	30	422
	2025	30	27	40	42	43	0	0	0	0	0	0	0	182
* Trade permits count not in .														
Accessory Buildings	2021	1	3	3	6	3	6	1	3	2	4	4	2	38
	2022	3	4	13	6	5	2	5	4	5	3	0	2	52
	2023	7	2	7	5	6	2	5	8	4	7	5	6	64
	2024	1	6	5	3	9	3	5	2	8	1	2	4	49
	2025	6	2	2	3	3	0	0	0	0	0	0	0	16
Swimming Pools	2021	0	0	7	1	5	2	3	4	1	0	1	2	26
	2022	0	2	4	4	1	0	3	3	0	0	0	0	17
	2023	1	0	6	1	2	4	0	0	0	2	0	0	16
	2024	1	0	6	1	2	4	0	0	0	2	0	0	16
	2025	3	0	2	1	0	0	0	0	0	0	0	0	6
Commercial/ Industrial Build/Cell Towers	2021	1	0	1	0	0	0	1	0	0	0	2	0	5
	2022	0	0	0	0	0	2	3	2	0	2	1	0	10
	2023	1	1	0	1	0	0	0	0	0	0	0	0	3
	2024	0	0	0	0	0	1	0	1	0	0	0	0	2
	2025	1	0	0	7	3	0	0	0	0	0	0	0	11
TOTAL BUILDING PERMITS	2021	51	26	73	66	55	70	50	47	37	56	55	45	631
	2022	54	65	97	66	71	86	72	77	61	80	61	50	840
	2023	67	51	64	52	51	40	52	48	56	56	57	57	651
	2024	49	46	64	44	63	45	60	44	57	49	55	40	616
	2025	51	42	61	67	64	0	0	0	0	0	0	0	285
* Trade permits count not included as in previous years														

Category	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
LAND DISTURBING PERMITS ISSUED														
LAND DISTURBING PERMITS	2021	22	10	18	20	18	22	16	11	4	23	13	8	185
	2022	16	13	19	11	18	34	11	10	8	13	8	3	164
	2023	5	14	9	15	10	7	10	5	10	8	8	14	115
	2024	8	6	15	8	9	11	16	12	12	16	14	7	134
	2025	12	12	17	13	18	0	0	0	0	0	0	0	72
INSPECTIONS COMPLETED														
TOTAL INSPECTIONS	2021	430	349	465	431	402	426	333	355	419	453	422	356	4,841
	2022	304	414	551	449	439	486	594	589	523	400	300	351	5,400
	2023	350	298	321	308	288	285	261	294	287	375	297	300	3,664
	2024	272	200	226	226	256	266	308	435	352	366	308	230	3,445
	2025	221	238	303	479	342	0	0	0	0	0	0	0	1,583
FEES COLLECTED														
Building Permits	2021	\$18,733	\$15,400	\$15,654	\$21,333	\$16,184	\$23,031	\$27,000	\$11,923	\$9,144	\$20,620	\$15,563	\$9,211	\$ 203,796
	2022	\$21,100	\$19,347	\$23,488	\$15,404	\$19,739	\$23,621	\$18,713	\$54,782	\$11,348	\$34,994	\$17,657	\$6,021	\$ 266,214
	2023	\$11,925	\$20,870	\$11,256	\$15,385	\$21,848	\$9,751	\$9,429	\$8,207	\$10,590	\$11,603	\$11,462	\$14,778	\$ 157,104
	2024	\$21,425	\$8,680	\$19,958	\$9,063	\$8,812	\$17,936	\$21,896	\$18,824	\$19,968	\$27,219	\$20,829	\$10,272	\$ 204,882
	2025	\$18,604	\$16,502	\$23,870	\$37,980	\$29,452	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 126,408
Land Disturbing Permits	2021	\$5,678	\$1,250	\$14,463	\$2,500	\$2,250	\$2,750	\$13,581	\$2,824	\$500	\$4,848	\$1,625	\$1,000	\$ 53,268
	2022	\$2,000	\$2,050	\$9,963	\$1,375	\$2,250	\$10,014	\$1,375	\$2,175	\$27,725	\$3,649	\$2,175	\$375	\$ 65,126
	2023	\$625	\$1,875	\$1,125	\$2,300	\$1,625	\$5,000	\$2,408	\$625	\$4,975	\$1,000	\$1,000	\$1,750	\$ 24,308
	2024	\$1,000	\$750	\$9,584	\$1,000	\$3,713	\$1,375	\$2,000	\$1,500	\$2,375	\$2,000	\$1,750	\$2,648	\$ 29,695
	2025	\$1,500	\$1,500	\$2,125	\$1,625	\$2,250	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 9,000
Zoning Fees collected by Building Dept starting February 2024	2021	\$2,150	\$1,150	\$3,650	\$2,950	\$2,650	\$3,400	\$2,450	\$1,850	\$1,300	\$2,900	\$1,900	\$1,150	\$ 27,500
	2022	\$1,900	\$1,400	\$3,900	\$1,650	\$2,300	\$3,900	\$1,800	\$1,500	\$1,500	\$2,000	\$1,450	\$750	\$ 24,050
	2023	\$1,350	\$1,950	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 3,300
	2024	\$0	\$800	\$2,250	\$1,150	\$1,800	\$2,250	\$2,250	\$1,650	\$1,750	\$2,300	\$1,900	\$1,000	\$ 19,100
	2025	\$1,600	\$2,550	\$1,800	\$2,650	\$3,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 12,200
TOTAL FEES	2021	\$26,561	\$17,800	\$33,767	\$26,783	\$21,084	\$29,181	\$43,031	\$15,148	\$10,944	\$28,368	\$24,584	\$11,361	\$ 293,810
	2022	\$25,001	\$22,797	\$37,351	\$18,429	\$24,289	\$37,535	\$21,888	\$58,457	\$40,573	\$40,643	\$24,584	\$7,146	\$ 290,061
	2023	\$13,900	\$24,395	\$12,381	\$17,685	\$23,473	\$14,751	\$11,837	\$8,834	\$15,565	\$12,603	\$12,462	\$16,528	\$ 184,714
	2024	\$22,425	\$10,230	\$31,792	\$11,213	\$14,325	\$21,561	\$26,146	\$21,974	\$24,093	\$31,519	\$24,479	\$13,920	\$ 253,677
	2025	\$21,704	\$20,552	\$27,795	\$42,255	\$35,302	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$ 147,608



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Fax (434) 591-1911
www.fluvannacounty.org

MEMORANDUM

Date: June 18, 2025
From: Theresa McAllister – Management Analyst
To: Board of Supervisors
Subject: FY25 Capital Reserve Balances

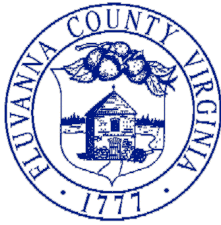
The FY25 Capital Reserve account balances are as follows:

County Capital Reserve:

FY24 Carryover	\$497,849.16
FY25 Budget Allocation:	\$250,000
Less: Public Safety Building Replace HVAC Unit #4 – 09.04.24	-\$19,318.80
Less: Library Heat Pump Unit #4 Replacement – 10.02.24	-\$7,000
Less: FUFC Bay #5 Roll Up Door Repair – 10.02.24	-\$9,055
Less: Public Safety Building Sewer Back-Up – 10.02.24	-\$10,175
Less: Public Safety Sewer Line Repairs – 11.20.24	-\$20,500
Less: Admin Building IT Room HVAC Replacement – 11.20.24	-\$10,340
Less: Forestry Mulching Pleasant Grove Park – 04.16.25	-\$8,000
Less: Floor Recoat Kent's Store Fire Truck Bay Area – 04.16.25	-\$49,321
Less: Replace Water Heater Courts Building – 04.16.25	-\$11,750
Less: Replace Transmission in Ambulance 6 – 05.07.25	-\$9,645.68
Add: Closed CRM Project – 05.15.25	\$7,105.75
Less: Courthouse Boiler Repairs – 06.04.25	-\$19,685
Less: Commonwealth Atty Basement Renovation Continuance – 06.04.25	-\$7,500
FY25 Available:	\$572,664.43

Schools Capital Reserve:

FY24 Carryover	\$237,045.55
FY25 Budget Allocation:	\$200,000
Less: FMS HVAC Unit Replacement & Installation – 07.03.24	-\$39,566
Less: FMS Bat Elimination – 08.07.24	-\$30,000
Less: School's Asphalt Patching (FCHS, CB, & CE) – 08.07.24	-\$9,759
Less: FCHS Driver on Chiller Circulation Pump – 08.21.24	-\$9,850
Less: CE Failed Condenser Fan's Chillers 1 & 2 – 10.02.24	-\$5,985
Less: FMS Remove Bat Colony & Seal Roofline – 10.02.24	-\$61,129
Less: Central Chiller Condenser Fan Motors – 11.06.24	-\$13,500
Add: Closed CRM Projects – 11.10.24	\$4,400
Less: Furnish & Install 9 HVAC Contactors – 11.20.24	-\$8,224.45
Less: FCHS Replace & Install 8 Speed Bumps – 11.20.24	-\$8,000
Less: FCHS Replace & Install Hot Water Pump Motor – 11.20.24	-\$4,736
Less: CEN & FMS Damage Due to Weather & Power Surges – 11.20.24	-\$9,171
Less: Abrams Academy 2 Building Removal – 11.20.24	-\$11,500
Less: FMS Recess Field Netting – 02.05.25	-\$3,220
Less: FCHS Bleachers & Gym – 02.05.25	-\$5,850
Less: Remove Carpet and ACM Floor Tile in 2 Small Buildings – 04.02.25	-\$7,250
Add: Closed CRM Projects – 04.17.24	\$286.53
Less: Blktop Repair at Central, Carysbrook, and FMS Tennis Court – 06.04.25	-\$24,947
FY25 Available:	\$189,044.63



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MEMORANDUM

Date: June 18, 2025
From: Theresa McAllister– Management Analyst
To: Board of Supervisors
Subject: Unassigned Fund Balance

*FY24 Year End (Audited) Unassigned Fund Balance:	\$30,580,253
Unassigned Fund Balance – 12% Target Per Policy:	12,268,030
Unassigned Fund Balance – Excess Above Policy Target:	18,312,223
Less: FCHS Track Resurfacing/Milling CIP – 08.06.24	-\$221,000
Less: Dev Agrmt btw Fluvanna, Zion 3 Notch, & Econ Dev Auth – 08.07.24	-\$250,000
Less: FY24-25 County Carryover Request – 12.04.24	-\$124,510.50
Less: FY24-25 Schools Carryover Request – 12.04.24	-\$370,591.10
Less: Space Study – 02.05.25	-\$136,295
Less: Deed of Easement & Utility Agmt with Macon Properties – 12.18.25	-\$106,000
Less: VA 250 Preservation Fund Grant – Historic Courthouse – 03.19.25	-\$400,029.50
Less: FY24 to FY25 JRWA Carryover Request – 05.21.25	-\$18,513
Less: Information Technology ADP Services (CAMA) – 05.21.25	-\$7,304
Current (Audited) Unassigned Fund Balance:	\$16,677,979.90

