

Via email: samantha.sifre@deq.virginia.gov

July 19, 2024

Ms. Samantha Sifre
Environmental Specialist II
Virginia Department of Environmental Quality
Northern Regional Office
13901 Crown Ct
Woodbridge, VA 22193

**Re: Permit No. VA0060500, Waterford Sewage Treatment Plant, Loudoun County
VPDES Reissuance Application Package**

Ms. Sifre,

Enclosed, please find a completed original application package for the reissuance of VPDES permit VA0060500 for the Waterford Sewage Treatment Plant (STP). Included are the following forms and attachments:

- EPA Form 2A
- VPDES Application Addendum
- Sewage Sludge Application Form
- Public Notice Billing Authorization Form
- Facility Schematic
- Topo Map
- Waterford Effluent Data
- Basis of Design Report – Sections Applicable to Waterford

As part of the permit reissuance and as was discussed during the Waterford reissuance status call held on June 18, 2024, Loudoun Water is requesting an extension to the current approved Source Removal Plan and Schedule.

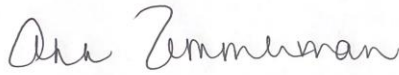
The Waterford STP facility is currently in the process of being fully replaced, with Phase I (design) currently underway and 30% design expected in August 2024. The current lagoon facility will be replaced with a new influent pump station and a sequencing batch reactor (SBR) facility consisting of a headworks with influent screening, influent EQ basin, two-train ICEAS SBR, post EQ, tertiary filtration, UV disinfection, post aeration and sludge holding tank. The facility will transition from a forced/controlled discharge that is intermittent to a continuous discharge. The existing outfall will be reused and there will be no change to the existing design flow of 0.058MGD. Phase II (construction) is



expected to begin in the 4th Quarter 2025 and active construction and lagoon decommissioning are expected to be complete by end of the 4th Quarter 2027.

Please let me know if need any additional information or wish to discuss further.

Respectfully,

A handwritten signature in dark ink, appearing to read "Ann Zimmerman". The signature is fluid and cursive, with the first name "Ann" and last name "Zimmerman" clearly distinguishable.

Ann Zimmerman
Manager, Community Systems



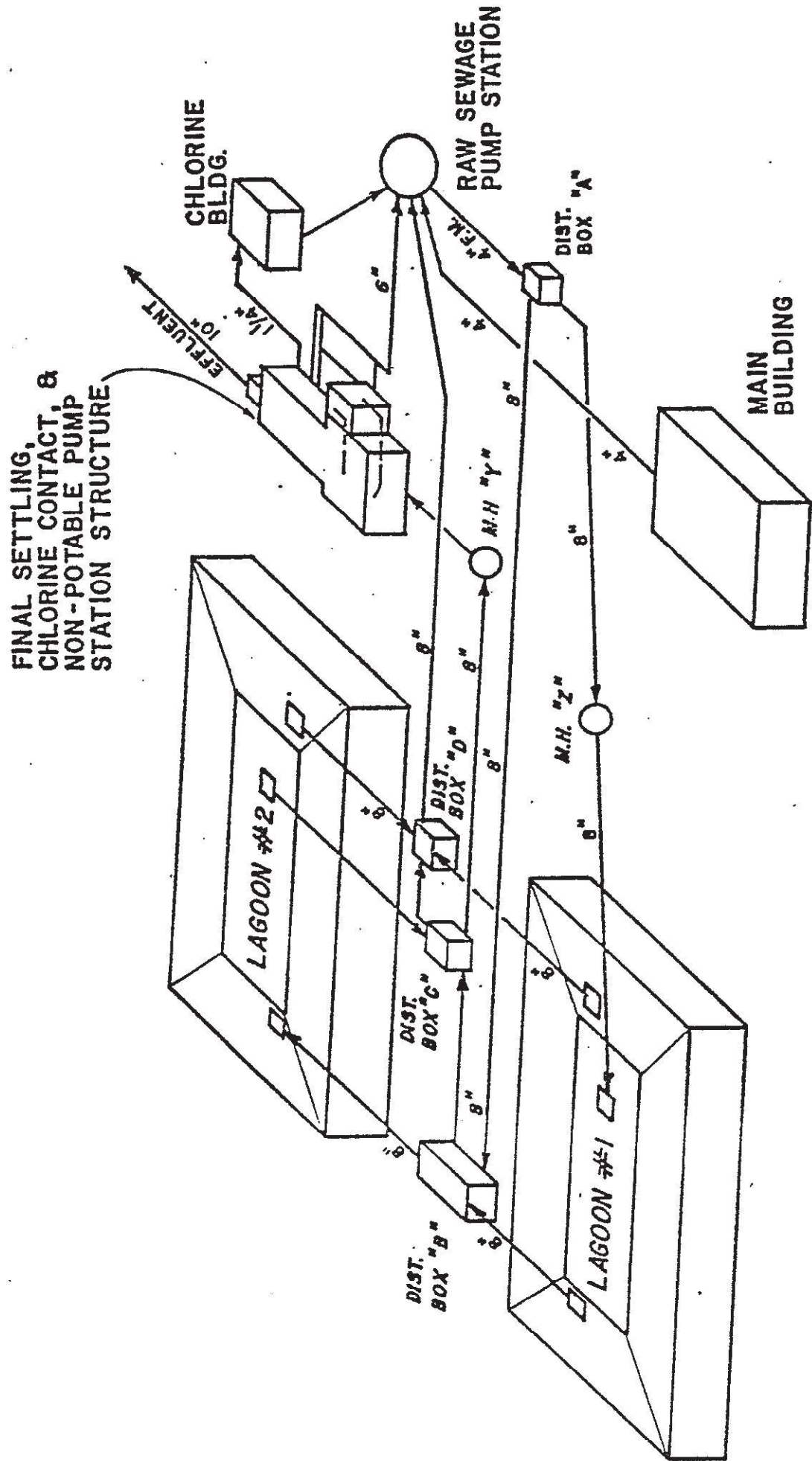


FIG. II. SCHEMATIC FLOW DIAGRAM

VPDES Sewage Sludge Permit Application for Permit Reissuance

Instructions

WHO MUST SUBMIT THE APPLICATION - All facilities with a current VPDES Permit that authorizes the discharge of treated sewage wastewater that are applying for reissuance must complete and submit this application.

Part 1 is general information to be provided by all facilities.

Part 2 must be completed by all facilities that generate Class A or Class B biosolids that are land applied.

Part 3 must be completed by all facilities that land apply Class B biosolids.

Part 1 - Sludge Disposal Management (To be completed by all facilities)

Facility Name: Waterford Wastewater Treatment Plant

VPDES Permit No: VA0060500

1. Shipment Off Site for Treatment or Blending

Is sewage sludge from your facility sent to another facility that provides treatment or blending?

☒ Yes ☐ No

If you send sewage sludge to more than one facility, attach additional sheets as necessary.

Shipment off site is: ☒ The primary method of sludge disposal ☐ A back up method of sludge disposal

a. Receiving Facility Name

Broad Run Water Reclamation Facility

b. Receiving Facility VPDES Permit No.

VA0091383

c. Include an acceptance letter from the Receiving Facility.

d. Receiving Facility's ultimate disposal method for sewage sludge Contract Land Disposal (Class B Sludge) or King George

2. Disposal in a Municipal Solid Waste Landfill

Is sewage sludge from your facility placed in a municipal solid waste landfill?

☐ Yes ☒ No

If sewage sludge is placed on more than one municipal solid waste landfill, attach additional pages as necessary.

Landfilling is: ☐ The primary method of sludge disposal ☐ A back up method of sludge disposal

a. Landfill Name

b. Landfill Permit No.

c. Include an acceptance letter from the landfill.

3. Incineration

Is sewage sludge from your facility fired in a sewage sludge incinerator?

☐ Yes ☒ No

Incineration is: ☐ The primary method of sludge disposal ☐ A back up method of sludge disposal

a. Do you own or operate all sewage sludge incinerators in which sewage sludge from your facility is fired?

☐ Yes ☒ No

If yes, provide the Air Registration No. _____

If no, complete items b - d for each incinerator that you do not own or operate.

b. Facility Name

c. Air Registration No.

d. Include an acceptance letter from the Incinerator.

4. Class A Biosolids

Do you produce Class A biosolids for land application or distribution and marketing? If yes, complete Part 2.

☐ Yes ☒ No

Are Class A biosolids from your facility land applied in bulk?

☐ Yes ☒ No

Do you sell or give away Class A biosolids in a bag or other container for application to the land? If yes, provide the VDACS certification number? _____

☐ Yes ☒ No

5. Class B Biosolids

Do you produce Class B biosolids? If yes, complete Part 2.

☐ Yes ☒ No

Are Class B biosolids from your facility land applied under the authorization of this VPDES Permit? If yes, complete Part 3.

☐ Yes ☒ No

6. Land Application Under a Separate Permit

Are biosolids from your facility land applied under the authorization of a permit other than your VPDES Permit?

☐ Yes ☒ No

Biosolids are land applied under the authorization of a ☐ VPA permit ☐ Another VPDES Permit ☐ Out of State

Complete items a - c for each VPA permit authorized to land apply biosolids from your facility.

a. Permittee Name

b. Permit No.

c. Include copy of any information you provide to the Receiving VPDES or VPA Permittee to comply with the "notice and necessary information" requirement of 9VAC25-31-530 F.

VPDES Sewage Sludge Permit Application for Permit Reissuance

Part 2 – Biosolids Characterization (To be completed by all facilities that generate biosolids that are land applied.)

1. Have there been changes to sludge treatment processes or storage facilities since the previous permit issuance/reissuance? ☐ Yes ☐ No
2. Do the biosolids generated under this permit that will be land applied meet one of the Class A pathogen requirements in 9VAC25-31-710 A 3 through A 8 or Class B pathogen requirements in 9VAC25-31-710 B 1 through B 4? ☐ Yes ☐ No
Identify the pathogen reduction option utilized to demonstrate compliance with the pathogen reductions requirements and provide the data that demonstrate compliance with the applicable alternative. _____
3. Do the biosolids generated under this permit that will be land applied meet one of the vector attraction reduction requirements in 9VAC25-31-720 B 1 through B 10? ☐ Yes ☐ No
Identify the vector attraction reduction option utilized to demonstrate compliance with the vector attraction reductions requirements and provide the data that demonstrate compliance with the applicable alternative. _____
4. Do the biosolids to be land applied meet the ceiling/pollutant concentrations in 9VAC25-31-540 B? ☐ Yes ☐ No
5. Has data from the most recent 3 samples for pH (S.U.), Percent Solids (%), Ammonium Nitrogen (mg/kg), Nitrate Nitrogen (mg/kg), Total Kjeldahl Nitrogen (mg/kg), Total Phosphorus (mg/kg), Total Potassium (mg/kg), Alkalinity as CaCO₃ (mg/kg), Arsenic (mg/kg), Cadmium (mg/kg), Copper (mg/kg), Lead (mg/kg), Mercury (mg/kg), Nickel (mg/kg), Selenium (mg/kg), Zinc (mg/kg) been submitted to DEQ? The samples shall be no more than 4½ years old and each sampling date shall be at least 1 month apart. ☐ Yes ☐ No
If no, provide the data with this application. _____

Part 3 – Land Application of Class B Biosolids (To be completed by all facilities that land apply Class B biosolids.)

1. Provide to DEQ and to each locality in which biosolids are to be land applied, written evidence of financial responsibility. Evidence of financial responsibility shall be provided in accordance with 9VAC25-31-100 P 9.
2. For each site, provide a properly completed landowner agreement for each landowner, using the most current Land Application Agreement - Biosolids Form (VPDES Sewage Sludge Permit Application Form – Attachment to Section C).
3. Are any new land application fields proposed at this reissuance? ☐ Yes ☐ No
If yes, contact the DEQ Regional Office for additional submittal requirements.
4. For the currently permitted land application fields, are the previously submitted site booklets, maps and acreage accurate. ☐ Yes ☐ No
If no, contact the DEQ Regional Office for additional submittal requirements.
5. Does the facility's Biosolids Management Plan on file with DEQ include the following minimum information? ☐ Yes ☐ No
 - a. An odor control plan that addresses the abatement of odors resulting from the storage and/or land application of biosolids.
 - b. A description of the transport vehicles to be used.
 - c. Procedures for biosolids offloading at the land application site including spill prevention, cleanup (including vehicle cleaning), field reclamation, and emergency notification and cleanup measures.
 - d. A description of the land application equipment including procedures for calibrating equipment to ensure uniform distribution and appropriate loading rates.
 - e. Procedures used to ensure that land application activities address notification requirements, signage requirements, slope restrictions, operation limitations during periods of inclement weather, soil pH requirements, buffer zone requirements, and site restrictions.
 - f. Any other information necessary to ensure compliance with the requirements of the Biosolids Program of the VPDES Permit Regulation (9VAC25-31-420 through 720).

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and Official Title Brian Carnes, General Manager

Signature 

Telephone number / Email (571) 291-7927 / bcarnes@loudounwater.org

Date signed 6/24/24

(Based on a review of this information, it may be necessary to submit additional information to meet other legal or technical review requirements.)

Standing Sludge Acceptance Letter

Facility Name: Waterford Sewage Treatment Plant
VPDES Permit No. VA0060500

Issue date: July 1, 2024

Expiration Date: None

This is a standing acceptance to dispose of wastewater sludge generated at the Waterford Sewage Treatment Plant. Wastewater sludge shall be hauled by a Loudoun Water permitted waste hauler to the Broad Run Water Reclamation Facility (BRWRF) Septage Receiving Facility for treatment and final disposal.

Procedural requirements for the acceptance of sludge from the Waterford Sewage Treatment Plant facility at the BRWRF are detailed as follows.



Douglas Frasier
Pretreatment Program Manager



Sludge Acceptance Requirements

Sludge Hauler

All haulers shall possess a current Loudoun Water permit to dispose of the wastewater sludge at the Broad Run Water Reclamation Facility.

Notification

The Community Systems Manager shall provide at least five (5) days' notice for any hauled sludge volume. All notifications shall be emailed to the BRWRF Superintendent, the Plant Manager and Pretreatment Manager. Notice shall indicate the treatment facility, proposed haul date(s), and approximate volume. BRWRF Staff may reschedule any delivery based on operational needs at the Broad Run Water Reclamation Facility.

Scheduled hauled volumes of 5,000 gallons, or more, per day shall be separated by a time period of no less than one (1) week.

Analysis Requirements

The Community Systems Manager shall ensure that the following information is collected for any single, hauled sludge volumes exceeding 5,000 gallons per day. All sludge delivered to the BRWRF shall be less than 2% Total Solids.

- Total Solids, mg/L
- Volatile Solids, mg/L
- Chemical Oxygen Demand, mg/L
- Total Kjeldahl Nitrogen, mg/L
- Ammonia-N, mg/L
- Total Phosphorus, mg/L

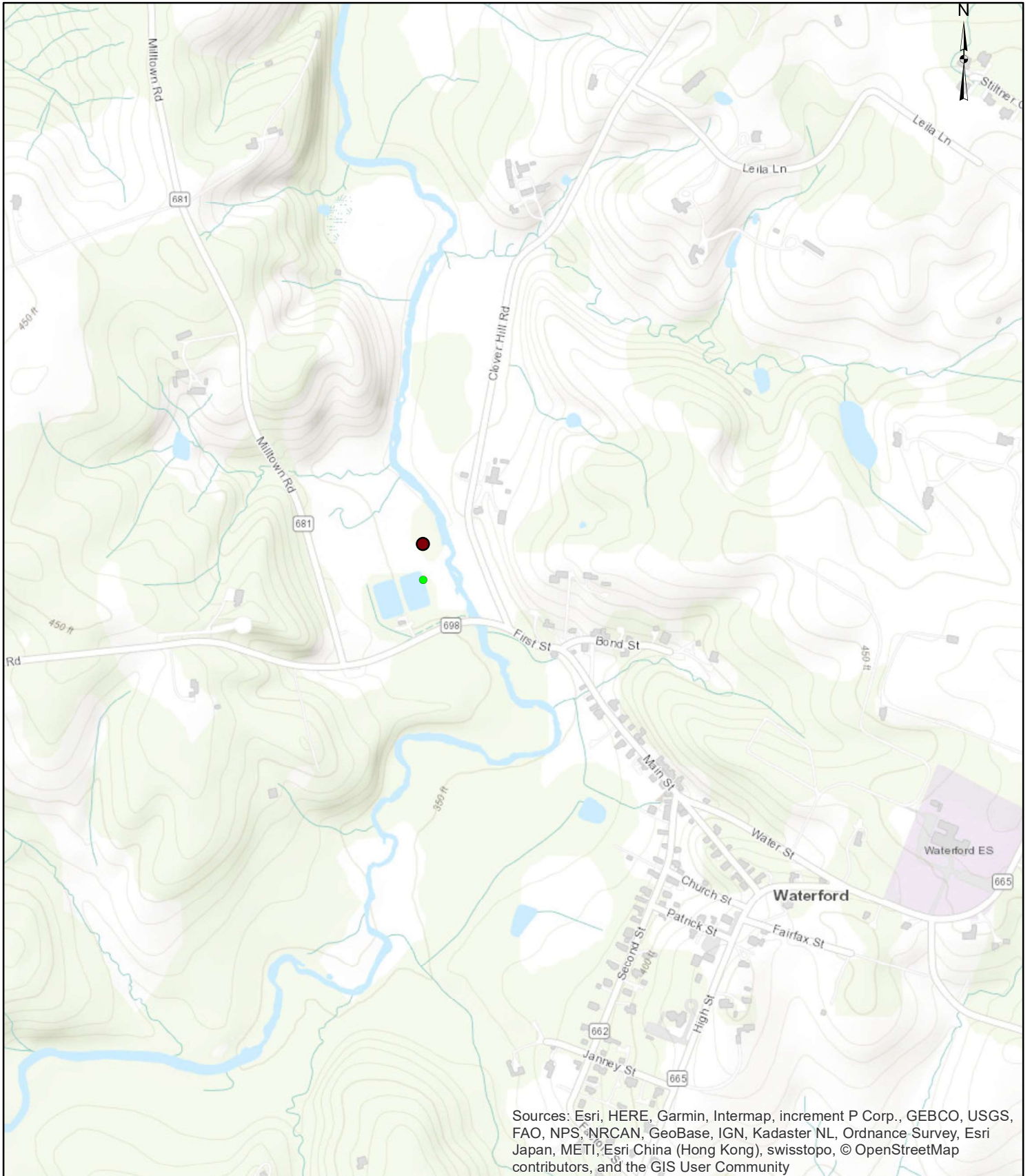
This information shall be retained on file at Loudoun Water.

Modification

The terms and conditions of this standing acceptance letter may be subject to modification at any time as limitations or requirements within the Loudoun County, VA Code of Ordinances, Chapter 1068 are revised, changes/updates to the BRWRF Technically Based Local Limits occur, or other just cause exists.



Waterford Sewage Treatment Plant



Legend

- VA0060500 Outfall 001
- VA0060500 Waterford Sewage Treatment Plant

EPA Identification Number		NPDES Permit Number VA0060500		Facility Name Waterford WWTP		Form Approved 03/05/19 OMB No. 2040-0004		
Form 2A NPDES		U.S. Environmental Protection Agency Application for NPDES Permit to Discharge Wastewater NEW AND EXISTING PUBLICLY OWNED TREATMENT WORKS						
SECTION 1. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS (40 CFR 122.21(j)(1) and (9))								
Facility Information	1.1	Facility name Waterford Wastewater Treatment Facility						
		Mailing address (street or P.O. box) 44865 Loudoun Water Way						
		City or town Ashburn			State VA		ZIP code 20147	
		Contact name (first and last) Ann Zimmerman		Title Manager, Community Systems		Phone number (571) 541-7991		Email address amzimmerman@loudounwater.org
		Location address (street, route number, or other specific identifier) ☐ Same as mailing address 40024 Old Wheatland Road						
		City or town Waterford			State VA		ZIP code 20197	
	Applicant Information	1.2	Is this application for a facility that has yet to commence discharge? ☐ Yes → See instructions on data submission requirements for new dischargers. ☒ No					
1.3		Is applicant different from entity listed under Item 1.1 above? ☐ Yes ☒ No → SKIP to Item 1.4.						
		Applicant name Loudoun Water						
		Applicant address (street or P.O. box) 44865 Loudoun Water Way						
		City or town Ashburn			State VA		ZIP code 20147	
		Contact name (first and last) Brian Carnes		Title General Manager		Phone number (571) 291-7927		Email address bcarnes@loudounwater.org
1.4	Is the applicant the facility's owner, operator, or both? (Check only one response.) ☐ Owner ☐ Operator ☒ Both							
1.5	To which entity should the NPDES permitting authority send correspondence? (Check only one response.) ☐ Facility ☐ Applicant ☒ Facility and applicant (they are one and the same)							
Existing Environmental Permits	1.6	Indicate below any existing environmental permits. (Check all that apply and print or type the corresponding permit number for each.)						
		Existing Environmental Permits						
		☒ NPDES (discharges to surface water) VA0060500		☐ RCRA (hazardous waste)		☐ UIC (underground injection control)		
		☐ PSD (air emissions)		☐ Nonattainment program (CAA)		☐ NESHAPs (CAA)		
		☐ Ocean dumping (MPRSA)		☐ Dredge or fill (CWA Section 404)		☐ Other (specify)		

EPA Identification Number		NPDES Permit Number VA0060500		Facility Name Waterford WWTP		Form Approved 03/05/19 OMB No. 2040-0004	
Collection System and Population Served	1.7	Provide the collection system information requested below for the treatment works.					
		Municipality Served	Population Served	Collection System Type (indicate percentage)		Ownership Status	
		Village of Waterford	275	<u>100</u> % separate sanitary sewer	☒ Own	☒ Maintain	
				_____ % combined storm and sanitary sewer	☐ Own	☐ Maintain	
				☐ Unknown	☐ Own	☐ Maintain	
				_____ % separate sanitary sewer	☐ Own	☐ Maintain	
				_____ % combined storm and sanitary sewer	☐ Own	☐ Maintain	
				☐ Unknown	☐ Own	☐ Maintain	
				_____ % separate sanitary sewer	☐ Own	☐ Maintain	
				_____ % combined storm and sanitary sewer	☐ Own	☐ Maintain	
			☐ Unknown	☐ Own	☐ Maintain		
			_____ % separate sanitary sewer	☐ Own	☐ Maintain		
			_____ % combined storm and sanitary sewer	☐ Own	☐ Maintain		
			☐ Unknown	☐ Own	☐ Maintain		
		Total Population Served	275				
				Separate Sanitary Sewer System	Combined Storm and Sanitary Sewer		
		Total percentage of each type of sewer line (in miles)		100 %	0 %		
Indian Country	1.8	Is the treatment works located in Indian Country? ☐ Yes ☒ No					
	1.9	Does the facility discharge to a receiving water that flows through Indian Country? ☐ Yes ☒ No					
Design and Actual Flow Rates	1.10	Provide design and actual flow rates in the designated spaces.				Design Flow Rate	
						0.058 mgd	
		Annual Average Flow Rates (Actual)					
		Two Years Ago	Last Year		This Year		
		0.042 mgd	0.048 mgd		0.050 mgd		
		Maximum Daily Flow Rates (Actual)					
		Two Years Ago	Last Year		This Year		
	0.079 mgd	0.093 mgd		0.198 mgd			
Discharge Points by Type	1.11	Provide the total number of effluent discharge points to waters of the United States by type.					
		Total Number of Effluent Discharge Points by Type					
		Treated Effluent	Untreated Effluent	Combined Sewer Overflows	Bypasses	Constructed Emergency Overflows	
		1	N/A	N/A	N/A	N/A	

EPA Identification Number	NPDES Permit Number VA0060500	Facility Name Waterford WWTP	Form Approved 03/05/19 OMB No. 2040-0004
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Outfalls Other Than to Waters of the United States			
1.12	Does the POTW discharge wastewater to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the United States? ☐ Yes ☒ No → SKIP to Item 1.14.		
1.13	Provide the location of each surface impoundment and associated discharge information in the table below.		
Surface Impoundment Location and Discharge Data			
	Location	Average Daily Volume Discharged to Surface Impoundment	Continuous or Intermittent (check one)
		gpd	☐ Continuous ☐ Intermittent
		gpd	☐ Continuous ☐ Intermittent
		gpd	☐ Continuous ☐ Intermittent
1.14	Is wastewater applied to land? ☐ Yes ☒ No → SKIP to Item 1.16.		
1.15	Provide the land application site and discharge data requested below.		
Land Application Site and Discharge Data			
	Location	Size	Average Daily Volume Applied
		acres	gpd
		acres	gpd
		acres	gpd
1.16	Is effluent transported to another facility for treatment prior to discharge? ☐ Yes ☒ No → SKIP to Item 1.21.		
1.17	Describe the means by which the effluent is transported (e.g., tank truck, pipe).		
1.18	Is the effluent transported by a party other than the applicant? ☐ Yes ☐ No → SKIP to Item 1.20.		
1.19	Provide information on the transporter below.		
Transporter Data			
Entity name		Mailing address (street or P.O. box)	
City or town		State	ZIP code
Contact name (first and last)		Title	
Phone number		Email address	

EPA Identification Number	NPDES Permit Number VA0060500	Facility Name Waterford WWTP	Form Approved 03/05/19 OMB No. 2040-0004
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SECTION 2. ADDITIONAL INFORMATION (40 CFR 122.21(j)(1) and (2))

Design Flow	Outfalls to Waters of the United States						
	2.1	Does the treatment works have a design flow greater than or equal to 0.1 mgd? ☐ Yes ☒ No → SKIP to Section 3.					
Inflow and Infiltration	2.2	Provide the treatment works' current average daily volume of inflow and infiltration.	Average Daily Volume of Inflow and Infiltration gpd				
	Indicate the steps the facility is taking to minimize inflow and infiltration.						
Topographic Map	2.3	Have you attached a topographic map to this application that contains all the required information? (See instructions for specific requirements.) ☒ Yes ☐ No					
Flow Diagram	2.4	Have you attached a process flow diagram or schematic to this application that contains all the required information? (See instructions for specific requirements.) ☒ Yes ☐ No					
Scheduled Improvements and Schedules of Implementation	2.5	Are improvements to the facility scheduled? ☒ Yes ☐ No → SKIP to Section 3.					
	Briefly list and describe the scheduled improvements.						
	1. Removal and decommissioning of lagoons and existing facility						
	2. New influent pump station						
	3. New two train SBR with influent EQ, tertiary filtration, and UV disinfection.						
	4.						
	2.6	Provide scheduled or actual dates of completion for improvements.					
	Scheduled or Actual Dates of Completion for Improvements						
		Scheduled Improvement (from above)	Affected Outfalls (list outfall number)	Begin Construction (MM/DD/YYYY)	End Construction (MM/DD/YYYY)	Begin Discharge (MM/DD/YYYY)	Attainment of Operational Level (MM/DD/YYYY)
		1.	001	12/01/2025	12/31/2027		
	2.						
	3.						
	4.						
2.7	Have appropriate permits/clearances concerning other federal/state requirements been obtained? Briefly explain your response. ☐ Yes ☒ No ☐ None required or applicable						
Explanation: Project still in design phase.							

EPA Identification Number	NPDES Permit Number VA0060500	Facility Name Waterford WWTP
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Form Approved 03/05/19
OMB No. 2040-0004

SECTION 3. INFORMATION ON EFFLUENT DISCHARGES (40 CFR 122.21(j)(3) to (5))

Description of Outfalls	3.1	Provide the following information for each outfall. (Attach additional sheets if you have more than three outfalls.)				
		Outfall Number	001	Outfall Number	Outfall Number	
	State	Virginia				
	County	Loudoun				
	City or town	Waterford				
	Distance from shore	0	ft.	ft.	ft.	
	Depth below surface	0	ft.	ft.	ft.	
	Average daily flow rate	0.058		mgd	mgd	
	Latitude	39°	11'	30" N	"	"
	Longitude	77°	37'	00" W	"	"
Seasonal or Periodic Discharge Data	3.2	Do any of the outfalls described under Item 3.1 have seasonal or periodic discharges? ☐ Yes ☒ No → SKIP to Item 3.4.				
	3.3	If so, provide the following information for each applicable outfall.				
		Outfall Number	Outfall Number	Outfall Number		
	Number of times per year discharge occurs					
	Average duration of each discharge (specify units)					
	Average flow of each discharge		mgd	mgd	mgd	
Months in which discharge occurs						
Diffuser Type	3.4	Are any of the outfalls listed under Item 3.1 equipped with a diffuser? ☐ Yes ☒ No → SKIP to Item 3.6.				
	3.5	Briefly describe the diffuser type at each applicable outfall.				
		Outfall Number	Outfall Number	Outfall Number		
Waters of the U.S.	3.6	Does the treatment works discharge or plan to discharge wastewater to waters of the United States from one or more discharge points? ☒ Yes ☐ No → SKIP to Section 6.				

EPA Identification Number		NPDES Permit Number VA0060500		Facility Name Waterford WWTP		Form Approved 03/05/19 OMB No. 2040-0004	
Receiving Water Description	3.7	Provide the receiving water and related information (if known) for each outfall.					
			Outfall Number 001	Outfall Number	Outfall Number	Outfall Number	
	Receiving water name	South Fork Catoctin Creek					
	Name of watershed, river, or stream system	Middle Potomac - Catoctin					
	U.S. Soil Conservation Service 14-digit watershed code	unknown					
	Name of state management/river basin	Potomac River					
	U.S. Geological Survey 8-digit hydrologic cataloging unit code	02070008					
	Critical low flow (acute)	unknown	cfs		cfs		cfs
	Critical low flow (chronic)	unknown	cfs		cfs		cfs
	Total hardness at critical low flow	unknown	mg/L of CaCO ₃		mg/L of CaCO ₃		mg/L of CaCO ₃
Treatment Description	3.8	Provide the following information describing the treatment provided for discharges from each outfall.					
			Outfall Number 001	Outfall Number	Outfall Number	Outfall Number	
	Highest Level of Treatment (check all that apply per outfall)	☐ Primary ☐ Equivalent to secondary ☒ Secondary ☐ Advanced ☐ Other (specify)	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify)	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify)	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify)		
	Design Removal Rates by Outfall						
	BOD ₅ or CBOD ₅	85	%		%		%
	TSS	85	%		%		%
	Phosphorus	☒ Not applicable	%	☐ Not applicable	%	☐ Not applicable	%
	Nitrogen	☒ Not applicable	%	☐ Not applicable	%	☐ Not applicable	%
	Other (specify)	☒ Not applicable	%	☐ Not applicable	%	☐ Not applicable	%

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Treatment Description Continued	3.9	Describe the type of disinfection used for the effluent from each outfall in the table below. If disinfection varies by season, describe below. Disinfection is by chlorine tablets currently. Upon facility update, disinfection will change to UV.																
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%;"></th> <th style="width: 20%;">Outfall Number <u>001</u></th> <th style="width: 20%;">Outfall Number _____</th> <th style="width: 30%;">Outfall Number _____</th> </tr> <tr> <td>Disinfection type</td> <td>Chlorine Tablets</td> <td></td> <td></td> </tr> <tr> <td>Seasons used</td> <td>Year-round</td> <td></td> <td></td> </tr> <tr> <td>Dechlorination used?</td> <td> ☐ Not applicable ☒ Yes ☐ No </td> <td> ☐ Not applicable ☐ Yes ☐ No </td> <td> ☐ Not applicable ☐ Yes ☐ No </td> </tr> </table>		Outfall Number <u>001</u>	Outfall Number _____	Outfall Number _____	Disinfection type	Chlorine Tablets			Seasons used	Year-round			Dechlorination used?	☐ Not applicable ☒ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No
		Outfall Number <u>001</u>	Outfall Number _____	Outfall Number _____														
	Disinfection type	Chlorine Tablets																
	Seasons used	Year-round																
Dechlorination used?	☐ Not applicable ☒ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No															

Effluent Testing Data	3.10	Have you completed monitoring for all Table A parameters and attached the results to the application package? ☒ Yes ☐ No																											
	3.11	Have you conducted any WET tests during the 4.5 years prior to the date of the application on any of the facility's discharges or on any receiving water near the discharge points? ☐ Yes ☒ No → SKIP to Item 3.13.																											
	3.12	Indicate the number of acute and chronic WET tests conducted since the last permit reissuance of the facility's discharges by outfall number or of the receiving water near the discharge points. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2"></th> <th colspan="2">Outfall Number _____</th> <th colspan="2">Outfall Number _____</th> <th colspan="2">Outfall Number _____</th> </tr> <tr> <th>Acute</th> <th>Chronic</th> <th>Acute</th> <th>Chronic</th> <th>Acute</th> <th>Chronic</th> </tr> <tr> <td>Number of tests of discharge water</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of tests of receiving water</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Outfall Number _____		Outfall Number _____		Outfall Number _____		Acute	Chronic	Acute	Chronic	Acute	Chronic	Number of tests of discharge water							Number of tests of receiving water						
		Outfall Number _____		Outfall Number _____		Outfall Number _____																							
		Acute	Chronic	Acute	Chronic	Acute	Chronic																						
	Number of tests of discharge water																												
	Number of tests of receiving water																												
	3.13	Does the treatment works have a design flow greater than or equal to 0.1 mgd? ☐ Yes ☒ No → SKIP to Item 3.16.																											
	3.14	Does the POTW use chlorine for disinfection, use chlorine elsewhere in the treatment process, or otherwise have reasonable potential to discharge chlorine in its effluent? ☐ Yes → Complete Table B, including chlorine. ☐ No → Complete Table B, omitting chlorine.																											
	3.15	Have you completed monitoring for all applicable Table B pollutants and attached the results to this application package? ☐ Yes ☐ No																											
3.16	Does one or more of the following conditions apply? - The facility has a design flow greater than or equal to 1 mgd. - The POTW has an approved pretreatment program or is required to develop such a program. - The NPDES permitting authority has informed the POTW that it must sample for the parameters in Table C, must sample other additional parameters (Table D), or submit the results of WET tests for acute or chronic toxicity for each of its discharge outfalls (Table E). ☐ Yes → Complete Tables C, D, and E as applicable. ☒ No → SKIP to Section 4.																												
3.17	Have you completed monitoring for all applicable Table C pollutants and attached the results to this application package? ☐ Yes ☐ No																												
3.18	Have you completed monitoring for all applicable Table D pollutants required by your NPDES permitting authority and attached the results to this application package? ☐ Yes ☐ No additional sampling required by NPDES permitting authority.																												

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Effluent Testing Data Continued	3.19	Has the POTW conducted either (1) minimum of four quarterly WET tests for one year preceding this permit application or (2) at least four annual WET tests in the past 4.5 years? ☐ Yes ☐ No → Complete tests and Table E and SKIP to Item 3.26.				
	3.20	Have you previously submitted the results of the above tests to your NPDES permitting authority? ☐ Yes ☐ No → Provide results in Table E and SKIP to Item 3.26.				
	3.21	Indicate the dates the data were submitted to your NPDES permitting authority and provide a summary of the results. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; text-align: center;">Date(s) Submitted (MM/DD/YYYY)</th> <th style="width: 50%; text-align: center;">Summary of Results</th> </tr> <tr> <td style="height: 40px;"></td> <td></td> </tr> </table>	Date(s) Submitted (MM/DD/YYYY)	Summary of Results		
	Date(s) Submitted (MM/DD/YYYY)	Summary of Results				
	3.22	Regardless of how you provided your WET testing data to the NPDES permitting authority, did any of the tests result in toxicity? ☐ Yes ☐ No → SKIP to Item 3.26.				
	3.23	Describe the cause(s) of the toxicity:				
	3.24	Has the treatment works conducted a toxicity reduction evaluation? ☐ Yes ☐ No → SKIP to Item 3.26.				
3.25	Provide details of any toxicity reduction evaluations conducted.					
3.26	Have you completed Table E for all applicable outfalls and attached the results to the application package? ☐ Yes ☐ Not applicable because previously submitted information to the NPDES permitting authority.					

SECTION 4. INDUSTRIAL DISCHARGES AND HAZARDOUS WASTES (40 CFR 122.21(j)(6) and (7))					
Industrial Discharges and Hazardous Wastes	4.1 Does the POTW receive discharges from SIUs or NSCIUs? ☐ Yes ☒ No → SKIP to Item 4.7.				
	4.2 Indicate the number of SIUs and NSCIUs that discharge to the POTW. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%; text-align: center;">Number of SIUs</th> <th style="width: 50%; text-align: center;">Number of NSCIUs</th> </tr> <tr> <td style="height: 30px;"></td> <td></td> </tr> </table>	Number of SIUs	Number of NSCIUs		
	Number of SIUs	Number of NSCIUs			
	4.3 Does the POTW have an approved pretreatment program? ☐ Yes ☐ No				
	4.4 Have you submitted either of the following to the NPDES permitting authority that contains information substantially identical to that required in Table F: (1) a pretreatment program annual report submitted within one year of the application or (2) a pretreatment program? ☐ Yes ☐ No → SKIP to Item 4.6.				
4.5 Identify the title and date of the annual report or pretreatment program referenced in Item 4.4. SKIP to Item 4.7.					
4.6 Have you completed and attached Table F to this application package? ☐ Yes ☐ No					

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Industrial Discharges and Hazardous Wastes Continued	4.7	Does the POTW receive, or has it been notified that it will receive, by truck, rail, or dedicated pipe, any wastes that are regulated as RCRA hazardous wastes pursuant to 40 CFR 261? ☐ Yes ☒ No → SKIP to Item 4.9.		
	4.8	If yes, provide the following information:		
	Hazardous Waste Number	Waste Transport Method (check all that apply)	Annual Amount of Waste Received	Units
		☐ Truck ☐ Dedicated pipe	☐ Rail ☐ Other (specify) _____	
		☐ Truck ☐ Dedicated pipe	☐ Rail ☐ Other (specify) _____	
		☐ Truck ☐ Dedicated pipe	☐ Rail ☐ Other (specify) _____	
	4.9	Does the POTW receive, or has it been notified that it will receive, wastewaters that originate from remedial activities, including those undertaken pursuant to CERCLA and Sections 3004(7) or 3008(h) of RCRA? ☐ Yes ☒ No → SKIP to Section 5.		
	4.10	Does the POTW receive (or expect to receive) less than 15 kilograms per month of non-acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e)? ☐ Yes → SKIP to Section 5. ☐ No		
	4.11	Have you reported the following information in an attachment to this application: identification and description of the site(s) or facility(ies) at which the wastewater originates; the identities of the wastewater's hazardous constituents; and the extent of treatment, if any, the wastewater receives or will receive before entering the POTW? ☐ Yes ☐ No		
SECTION 5. COMBINED SEWER OVERFLOWS (40 CFR 122.21(j)(8))				
CSO Map and Diagram	5.1	Does the treatment works have a combined sewer system? ☐ Yes ☒ No → SKIP to Section 6.		
	5.2	Have you attached a CSO system map to this application? (See instructions for map requirements.) ☐ Yes ☐ No		
	5.3	Have you attached a CSO system diagram to this application? (See instructions for diagram requirements.) ☐ Yes ☐ No		

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CSO Outfall Description	5.4	For each CSO outfall, provide the following information. (Attach additional sheets as necessary.)					
			CSO Outfall Number _____	CSO Outfall Number _____	CSO Outfall Number _____		
	City or town						
	State and ZIP code						
	County						
	Latitude	° ' "	° ' "	° ' "	° ' "		
	Longitude	° ' "	° ' "	° ' "	° ' "		
	Distance from shore		ft.		ft.		ft.
	Depth below surface		ft.		ft.		ft.
CSO Monitoring	5.5	Did the POTW monitor any of the following items in the past year for its CSO outfalls?					
			CSO Outfall Number _____	CSO Outfall Number _____	CSO Outfall Number _____		
	Rainfall		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
	CSO flow volume		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
	CSO pollutant concentrations		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
	Receiving water quality		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
	CSO frequency		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
	Number of storm events		☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
CSO Events in Past Year	5.6	Provide the following information for each of your CSO outfalls.					
			CSO Outfall Number _____	CSO Outfall Number _____	CSO Outfall Number _____		
	Number of CSO events in the past year		events	events	events		
	Average duration per event		hours ☐ Actual or ☐ Estimated	hours ☐ Actual or ☐ Estimated	hours ☐ Actual or ☐ Estimated		
	Average volume per event		million gallons ☐ Actual or ☐ Estimated	million gallons ☐ Actual or ☐ Estimated	million gallons ☐ Actual or ☐ Estimated		
	Minimum rainfall causing a CSO event in last year		inches of rainfall ☐ Actual or ☐ Estimated	inches of rainfall ☐ Actual or ☐ Estimated	inches of rainfall ☐ Actual or ☐ Estimated		

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CSO Receiving Waters	5.7	Provide the information in the table below for each of your CSO outfalls.		
		CSO Outfall Number ____	CSO Outfall Number ____	CSO Outfall Number ____
	Receiving water name			
	Name of watershed/ stream system			
	U.S. Soil Conservation Service 14-digit watershed code (if known)	☐ Unknown	☐ Unknown	☐ Unknown
	Name of state management/river basin			
	U.S. Geological Survey 8-Digit Hydrologic Unit Code (if known)	☐ Unknown	☐ Unknown	☐ Unknown
	Description of known water quality impacts on receiving stream by CSO (see instructions for examples)			

SECTION 6. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))			
Checklist and Certification Statement	6.1	In Column 1 below, mark the sections of Form 2A that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.	
		Column 1	Column 2
	☒	Section 1: Basic Application Information for All Applicants	☐ w/ variance request(s) ☐ w/ additional attachments
	☒	Section 2: Additional Information	☒ w/ topographic map ☒ w/ process flow diagram ☐ w/ additional attachments
	☒	Section 3: Information on Effluent Discharges	☒ w/ Table A ☐ w/ Table D ☐ w/ Table B ☐ w/ Table E ☐ w/ Table C ☐ w/ additional attachments
	☐	Section 4: Industrial Discharges and Hazardous Wastes	☐ w/ SIU and NSCIU attachments ☐ w/ Table F ☐ w/ additional attachments
	☐	Section 5: Combined Sewer Overflows	☐ w/ CSO map ☐ w/ additional attachments ☐ w/ CSO system diagram
	☒	Section 6: Checklist and Certification Statement	☐ w/ attachments

6.2	Certification Statement <i>I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</i>	
	Name (print or type first and last name) Brian Carnes	Official title General Manager
	Signature 	Date signed 6/24/24

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TABLE A. EFFLUENT PARAMETERS FOR ALL POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units		
Biochemical oxygen demand ☒ BOD ₅ or ☐ CBOD ₅ (report one)	45.3	mg/L	6.3	mg/L	SM5210B	☒ ML ☐ MDL 0
Fecal coliform	9.6	MPN/100 mL	1.0	MPN/100 mL	SM9223B (E. coli)	☒ ML ☐ MDL <1
Design flow rate	0.198	MGD	0.043	MGD		
pH (minimum)	6.7	Standard Units				
pH (maximum)	8.7	Standard Units				
Temperature (winter)	21.9	C	9.9	C		
Temperature (summer)	28.8	C	23.0	C		
Total suspended solids (TSS)	34.5	mg/L	11.1	mg/L	SM2540D	☒ ML ☐ MDL 0

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE B. EFFLUENT PARAMETERS FOR ALL POTWS WITH A FLOW EQUAL TO OR GREATER THAN 0.1 MGD

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Number of Samples	Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units			
Ammonia (as N)							☐ ML ☐ MDL
Chlorine (total residual, TRC) ²							☐ ML ☐ MDL
Dissolved oxygen							☐ ML ☐ MDL
Nitrate/nitrite							☐ ML ☐ MDL
Kjeldahl nitrogen							☐ ML ☐ MDL
Oil and grease							☐ ML ☐ MDL
Phosphorus							☐ ML ☐ MDL
Total dissolved solids							☐ ML ☐ MDL

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

² Facilities that do not use chlorine for disinfection, do not use chlorine elsewhere in the treatment process, and have no reasonable potential to discharge chlorine in their effluent are not required to report data for chlorine.

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Metals, Cyanide, and Total Phenols							
Hardness (as CaCO ₃)							☐ ML ☐ MDL
Antimony, total recoverable							☐ ML ☐ MDL
Arsenic, total recoverable							☐ ML ☐ MDL
Beryllium, total recoverable							☐ ML ☐ MDL
Cadmium, total recoverable							☐ ML ☐ MDL
Chromium, total recoverable							☐ ML ☐ MDL
Copper, total recoverable							☐ ML ☐ MDL
Lead, total recoverable							☐ ML ☐ MDL
Mercury, total recoverable							☐ ML ☐ MDL
Nickel, total recoverable							☐ ML ☐ MDL
Selenium, total recoverable							☐ ML ☐ MDL
Silver, total recoverable							☐ ML ☐ MDL
Thallium, total recoverable							☐ ML ☐ MDL
Zinc, total recoverable							☐ ML ☐ MDL
Cyanide							☐ ML ☐ MDL
Total phenolic compounds							☐ ML ☐ MDL
Volatile Organic Compounds							
Acrolein							☐ ML ☐ MDL
Acrylonitrile							☐ ML ☐ MDL
Benzene							☐ ML ☐ MDL
Bromoform							☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units		
Carbon tetrachloride						☐ ML ☐ MDL
Chlorobenzene						☐ ML ☐ MDL
Chlorodibromomethane						☐ ML ☐ MDL
Chloroethane						☐ ML ☐ MDL
2-chloroethylvinyl ether						☐ ML ☐ MDL
Chloroform						☐ ML ☐ MDL
Dichlorobromomethane						☐ ML ☐ MDL
1,1-dichloroethane						☐ ML ☐ MDL
1,2-dichloroethane						☐ ML ☐ MDL
trans-1,2-dichloroethylene						☐ ML ☐ MDL
1,1-dichloroethylene						☐ ML ☐ MDL
1,2-dichloropropane						☐ ML ☐ MDL
1,3-dichloropropylene						☐ ML ☐ MDL
Ethylbenzene						☐ ML ☐ MDL
Methyl bromide						☐ ML ☐ MDL
Methyl chloride						☐ ML ☐ MDL
Methylene chloride						☐ ML ☐ MDL
1,1,2,2-tetrachloroethane						☐ ML ☐ MDL
Tetrachloroethylene						☐ ML ☐ MDL
Toluene						☐ ML ☐ MDL
1,1,1-trichloroethane						☐ ML ☐ MDL
1,1,2-trichloroethane						☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units		
Trichloroethylene						☐ ML ☐ MDL
Vinyl chloride						☐ ML ☐ MDL
Acid-Extractable Compounds						
p-chloro-m-cresol						☐ ML ☐ MDL
2-chlorophenol						☐ ML ☐ MDL
2,4-dichlorophenol						☐ ML ☐ MDL
2,4-dimethylphenol						☐ ML ☐ MDL
4,6-dinitro-o-cresol						☐ ML ☐ MDL
2,4-dinitrophenol						☐ ML ☐ MDL
2-nitrophenol						☐ ML ☐ MDL
4-nitrophenol						☐ ML ☐ MDL
Pentachlorophenol						☐ ML ☐ MDL
Phenol						☐ ML ☐ MDL
2,4,6-trichlorophenol						☐ ML ☐ MDL
Base-Neutral Compounds						
Acenaphthene						☐ ML ☐ MDL
Acenaphthylene						☐ ML ☐ MDL
Anthracene						☐ ML ☐ MDL
Benzidine						☐ ML ☐ MDL
Benzo(a)anthracene						☐ ML ☐ MDL
Benzo(a)pyrene						☐ ML ☐ MDL
3,4-benzofluoranthene						☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units		
Benzo(ghi)perylene						☐ ML ☐ MDL
Benzo(k)fluoranthene						☐ ML ☐ MDL
Bis (2-chloroethoxy) methane						☐ ML ☐ MDL
Bis (2-chloroethyl) ether						☐ ML ☐ MDL
Bis (2-chloroisopropyl) ether						☐ ML ☐ MDL
Bis (2-ethylhexyl) phthalate						☐ ML ☐ MDL
4-bromophenyl phenyl ether						☐ ML ☐ MDL
Butyl benzyl phthalate						☐ ML ☐ MDL
2-chloronaphthalene						☐ ML ☐ MDL
4-chlorophenyl phenyl ether						☐ ML ☐ MDL
Chrysene						☐ ML ☐ MDL
di-n-butyl phthalate						☐ ML ☐ MDL
di-n-octyl phthalate						☐ ML ☐ MDL
Dibenzo(a,h)anthracene						☐ ML ☐ MDL
1,2-dichlorobenzene						☐ ML ☐ MDL
1,3-dichlorobenzene						☐ ML ☐ MDL
1,4-dichlorobenzene						☐ ML ☐ MDL
3,3-dichlorobenzidine						☐ ML ☐ MDL
Diethyl phthalate						☐ ML ☐ MDL
Dimethyl phthalate						☐ ML ☐ MDL
2,4-dinitrotoluene						☐ ML ☐ MDL
2,6-dinitrotoluene						☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge		Analytical Method ¹	ML or MDL (include units)
	Value	Units	Value	Units		
1,2-diphenylhydrazine						☐ ML ☐ MDL
Fluoranthene						☐ ML ☐ MDL
Fluorene						☐ ML ☐ MDL
Hexachlorobenzene						☐ ML ☐ MDL
Hexachlorobutadiene						☐ ML ☐ MDL
Hexachlorocyclo-pentadiene						☐ ML ☐ MDL
Hexachloroethane						☐ ML ☐ MDL
Indeno(1,2,3-cd)pyrene						☐ ML ☐ MDL
Isophorone						☐ ML ☐ MDL
Naphthalene						☐ ML ☐ MDL
Nitrobenzene						☐ ML ☐ MDL
N-nitrosodi-n-propylamine						☐ ML ☐ MDL
N-nitrosodimethylamine						☐ ML ☐ MDL
N-nitrosodiphenylamine						☐ ML ☐ MDL
Phenanthrene						☐ ML ☐ MDL
Pyrene						☐ ML ☐ MDL
1,2,4-trichlorobenzene						☐ ML ☐ MDL

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE D. ADDITIONAL POLLUTANTS AS REQUIRED BY NPDES PERMITTING AUTHORITY

[illegible]

¹ Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter I, subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE E: EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

Test Information		Test Number _____	Test Number _____	Test Number _____
Test species				
Age at initiation of test				
Outfall number				
Date sample collected				
Date test started				
Duration				
Toxicity Test Methods				
Test method number				
Manual title				
Edition number and year of publication				
Page number(s)				
Sample Type				
Check one:		☐ Grab	☐ Grab	☐ Grab
		☐ 24-hour composite	☐ 24-hour composite	☐ 24-hour composite
Sample Location				
Check one:		☐ Before Disinfection	☐ Before Disinfection	☐ Before disinfection
		☐ After Disinfection	☐ After Disinfection	☐ After disinfection
		☐ After Dechlorination	☐ After Dechlorination	☐ After dechlorination
Point in Treatment Process				
Describe the point in the treatment process at which the sample was collected for each test.				
Toxicity Type				
Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.)		☐ Acute	☐ Acute	☐ Acute
		☐ Chronic	☐ Chronic	☐ Chronic
		☐ Both	☐ Both	☐ Both

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TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

	Test Number _____	Test Number _____	Test Number _____
Test Type			
Indicate the type of test performed. (Check one response.)	☐ Static ☐ Static-renewal ☐ Flow-through	☐ Static ☐ Static-renewal ☐ Flow-through	☐ Static ☐ Static-renewal ☐ Flow-through
Source of Dilution Water			
Indicate the source of dilution water. (Check one response.)	☐ Laboratory water ☐ Receiving water	☐ Laboratory water ☐ Receiving water	☐ Laboratory water ☐ Receiving water
If laboratory water, specify type.			
If receiving water, specify source.			
Type of Dilution Water			
Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.	☐ Fresh water ☐ Salt water (specify)	☐ Fresh water ☐ Salt water (specify)	☐ Fresh water ☐ Salt water (specify)
Percentage Effluent Used			
Specify the percentage effluent used for all concentrations in the test series.			
Parameters Tested			
Check the parameters tested.	☐ pH ☐ Salinity ☐ Temperature	☐ Ammonia ☐ Dissolved oxygen ☐ pH ☐ Salinity ☐ Temperature	☐ Ammonia ☐ Dissolved oxygen ☐ pH ☐ Salinity ☐ Temperature
Acute Test Results			
Percent survival in 100% effluent	%	%	%
LC ₅₀			
95% confidence interval	%	%	%
Control percent survival	%	%	%

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TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

	Test Number _____	Test Number _____	Test Number _____
Acute Test Results Continued			
Other (describe)			
Chronic Test Results			
NOEC	%	%	%
IC ₂₅	%	%	%
Control percent survival	%	%	%
Other (describe)			
Quality Control/Quality Assurance			
Is reference toxicant data available?	☐ Yes	☐ No	☐ Yes ☐ No
Was reference toxicant test within acceptable bounds?	☐ Yes	☐ No	☐ Yes ☐ No
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (describe)			

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TABLE F. INDUSTRIAL DISCHARGE INFORMATION

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

	SIU ____	SIU ____	SIU ____
Name of SIU			
Mailing address (street or P.O. box)			
City, state, and ZIP code			
Description of all industrial processes that affect or contribute to the discharge.			
List the principal products and raw materials that affect or contribute to the SIU's discharge.			
Indicate the average daily volume of wastewater discharged by the SIU.	gpd	gpd	gpd
How much of the average daily volume is attributable to process flow?	gpd	gpd	gpd
How much of the average daily volume is attributable to non-process flow?	gpd	gpd	gpd
Is the SIU subject to local limits?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Is the SIU subject to categorical standards?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

EPA Identification Number	NPDES Permit Number VA0060500	Facility Name Waterford WWTP
---------------------------	----------------------------------	---------------------------------

TABLE F. INDUSTRIAL DISCHARGE INFORMATION

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

	SIU ____	SIU ____	SIU ____
Under what categories and subcategories is the SIU subject?			
Has the POTW experienced problems (e.g., upsets, pass-through interferences) in the past 4.5 years that are attributable to the SIU? If yes, describe.	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

VPDES Permit Application Addendum

1. **Entity to whom the permit is to be issued:** _____
Who will be legally responsible for the wastewater treatment facilities and compliance with the permit? This may or may not be the facility or property owner.
2. **State Corporation Commission (SCC) Entity Identification No.:** _____
If the owner is required to obtain an entity identification number by law (e.g. Incorporated (Inc.), Limited Liability Companies (LLCs), Limited Partnerships (LPs) and certificates of authority). If not applicable to the owner, please indicate "NA" as your answer.
3. **Facility Design Average Flow:** _____ MGD
Industrial Facilities - Maximum 30-day Average Production Level (include units)?

In addition to the above design flow or production level, should the permit be written with limits for any other discharge flow tiers or production levels? ☐ YES ☐ NO

If "Yes", please specify the other flow tiers (in MGD) or production levels: _____

4. **Nature of operations generating wastewater:**

_____ % of flow from domestic connections/sources

Number of private residences to be served by the wastewater treatment facility: ☐ 0 ☐ 1-49 ☐ 50 or more

_____ % of flow from non-domestic connections/sources

5. **Consent to receive electronic mail**

The Department of Environmental Quality (DEQ) may deliver permits, certifications and plan approvals to recipients, including applicants or permittees, by electronically certified mail where the recipients notify DEQ of their consent to receive mail electronically (§ 10.1-1183). Check *only one* of the following to consent to or decline receipt of electronic mail from DEQ as follows:

- ☐ Applicant or permittee agrees to receive by electronic mail the permit and any plan approvals associated with the permit that may be issued for the proposed pollutant management activity, and to certify receipt of such electronic mail when requested by the DEQ.

Please provide email: _____

- ☐ Applicant or permittee declines to receive by electronic mail the permit and any plan approvals associated with the permit that may be issued for the proposed pollutant management activity.

6. **Financial Assurance/Closure**

The Financial Assurance Regulation, 9VAC25-650 applies to all privately owned sewerage systems that treat sewage generated by private residences and discharge more than 1,000 gallons per day and less than 40,000 gallons per day. A private residence is defined as any building, buildings or part of a building owned by a private entity which serves as a permanent residence where sewage is generated. It does not apply to hotels, motels, seasonal camps and industrial facilities that do not serve as permanent residences. The regulation requires that a closure plan, a cost estimate and a financial assurance mechanism be in place. Is financial assurance/cost estimate/closure plan requirement applicable to this facility? ☐ YES ☐ NO

7. **Materials (Chemical) Storage:**

Using the table below, provide a list of the chemicals used/stored at this facility, along with the volume stored and the spill/stormwater prevention measures taken to prevent the stored chemicals from reaching state waters.

Chemical	Volume Stored	Spill/Stormwater Prevention Measures

PROJECT NO. 50168128

LOUDOUN WATER COMMUNITY SYSTEMS AMMONIA REMOVAL UPGRADES

Basis of Design Report

JUNE 14, 2024



FINAL

SUBMITTED BY
Dewberry Engineers Inc.
8401 Arlington Boulevard
Fairfax, Virginia 22031-4666

SUBMITTED TO
Loudoun Water
44865 Loudoun Water Way
Ashburn, Virginia 20146

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Executive Summary

Loudoun Water owns and operates several small community wastewater treatment plants (WWTP), five of which are being impacted by the new ammonia criteria for wastewater treatment plants less than 0.5 MGD, adopted by Virginia DEQ in October 2020. The five wastewater treatment plants, Waterford, St. Louis, Elysian Heights, Raspberry Falls/Selma, and Aldie were evaluated in a study performed by Black and Veatch titled Loudoun Water Community Systems – Ammonia Removal Study dated June 2021. This report recommended that the Waterford and St. Louis treatment plants required complete replacements of the existing system and that Elysian Heights required numerous upgrades to support the upcoming ammonia criteria. This project focuses specifically on Waterford, St. Louis, and Elysian Heights WWTPs.

This basis of design report (BODR) summarizes the design approach for the replacement and/or upgrades to the Waterford, St. Louis and Elysian Heights WWTPs located in Loudoun County, Virginia.

The replacement and upgrades of the facilities are being designed, permitted and constructed via Progressive Design Build (PDB) delivery method. This delivery method allows a transparent and collaborative process to provide best value to Loudoun Water and allows a fast-tracked project schedule to meet discharge permit compliance schedules. As part of this process, several technical memorandums, and requests for information (RFI) were submitted and addressed by Loudoun Water to establish key decisions and basis of design requirements such as the use of Sequencing Batch Reactor (SBR) technology for new treatment processes, influent flow and sewage characteristics and SBR manufacturer selections amongst others. Those documents are summarized in the BODR and attached for reference.

Waterford WWTP

The Waterford WWTP is located adjacent to the Historic Village of Waterford. The WWTP is rated for an average day capacity of 58,000 GPD and currently uses an aerated lagoon treatment system. This facility will be replaced with a new SBR treatment system. Due to its proximity to the Village of Waterford, the facility will be enclosed in a building. The Waterford WWTP replacement will include the following:

- New Influent Pumping Station
- Influent Screening System and Flow Splitter Box
- Pre-Equalization Basin
- Sludge Holding Tank
- SBR Process Tanks
- Post-Equalization Tanks
- Tertiary Filtration
- UV Disinfection
- WWTP Building that will house all components including the control room, generator, lab room, chemical storage, tertiary filtration, UV disinfection, and blowers and be finished architecturally to blend into the historic village of Waterford (The influent pump station will be separate with several below grade structures for the wet well, valve vault, and flow meter vault)
- HVAC, Plumbing and Ancillary Support Systems
- Decommissioning and abandonment of existing lagoon systems and associated buildings
- Site Improvements such as new fencing, security driveways, access, etc.
- Landscaping

In addition to the major components, the facility will consider the potential for future expansion by including design elements to allow for expansion and prevent costly rework in the future.

St. Louis WWTP

The St. Louis WWTP is located within the St. Louis community. The WWTP is rated for an average day capacity of 86,000 GPD and currently uses an aerated lagoon treatment system. This facility will be replaced with a new SBR treatment system and the new treatment basins will be outdoors. The tertiary filter/UV systems will be housed in buildings to protect equipment from the elements. The St. Louis WWTP replacement will include the following:

- Influent Screening System and Flow Splitter Box
- Pre-Equalization Basin
- Sludge Holding Tank with additional storage volume to serve as a regional receiving facility
- SBR Process Tanks
- Post-Equalization Tanks
- Tertiary Filtration and UV Disinfection in the maintenance and control building
- Maintenance, Storage and Control Building to serve as a regional storage facility, and include a lab room, utility room, and control room
- Decommissioning and abandonment of existing lagoon systems and associated buildings
- Site Improvements such as new fencing, security driveways, access, etc.
- Landscaping

Elysian Heights WWTP

The Elysian Heights WWTP is located outside of Lucketts, northeast of Route 15. The WWTP includes a vertical mechanical screen, secondary treatment, and chlorine disinfection. The secondary treatment is accomplished through an extended aeration treatment system. The plant is rated for an average day capacity of 120,000 GPD. Meeting future ammonia limits may require additional aeration capacity to allow the plant to fully nitrify. Various other improvements are included as part of this project to provide upgraded controls, instrumentation, chemical systems and UV disinfection. The Elysian Heights WWTP upgrades will include the following:

- Conversion from chlorine to UV disinfection
- PLC programming and connection to existing SCADA system
- Electrical upgrades required for planned improvements
- Modifications to existing chemical feed building to accommodate improvements

All three (3) facilities will be constructed as part of the PDB project and will be phased and sequenced accordingly to meet the needs of Loudoun Water. Project procurement approach and budgetary costs are included as attachments. As the project progresses, design will include 30%, 60% and 90% deliverables for Phase I work. In addition, early procurement, pricing and potentially guaranteed maximum price (GMP) may be reached/agreed upon to allow for early work packages, if necessary. A formal procurement plan is being submitted under separate cover.

A formal project schedule is included as an attachment. Key milestone dates include:

- 30% Design Submission (All Facilities) – August 27, 2024
- 60% Design Submission (All Facilities) – January 21, 2025
- 90% Design Submission (All Facilities) – May 13, 2025
- Waterford Startup – February 3, 2027
- Elysian Heights Startup – October 30, 2026
- St. Louis Startup – June 24, 2027

1. Background and Purpose

1.1 Background

Loudoun Water owns and operates several small community wastewater treatment plants (WWTP), five of which are being impacted by the new ammonia criteria for wastewater treatment plants less than 0.5 MGD, adopted by Virginia DEQ in October 2020. The five treatment plants, Waterford, St. Louis, Elysian Heights, Raspberry Falls/Selma, and Aldie WWTPs were evaluated in a study performed by Black and Veatch titled Loudoun Water Community Systems – Ammonia Removal Study dated June 2021. This report recommended that the Waterford and St. Louis treatment plants required complete replacements of the existing system and that Elysian Heights required numerous upgrades to support the upcoming ammonia criteria. This project focuses specifically on Waterford, St Louis, and Elysian Heights WWTPs.

1.2 Purpose

This basis of design report (BODR) summarizes the design approach for the replacement and/or upgrades to the Waterford, St. Louis and Elysian Heights wastewater treatment plants (WWTP) located in Loudoun County, Virginia. The report will document design assumptions based upon influent characterization, effluent requirements, and site assessments. The purpose of the BODR is to outline the recommended improvements at all three (3) facilities, provide budgetary costs, and a preliminary execution schedule for the overall project.

1.3 Previous Evaluations

Prior to the development of the BODR, four (4) RFIs were prepared and previously reviewed by Loudoun Water. These documents are summarized below and are included as attachments to the BODR.

- RFI #005: Building Layouts and Approach
- RFI #007: Treatment Technology Evaluation
- RFI #009: Influent Flow, Influent Characteristics, and Effluent Limitations
- RFI #003: SBR Manufacturer Evaluation Attachment H

1.4 Overview

The following BODR is developed to evaluate and outline the approach to each facility in individual sections. Each section will begin with background information including general information, project site, influent characterization, and effluent requirements. The section will outline the design requirements for each major component of the WWTP and various ancillary items, including preliminary layouts.

2. Common Design Requirements and Equipment Selections

2.1 Common Design Requirements

There are many design requirements for wastewater treatment plants that are either regulatory requirements or are industry best practices; refer to **Table 2-1** for a select list of references that will be used in design. The listed requirements will generally specify the minimum standards of the design; the design may be more conservative based upon best engineering judgement and industry standards. The plants will be designed to EPA Reliability Class I.

TABLE 2-1 – MISCELLANEOUS DESIGN REQUIREMENTS	
DESIGN REQUIREMENTS	DESCRIPTION
Virginia SCAT Regulations	Sewage collection and treatment regulations for the Commonwealth of Virginia
Loudoun Water Engineers Design Manual	Loudoun Water design standards
EPA Design Criteria For Mechanical, Electrical, and Fluid System Component Reliability	Requirements for redundant tanks, equipment, and appurtenances
NFPA 820	Definition of classified hazardous locations and special design requirements for hazardous locations
NEC	National Electric Code
2021 Virginia Uniform Statewide Building Code (VUSBC)	Requirements for New or Modifications to Existing Structures
2021 International Building Code	Incorporated by reference in the VUSBC
ACI 350-20: Code Requirements for Environmental Engineering Concrete Structures	Design requirements for structures that convey, store, or treat water, wastewater, other liquids, and solid waste

2.2 Lagoon Closures

Both the Waterford and St. Louis WWTPs utilize aerated lagoon processes. Each facility uses multiple lagoons for treatment. The Waterford WWTP utilizes two lagoons, and the St. Louis WWTP utilizes three lagoons. As part of this project, all the existing lagoons will be decommissioned and closed in accordance with DEQ requirements.

Closure of the existing lagoons at each facility will require the development of a closure plan, to be submitted and approved by DEQ prior to the closure. The closure plan will be developed to include a detailed description of the existing facilities and a stepwise plan for decommissioning the lagoon(s) and associated infrastructure. The plan will include an inventory specifying the types of existing structures and equipment to be removed, proper protocol for removing structures/equipment, means and methods of disposing of effluent and residuals, and required monitoring and documentation to be completed during and after the process. To accurately account for necessary effluent and residual sludge disposal requirements, testing will be performed to characterize the chemical composition of each. Based on the results of the effluent and residual sludge testing, an operational plan will detail appropriate disposal steps. Existing soil monitoring and groundwater well data will be incorporated into the development of disposal plans, and future monitoring requirements will be determined and detailed in the closure plan as well.

Upon completion of the Closure Plan for the lagoons, the plan will be submitted to DEQ for review and approval. Agency comments will be addressed as necessary, and the final approved plan, including a detailed decommissioning work sequence, will be specified in the Construction/Contract Documents phase of the project, as applicable. It is anticipated that the deed for the property will need to be amended to reflect the presence of a closed sewage aerobic lagoon.

For St. Louis, it is proposed to use the existing Lagoon 3 space for construction of the new facility and ancillary improvements. This will be incorporated into the closure plan and coordinated with DEQ. At a minimum, 4-feet of fill will need to be removed from the bottom of the lagoon and replaced with stone or other select fill prior to placing any base slab. The final requirements will be further defined after sampling and geotechnical analysis of the lagoon.

2.3 Common Equipment

2.3.1 Introduction

Since both Waterford and St. Louis will be new systems, the recommended approach to simplify long term operation and maintenance is to standardize common equipment across both facilities. The major equipment that would be common across the facilities include:

- Influent Screening
- Sequencing Batch Reactor (SBR) Equipment
- Submersible Mixers
- Diffusers
- Blowers
- Submersible Pumps
- Process Mechanical Equipment (Valves, Weirs, Gates, etc.)
- Tertiary Filtration
- Disinfection

The following sections include a brief evaluation of each piece of equipment and the recommended approach for design and construction.

2.3.2 Influent Screening

At the design flow rates for these facilities, an inclined micro strainer is the most common type of influent mechanical screen. There are several manufacturers that provide this equipment including JWC Environmental, Lakeside, and Huber. Each of these manufacturers provide similar screening and hydraulic performance and have negligible differences in operation and maintenance or channel widths.

Loudoun Water does not have a current standard manufacturer for mechanical screening equipment but does have several JWC and Lakeside mechanical screens installed at other facilities. Two (2) new mechanical screens will be provided as part of this project, one (1) at the Waterford WWTP and one (1) at the St. Louis WWTP. The mechanical screens will be housed inside buildings in a concrete influent channel. Based on discussions with Loudoun Water, operations staff is comfortable operating and maintaining both JWC and Lakeside systems. Preliminary equipment budget costs for each manufacturer are summarized below:

- Lakeside Raptor Micro Strainer 12MS-0.12-101 for both facilities- \$238,600 Total
- JWC Auger Monster ALE 1800-285-2500-35 for both facilities - \$181,500 Total
- Huber Micro Strainer ROTAMAT Ro9 300/3 for the Waterford WWTP and Ro9 400/3 for the St. Louis WWTP - \$237,500 Total

The JWC mechanical screen will be used as a basis for the design for these facilities due to the low initial capital cost. During procurement, competitive pricing for all three (3) manufacturers can be obtained to determine the final installation cost and the design can be modified between 60% and 90% to accommodate larger channels or modified electrical/control requirements.

2.3.3 SBR Equipment

There are several different SBR manufacturers that offer SBR treatment process equipment. An evaluation of various manufacturers was performed as part of a technical memorandum titled SBR Manufacturer Evaluation submitted as RFI #003 included as **Attachment H**. The evaluation compared the treatability, operation, maintenance, and life cycle cost of both Aqua Aerobic SBR and Sanitaire ICEAS SBR systems. The memorandum recommended proceeding with the use of the Sanitaire ICEAS SBR system for the basis of design due to its lower overall life cycle cost, favorable operability and Loudoun Water familiarity with the system.

The main SBR system components include blowers, diffusers, mixers, pumps, decanters, and instrumentation and controls. Most of the equipment including blowers, mixers, and pumps will also be utilized in other unit processes such as the influent pump station and pre and post equalization basins.

For example, the wet-pit submersible WAS pumps will be the same pump type as the influent pumps, pre-equalization pumps, and post-equalization pumps. In total, approximately 21 wet-pit submersible pumps will be required across all three (3) facilities. Loudoun Water's standard is to use Flygt pumps for these installations. Flygt is a part of Xylem, who also supplies the Sanitaire ICEAS SBR system. Therefore, it is assumed that Flygt pumps be used across the entire project, final pumps can be selected utilizing a competitive bid during procurement. Additional equipment recommendations to be used as the basis of design are summarized in **Table 2-2** below.

TABLE 2-2 – EQUIPMENT MANUFACTURER	
EQUIPMENT	MANUFACTURER(S)
Decanter	Sanitaire
Submersible Pumps	Flygt
Blowers	Aerzen
Mixers	Flygt
Diffusers	Sanitaire, Aquarius, or approved equal

The rest of the minor equipment (i.e., valves, guides, actuators, probes) will be included as part of subsequent design packages for review and approval and be in accordance with Loudoun Water EDM requirements.

2.3.4 Tertiary Filtration

2.3.4.1 Introduction

Three options were evaluated for the tertiary filtration systems at the Waterford WWTP and St. Louis WWTP: cloth media disk filtration, upflow, deep bed, granular media filtration, and conventional sand filters. All the options can meet the design requirements, however the operating principles of the technologies are different. The main differences in components between the different forms of tertiary filtration include filtration media, unit dimensions, system components, and ancillary equipment. The technologies contributing to these differences for each filtration system drive the system O&M requirements and costs, which also varies between both alternatives.

2.3.4.2 Design Assumptions

Table 2-3 summarizes the design requirements provided to process vendors for each facility to identify model selection associated with each filtration alternative. Flow rates in **Table 2-3** are based upon the previous discussions in RFI #009 in **Attachment G**. The average influent TSS, peak influent TSS are based upon SBR performance with conservatism included if SBR is not operating at peak performance. Effluent TSS is based upon the recommended design of Table 14.4 of WEF MOP 8. All filter types are designed for phosphorus removal down to 1 mg/L with the addition of Aluminum Sulfate (Alum).

TABLE 2-3 – TERTIARY FILTRATION DESIGN					
PARAMETER	DESIGN FLOWS		DESIGN TSS		
	AVERAGE FLOW (GPM)	PEAK FLOW (GPM)	AVERAGE INFLUENT TSS (MG/L)	PEAK INFLUENT TSS (MG/L)	EFFLUENT TSS* (MG/L)
WATERFORD WWTP	41	91	15	30	4
ST. LOUIS WWTP	60	160	15	30	4

2.3.4.3 Cloth Media Disk Filter Systems

Aqua-Aerobic Systems, Inc. (Aqua Aerobic) provided a selection for two (2) Aqua MiniDisk cloth media filtration units at both Waterford WWTP and St. Louis WWTP. The Aqua MiniDisk filtration unit utilizes vertically oriented cloth media disks consisting of cloth media under their OptiFiber media line, which are rated to treat flows containing high levels of solids and high hydraulic loading rates, see **Figure 2.1**. The disk filtration units offered by Aqua-Aerobics feature cloth media with a pore size of 5 microns for both facilities. The unit also features a low hydraulic profile, which optimizes the head loss of the unit, and a low backwash rate, which reduces the amount of backwash flow that must be handled. Regular O&M for this technology is relatively simple, as the media disks can be removed and replaced by hand and replacement costs for the disks are economical. Because of the outside to inside flow path, Aqua-Aerobics cloth disk filters handle peak solids events better and recover faster than many other technologies. Additionally, no external backwash water tank is required, and the filters can provide filtration even during backwash and cleaning cycles.

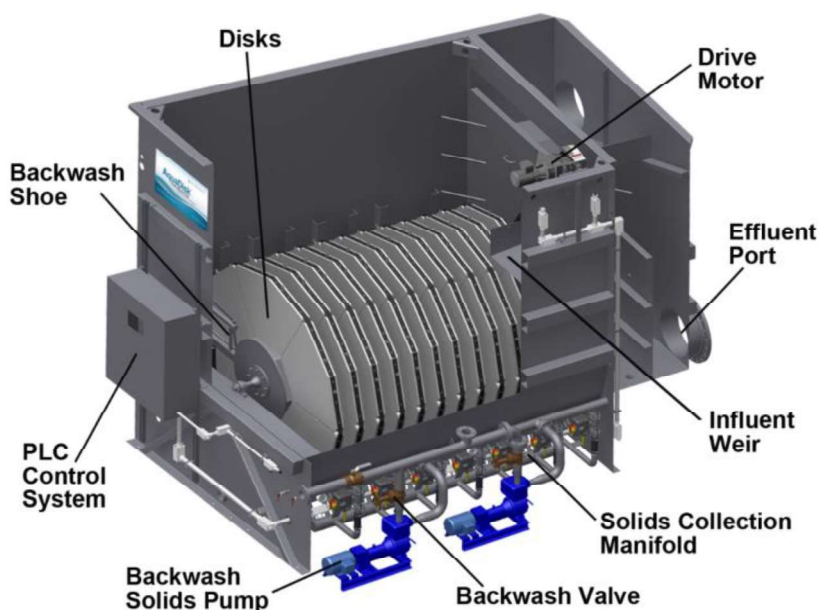


Figure 2.1 - Cloth Disk Filter

2.3.4.4 Upflow, Deep Bed Sand Filter Systems

Parkson proposed two (2) Dynasand filtration units for applications at both Waterford WWTP and St. Louis WWTP. The Dynasand filtration unit is an upflow, deep bed, granular media filter technology with continuous or intermittent backwash capabilities. For the application of tertiary filtration at both facilities, intermittent backwash solutions will be investigated due to the nature of flow provided from the upstream SBR process. Backwash storage tanks and pump systems are not required with this system aiding in the O&M affiliated with this technology; however, an air compressor system is required. Clean-in-place and process chemicals are also not required with this system. **Figure 2.2** displays the flow scheme for the model of Dynasand deep bed sand filtration unit proposed at both sites.

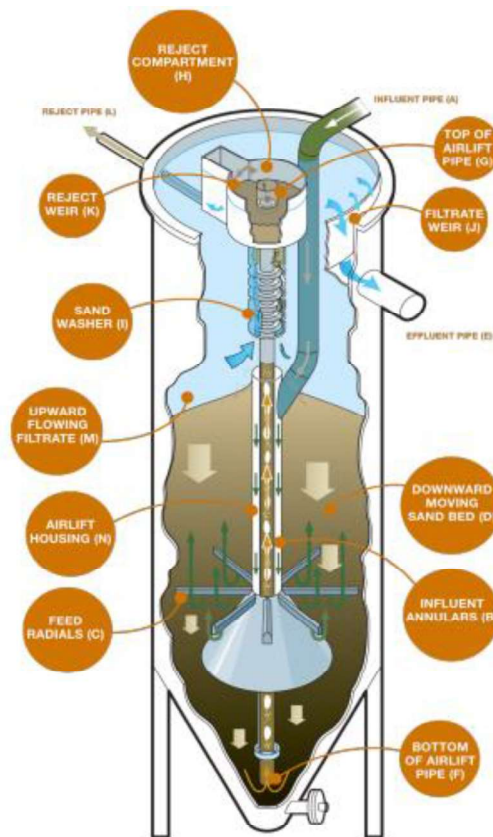


Figure 2.2 - Dynasand Sand Filter Flow Diagram

Flow enters the unit through a horizontal pipe that bends down into the bed through the top of the unit, which carries flow towards the bottom of the tank between the feed pipe and airlift housing. Feed is then introduced to the media through one of many distribution radials, and the flow is filtered as it moves upward through the media. The filtrate then exits at the top of the filter over the effluent filtrate weir. During this time, media is cleaned and recycled throughout the filter via airshaft pipe and media washer mechanism. A steady stream of compressed air is required to operate this system to draw media into the airlift piping for cleaning, which allows for continuous operation while reducing the volume of backwash water produced. As such, no shutdown is required for backwash cycles and the possibility for short-circuiting is low. However, the system must be maintained through regularly scheduled sand media change-outs. The two drawbacks to an upflow are the significant height of the unit and the deep bed sand filter system is a higher head loss. The proposed units are over 22' tall, which would have a major impact on the design of the buildings that will contain these units.

2.3.4.5 Conventional Sand Filter

Two manufacturers, Leopold and Orthos, were evaluated for the traditional sand filtration option. Leopold indicated that they would not be able to provide a design and proposal based upon the size of the facilities. Orthos indicated that they would be able to provide filters for an application of this size. The Orthos filtration system includes a nozzle underdrain system that utilizes filtered effluent and air for a cycled back wash. The primary advantage of an Orthos system is that it is an industry proven technology that Loudoun Water is familiar with. However, there are some significant disadvantages to this system for this application. Unlike the previous two options, an external backwash tank sized for approximately 900 gallons is required along with associated back wash pumps and air scour system to backwash and clean the filter media. During these backwash cycles, all flow would have to be routed through the other tertiary filter, concurrent forward flow and backwash is not possible. The physical height of a conventional sand filter is shorter than an upflow, deep bed sand filter, but taller than a cloth disk filter, which will require additional design considerations including a taller building or depressed sump area. Preliminary filter

heights are anticipated to be in the range of 11' tall. The final draw backs are the capital cost and the requirement to replace the granular media.

2.3.4.6 Summary and Conclusion

Table 2-4 summarizes the pros and cons of the filtration system alternatives offered for the Waterford and St. Louis WWTPs.

TABLE 2-4 - TERTIARY FILTRATION TECHNOLOGY COMPARISON					
DEEP BED SAND FILTRATION		CLOTH MEDIA FILTRATION		CONVENTIONAL SAND FILTER	
PROS	CONS	PROS	CONS	PROS	CONS
High solids loading rates.	Granular media must be cleaned out, disposed of offsite, and replaced.	Low head loss.	Requires annual chemical cleaning cycles with chlorine to prevent biological fouling.	Industry proven technology that Loudoun Water is familiar with	Granular media must be cleaned out, disposed of offsite, and replaced.
Can add denitrification capabilities if required.	Significant equipment height.	Compact footprint and height.	Requires backwash system with pump and solenoid valves.	-	Equipment height
Forward flow can occur during backwash cycle	Higher head loss	Ability to handle peak solids loading events.	-	-	Requires backwash tank, pumps, and air scour system
-	-	Simple media replacement.	-	-	Forward flow cannot occur during backwash cycle
-	-	Forward flow can occur during backwash cycle	-	-	Significantly higher capital cost

Table 2-5 shows the equipment capital costs associated with the installation of each tertiary filter alternative at Waterford, St. Louis, and Elysian Heights WWTP.

TABLE 2-5 - TERTIARY FILTRATION SYSTEM COST COMPARISON			
FACILITY	WATERFORD	ST LOUIS	TOTAL COST
Aqua-Aerobic MiniDisk Cloth Media Filter	\$291,350	\$332,580	\$623,930
Parkson Dynasand Deep Bed Sand Filter	\$375,000	\$415,000	\$790,000
Orthos Conventional Sand Filter	\$600,000	\$700,000	\$1,300,000

It is recommended to proceed with an Aqua-Aerobic MiniDisk Cloth Media Filter for this project due to the following benefits.

- Compact footprint and height
- Simple media replacement
- Lowest capital cost
- Does not require external back wash tank or air scour system

2.3.5 UV Disinfection

2.3.5.1 Introduction

The two types of UV systems that were evaluated are contact, low pressure, low output (LPLO) systems and contact, low pressure, high output (LPHO) systems, each by various manufacturers. Both types of UV disinfection systems rely on ultraviolet light to accomplish disinfection and can meet the proposed design requirements.

In contact UV systems, the UV lamps are installed into the disinfection chamber to directly contact with the feed flow. Quartz sleeves are used to isolate the UV diodes from directly contacting with the flow, thereby maintaining a fairly uniform lamp output. Contact systems generally provide a higher degree of treatment at a lesser power requirement. Contact systems can be provided in both a LPLO and LPHO configuration, which will be discussed in subsequent sections. Most contact systems also typically include an automated cleaning system to remove biological build-up and chemical fouling. However, this feature is usually only offered with LPHO UV system, since LPLO UV system are often utilized for small and simple installations. For instance, the LPLO option of UV lamp systems proposed herein, or the Trojan PTP line, does not accommodate automated cleaning systems. However, Trojan's alternative for LPHO UV treatment does include a mechanical and chemical automated cleaning system.

The pressure of UV lamps refers to the internal gas pressure of the lamp, where the pressure level of the gas encased in the lamp determines the radiation provided by the system. For municipal WWTPs of this size, low pressure is generally used in lieu of medium pressure because of capital cost savings, operation and maintenance cost savings, reduced operating temperatures, and better ability to handle intermittent flow.

2.3.5.2 Design Assumptions

Table 2-6 summarizes the design requirements provided to each vendor to identify model selection associated with each UV system alternative. Flow rates and design TSS in **Table 2-3** are based upon the previous discussions in RFI #009 in **Attachment G**.

TABLE 2-6 - UV DISINFECTION TECH DESIGN ASSUMPTIONS		
PARAMETER	DESIGN FLOW (GPM)	DESIGN TSS (MG/L)
Waterford WWTP	91 (max flow rate)	10
St. Louis WWTP	160 (max flow rate)	10
Elysian Heights WWTP	475 (peak flow rate)	30

Additionally, each alternative includes the following design criteria:

- Effluent E. Coli Geometric Monthly Average of 126 #/100 mLs, based upon anticipated effluent limits as discussed in RFI #009 in **Attachment G**
- 55% Ultraviolet Transmittance (UVT)
- Minimum average UV Dose of 50,000 mJ/cm² after 7,500 hrs
- The system will be sized with a minimum of two banks sized for 50% of the peak flow rate

2.3.5.3 Low System Pressure and Low Lamp Output UV Systems

A selection for LPLO contact UV systems at all three facilities was provided from Trojan Technologies. Low lamp output refers to the level of lamp radiation being lower comparatively to high level UV systems. The dosage of low pressure, low output system, measured in mJ/cm² per lamp, is lower than high output systems; therefore, more lamps are required UV systems. As such, LPLO lamp systems are advantageous in smaller applications that aren't footprint limited due to the additional number of lamps required because the cost per lamp is significantly less expensive than LPHO lamps. LPLO systems provided by Trojan Technologies do not feature automated cleaning systems and must be removed individually for regular maintenance cleaning protocols. As such, the maintenance time required to support the Trojan Technologies LPLO lamp systems can be expected to be longer and more regular due to operators needing to service lamps manually. Summaries of the LPLO UV lamp systems quoted from Trojan Technologies are displayed in **Table 2-7**.

TABLE 2-7 - LPLO UV SYSTEM EQUIPMENT SUMMARY

PARAMETER	WATERFORD WWTP	ST. LOUIS WWTP	ELYSIAN HEIGHTS WWTP
Manufacturer	Trojan Technologies	Trojan Technologies	Trojan Technologies
Model	D3075K	3200K	3800K
No. Banks	2	2	2
No. Modules per Bank	3	6	8
No. Lamps per Module	2	2	4
Total No. Lamps	12	16	24
Power Draw per Lamp (Watt)	87.5	87.5	87.5
Total System Load (kW)	0.54	1.4	2.1
Total Footprint Required	11'-0" x 1'-6"	19'-0" x 1'-8"	19'-0" x 2'-2"
Anticipated Lamp Life	12,000 hours	12,000 hours	12,000 hours
Cost Per Lamp	\$63		

2.3.5.4 Low System Pressure and High Lamp Output UV Systems

A LPHO lamp contact system selection for each facility was provided by Wedeco, Veolia, and Trojan Technologies. The dosage, measured in mJ/cm² per lamp, of low pressure, high output systems is higher when compared to lower output systems; therefore, less bulbs are generally required in high output UV systems. LPHO UV models are advantageous towards users that are willing to trade off a higher power demand for a lower process footprint or on larger systems to reduce the number of bulbs required. Less lamps are replaced on an annual-basis and less man hours are needed to support such systems; however, the cost per lamp of LPHO systems are higher than its counterparts.

LPHO UV systems quoted by all three of the featured manufacturers include automated cleaning systems, which reduces maintenance man hours required to upkeep the disinfection processes. The Wedeco and Veolia LPHO UV systems both include pneumatically powered mechanical wipe cleaning systems. The Trojan Technologies LPHO UV system also features a similar mechanical wiping system to the other models; however, a chemical (citric acid) cleaning system is also included.

TABLE 2-8 - LPHO UV SYSTEM EQUIPMENT SUMMARY			
PARAMETER	WATERFORD	ST. LOUIS	ELYSIAN HEIGHTS
VEOLIA - AQUARAY S MODULE SYSTEM			
No. Banks	2	2	2
No. Modules per Bank	2	3	4
No. Lamps per Module	2	2	4
Total No. Lamps	8	12	32
Total System Load (kW)	1.4	2.1	5.5
Total Footprint Required	18'-7" x 1'-2"	18'-7" x 1'-4"	20'-7" x 1'-10"
Anticipated Lamp Life	12,000 hours	12,000 hours	12,000 hours
Cost Per Lamp	\$30		
WEDECO – TAK Smart UV System			
No. Banks	2	2	2
No. Modules per Bank	1	1	2
No. Lamps per Module	4	6	6
Total No. Lamps	8	12	24
Total System Load (kW)	3.4	4.6	8.2
Total Footprint Required	19'-5" x 1'-4"	21'-3" x 1'-10"	24'-8" x 2'-2"
Anticipated Lamp Life	14,000 hours	14,000 hours	14,000 hours
Cost Per Lamp	\$182		
TROJAN – UV3000 PLUS			
No. Banks	2	2	2
No. Modules per Bank	2	2	3
No. Lamps per Module	4	4	6
Total No. Lamps	16	16	36
Total System Load (kW)	4	4	9
Total Footprint Required	30' x 8"	30' x 8"	30' x 1'-0"
Anticipated Lamp Life	12,000 hours	12,000 hours	12,000 hours
Cost Per Lamp	\$397		

2.3.5.5 Summary and Conclusion

Various UV disinfection system technologies were investigated for potential selection and implementation at the three facilities.

Table 2-9 shows the total equipment capital costs associated with the installation of each UV alternative at Waterford, St. Louis, and Elysian Heights WWTP. Annualized O&M costs includes the following components.

- Lamps
- Bulbs
- Sleeves
- Ballasts
- Miscellaneous Operations and Maintenance Costs
- Power Costs

TABLE 2-9 - UV SYSTEM COST COMPARISON				
FACILITY	Number of Banks/Modules/Lamps	Automated Cleaning System (Y/N)	Total Capital Cost for all Three Facilities* (\$)	Annualized O&M Cost (\$)
Veolia – Aquaray (LPHO)	52 Lamps	Yes, mechanical cleaning only	\$290,500	\$6,757
Xylem – WEDECO (LPHO)	56 Lamps	Yes, mechanical cleaning only	\$280,220	\$19,620
Trojan Technologies – PTP (LPLO)	52 Lamps	No	\$199,399	\$4,633
Trojan Technologies – 3000 Plus (LPHO)	68 Lamps	Yes, mechanical and chemical cleaning	\$467,000	\$10,563
*Total capital cost includes equipment and capital cost for UV disinfection system at all three facilities.				

Dewberry recommends the selection of the Trojan PTP UV (LPLO) system for each facility due to lower capital and O&M cost. The LPHO options have a much higher cost based on a capital and O&M costs and do not provide a significant additional benefit in automated cleaning as the UV lamps still need to be periodically removed and manually cleaned even with an automated in-channel cleaning system.

3. Waterford WWTP

3.1 General Information

The Waterford WWTP is located at 40024 Old Wheatland Road (PIN 303-35-2541) at the intersection of Old Wheatland Road and Milltown Road. The existing facility serves the Village of Waterford. The existing facility is a lagoon treatment plant rated for 58,000 GPD average daily flow, which was determined to need either extensive modification or replacement to meet the new ammonia limits. It was decided to replace the existing treatment facility with a new sequencing batch reactor (SBR) to meet the new effluent requirements.

3.2 Project Site

The existing site is about 8.43 acres and varies in elevation from approximately 340 feet to 366 feet. The site is generally flat but will be final graded as part of the project to meet hydraulic requirements with the existing outfall. The existing outfall is located at the southeast corner of the parcel, and discharges into the South Catoctin Creek and consists of a 10" pipe in a headwall with a flap valve at an invert of elevation of 338'. The WWTP is in a historic district in Loudoun County, Virginia. Waterford is a National Historic Landmark, meaning that it is recognized by the United States government for its historical significance, as the village is dedicated to preserving its 18th- and 19th-century architecture and landscape.

3.3 Permitting

The property is zoned AR-1 and subject to the recently adopted 2023 Loudoun County Zoning Ordinance. After preliminary discussions with Loudoun County Planning and Zoning, it is likely that the existing special exception application from 1975 is still applicable and that a new special exception application will not be required.

The project will require a site plan application to be reviewed and approved by Loudoun County. The site plan will include the site existing conditions and demolition plan, site layout and grading plan, erosion and sediment controls in 2 phase format, stormwater management design, utility profiles, and a landscape plan to show compliance with zoning regulations. At "conditional approval," a phase 1 grading permit can be obtained to begin earthwork operations and established phase 1 erosion and sediment controls.

It seems the floodplain on the property has been adequately studied because cross-sections appear on FEMA maps. Due to the location of the proposed building being located opposite floodplain and with approximately 10' of vertical separation, a floodplain study is not anticipated to be required. It is assumed that any earthwork within floodplain limits can be permitted through a "certification of no-rise or no impact" during the site plan review process.

Under the Loudoun County 2023 Zoning Ordinance Table 6.01-1, state scenic rivers require a minimum 300' River and Stream Corridor Resource (RSCR) Buffer. Catoctin Creek adjacent the property is classified as state scenic river. There is an additional 50' Riparian Protection Buffer on the floodplain limits. Utility lines for public sewer is an allowable use within the RSCR buffer but impacts may be required to be mitigated.

Loudoun County floodplain and storm drainage easements will likely be required through the site plan process. Once the easement plat is approved and recorded, a phase 2 grading permit can be obtained.

VDOT land use permits will be required for any work in rights-of-way and to permit temporary and permit entrances.

3.3.1 Stormwater Management

Due to the anticipated amount land disturbance for site of greater than 1 acre, a VSMP (Virginia Stormwater Management Program) permit will be required. The project will be considered redevelopment and is anticipated to be subject to the Virginia Stormwater Management Program (VSMP) regulations that will go into effect on July 1, 2024.

3.3.2 Virginia Department of Historic Resources

A review of the Virginia Department of Historic Resources (DHR) Virginia Cultural Resources Information System (VCRIS) database noted that the Waterford wastewater treatment plant falls within the Waterford Historic District and Waterford Preservation Zone (DHR ID #401-0123), which is listed as a National Historic Landmark (NHL) as well as being listed on the National Register of Historic Places (NRHP) and the Virginia Landmarks Register (VLR).

As the project location falls within a listed historic landmark, if any federal nexus for the project is established, such as the use of federal funds or wetlands permitting through the U.S. Army Corps of Engineers (USACE), a review of the proposed project plans may be required by the Advisory Council on Historic Preservation as well as the National Historic Landmarks Program National Capital Regional Office, which administers the NHL program in Loudoun County, VA. In addition, the project is anticipated to be subject to a review by DHR. The architecture and appearance of proposed structures and appurtenances may be subject to revisions in order to ensure the proposed facility upgrades do not impact the existing listed historic nature of the historic district or its viewshed.

It is recommended that, regardless of the necessity of review and approval from the aforementioned advisory groups, coordination with DHR be conducted to ensure the proposed project does not adversely impact the historic nature of the Waterford Historic District.

The project also falls adjacent to the Catoctin Creek Scenic River architectural resource (DHR ID #053-0059), which has been determined eligible for listing on the NRHP by the DHR board. As an eligible property, development adjacent to this resource would be subject to the same requirements and restrictions as the Waterford Historic District. It is recommended that DHR consultation be conducted for this resource to ensure the proposed project design does not adversely impact the eligibility of this resource.

VCRIS records indicate that the area within and immediately adjacent to the project location has not been subject to a recorded Phase 1 archaeological survey. If significant ground disturbance outside of the previously disturbed/developed area is required for the proposed design, a Phase 1 archaeological survey of the proposed Limits of Disturbance (LOD) is anticipated to be necessary to determine the presence of unidentified archaeological resources.

3.3.3 Waters of the U.S. and State including Wetlands

Small wetland and stream features were identified around the proposed project location during a delineation of the site, particularly within the floodplain of Catoctin Creek where scattered wetlands were noted. As the site is adjacent to areas that contain non-tidal jurisdictional Waters of the U.S. (WOUS) and State waters, Clean Water Act (CWA) Section 404/401 permits may need to be acquired through the U.S. Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (DEQ) dependent on the final LOD defined for the project. Impacts to Catoctin Creek below the mean low water mark (MLW) will require coordination and permit acquisition through the Virginia Marine Resources Commission (VMRC). If impacts to Catoctin Creek do not involve utility installations above or below the waterway, VMRC permitting may be accomplished through DEQ during the Joint Permit Application (JPA) process. Coordination with the United States Coast Guard (USCG) may also be required for any project aspects affecting Catoctin Creek.

3.3.4 Threatened & Endangered Species

Federally listed species identified during preliminary review of the state and federal Threatened and Endangered (T&E) species databases included the federally endangered Northern Long-eared Bat (NLEB; *Myotis septentrionalis*), the Tricolored Bat (*Perimyotis subflavus*), which is proposed to be listed as endangered, the Green Floater (*Lasmigona subviridis*), which is proposed to be listed as threatened, as well as the Monarch Butterfly (*Danaus plexippus*), which is currently listed as a candidate species. No critical habitat for any of the listed or proposed listed species was identified within or adjacent to the Waterford facility.

In addition to the federally listed species discussed above, the state listed threatened Wood Turtle (*Glyptemys insculpta*) and Loggerhead Shrike (*Lanius ludovicianus*) are listed as being observed within 2 miles of the project location.

Federal and state wetland impact permits require compliance with Section 7 of the Endangered Species Act (ESA) and coordination with the U.S. Fish & Wildlife Service (USFWS) is anticipated to be required for the project.

No roosts or hibernaculum for the NLEB have been identified within or adjacent to the project location, nor has the species been detected within 3 miles of the project location. It is not anticipated that this project would adversely affect the NLEB. However, a voluntary commitment to a Time of Year Restriction (TOYR) for tree clearing activities between April 1st to November 15th would facilitate a more streamlined T&E species review with the required agencies. Similarly, the Tricolored bat has no recorded habitat or observations within or adjacent to the project area and is not anticipated to be adversely affected by the proposed project. A voluntary TOYR for tree clearing would further avoid adverse impacts to the species.

The Green Floater and Wood Turtle have been observed in Catoctin Creek downstream of the project area. Direct impacts to Green Floater habitat are not anticipated as in-stream work in Catoctin Creek is not expected to be necessary for this project. However, the presence of T&E habitat directly downstream of the project area may result in additional Erosion and Sediment Control (ESC) requirements and stricter limits for any reissuance of a VPDES permit. Additionally, the potential for Wood Turtle habitat to extend into the portion of Catoctin Creek adjacent to the project area may result in time-of-year restrictions from April 1st through June 30th on any land disturbing activities within 600 feet from stream edge, and July 1st through October 31st on any land disturbing activities within 300 feet from stream edge to protect this species during their active periods. If in-stream work is determined necessary, a stream mussel survey may be required and a TOYR from October 1st through April 30th on instream work to protect Wood Turtles during winter hibernation may be required.

The Loggerhead Shrike was observed once within 2-miles of the project area within the last century. It is not anticipated that this project will adversely affect the species.

The Monarch Butterfly is a candidate species and there are no official current protections for the butterfly, however the species is currently under study. Should the status of the species change to threatened or endangered, additional coordination with the USFWS may be necessary and project aspects may need to be altered to prevent impact to the species.

Eagles and their nests are protected under the Bald and Golden Eagle Protection Act. The closest Bald Eagle (*Haliaeetus leucocephalus*) nest is located approximately 5 miles from the project area, and there are no Bald Eagle concentration areas within or adjacent to the project area. It is not anticipated that this project will have any adverse effects to Bald Eagles.

3.3.5 Parks & Preservation Areas, Conservation Easements & Scenic Rivers

There are no parks or preservation areas noted adjacent to the project location. However, there are several conservation easements in the general vicinity of the project area, most of which are associated with the Waterford Historic District. It is not anticipated that the proposed project will impact any of the adjacent conservation easements.

The existing wastewater treatment facility is located adjacent to a portion of Catoctin Creek that is designated as a Virginia Scenic River. As such, it is anticipated that the proposed project plans may be reviewed by the Catoctin Creek Scenic River Advisory Committee and/or the Piedmont Environmental Council and may be subject to recommendations of the committee in consideration of protection of existing vegetation within the stream buffer and viewshed from the creek.

In addition to the potential reviews discussed above, the new Loudoun County Zoning Ordinances, adopted December 13th, 2023, establish restrictions and requirements for activities within areas defined as River and Stream Corridor Resources (RSCR) (Chapter 6). The ordinance defines a 300-foot stream buffer around scenic rivers, including a 50-foot Riparian Protection Buffer Width and a 250-foot Variable

Riparian Preservation Buffer Width. The anticipated activities do not meet the definition of an allowable exception to the requirements of this ordinance and will be subject to the requirements of the ordinances.

3.3.6 Hazardous Materials

The proposed project area consists of existing grazed pasture lands, a well, and the existing wastewater treatment plant. Should the project require acquisition of permanent or temporary right-of-way, a Phase I Environmental Site Assessment (ESA) may be required to be obtained. A review of the DEQ Environmental Data Mapper noted the presence of a non-active petroleum tank and a closed petroleum release site within the existing facility. If excavation is necessary in the vicinity of these identified sites, there is the potential to encounter contaminated soils. Appropriate precautions should be taken, and any contaminated substrates encountered should be reported to DEQ and disposed of properly. Structure demolition should be subjected to lead based paint and asbestos containing materials inspections to assess worker protection, handling and disposal methodologies. Should asbestos containing materials be noted notification and authorization for its removal may be required from the Department of Labor and Industry.

3.4 Wastewater Treatment Design Summary

Influent wastewater characteristics and effluent limitations were discussed in detail in RFI #009: Influent Flow, Influent Characteristics, and Effluent Limitations included in **Attachment G**. The conclusions of the referenced RFI are summarized below and are the basis of the design for the proceeding sections.

TABLE 3-1 – WATERFORD WWTP INFLUENT FLOW BASIS OF DESIGN			
DESCRIPTION	FACTOR	FLOW GPD	FLOW GPM
Annual Average Daily Flow	1	58,000	41
Maximum Month Average Daily Flow	1.61	93,360	65
Maximum Daily Flow	2.27	131,700	91
Peak Hour Flow	4.54	263,400	183

TABLE 3-2 – WATERFORD WWTP INFLUENT LOADING BASIS OF DESIGN				
DESCRIPTION	CURRENT AVERAGE DAILY LOADINGS LBS/DAY	DESIGN ANNUAL AVERAGE DAILY LOADING LBS/DAY	DESIGN MAXIMUM MONTH AVERAGE DAILY LOADING LBS/DAY	DESIGN MAXIMUM DAY LOADING LBS/DAY
Biochemical Oxygen Demand (BOD ₅)	6.5	89.5	112	134
Total Suspended Solids (TSS)	3.0	83.9	105	126
Total Kjeldahl Nitrogen (TKN)	2.7	17.2	21.5	25.8
Ammonia-N (NH ₃ -N)	2.4	10.7	13.4	16.1
Total Phosphorus (TP)	0.3	2.6	3.3	4.0
Nitrite/Nitrate (NO _x)	0.0	0.3	0.3	0.4
Alkalinity as CaCO ₃	16.0	118.8	148.5	178.2

TABLE 3-3 – WATERFORD WWTP EFFLUENT BASIS OF DESIGN

DESCRIPTION	MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	CALENDAR YEAR AVERAGE
pH (SU)			6.0	9.0	
Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	10 mg/L	15 mg/L			
Total Suspended Solids (TSS)	10 mg/L	15 mg/L			
Dissolved Oxygen (DO)			6.8 mg/L		
Total Kjeldahl Nitrogen (TKN)	3.0 mg/L	4.5 mg/L			
E. Coli	126 n/100mLs				
Total Nitrogen (TN)					8.0 mg/L
Total Phosphorus as P (TP)					1.0 mg/L

TABLE 3-4 – WATERFORD WWTP EFFLUENT AMMONIA BASIS OF DESIGN

DESCRIPTION	CONCENTRATION MG/L
Full Nitrification	<1.0

3.5 Future Expansion

The potential exists to increase the average annual daily flow rate by 70,000 GPD (128,000 GPD total) in the future. Key components of the wastewater treatment plant will be evaluated to ensure that the expansion can be streamlined. The same approach as outlined in RFI 001 was utilized to estimate future flow and loadings, which are summarized below in **Table 3-5** and **Table 3-6**. It was assumed that the effluent limitations would remain the same with the higher flow tier.

TABLE 3-5 – WATERFORD WWTP FUTURE INFLUENT FLOW BASIS OF DESIGN

DESCRIPTION	FACTOR	FLOW GPD	FLOW GPM
Annual Average Daily Flow	1	128,000	89
Maximum Month Average Daily Flow	1.61	206,100	143
Maximum Daily Flow	2.27	290,600	202
Peak Hour Flow	4.54	581,000	404

TABLE 3-6 – WATERFORD WWTP FUTURE INFLUENT LOADING BASIS OF DESIGN

DESCRIPTION	ANNUAL AVERAGE DAILY LOADING LBS/DAY	MAXIMUM MONTH AVERAGE DAILY LOADING LBS/DAY	MAXIMUM DAY LOADING LBS/DAY
Biochemical Oxygen Demand (BOD ₅)	197.5	247.2	295.7
Total Suspended Solids (TSS)	185.2	231.7	278.1
Total Kjeldahl Nitrogen (TKN)	38.0	47.4	56.9
Ammonia-N (NH ₃ -N)	23.6	29.6	35.5
Total Phosphorus (TP)	5.7	7.3	8.8
Nitrite/Nitrate (NO _x)	0.7	0.7	0.9
Alkalinity as CaCO ₃	260.4	326.6	390.6

3.6 Wastewater Treatment Facility Design

3.6.1 Influent Pumping Station

The existing facility has a small submersible influent pumping station. The current station is in a 5-foot diameter precast concrete manhole with two (2) wet-pit submersible pumps. Based on the age of the system and size of the wet well, a new influent pumping station is required for the project.

The new influent pump station will be designed to hydraulically pass the peak hour flow rate with one pump out of service and will consist of submersible wet pit pumps in a precast concrete wet well, a below grade precast concrete valve vault, and a precast concrete magnetic flow meter vault. This pump station will be located close to the existing entrance to the facility near the existing pumping station and will be sited to minimize impacts to the existing utilities. The pumping station will be located approximately 300' from the new WWTP facility, making it semi-remote. Access to the influent pump station will be through a separate asphalt access road as shown in **Attachment A**.

The pump station will be controlled through the main system PLC located at the WWTP building. Starters will be housed in the WWTP building to protect them from the elements. A rack-mounted local control station and disconnect switch will be located at the pump station site to provide local on-off control.

The pump station will be designed to convey peak hour flow at full build out. Based upon the ratio of the peak hour flow at build out to the current average daily flows, turn down is a key consideration in the number of influent pumps in the pump station. Therefore, the influent pump station will be designed with three (3) wet pit submersible pumps with variable frequency drives (VFDs). The flow variability is summarized in **Table 3-7** below:

TABLE 3-7 – WATERFORD WWTP INFLUENT PUMP STATION FLOWS				
DESCRIPTION	FLOW GPD	VELOCITY IN 4" FORCE MAIN FPS	VELOCITY IN 6" FORCE MAIN FPS	VELOCITY IN DUAL 4" FORCE MAINS FPS
Existing Annual Average Daily Flow	7,832	0.14	0.06	0.07
Existing Peak Hour Flow*	35,557	0.63	0.28	0.32
Design Annual Average Daily Flow	58,000	1.03	0.46	0.51
Design Peak Hour Flow*	263,200	4.67	2.08	2.33
Future Expansion Annual Average Daily Flow	128,000	2.27	1.01	1.13
Future Expansion Peak Hour Flow*	581,120	10.3	4.58	5.15
*Based upon Peaking equation in LW EDM (2 x Max.Day)				

Three pumps will be provided so that two (2) pumps operating at 100% speed will meet the design peak hour flow rate of 183 gpm. Current average daily flow will be conveyed by one (1) pump operating at its minimum speed and cycling as required. The proposed influent pump station force main will be two (2) 4-inch diameter ductile iron pipe(s) that will convey the range of flows, to maintain adequate velocities over the range of design flow rates. A 4-inch force main would result in excessive velocities during the future peak hour and a single 6-inch force main would result in low velocities until the future buildout. Two (2) 4-inch force mains would allow for flexibility to open and close the second force main as the plant approaches buildout.

TABLE 3-8 – WATERFORD WWTP INFLUENT PUMP STATION SUMMARY	
PARAMETER	VALUE
Number of Pumps	3
Total Pump Station Peak Flow	183 gpm (404 GPM future)
Peak Flow Per Pump	92 gpm (202 GPM future)

Wet well volume will be sized for future flow rates, and it was assumed that the pumps will be replaced for the future expansion. Working volume based on a 10-minute cycle time with one pump running at full speed was estimated to be 505 gallons for the future peak hour flow rate. It is recommended that a 10 foot inside diameter wet well be utilized to ensure adequate space for three pumps and this will provide adequate working volume for both initial and future conditions.

3.6.2 Headworks

As previously discussed, Selections from three manufacturers, Huber, JWC, and Lakeside, were obtained based upon the following assumptions:

- Designed to pass the peak hour flow rate of 183 gpm
- Optional wash/press zones are included to reduce odor and screenings volume
- Perforations will be 3 mm in diameter
- Construction will be all 316 stainless steel
- Optional bagger system will be provided

Table 3-9 summarizes the preliminary screen selections.

TABLE 3-9 – WATERFORD WWTP INFLUENT SCREEN EVALUATION			
DESCRIPTION	JWC	HUBER	LAKESIDE
Capital Equipment Cost	\$90,750	\$112,500	\$119,300
Head loss at Peak Hour Flow Assuming 6" downstream depth	2"	2"	3.2"
Channel Width	16 inches	12 inches	12 inches
Wash Water Requirements	17.5 GPM at 40 psi	14 GPM at 60 PSI	15 GPM at 60 PSI
Horsepower Requirements	2 hp	1.5 HP	2 HP

There are minor differences in the design and details of each of these manufacturers. As previously discussed, to provide the most flexibility in purchasing and future replacement the headworks will be designed to utilize any of the evaluated screens. The influent automatic screen will be installed in a headworks room inside of the treatment building. Redundancy will be provided with a manual bar rack and isolation stop gates to direct flow either to the mechanical screen or the manual bypass screen. Wash water for the screening systems will come from a non-potable water (NPW) pump located after filtration.

Flow from the headworks will be directed to the splitter box which will be located outside the building near the process tanks. **Figure 3.1** below shows the preliminary screening room layout. See **Attachment A** for preliminary layout drawings.

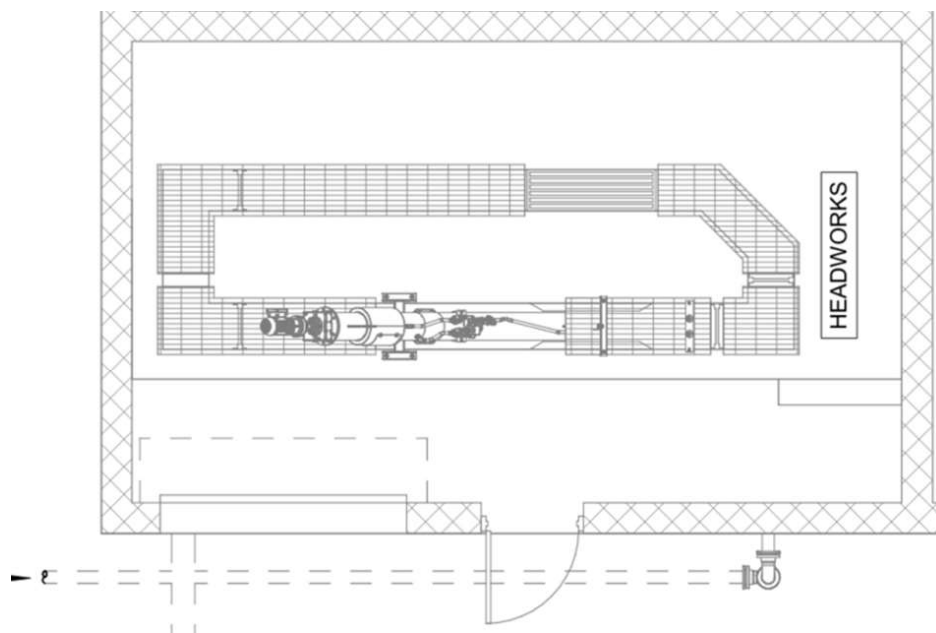


Figure 3.1 - Headworks Room

At the design flow rate, the screenings production is anticipated to be between 0.2 to 0.6 cubic feet per day, which will equate to the frequency of trash can pick up presented in **Table 3-10**.

TABLE 3-10 – WATERFORD WWTP ANTICIPATED SCREENINGS PICK UP SCHEDULE	
DESCRIPTION	FREQUENCY
32 Gallon trash can	7 to 19 days
64 Gallon trash can	14 to 38 days

Each of the screens considered can handle both current and future flows. There is minor additional head loss across the screen that will be accounted for within design of the hydraulic profile. The headworks screens and channels will be designed for the future peak hour flow rate of 404 gpm.

3.6.3 Influent Equalization

Influent equalization was included in the design based upon the following factors.

- LW EDM requirements for a minimum equalization volume,
- Required by VDEQ SCAT regulations, unless specific requirements are met,
- Increases operator flexibility and control,
- Reduces impact of peak hour flow on downstream processes.

The size of the influent equalization volume was calculated by two separate methods, with the higher of the two calculated volumes used for design

- Volume of equalization required to buffer hourly peaks on a maximum day to limit the flow through downstream processes to a consistent maximum monthly daily flow rate,
- Volume of equalization required by LW EDM, which is 8 hours at the average daily flow rate.

TABLE 3-11 WATERFORD WWTP EQUALIZATION VOLUME EVALUATION	
PARAMETER	VALUE
Volume based on Max Day	33,500 gal
Volume Required by LW EDM	19,333 gal

Influent equalization will be designed to be offline utilizing a splitter box with a fixed weir to direct peak flows to the equalization basin and smaller manually adjustable weir gates to direct flow to the treatment trains. Peak flows that are diverted to the influent equalization basin will be returned by equalization pumps during lower flow periods, with P&ID control. The control system will set the equalization basin return rate based upon the difference between an operator set target forward flow rate and the measured influent flow rate. The equalization return pumps will be sized to return a flow rate of up to the maximum daily flow of 91 gpm. The influent equalization basin and splitter box will be designed such that when the equalization basin is full it will back up the splitter box and additional flow will be routed to the treatment trains prior to overflowing.

The influent equalization tank will be common-wall construction with the secondary treatment trains, post equalization, and sludge holding tank. All tanks provided for the project will be precast post-tensioned tanks. The tank will be a single chamber tank. A two-chamber tank was also considered, which would add a divider wall to the tank with a manual valve. Normal operation would have the valve open, and the tanks would operate as a single unit. During maintenance, cleaning or draining, one tank could be isolated and taken offline without complete elimination of influent equalization. However, a dual compartment system would add additional mechanical equipment and is not needed since the ICEAS SBR system allows for storm modes that can treat peak flows without hydraulic restriction and influent equalization basin is an offline basin, which allows for easy isolation if required.

No mixing or aeration will be provided for the equalization basin since it will normally be empty.

Influent equalization will be provided as part of the future expansion as required; the only design changes that would need to be incorporated into the initial design is related to the influent splitter box and any equalization basin crossovers will need to be stubbed out. The influent splitter box could be designed with weirs and pipes that are stubbed out to accommodate future trains. Flow to the new equalization basin can be provided for by teeing off of the pipe to the existing equalization basin or providing a separate fixed weir.

3.6.4 Sequencing Batch Reactor

As previously discussed, secondary treatment will be accomplished with an ICEAS SBR by Sanitaire. Both a two train and three train alternatives were evaluated. Both options will require approximately the same total volume split between the respective two or three trains. There are several key factors when determining the number of treatment trains required for a facility. This includes turndown capability,

effluent discharge limits, tank cost, equipment cost, and building footprint. There is significant benefit to using a two-train system from an initial capital cost and lifecycle cost analysis. A two-train approach reduces the amount of equipment, concrete and building support systems. For Waterford, significant turndown is required to meet initial loading conditions; however, the effluent limits for ammonia are not stringent, which provides some flexibility in operation. Since the ICEAS SBR is typically operated with a continuous inflow, it can be operated with a single train. This combined with a lower MLSS concentration allows for significant turndown, which will be needed at the initial startup. Basic design assumptions and values are summarized in **Table 3-12** and **Table 4-8**.

TABLE 3-12 – WATERFORD WWTP SBR DESIGN SUMMARY	
DESCRIPTION	VALUE
Residual Dissolved Oxygen Concentrations	1.0 mg/L at max day loading
Minimum Winter Wastewater Temperature	10° Celsius
Maximum Summer Wastewater Temperature	30° Celsius
MLSS At Low Water Level	4,511 mg/L
F/M Ratio	0.043 lbs BOD/day / lb MLSS
SVI (After 30 minutes of settling)	150 mg/L
HRT	0.90 Days
Total SRT	30.5 Days
Aerobic SRT	12.7 Days

The SBR design will utilize common wall construction between the influent equalization, SBR trains, post equalization, and sludge holding tank. The recommended two train option will consist of two trains that are approximately 34' long by 12' wide, with a 15' side water depth at the high level, see **Attachment A** for preliminary sketches of both options.

The estimated decant rates and cycle times are summarized in **Table 3-13**. Decant rates are per reactor, with the cycle times offset to prevent multiple decanting events occurring concurrently.

TABLE 3-13 – WATERFORD WWTP SBR ESTIMATED DECANT FLOW RATES AND CYCLE TIMES	
DESCRIPTION	VALUE
Max Month Decant Rate	201 gpm
Max Storm Cycle Decant Rate	313 gpm
Cycle Time	288 minutes
Aeration Cycle Time	120 minutes
Un aerated React Cycle Time	48 minutes
Settle Cycle Time	60 minutes
Decant Cycle Time	60 minutes

Aeration will be provided by blowers and fixed grid fine bubble diffusers. The aeration requirements will be met with one blower per train with a third blower to allow for redundancy. Preliminary aeration system and miscellaneous equipment design information is summarized in **Table 3-14**. The preliminary design includes on waste activated sludge (WAS) pump and one submersible mixer per tank. A dedicated SBR blower will be provided per basin to maximize flexibility. Redundancy will be provided with a common swing blower as discussed in proceeding sections.

TABLE 3-14 – WATERFORD WWTP PRELIMINARY EQUIPMENT DESIGN

DESCRIPTION	VALUE
Actual Oxygen Required (AOR)	80 lb/day/basin
Standard Condition Oxygen Required (SOR)	170 lbs/day/basin
Blower Air Flow Rate	70 SCFM
Estimated Blower Discharge Pressure	7.1 psig
Blower Motor Size	7.5 HP
Number of Diffusers Per Basin	45
WAS Pump Flow Rate	110 gpm
WAS Pump Horsepower	2.4 HP
Submersible Mixer Motor Size	2.5 HP
Decanter Drive Motor Size	¼ HP

An initial evaluation was completed for the loading condition at plant start up. Based on influent wastewater flow and characteristic data, the estimated average loading at startup will be approximately 20 times less than the design loading. This will result in a very low F:M ratio and a high SRT, which could cause settling issues. Tertiary filtration will aid in solids removal and will provide a safety buffer; however, there are additional options to help improve performance. This includes feeding additional carbon chemical to the influent, adding the ability to feed a polymer or coagulant to assist with settling, or adding a removable wall (i.e., FRP) to one train to initially reduce the volume of one reactor. These options will provide plant staff with operational flexibility to reliably meet permit limits under initial operating conditions while efficiently planning for ultimate design capacity.

Lastly, future expansion has been considered. Oversizing SBR process basins to accommodate future flows is not recommended due to the initial turndown requirements at startup. Therefore, additional SBR basins would be required located adjacent to the proposed process tanks during an expansion.

3.6.5 Post Equalization

Post equalization is included in the design because an intermediate pump station is required to break the hydraulic grade line to allow the tertiary filtration and UV disinfection systems to be connected without excess excavation since the treatment tanks are below grade. The size difference between a pump station wet well and a post equalization basin is minor and provides a few significant benefits, including the following:

- Reduction of sizing of the downstream processes from the decant flow rate to the maximum daily flow rate
- More consistent flow to the downstream processes
- Increased operator flexibility

The post equalization basin volume was calculated to be 6,600 gallons based upon a decant rate of 201 gpm for a duration of 60 minutes, for a two-train system and a maximum downstream flow rate of 91 gpm (maximum daily flow). SBR effluent will be routed to the post equalization basins and the post equalization pumps driven by VFDs will pump flow to the tertiary filters. The post equalization tank will be common wall construction with the SBR treatment trains and sludge holding tank.

TABLE 3-15 – WATERFORD WWTP POST EQUALIZATION TANK SUMMARY

DESCRIPTION	VALUE
Post Equalization Volume	6,600 gallons
Number of Post Equalization Basin Pumps	2
Total Pump Station Peak Flow	91 gpm
Peak Flow Per Pump	91 gpm

3.6.6 Tertiary Filtration

As previously discussed, it is recommended that the Aqua-Aerobic Aqua MiniDisk filtration unit be implemented for use at the Waterford WWTP. The tertiary filtration process will be designed to reduce total phosphorus concentrations to 1.0 mg/L with the addition of Aluminum Sulfate into the mixed liquor and an effluent TSS of 4 mg/L at the following design conditions:

- Average daily flow rate of 41 gpm with an influent TSS of less than 15 mg/L
- A peak flow rate of 91 gpm with an influent TSS of less than 30 mg/L

Tertiary filters will be located in stainless steel tanks in a common room with the UV disinfection system. An aluminum platform will be provided to access the top of the filters for observation and maintenance.

Future expansion can be accommodated by providing a filter space for additional future disks. This would marginally increase the cost of the filter units initially but would simplify a capacity increase in the future. The hydraulic profile would have to be evaluated for the future design flow rates, but no major issues are anticipated if this is incorporated early in the design process.

3.6.7 UV Disinfection

As previously discussed, there are many UV disinfection systems that can meet the design requirements, with several options being very similar. Based upon the previous evaluation, it is recommended to utilize the Trojan PTP UV system listed below in **Table 3-16**. The UV disinfection system will be located in a common room with the tertiary filtration system.

TABLE 3-16 – WATERFORD WWTP UV SYSTEM	
PARAMETER	VALUE
Model	Trojan PTP 3075k
Length x Width	11'-0" x 1'-6"
Average Power Draw	0.27 kW

Future expansion can be accounted for in multiple ways, depending upon Loudoun Water's preference.

- The UV disinfection system could be designed to handle the future flows as part of the design.
- The UV disinfection system could be designed to allow an additional bank or banks to be installed to increase the capacity in the future.
- Space could be designed to allow for a future parallel UV disinfection system to be installed.

Leaving space for a future system would complicate splitting flow effectively between the two systems, and over designing the existing system would add unnecessary cost. Therefore, the best approach would be to design the UV system for the existing flow rates, but with flexibility to expand to the future flow rates by adding additional modules. This approach would require more detailed evaluation during preliminary design with the chosen manufacturer to determine the best design approach.

3.6.8 Post Aeration System

Post aeration is required prior to effluent disposal to ensure that the minimum effluent dissolved oxygen is maintained. The use of a cascade aerator is possible with the fall from the plant to the outfall of greater than 10 feet, but mechanical aeration is used here to simplify the site layout since the existing aerator is located a few hundred feet from the new treatment facility and is within sensitive areas including a floodplain, scenic creek buffer and other areas. Therefore, a concrete post aeration tank will be located just outside of the main treatment plant structure. Two post aeration blowers will be located inside of the tertiary filtration and UV disinfection room.

TABLE 3-17 – WATERFORD WWTP POST AERATION BASIS OF DESIGN	
DESCRIPTION	VALUE
Assumed Influent Dissolved Oxygen	0 mg/L
Effluent Dissolved Oxygen Required	6.8 mg/L
Effluent Liquid Temperature	30° Celsius
HRT at Peak Flow	10 minutes
Volume at Rated Capacity	1,010 gallons
Diameter and Depth at Rated Capacity	6' diameter at 4.8' deep
Design Air Flow Rate	26 SCFM

The post aeration basin will also contain a separate chamber upstream of aeration with two (2) wet pit submersible non-potable water (NPW) pumps to meet the wash water requirement of the influent mechanical screen.

Future expansion can be accommodated by oversizing the physical post aeration tank, and replacing the post aeration blowers in the future, see **Table 3-18**.

TABLE 3-18 – WATERFORD WWTP POST AERATION FUTURE EXPANSION BASIS OF DESIGN	
DESCRIPTION	VALUE
Volume at Future Expansion Capacity	2,000 gallons
Diameter and Depth at Future Expansion Capacity	7' diameter at 7' deep

3.6.9 Outfall

The existing 10" diameter CIP outfall piping and a 10" flap valve anchored onto the concrete outfall structure currently being used to discharge final effluent to the outfall location will be reused. The piping from the post aeration tank will be tied into the outfall piping.

3.6.10 Sludge Holding Tank

The sludge holding tank will be designed to provide a holding time of 30 days based upon the LW EDM. To calculate the volume required at this holding time, the volumetric flow rate must be determined. The volumetric flow rate was determined by taking the mass of sludge produced assuming the maximum month average daily flow and an assumed digester concentration. The mass of sludge produced was based upon the manufacturers estimations and standard equations based upon the influent characterization and effluent requirements. The digester concentration is based upon industry standard digester concentrations. The assumptions and sizing are summarized in **Table 3-19**. The depth of the sludge holding tank will match the depth of the SBR basins and equalization basins, see **Attachment A** for preliminary layout and geometry.

TABLE 3-19 – WATERFORD WWTP SLUDGE HOLDING TANK BASIS OF DESIGN	
DESCRIPTION	VALUE
Total Sludge Production	77 lbs/day
Assumed Digester Concentration	1.0%
Volumetric Sludge Flow Rate	923 GPD
Volume of Sludge Holding Tank	28,000 gallons

The sludge holding tank will be common wall construction with the treatment trains and post equalization basin. Blowers and fine bubble diffusers will be provided to meet the more stringent requirements of either mixing or biological uptake based upon the estimated volatile destruction as summarized in **Table 3-20**. A single blower will be utilized to provide the air requirement, with redundancy being provided by a common swing blower for all major blowers designed for the highest air flow rate required, as detailed in the next section of the report. Decanting will be provided utilizing a pump and hose suspended by a davit crane.

TABLE 3-20 – WATERFORD WWTP SLUDGE HOLDING TANK AERATION BASIS OF DESIGN

DESCRIPTION	VALUE
Air Required for Mixing	0.13 SCFM per square foot surface area
Air Required for Mixing	32 SCFM
Air Required for VSS Destruction	50 SCFM

The sludge holding tank can be provided as a single chamber tank or a two chamber tank. A two chamber tank would require a crossover valve, additional mixer, additional telescoping valve, additional air piping and valving, and the dividing wall. The benefit to a two chamber system is additional flexibility for taking one half offline for cleaning and maintenance. However, based upon the future expansion requiring a separate sludge holding tank it is recommended to provide a single sludge holding tank for simplicity and to reduce the amount of mechanical equipment installed.

3.6.11 Chemical Addition

Three chemical feed systems will be included at the Waterford WWTP - alkalinity, aluminum sulfate (alum), and carbon.

An alkalinity feed system will be provided to supplement alkalinity as required; alkalinity feed was assumed to be 25% Sodium Hydroxide. The process of nitrification consumes 7.14 mg/L alkalinity as CaCO_3 per milligram of ammonia nitrogen reduced. Although 3.57 mg/L as CaCO_3 per gram of nitrate reduced can be recovered during denitrification, a net consumption of alkalinity will occur. Influent alkalinity is based upon the mass loading as described in RFI #009: Influent Flow, Influent Characteristics, and Effluent Limitations. The design calculations maintain a minimum effluent alkalinity of 80 mg/L for max month and max day loading and 100 mg/L for average day loading based upon WEF MOP 8. Feed pump sizing is based on max day loadings because the alkalinity feed requirements are based upon biological activity and are not expected to vary drastically in short duration peaks. Alkalinity storage is based upon the storage required for one maximum month duration. This storage volume was then converted to an equivalent number of 55-gallon drums and 330-gallon totes to better understand the storage footprint requirements and to confirm that bulk storage is not required. See **Table 3-21** for a summary. The alkalinity feed point will be located in the splitter box upstream of the weirs. This feed location will help to ensure adequate mixing and symmetrical distribution of the alkalinity to each train. One pump will be provided per train with an additional pump to provide redundancy.

An aluminum sulfate (alum) feed system will be provided to ensure effluent phosphorus limits are consistently maintained. A 48% aluminum sulfate concentration was assumed for all calculations. Although SBRs can provide a degree of biological phosphorus removal when operating under ideal conditions, the alum feed calculations assumed that no biological phosphorus removal was occurring. This ensures that effluent phosphorus limits can be maintained independent of the biological system performance, which adds a safety factor. If biological phosphorus removal is occurring, then the feed rate can be reduced through the turndown of the chemical feed pumps. Influent phosphorus loading and effluent requirements are based upon RFI #009: Influent Flow, Influent Characteristics, and Effluent Limitations. Feed pump sizing is based on max day loadings because the alum feed point will be located downstream of the influent equalization basin. Alkalinity storage is based upon the storage required for one maximum month duration. This storage volume was then converted to an equivalent number of 55 gallon drums and 330 gallon totes to better understand the storage footprint requirements and to confirm that bulk storage is not required. Initial calculations were prepared assuming no biological phosphorus removal. Based upon requiring four totes during a maximum month, the chemical feed was reevaluated based upon the anticipated biological phosphorus removal rates. The design will allow for storage based upon no biological phosphorus removal for maximum flexibility, but operations staff can expect a much small storage requirement of one tote. See **Table 3-21** for a summary. The alum feed system will discharge into the treatment basins; therefore, one pump will be provided for each basin with an additional redundant pump.

A carbon feed system, in the form of MicroC Glycerin will be provided to ensure effluent total nitrogen limits are consistently achieved. Carbon can be required for biological nitrogen removal, because the rate of denitrification is heavily dependent upon the food to mass ratio. If sufficient readily biodegradable

carbon is not present in the influent or if it is consumed during the aerobic phase, the rate of denitrification may be hindered, and the effluent nitrate may be elevated causing the effluent limits to be exceeded. See **Table 3-21** for a summary. The external carbon feed system will discharge into the treatment basins; therefore, one pump will be provided for each basin with an additional redundant pump.

TABLE 3-21 – WATERFORD WWTP CHEMICAL ADDITION SUMMARY				
CHEMICAL	PURPOSE	STORAGE VOLUME ¹	FEED POINT (NUMBER OF PUMPS DUTY/STANDBY) ³	PUMP FLOW ³
Alkalinity 25% Sodium Hydroxide	Alkalinity supplement to ensure nitrification is not hindered	199 gallons (4 drums or 1 tote)	Influent Splitter Box Upstream of Weir (1/2)	0.28 gph each
Alum 48% Aluminum Sulfate	Phosphorus Removal	to 302 gallons (6 drums or 1 totes) ²	SBR Basin (2/3)	0.42 gph each
Carbon MicroC Glycerin	Denitrification	0 to 10 gallons (0 to 1 drum or 0 to 1 tote) ²	SBR Basin (2/3)	0.02 gph each
1. Storage based upon one month of storage at the maximum month average daily flow and loading				
2. Based upon biological nutrient removal efficiency.				
3. All chemical feed pumps will be peristaltic chemical metering pumps with one pump for each discharge point and one spare pump, for a total of three pumps per chemical for the chemicals that discharge into the SBR trains				

All chemical feed systems could utilize totes or drums. Because these calculations are conservative values based upon full plant capacity, and the chemical feed rates may be much lower during initial operation, the chemical feed rooms will be designed to accommodate either 55 gallon drums or 330 gallon totes. This will ensure maximum flexibility for operations staff as the plant flows increase over time. Peristaltic chemical feed pumps will be used for each application and will be mounted on a chemical feed shelf in the same room as the storage. The chemical feed room will be a singular room, with a dedicated bay area for each chemical. Secondary containment will be provided for each bay based upon one 330 gallon tote failing, by installing a trench with grating in the floor slab to separate the entrance from the storage area. The chemical feed room will be sized large enough to accommodate storage for the future expansion with the final sizing confirmed during the 30% design phase.

3.7 Non-Process Facilities

3.7.1 Operations Room (Laboratory Room)

A laboratory room will be designed in accordance with VDEQ SCAT and Loudoun Water EDM Requirements; see **Table 3-22** for lab requirements. The laboratory room will be equipped with 12 linear feet of phenolic resin bench with a 4 inch back splash, sink, metal cabinets below and wall cabinets above. In addition, the room will include a half bathroom in a separate room. The laboratory room will also have some additional equipment including but not limited to 3 desks and chairs, and a full size specimen / commercial grade stainless steel refrigerator.

TABLE 3-22 – LABORATORY REQUIREMENTS		
DESCRIPTION	SQUARE FEET OF FLOOR SPACE	SQUARE FEET OF BENCH SPACE
DEQ SCAT Regulations* (Not Performing BOD and Suspended Solids Testing)	50	20
DEQ SCAT Regulations* (Performing BOD, Suspended Solids, or Fecal Coliform Testing)	400	150
LW EDM	400	Not Specified
Design	400	20
*DEQ SCAT Regulations require 100 sq. ft of additional floor space with a proportional increase in bench space if more than two people will be in the lab facility at a given time.		

3.7.2 Power Distribution System and Lighting

The Waterford WWTP is served by a single-phase overhead power line owned by Dominion Energy. The overhead line supplies a single phase, 50kVA aerial transformer with a 120/240V secondary. A single-phase service is not sufficient to support the proposed improvements at the WWTP. A new three phase electrical service will be required to support the equipment that will be installed under this contract. The provision of a three-phase service is likely to require Dominion to extend additional phase conductors a significant distance. The details of a service extension will need to be coordinated with Dominion; however, the nearest three phase service lines noted during the preliminary site visit are located approximately a mile west of the project site.

A 600A, 277/480V service is proposed to supply the Waterford WWTP expansion. The main distribution gear will include a 600A main circuit breaker, three pole automatic transfer switch (ATS), main distribution panel and motor control center (MCC). The MCC will contain a series of motor controls including starters and variable frequency drives. Constant speed motors rated for 7.5HP and less will be controlled with full voltage starters. If variable speed of the motor is required, six-pulse variable frequency drives will be provided. Variable speed motors will be rated for variable speed duty. Due to the distance between the motors and VFDs, output filters will not be required. The electrical gear will be located in a dedicated, climate controlled electrical room.

All conductors will be copper. SCH 40 PVC will be utilized below grade. Duct banks outside the footprint of the building will be encased in concrete. Aluminum rigid conduit will be utilized for exposed conduit runs in process, electrical and exterior spaces. Exposed conduit in chemical storage and other corrosive areas will be SCH 80 PVC. A heavy duty disconnect switch will be provided at each piece of mechanical equipment. NEMA 7 enclosures will be provided in hazardous classified locations, NEMA 4X enclosures will be provided in process and exterior spaces and NEMA 1/12 enclosures will be used in electrical rooms and other conditioned spaces.

LED lighting will be provided throughout the building and around the perimeter of the building. Interior lighting will be controlled using motion switches in finished spaces and standard toggle switches in equipment spaces. A lighting contactor will be provided to control the exterior lighting via a photocell; an HOA switch will be provided at the contactor for manual control of lighting.

3.7.3 Standby Power

Standby power will be provided to the ATS by a 264kW/330kVA portable diesel generator located adjacent to the building. A steel, weatherproof, sound attenuating enclosure will be provided. That standard unit-mounted fuel storage will provide 24-hours of facility operation when the plant is operating at rated capacity. The SCADA system will monitor the status and alarm condition of the standby power equipment using hardwired connections to the ATS.

3.7.4 Controls and SCADA

The proposed plant upgrades will require updates to the existing communication system, as well as a new main PLC panel to bring the plant into alignment with Loudoun Water's SCADA standards. This includes installing a fiber patch panel within the PLC panel and the necessary accessories to allow it to serve as an RTU and tying into the existing fiber optic service to communicate with the existing SCADA System and the Loudoun Water's operations staff. A backup control panel will be furnished and will be completely isolated from the primary PLC control panel using a microprocessor-based controller capable of accepting analog signals. An autodialer system shall be installed, capable of notifying of selected alarm conditions to WWTP staff.

Additionally, a comprehensive security and access control system will be installed within the WWTP. The plant will be monitored by CCTV power-over-ethernet security cameras, and each door will have a door switch, proximity card reader, strike release, and request-to-exit motion detector. The plant entrance gate will be driven using an electric gate operator and local card reader pedestals. The well hatches will have monitored intrusion switches.

Each basin, well, and tank will have Low-Low and High-High float alarms and each wet well will include both primary and backup level transducers. The High-High will be connected to an alarm light and horn. Flood switches will be utilized for all process rooms.

TABLE 3-23 – APPROVED EQUIPMENT MANUFACTURERS

EQUIPMENT	MANUFACTURERS
Pilot lights	Type 8415 by Stahl Bulletin 800T by Allen-Bradley
Selector Switches, Pushbuttons, Potentiometers	Bulletin 800 by Allen-Bradley
Receptacles	DIN Rail Mounted by Phoenix Contact
Regulated Power Supplies	Bulletin 1606 by Allen-Bradley
Terminal Blocks, Breakers, Related Accessories	Phoenix Contact
Intrinsically Safe Interfaces, Isolators, Signal Conditioners and Related Accessories	Pepperl+Fuchs or as required by the device manufacturers listing
Relays	Bulletin 700HA w/ 11 Pin Socket suitable for use with timing module By Allen-Bradley
Timers	Bulletin 700HT By Allen-Bradley
Repeat Cycle Timers	Series 422 Flip-Flop Timer By Atc
Float Switches	Contegra Model FS 96
Flow Meters	Foxboro Model 9100 w/ Foxboro IMT25 Transmitter
Level Transducers	Endress and Hauser Water Pilot
Flood Switch	Contegra FA 202 Dry Well Float Switch
Hatch Intrusion Switches	Honeywell BX Series
Door Switches	Sentrol Model 1047 TH
UPS	Powerware American Power Conversion Triplite
Signal Isolators, Converters, Conditioners	Ametek Power Instruments Systems Series 1300
Monitoring Switches	Site-programmable Isolated Alarm by Moore Industries. Model SPA2
Transient Protection: 120VAC Power Connections	MAINS-PLUGTRAB UAK 2-PE/S by Phoenix Contact Atlantic Scientific Corp.
Transient Protection: Analog Signal Connections	MCR-PLUGTRAB UFBK 2-PE by Phoenix Contact Atlantic Scientific Corp.
Transient Protection: Discrete Signal Connections	MCR-PLUGTRAB UFBK 2/2 by Phoenix Contact Atlantic Scientific Corp.
Transient Protection: Digital Communications Signal Lines and telephone lines	Phoenix Contact Transtector Systems Atlantic Scientific Cop.
PLCs	Compact or Control Logix by Allen-Bradley
OIT	Minimum includes PanelView Plus 7 Color w/ 10" touch screen by Allen-Bradley
Power Monitor	Power Monitor 5000 by Allen-Bradley
Radio Transceiver	GE MDS Orbit
Transient Protector	Model IS-B50LN-C2MN by Polyphaser
Coax Jumper	Andrew 1/2", 50-Ohm by SureFlex
Antenna	Kathrein Scala Division Ty-900 Yagi
Cable Bridges	Radian Transmission
PLC Software	RS Logix Designer by Rockwell Software
OIT Software	RSView Factory Studio by Rockwell Software

3.7.5 Ventilation and Odor Control

The HVAC system for the influent lift station wet well will consist of an intake gooseneck and exhaust fan for the wet well. Exhaust fan will not be used for a reduction of classification in the wet well.

TABLE 3-25 – NFPA 820, 4.2.2, ROW 16, WASTEWATER PUMPING STATIONS WET WELLS		
VENTILATION	NFPA CLASSIFICATION	COMBUSTIBLE GAS DETECTION REQUIRED
No Ventilation or ventilated at less than 12 ACPH	Class 1 Division 1	No *
Continuously ventilated at 12 ACPH or greater in accordance with NFPA 820 Chapter 9	Class 1 Division 2	Yes

* Combustible Gas Detection (CGD) would not be required since the wet well is not open into a building interior.

The headworks room will be heated and ventilated only. The ventilation systems will be designed to operate continuously at 12 ACPH or greater to reduce the classification to Class 1 Div. 2. The room will be ventilated with a push-pull fan system and heated with electric unit heaters to maintain a minimum temperature of 55°F. Ventilation systems will be equipped with flow detection switches. Equipment will be rated for hazardous environments. Combustible gas detection will be provided. It is assumed that the headworks area will physically be separated from other portions of the building.

TABLE 3-26– NFPA 820, 5.2.2, ROW 2, COARSE AND FINE SCREEN FACILITIES		
VENTILATION	NFPA CLASSIFICATION	COMBUSTIBLE GAS DETECTION REQUIRED
No Ventilation or ventilated at less than 12 ACPH	Class 1 Division 1	Yes
Continuously ventilated at 12 ACPH or greater in accordance with NFPA 820 Chapter 9	Class 1 Division 2	Yes

The Pre-equalization basin, Sequencing Batch Reactor, Post-equalization basin, and Sludge Holding Tank, will be located outside, adjacent to the control building and connected to the headworks and filter rooms. There is no odor control planned for the treatment process tanks.

The UV Channel and Tertiary Filtration room will be heated and ventilated only. Air conditioning for this space is not provided. A make-up air louver and exhaust fan will be provided for the UV Channel and Tertiary Filtration room. Heating will be provided by electric unit heaters.

The blower room will be heated and ventilated only. Air conditioning for this space is not provided. A make-up air louver and exhaust fan will be provided for the blower room. Heating will be provided by electric unit heaters.

The electrical room will be conditioned with split-system heat pump units to offset the heat gain from the electrical equipment and building envelope. It is assumed that these spaces are normally unoccupied. Anticipated heat rejection of proposed electrical equipment will be validated during detailed design.

The lab and associated toilet room with shower will be conditioned with a packaged heat pump unit mounted at grade or a split system heat pump unit. The heat pump unit will be equipped with supplemental electric heat. Insulated sheet metal ductwork will provide air distribution from the heat pump unit to the spaces. It is assumed that the lab room will not require a fume hood or specialized exhaust. The toilet room will include an exhaust fan. The exhaust fan for the toilet room will be wall switch controlled.

The chemical feed room will be heated and ventilated only. Air conditioning for this space is not provided. The ventilation system will consist of a make-up air louver, exhaust ductwork with high and low intake grilles, and an exhaust fan. At this time, the anticipated chemicals will be 25% sodium hydroxide, 48%

Aluminum Sulfate, and MicroC Glycerin in drums or totes. This room will be ventilated at a rate of 10 ACPH. Heating will be provided by electric unit heaters.

Ventilation for classified spaces will be provided in accordance with NFPA 820. Rooms will be separated based on space classification. Based on the preliminary layouts, the following rooms with their potential classification and ventilation requirements are summarized in the following table.

TABLE 3-24 – WATERFORD WWTP NFPA AND HVAC SUMMARY		
DESCRIPTION	NFPA CLASSIFICATION	HVAC REQUIREMENTS
Influent Pump Station	Wet Well: Class 1 Division 1 Valve Vault: Unclassified	Exhaust Fan and Gooseneck
Headworks Room	Class 1 Division 2	Supply Fans, Exhaust Fans and Unit Heaters
Tertiary Filtration and UV Disinfection Room	Unclassified	Exhaust Fan, Louver, and Unit Heaters
Blower Room	Unclassified	Exhaust Fan, Louver, and Unit Heaters
Electrical and Controls Room	Unclassified	Conditioned
Laboratory Room	Unclassified	Conditioned
Chemical Feed Room	Unclassified	Exhaust Fan, Louver, and Unit Heaters

The required air change rates for classified spaces will be handled using supply fans with intakes and exhaust fans with discharge louvers. Each room will be separated in accordance with NFPA 820 requirements and will be separately ventilated.

No odor control is planned for the treatment facility.

3.7.6 Plumbing

The support building will include domestic water supply and sanitary waste and vent systems. No plumbing systems are anticipated for other structures on this project site. All plumbing systems shall be installed in accordance with the 2021 Virginia Plumbing Code.

An ADA-compliant unisex restroom shall be provided within the facility. This restroom shall be equipped with a floor-mounted, floor-outlet, ceramic water closet with a 1.28-gpf manually operated flush valve and open-front plastic seat without cover. This restroom shall also be equipped with a carrier-mounted, ceramic, rectangular lavatory with a 0.5-gpm single lever manual faucet. This restroom shall have a single shower compartment with a pressure-balanced shower valve, indexed trim, a fixed 1.5-gpm showerhead, and a diverter valve to a 1.5-gpm hand shower on a slide bar with metallic supply hose. The shower stall shall be tiled by the general contractor and provided with a floor drain.

The lab room will be provided with a single sink. The sink basin shall be acid-resistant and integral to the countertop provided as detailed with the architectural finishes. This sink shall have a 1.0-gpm gooseneck faucet with wrist-blade handles and lab torrent outlet.

A combination emergency eye/facewash and shower unit shall be provided in the lab room and the chemical feed room. An ANSI Z358.1 compliant tepid water thermostatic mixing valve shall be provided for this unit. A floor drain shall also be provided at each fixture to aid in cleanup from routine testing and use of the emergency fixture.

Domestic hot water shall be generated by an electric, vertical storage type water heater. The water heater shall be provided with automatic controls, a thermal expansion tank, and a circulation pump.

The process rooms shall be equipped with hose bibbs, and general drainage as coordinated with the needs of the equipment and general usage of the space.

A 1-1/2" domestic water supply shall enter the building as coordinated with the site utility plan and building layout to serve the fixtures. Potable water will be provided by the on-site well. The service shall be protected by a reduced-pressure-zone backflow preventer in a weatherproof enclosure on site. Based on historic well yield information, a small bladder tank will be required to provide additional storage and pressurization to serve the building's uses.

A 4" sanitary waste drain shall exit the building as coordinated with the site utility plan to serve the fixtures and will be sent to the influent pumping station or other raw gravity sewer on site. Pending the final chemical list utilized in the laboratory, a point-of-use chemical neutralization tank shall be provided at the laboratory sink.

3.7.7 Architectural Finishes

The building will consist of materials that are similar in nature to the requirements of the adjacent Waterford Historic District. As such some of the elements will be those in a similar vernacular of a rustic / colonial support building aka barn. Since this is a modern building there will be an opportunity to utilize modern materials in place of some classic materials, since durability and maintenance is a prime concern for this type of facility. In addition to the proceeding discussion, see **Attachment D** for renderings and elevations. Barn type structures tend to have a masonry water course consisting of natural stone colors this will be achieved utilizing a 4" concrete masonry unity veneer. Modulating the height of that water course will help to break up the mass and scale of the building. Above the water course there will be a board and batten vertical siding. This will be achieved by utilizing integral color fiber cement siding, the scale of the board and batten will be like that of the wood siding seen on barns. The Roof will be a multi gable roof system of standing seam metal roof. The historic district requires the slopes to be 4 on 12 but with use being outside of the district, with the size and scale of this facility that will not be keeping with the scale of the surrounding structures. So, a lower slope will be explored and the more in line of 1 on 12 would be more in keeping with that scale.

The exterior wall finishes will be hung off a bearing masonry structure. The overall wall construction (exterior to interior) will be cladding (CMU or Siding) insulation cold formed framing supported off bearing masonry (outlined below).

Roof will be standing seam roofing on cover board on insulation supported off roof deck, supported on steel structure (outlined below).

Interior walls will typically be CMU walls with epoxy paint. The intent of the epoxy paint will be to help to mitigate chemical and moisture permeability. For any spaces requiring ceilings, the ceilings will consist of cement board or moisture resistant gypsum board, with epoxy paint. The Floor system will need to be a high performance chemical resistant coating.

Doors will be aluminum or fiber reinforced plastic doors and frames for corrosion and chemical resistant requirements.

3.7.8 Building Structure

Structural design will conform to the 2021 Virginia Unified State Building Code and the 2021 International Building Code (incorporated by the 2021 Virginia Unified State Building Code). Structures anticipated for this site include a conventionally constructed treatment plant building and a precast concrete treatment tank. Due to historic district concerns associated with the Town of Waterford, the building will be designed to match the aesthetic historic nature of the town with respect to wall finishes and roofs with significant slope.

The treatment plant building will house the headworks, UV disinfection, tertiary filtration, blowers, chemical feed systems, a laboratory, utility room, and bathroom. The building will have a gable roof constructed of cold-formed steel trusses bearing on the CMU walls at an elevation of at least 12'-0" above finished floor. It is anticipated that the trusses will be sloped and spaced at 4'-0" on center. The trusses will be a delegated design item to be designed by a truss manufacturer. Openings for louvers and exhaust fans will be located in the exterior walls around the perimeter of the process floor. Exterior CMU walls will be supported by continuous concrete wall footings set a minimum of 2'-0" below grade. Non-

load bearing interior CMU walls will either be supported by thickened slab-on-grade or continuous wall footing. The floor will be a minimum 8" thick reinforced concrete slab-on-grade.

A cast-in-place headworks will be constructed inside the treatment building. This building will also house a prefabricated screen with the screen bottom located below the finished floor elevation. An aluminum stair and elevated platform with aluminum guard rail around the perimeter will be designed to provide access to the top of the filters housed in the tertiary filtration room. The platform will be constructed of aluminum framing and aluminum grating for the walking surface. A stainless steel UV channel will be set on concrete supports inside the tertiary filtration and UV disinfection room.

Miscellaneous reinforced concrete housekeeping pads for supporting mechanical and electrical equipment will be located inside the building. It is anticipated these housekeeping pads will be a minimum of 4" thick and will be doveled into the building slab-on-grade.

The precast concrete treatment tank will be a delegated design item to be designed by a precast concrete manufacturer.

The site will require miscellaneous concrete equipment pads for supporting mechanical and electrical equipment, including a generator with belly tank, located at grade. It is anticipated these equipment pads will be a minimum of 8" thick slab-on-grade with turn down edges bearing a minimum of 2'-0" below grade. If required for access to the generator doors, a pre-fabricated aluminum platform with aluminum guard rail and stairs will be specified as a delegated design item to be designed by a vendor.

3.8 Site Layout and Access Plan

The treatment plant will consist of the treatment process tanks and a single building that contains the equipment, lab and various process rooms. As previously discussed, it is anticipated that precast post tensioned concrete tanks will be used for the treatment tankage, except for specific units requiring more complex formwork, like the headworks and splitter boxes. A cast in place concrete base slab will be poured and walls will be erected on site.

A preliminary site layout and access plan was prepared to determine permitting requirements. Access to the site is planned through a new entrance from Milltown Road. The existing well facility entrance will be abandoned, and access will be provided through the WWTP site. A minimum 20' wide access road will surround the building with additional width as required for turning and for dedicated parking spaces. The side of the building adjacent to the entrance will be 25' wide to provide fire access per County requirements. The site will be finished with asphalt pavement and will be secured with Loudoun Water standard fencing, including a vehicular access gate as well as a manned access gate. Site lighting will be included at the site. Ancillary facilities on the site that are exterior to the main treatment building will include, the generator with belly fuel tank, and dumpster. In addition to the type 4 buffer, evergreens to match the existing plantings will be included.

3.9 Preliminary Sequence of Construction

The sequence of construction for the Waterford WWTP is anticipated to be relatively simple. All proposed facilities can be constructed and tested parallel to the existing facility. Then the influent and effluent can be crossed over from the existing lagoons to the new SBR treatment system, which will then allow for the demolition of all existing facilities including the lagoons. One key activity that will need to be coordinated is maintaining access to the existing facility during construction of the influent pump station, fence, gating, and general site improvements.

3.10 Hydraulic Profile

A preliminary hydraulic profile was developed and will be finalized as design proceeds. Key design considerations are summarized in **Table 3-25**. Additional considerations will be taken to balance the hydraulic head loss with minimum design velocities to prevent settling. A preliminary hydraulic profile is included in **Attachment A**.

TABLE 3-25 – WATERFORD HYDRAULIC PROFILE BASIS OF DESIGN	
DESCRIPTION	VALUE
Flow Rate Upstream of Influent Splitter Box	Future peak hour flow rate of 404 gpm
Flow Rate Downstream of Influent Splitter Box through Post EQ	Maximum daily flow rate of 91 gpm
Flow Rate Downstream of Post EQ	Future maximum daily flow rate of 202 gpm
Redundancy Considerations	Class 1 Reliability

3.11 Basis of Design Equipment Summary

Based on the recommendations outlined above, **Table 3-26** below summarizes preliminary equipment selections for the Waterford WWTP.

TABLE 3-26 – WATERFORD WWTP EQUIPMENT SUMMARY			
DESCRIPTION	MAKE	MODEL (OR SIZE)	QUANTITY
Influent Pump Station Pump	Flygt	2.5-5 HP	3
Influent Screen	JWC	Auger Monster ALE 1800-285-2500-35	1
Pre-Equalization Pump	Flygt	2-3 HP	2
Sequencing Batch Reactor Decanter	Sanitaire	3' Weir and 0.25 HP	2
Waste Activated Sludge Pump	Flygt	2.5-5 HP	2
Post Equalization Pump	Flygt	2.5-5 HP	2
Tertiary Filtration	Aqua	Four Disk MiniDisk With Two Disks Installed	2
UV Disinfection	Trojan	PTP 3075k	1*
Sequencing Batch Reactor Mixer	Flygt	4 HP	2
Sequencing Batch Reactor Blowers	Aerzen	10 HP	3
Sludge Holding Tank Blowers	Aerzen	5-10 HP	2
Post Aeration Blowers	Aerzen	3-5 hp	2
*UV system consists of a single disinfection system consisting of a single channel and two banks of UV bulbs.			

The equipment summary table has been generated to provide an overview of major mechanical equipment and approximate sizes or models to be utilized at the facility. During design, final selections will be made that may change the equipment size or model.

3.12 Waterford Expansion Approach

A future expansion of the facility may be realized through connection of a nearby community. The approximate additional flow and preliminary approach to addressing expansion is outlined throughout this section. A summary of the recommended approach to expansion for the design of the Waterford WWTP is included in **Table 3-27** below. In general, there are three (3) approaches that have been used for future expansion at Waterford

- Requires Future Modification – This approach includes most major components for future expansion but will require future modifications/upgrades to meet future demands.
- Expansion Included – All equipment will be designed to handle current and future flows up to the approximate flows outlined in Section 3 above.
- Not Included – Will require new/separate components to account for future expansion.

TABLE 3-27 – WATERFORD EXPANSION SUMMARY

COMPONENT	APPROACH	DESCRIPTION
Influent Pumping Station	Requires Future Modification	The influent pumping station will be designed for both current and future potential flows. The current construction will install pumps designed for the initial design flow. Future flows will require the pumps to be replaced.
Influent Force Main	Expansion Included	This project will install two (2) force mains to allow for future flow to be conveyed through two (2) force mains. This will also provide redundancy for current flows and allow one force main to be taken offline for cleaning/flushing while maintaining full service.
Influent Screen	Expansion Included	The existing screen system will be designed to hydraulically pass up to 404 GPM, which is the approximate future peak hourly flow.
Splitter Box	Expansion Included	Additional outlets with piping and valves will be installed to accommodate expansion and two (2) additional process trains.
Pre-Equalization Tank	Not Included	All process tanks and supporting aeration/decanting equipment will require new construction for the future expansion. These tanks and associated equipment would be constructed adjacent to the process tanks. This will allow process to be correctly sized/designed to accommodate final anticipated flows.
SBR Process Tank	Not Included	
Post Equalization Tank	Not Included	
Sludge Holding Tank	Not Included	
Process Blowers	Not Included	
Tertiary Filters	Expansion Included	Tertiary filters will be sized for the existing maximum daily flow rate but allow for easy expansion to accommodate the future maximum daily flow rate.
UV Disinfection	Requires Future Modification	UV system channel will be upsized to allow room for additional UV modules to be installed to handle future flows with expansion.
Control Room	Requires Future Modification	The main control panel, switchgear, and MCC will be designed to accommodate future expansion from additional treatment trains. Panel modifications and UL listing will be required at the time of future construction.
Generator and Emergency Power	Requires Future Modification	The generator pad will be sized for the potential future generator and will be removable to allow for the future generator to be installed. An alternative to this would be installation of a ATS that is connected to a portable generator with smaller fuel system. The portable generator could be removed in the future and the new generator installed.
Building Layout and Architecture	Requires Future Modification	The building will be designed to accommodate the equipment and panels for both current and future phases. This includes additional blowers. Since the process tanks are located outside, the building is not significantly oversized for the current facility and will not require expansion in the future.