Dameron, Jason (DEQ)

From: James E. Didawick [james.didawick@townofwoodstockva.gov]
Sent: Thursday, December 17, 2015 2:19 PM
To: Dameron, Jason (DEQ)
Cc: Bill Ryan; Ed Presley
Subject: Woodstock STP

Jason,

The town would like to carry forward the reduced monitoring frequencies for cBOD5 and E.coli into the new VPDES permit.

Thank you,
James

James E. Didawick
Superintendent of Public Works

Town of Woodstock
135 N. Main St.
Woodstock, Va. 22664

Public Works Phone: (540) 459-3045
Public Works FAX: (540) 459-4871

VPDES/VPA Permit Billing Information Form
for Annual Maintenance Fee

Facility Name: Town of Woodstock STP

Permit Number: VA0026468

Owner Name: Town of Woodstock

Owner Address: 135 N. Main St.

Woodstock, VA 22664

Billing Contact Name: James E. Didawick

Title: Superintendent of Public Works

Phone Number: 540-459-3621

E-Mail Address: james.didawick@townofwoodstockva.gov

DEQ VALLEY
AUG 27 2015
To:
Date:

PUBLIC NOTICE BILLING INFORMATION

I hereby authorize the Department of Environmental Quality to have the cost of publishing a public notice billed to the Agent/Department shown below. The public notice will be published once a week for two consecutive weeks in Shenandoah Valley-Herald in accordance with 9 VAC 25-31-290.C.2.

Agent/Department to be billed: Department of Public Works

Owner: Town of Woodstock

Agent/Department Address: 135 North Main Street

Woodstock, VA 22664

Agent's Telephone No.: 540-459-3621

Printed Name: Dr. Reid A. Wodicka, Town Manager

Authorizing Agent – Signature: Reid Wodicka

Date: 26 August 2015

Facility Name: Town of Woodstock STP

VPDES Permit No. VA 0026468

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART A. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS:

All treatment works must complete questions A.1 through A.8 of this Basic Application Information packet.

A.1. Facility Information.

Facility name: Town of Woodstock STP

Mailing Address: 135 N. Main St., Woodstock, VA 22664

Contact person: James E. Didawick

Title: Superintendent of Public Works

Telephone number: (540) 459-3621

Facility Address (not P.O. Box): 943 Mill Road, Woodstock, VA 22664

A.2. *Applicant Information.* *If the applicant is different from the above, provide the following:*

Applicant name: Town of Woodstock

Mailing Address: 135 N. Main St., Woodstock, VA 22664

Contact person: Dr. Reid A. Wodicka

Title: Town Manager

Telephone number: (540) 459-3621

Is the applicant the owner or operator (or both) of the treatment works?

✓ owner ✓ operator

Indicate whether correspondence regarding this permit should be directed to the facility or the applicant.

✓ facility ____ applicant

A.3. Existing Environmental Permits. Provide the permit number of any existing environmental permits that have been issued to the treatment works (include state-issued permits).

NPDES	VA0026468	PSD	
UIC		Other	VAN010094
RCRA		Other	

A.4. Collection System Information. *Provide information on municipalities and areas served by the facility. Provide the name and population of* each entity and, if known, provide information on the type of collection system (combined vs. separate) and its ownership (municipal, private, etc.).

Name	Population Served	Type of Collection System	Ownership
Town of Woodstock	5,100	Separate	Municipal

Total population served 5,100

A.5. Indian Country.

a. Is the treatment works located in Indian Country?

____ Yes ✓ No

b. Does the treatment works discharge to a receiving water that is either in Indian Country or that is upstream from (and eventually flows through) Indian Country?

____ Yes ✓ No

A.6. Flow. Indicate the design flow rate of the treatment plant (i.e., the wastewater flow rate that the plant was built to handle). Also provide the average daily flow rate and maximum daily flow rate for each of the last three years. Each year's data must be based on a 12-month time period with the 12th month of "this year" occurring no more than three months prior to this application submittal.

a. Design flow rate 2.0 mgd

	Two Years Ago	*Last Year*	*This Year*	
b. Annual average daily flow rate	0.595	0.603	0.525	mgd
c. Maximum daily flow rate	1.373	1.158	0.915	mgd

A.7. Collection System. Indicate the type(s) of collection system(s) used by the treatment plant. Check all that apply. Also estimate the percent contribution (by miles) of each.

✓ Separate sanitary sewer 100 %

____ Combined storm and sanitary sewer ____ %

A.8. Discharges and Other Disposal Methods.

a. Does the treatment works discharge effluent to waters of the U.S.? ✓ Yes ____ No

If yes, list how many of each of the following types of discharge points the treatment works uses:

i. Discharges of treated effluent 1

ii. Discharges of untreated or partially treated effluent 0

iii. Combined sewer overflow points 0

iv. Constructed emergency overflows (prior to the headworks) 0

v. Other ____

b. Does the treatment works discharge effluent to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the U.S.? ____ Yes ✓ No

If yes, provide the following for each surface impoundment:

Location: ____

Annual average daily volume discharged to surface impoundment(s) ____ mgd

Is discharge ____ continuous or ____ intermittent?

c. Does the treatment works land-apply treated wastewater? ____ Yes ✓ No

If yes, provide the following for each land application site:

Location: ____

Number of acres: ____

Annual average daily volume applied to site: ____ Mgd

Is land application ____ continuous or ____ intermittent?

d. Does the treatment works discharge or transport treated or untreated wastewater to another treatment works? ____ Yes ✓ No

If yes, describe the mean(s) by which the wastewater from the treatment works is discharged or transported to the other treatment works (e.g., tank truck, pipe).

_____

If transport is by a party other than the applicant, provide:

Transporter name: _____

Mailing Address: _____

_____

Contact person: _____

Title: _____

Telephone number: _____

For each treatment works that receives this discharge, provide the following:

Name: _____

Mailing Address: _____

_____

Contact person: _____

Title: _____

Telephone number: _____

If known, provide the NPDES permit number of the treatment works that receives this discharge. _____

Provide the average daily flow rate from the treatment works into the receiving facility. NA mgd

e. Does the treatment works discharge or dispose of its wastewater in a manner not included in A.8.a through A.8.d above (e.g., underground percolation, well injection)? _____ Yes ✓ No

If yes, provide the following for each disposal method:

Description of method (including location and size of site(s) if applicable):

_____

Annual daily volume disposed of by this method: _____

Is disposal through this method _____ continuous or _____ intermittent?

WASTEWATER DISCHARGES:

If you answered "yes" to question A.8.a, complete questions A.9 through A.12 **once for each outfall** (including bypass points) through which effluent is discharged. Do not include information on combined sewer overflows in this section. **If you answered "no" to question A.8.a**, go to Part B, "Additional Application Information for Applicants with a Design Flow Greater than or Equal to 0.1 mgd."

A.9. Description of Outfall.

a. Outfall number 001

b. Location

(City or town, if applicable)	(Zip Code) 22664
(County) Shenandoah County	(State) Virginia
(Latitude) 78 deg 28 min 48 sec	(Longitude) 38 deg 53 min 10 sec

c. Distance from shore (if applicable) N/A ft.

d. Depth below surface (if applicable) N/A ft.

e. Average daily flow rate 0.57 mgd

f. Does this outfall have either an intermittent or a periodic discharge? ____ Yes ✓ No (go to A.9.g.)

If yes, provide the following information:

Number of times per year discharge occurs: ____

Average duration of each discharge: ____

Average flow per discharge: ____ mgd

Months in which discharge occurs: ____

g. Is outfall equipped with a diffuser? ____ Yes ✓ No

A.10. Description of Receiving Waters.

a. Name of receiving water N. Fork Shenandoah, to Shenandoah, to Pogomac, to Chesapeake Bay

b. Name of watershed (if known) Chesapeake Bay

United States Soil Conservation Service 14-digit watershed code (if known): ____

c. Name of State Management/River Basin (if known): Potomac River

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): 02070006

d. Critical low flow of receiving stream (if applicable):
acute 54.78 cfs chronic 64.8 cfs

e. Total hardness of receiving stream at critical low flow (if applicable): 169 mg/l of $CaCO_3$

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

Form Approved 1/14/99
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A.11. Description of Treatment.

a. What levels of treatment are provided? Check all that apply.

✓ Primary ✓ Secondary
✓ Advanced _____ Other. Describe: _____

b. Indicate the following removal rates (as applicable):

Design BOD_5 removal or Design $CBOD_5$ removal	97	%
Design SS removal	96	%
Design P removal	93	%
Design N removal	87	%
Other _____		%

c. What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe.

Ultraviolet

If disinfection is by chlorination, is dechlorination used for this outfall? _____ Yes _____ No

d. Does the treatment plant have post aeration? ✓ Yes _____ No

A.12. Effluent Testing Information. All Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three samples and must be no more than four and one-half years apart.

Outfall number: 001

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)	6.8	s.u.			
pH (Maximum)	7.8	s.u.			
Flow Rate	2.8	MGD	0.574	MGD	Continuous
Temperature (Winter)					
Temperature (Summer)					

* For pH please report a minimum and a maximum daily value

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
		Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.								
BIOCHEMICAL OXYGEN	*BOD-5*							
DEMAND (Report one)	CBOD-5	10.736	mg/L	<QL	mg/L	36	SM5210B	2 mg/L
FECAL COLIFORM E. coli		<1/100mL		<1/100mL		11	Colilert	1/100mL
TOTAL SUSPENDED SOLIDS (TSS)		<QL	mg/L	<QL	mg/L	36	SM2540D	1 mg/L

END OF PART A.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

BASIC APPLICATION INFORMATION

PART B. ADDITIONAL APPLICATION INFORMATION FOR APPLICANTS WITH A DESIGN FLOW GREATER THAN OR EQUAL TO 0.1 MGD (100,000 gallons per day).

All applicants with a design flow rate ≥ 0.1 mgd must answer questions B.1 through B.6. All others go to Part C (Certification).

B.1. Inflow and Infiltration. Estimate the average number of gallons per day that flow into the treatment works from inflow and/or infiltration.

250,000 gpd

Briefly explain any steps underway or planned to minimize inflow and infiltration.

Public Works staff monitor infiltration/inflow and correct it as it is found.

B.2. Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information. (You may submit more than one map if one map does not show the entire area.)

a. The area surrounding the treatment plant, including all unit processes.

b. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.

c. Each well where wastewater from the treatment plant is injected underground.

d. Wells, springs, other surface water bodies, and drinking water wells that are: 1) within 1/4 mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.

e. Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.

f. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, and/or disposed.

B.3. Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant, including all bypass piping and all backup power sources or redundancy in the system. Also provide a water balance showing all treatment units, including disinfection (e.g, chlorination and dechlorination). The water balance must show daily average flow rates at influent and discharge points and approximate daily flow rates between treatment units. Include a brief narrative description of the diagram.

B.4. Operation/Maintenance Performed by Contractor(s).

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of a contractor? ____Yes ✓ No

If yes, list the name, address, telephone number, and status of each contractor and describe the contractor's responsibilities (attach additional pages if necessary).

Name: _____

Mailing Address: _____

Telephone Number: _____

Responsibilities of Contractor: _____

B.5. Scheduled Improvements and Schedules of Implementation. Provide information on any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses to question B.5 for each. (If none, go to question B.6.)

a. List the outfall number (assigned in question A.9) for each outfall that is covered by this implementation schedule.

N/A

b. Indicate whether the planned improvements or implementation schedule are required by local, State, or Federal agencies.

____Yes ____No

c If the answer to B.5.b is "Yes," briefly describe, including new maximum daily inflow rate (if applicable).

_____

d. Provide dates imposed by any compliance schedule or any actual dates of completion for the implementation steps listed below, as applicable. For improvements planned independently of local, State, or Federal agencies, indicate planned or actual completion dates, as applicable. Indicate dates as accurately as possible.

Implementation Stage	Schedule MM / DD / YYYY	Actual Completion MM / DD / YYYY
– Begin construction	___/___/_____	___/___/_____
– End construction	___/___/_____	___/___/_____
– Begin discharge	___/___/_____	___/___/_____
– Attain operational level	___/___/_____	___/___/_____

e. Have appropriate permits/clearances concerning other Federal/State requirements been obtained? ____Yes ____No

Describe briefly: _____

B.6. EFFLUENT TESTING DATA (GREATER THAN 0.1 MGD ONLY).

Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall Number: 001

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
	Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.							
AMMONIA (as N)	<0.1	mg/L	<0.1	mg/L	3	SM 4500 NH3	0.1 mg/L
CHLORINE (TOTAL RESIDUAL, TRC)	<0.1	mg/L	<0.1	mg/L	3	SM 4500 Cl	0.1 mg/L
DISSOLVED OXYGEN			>5.0	mg/L	daily		
TOTAL KJELDAHL *NITROGEN (TKN)*	1.08	mg/L	0.71	mg/L	41	SM4500NH3D	0.5 mg/L
NITRATE PLUS NITRITE NITROGEN	3.2	mg/L	0.63	mg/L	11	SM4500NO3E	0.10 mg/L
OIL and GREASE	ND	mg/L	ND	mg/L	3	EPA 1664B	5.0 mg/L
PHOSPHORUS (Total)	0.29	mg/L	0.13	mg/L	11	HACH 8091	0.04 mg/L
TOTAL DISSOLVED SOLIDS (TDS)	507	mg/L	498	mg/L	3		
OTHER							

END OF PART B.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

Woodstock STP VA0026468

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART C. CERTIFICATION

All applicants must complete the Certification Section. Refer to instructions to determine who is an officer for the purposes of this certification. All applicants must complete all applicable sections of Form 2A, as explained in the Application Overview. Indicate below which parts of Form 2A you have completed and are submitting. By signing this certification statement, applicants confirm that they have reviewed Form 2A and have completed all sections that apply to the facility for which this application is submitted.

Indicate which parts of Form 2A you have completed and are submitting:

✓ Basic Application Information packet

Supplemental Application Information packet:

✓ Part D (Expanded Effluent Testing Data)

✓ Part E (Toxicity Testing: Biomonitoring Data)

____ Part F (Industrial User Discharges and RCRA/CERCLA Wastes)

____ Part G (Combined Sewer Systems)

ALL APPLICANTS MUST COMPLETE THE FOLLOWING 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: Dr. Reid A. Wodicka, Town Manager

Signature: [signature]

Telephone number: (540) 459-3621

Date signed: 26 August 2005

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

SEND COMPLETED FORMS TO:

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

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SUPPLEMENTAL APPLICATION INFORMATION

PART D. EXPANDED EFFLUENT TESTING DATA

Refer to the directions on the cover page to determine whether this section applies to the treatment works.

Effluent Testing: 1.0 mgd and Pretreatment Treatment Works. If the treatment works has a design flow greater than or equal to 1.0 mgd or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information and any other information required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analyses conducted using 40 CFR Part 136 methods. In addition, these data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum, effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall number: 001 (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS, AND HARDNESS.											
ANTIMONY	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	5.0
ARSENIC	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	10.0
BERYLLIUM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	1.0
CADMIUM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	1.0
CHROMIUM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	5.0
COPPER	28.0	µg/L	64.2	g/d	15.7	µg/L	35.6	g/d	3	EPA 200.7	5.0
LEAD	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	5.0
MERCURY	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 245.1	0.20
NICKEL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	5.0
SELENIUM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	10.0
SILVER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	5.0
THALLIUM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 200.7	10.0
ZINC	35.1	µg/L	80.5	g/d	30.1	µg/L	68.8	g/d	3	EPA 200.7	10.0
CYANIDE	ND	mg/L	ND	g/d	ND	mg/L	ND	g/d	3	SM 4500-CN-E	0.0080
TOTAL PHENOLIC COMPOUNDS	0.017	mg/L	0.039	g/d	0.012	mg/L	0.03	g/d	3	EPA 420.4	0.010
HARDNESS (AS $CaCO_3$)	271	mg/L			264	mg/L			3	EPA 200.7	0.662
Use this space (or a separate sheet) to provide information on other metals requested by the permit writer.											

FACILITY NAME AND PERMIT NUMBER:
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Outfall number: 001 (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
VOLATILE ORGANIC COMPOUNDS.											
ACROLEIN	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	5.0
ACRYLONITRILE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	50.0
BENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
BROMOFORM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
CARBON TETRACHLORIDE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
CLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
CHLORODIBROMO-METHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
CHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
2-CHLORO-ETHYLVINYL ETHER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 8260	10.0
CHLOROFORM	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
DICHLOROBROMO-METHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,1-DICHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,2-DICHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
TRANS-1,2-DICHLORO-ETHYLENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,1-DICHLOROETHYLENE											
1,2-DICHLOROPROPANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,3-DICHLORO-PROPYLENE											
ETHYLBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
METHYL BROMIDE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
METHYL CHLORIDE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
METHYLENE CHLORIDE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,1,2,2-TETRACHLORO-ETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
TETRACHLORO-ETHYLENE											
TOLUENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0

FACILITY NAME AND PERMIT NUMBER:
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Outfall number: 001 (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
1,1,1-TRICHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
1,1,2-TRICHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
TRICHLORETHYLENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
VINYL CHLORIDE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 624	2.0
Use this space (or a separate sheet) to provide information on other volatile organic compounds requested by the permit writer.											
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2-CHLOROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2,4-DICHLOROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2,4-DIMETHYLPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
4,6-DINITRO-O-CRESOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	20.0
2,4-DINITROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	50.0
2-NITROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
4-NITROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	50.0
PENTACHLOROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
PHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2,4,6-TRICHLOROPHENOL	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
Use this space (or a separate sheet) to provide information on other acid-extractable compounds requested by the permit writer.											
BASE-NEUTRAL COMPOUNDS.											
ACENAPHTHENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
ACENAPHTHYLENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
ANTHRACENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BENZIDINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	50.0
BENZO(A)ANTHRACENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BENZO(A)PYRENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: 001 (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
3,4 BENZO-FLUORANTHENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BENZO(GHI)PERYLENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BENZO(K)FLUORANTHENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BIS (2-CHLOROETHOXY) METHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
BIS (2-CHLOROETHYL)-ETHER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BIS (2-CHLOROISO-PROPYL) ETHER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BIS (2-ETHYLHEXYL) PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
4-BROMOPHENYL PHENYL ETHER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
BUTYL BENZYL PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2-CHLORONAPHTHALENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
4-CHLORPHENYL PHENYL ETHER	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
CHRYSENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
DI-N-BUTYL PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
DI-N-OCTYL PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
DIBENZO(A,H) ANTHRACENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
1,2-DICHLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
1,3-DICHLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
1,4-DICHLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
3,3-DICHLOROBENZIDINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	25.0
DIETHYL PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
DIMETHYL PHTHALATE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2,4-DINITROTOLUENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
2,6-DINITROTOLUENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
1,2-DIPHENYLHYDRAZINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: 001 (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
FLUORANTHENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
FLUORENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
HEXACHLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
HEXACHLOROBUTADIENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
HEXACHLOROCYCLO-PENTADIENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
HEXACHLOROETHANE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
INDENO(1,2,3-CD)PYRENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
ISOPHORONE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
NAPHTHALENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
NITROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
N-NITROSODI-N-PROPYLAMINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
N-NITROSODI- METHYLAMINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
N-NITROSODI-PHENYLAMINE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	10.0
PHENANTHRENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
PYRENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0
1,2,4-TRICHLOROBENZENE	ND	µg/L	ND	g/d	ND	µg/L	ND	g/d	3	EPA 625	5.0

Use this space (or a separate sheet) to provide information on other base-neutral compounds requested by the permit writer.

Use this space (or a separate sheet) to provide information on other pollutants (e.g., pesticides) requested by the permit writer.

END OF PART D.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

SUPPLEMENTAL APPLICATION INFORMATION

PART E. TOXICITY TESTING DATA

POTWs meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points: 1) POTWs with a design flow rate greater than or equal to 1.0 mgd; 2) POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403); or 3) POTWs required by the permitting authority to submit data for these parameters.

- At a minimum, these results must include quarterly testing for a 12-month period within the past 1 year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute and/or chronic toxicity, depending on the range of receiving water dilution. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- In addition, submit the results of any other whole effluent toxicity tests from the past four and one-half years. If a whole effluent toxicity test conducted during the past four and one-half years revealed toxicity, provide any information on the cause of the toxicity or any results *of a toxicity reduction evaluation, if one was conducted.*
- If you have already submitted any of the information requested in Part E, you need not submit it again. Rather, provide the information requested in question E.4 for previously submitted information. If EPA methods were not used, report the reasons for using alternate methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E.

If no biomonitoring data is required, do not complete Part E. Refer to the Application Overview for directions on which other sections of the form to complete.

E.1. Required Tests.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years.

____chronic ____acute

E.2. Individual Test Data. Complete the following chart for each whole effluent toxicity test conducted in the last four and one-half years. Allow one column per test (where each species constitutes a test). Copy this page if more than three tests are being reported.

	Test number:_____	Test number:_____	Test number:_____
a. Test information.			
Test species & test method number			
Age at initiation of test			
Outfall number			
Dates sample collected			
Date test started			
Duration			
b. Give toxicity test methods followed.			
Manual title			
Edition number and year of publication			
Page number(s)			
c. Give the sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used.			
24-Hour composite			
Grab			
d. Indicate where the sample was taken in relation to disinfection. (Check all that apply for each)			
Before disinfection			
After disinfection			
After dechlorination			

FACILITY NAME AND PERMIT NUMBER:
Woodstock STP VA0026468

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	Test number: 1	Test number: 2	Test number: 3
e. Describe the point in the treatment process at which the sample was collected.			
Sample was collected:			
f. For each test, include whether the test was intended to assess chronic toxicity, acute toxicity, or both.			
Chronic toxicity			
Acute toxicity			
g. Provide the type of test performed.			
Static			
Static-renewal			
Flow-through			
h. Source of dilution water. If laboratory water, specify type; if receiving water, specify source.			
Laboratory water			
Receiving water			
i. Type of dilution water. It salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh water			
Salt water			
j. Give the percentage effluent used for all concentrations in the test series.			
k. Parameters measured during the test. (State whether parameter meets test method specifications)			
pH			
Salinity			
Temperature			
Ammonia			
Dissolved oxygen			
l. Test Results.			
Acute:			
Percent survival in 100% effluent	%	%	%
LC_{50}			
95% C.I.	%	%	%
Control percent survival	%	%	%
Other (describe)			

Chronic:			
NOEC	%	%	%
IC_{25}	%	%	%
Control percent survival	%	%	%
Other (describe)			
m. Quality Control/Quality Assurance.			
Is reference toxicant data available?			
Was reference toxicant test within acceptable bounds?			
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (describe)			

E.3. Toxicity Reduction Evaluation. Is the treatment works involved in a Toxicity Reduction Evaluation?

____*Yes* ✓ *No* *If yes, describe:* _____

E.4. Summary of Submitted Biomonitoring Test Information. If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date submitted: _____ (MM/DD/YYYY)

Summary of results: (see instructions)

See attached summary sheet

END OF PART E.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE.

VPDES Permit Application Addendum

1. **Entity to whom the permit is to be issued:** Town of Woodstock
   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. **Is this facility located within city or town boundaries?** ☐ YES ☑ NO
   Include a topographic map identifying the location of the facility, the property boundaries, and the discharge point.

3. **What is the tax map parcel number for the land where this facility is located?** 046 A 158B

4. **For the facility to be covered by this permit, how many acres will be disturbed during the next five years due to new construction activities?** 0

5. ALL FACILITIES: **What is the design average flow of this facility?** 2.0 MGD
   Industrial facilities: **What is the maximum 30-day avg. 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: _____
   Please consider: Is your facility's design flow considerably greater than your current flow? Do you plan to expand operations during the next five years?

6. **Nature of operations generating wastewater:**
   Municipal, domestic

   100? % of flow from domestic connections/sources
   Number of private residences to be served by the wastewater treatment facilities: ☐ 0 ☐ 1-49 ☑ 50 or more

   0? % of flow from non-domestic connections/sources

7. **Mode of discharge:** ☑ Continuous ☐ Intermittent ☐ Seasonal
   Describe frequency and duration of intermittent or seasonal discharges:
   _____

8. **Identify the characteristics of the receiving stream at the point just above the facility's discharge point:**
   ☑ Permanent stream, never dry
   ☐ Intermittent stream, usually flowing, sometimes dry
   ☐ Ephemeral stream, wet-weather flow, often dry
   ☐ Effluent-dependent stream, usually or always dry
   ☐ Lake or pond at or below the discharge point
   ☐ Other: _____

9. **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: james.didawick@townofwoodstockva.gov

   ☐ 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.

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: Town of Woodstock STP **VPDES Permit No:** VA0026468

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 _____

b. Receiving Facility VPDES Permit No. _____

c. Include an acceptance letter from the Receiving Facility.

d. Receiving Facility's ultimate disposal method for sewage sludge _____

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 Shenandoah County Landfill

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 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 $CaCO_3$ (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: Dr. Reid A. Wodicka, Town Manager

Signature: Reid Wodicka

Telephone number / Email: (540) 459-3621 / reid.wodicka@townofwoodstockva.gov

Date signed: 26 August 2015

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

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: Town of Woodstock STP **VPDES Permit No:** VA0026468

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 _____
   b. Receiving Facility VPDES Permit No. _____
   c. Include an acceptance letter from the Receiving Facility.
   d. Receiving Facility's ultimate disposal method for sewage sludge _____

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 Battle Creek Landfille, Page County
   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 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 $CaCO_3$ (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: Dr. Reid A. Wodicka, Town Manager

Signature: Reid Wodicka

Telephone number / Email: (540) 459-3621 / reid.wodicka@townofwoodstockva.gov

Date signed: 26 August 2013

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

TOMS BROOK TOPO MAP

800
MOOSE RD
700
800
800
Spring
Hollow
700
800
700
N Fork Shenandoah River
HICKORY LN
MILL RD
WOODSTOCK TOWER RD
ollow Run
800
800

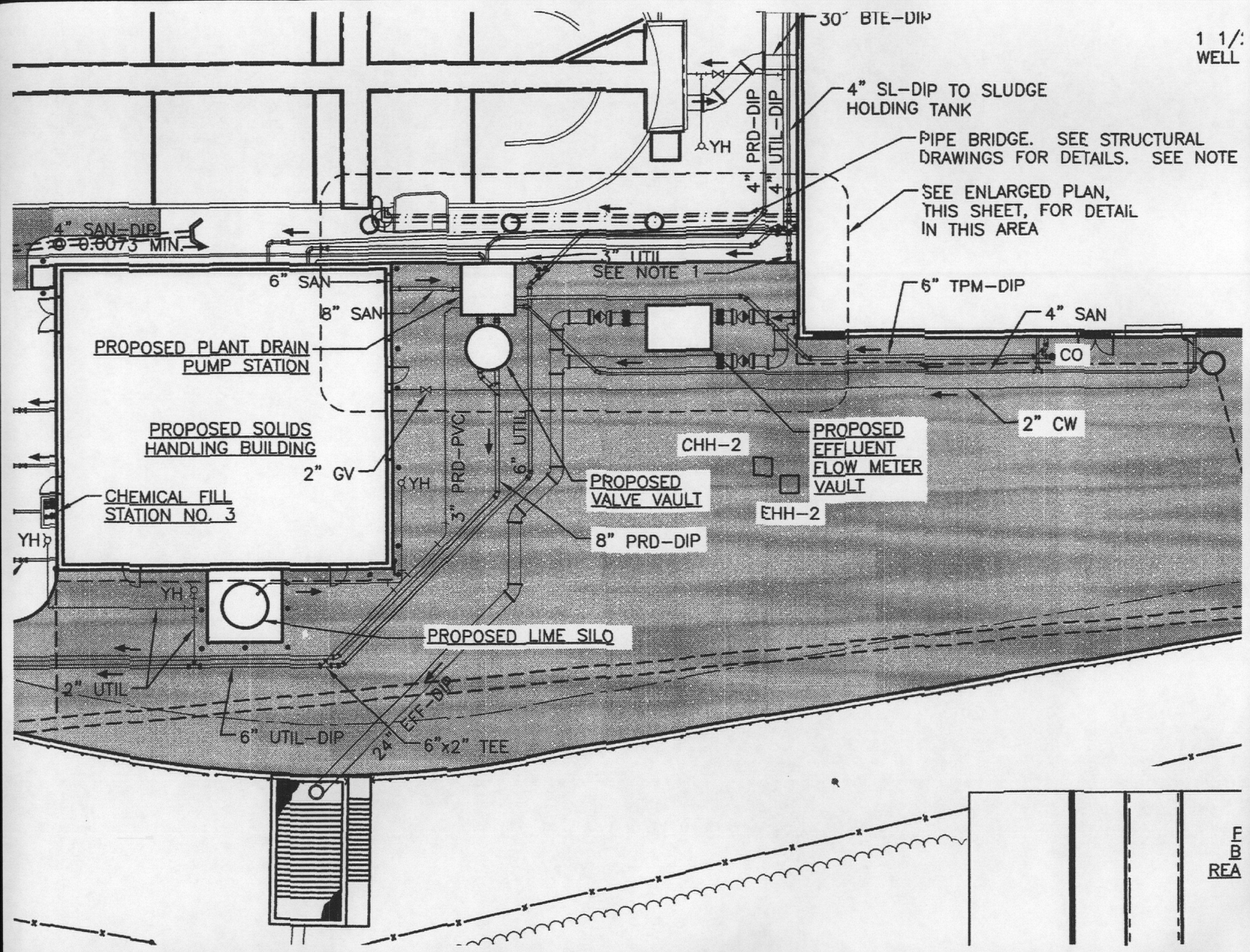
WASTEWATER TREATMENT PLANT TOPO MAP

Google earth

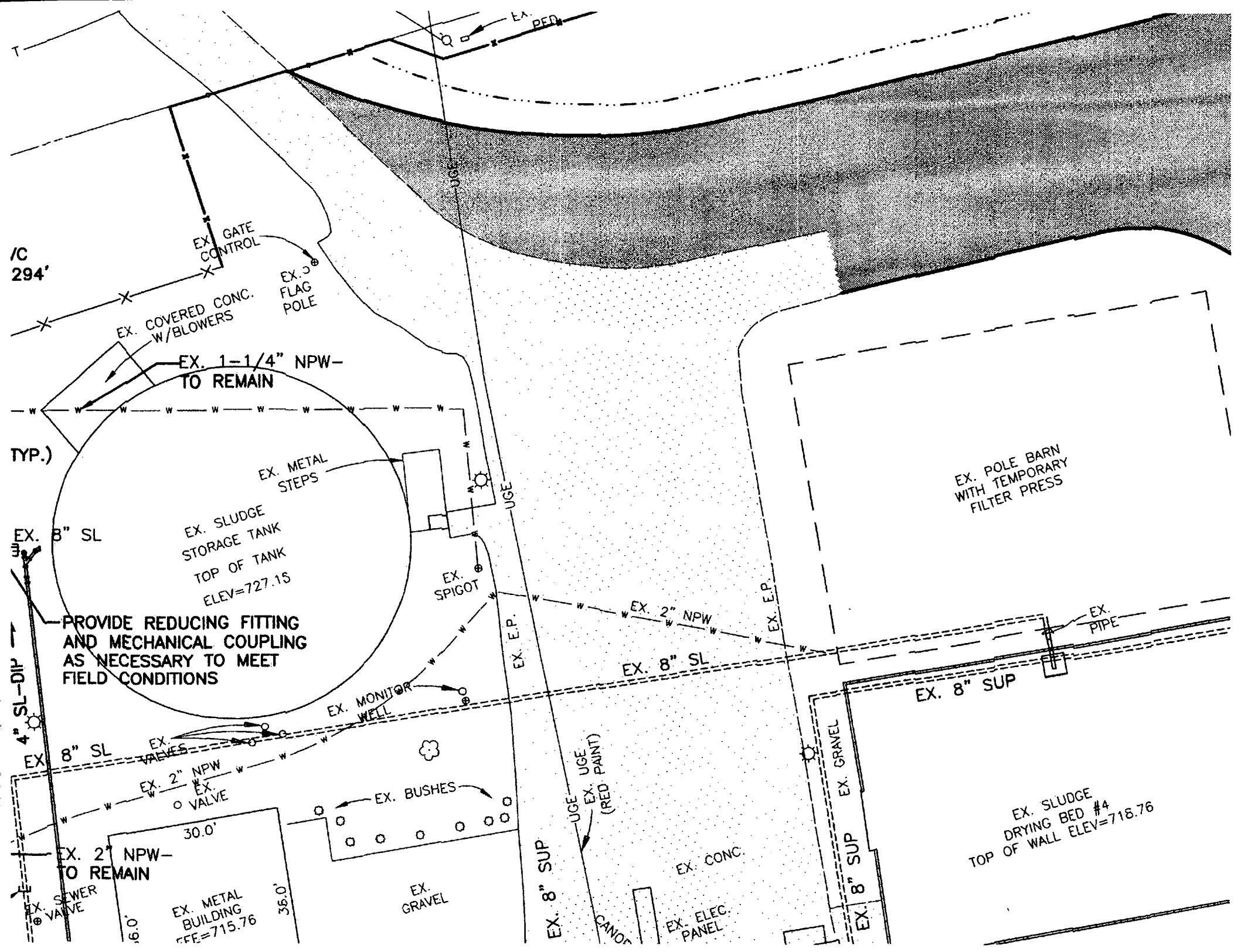
feet 500

meters 100

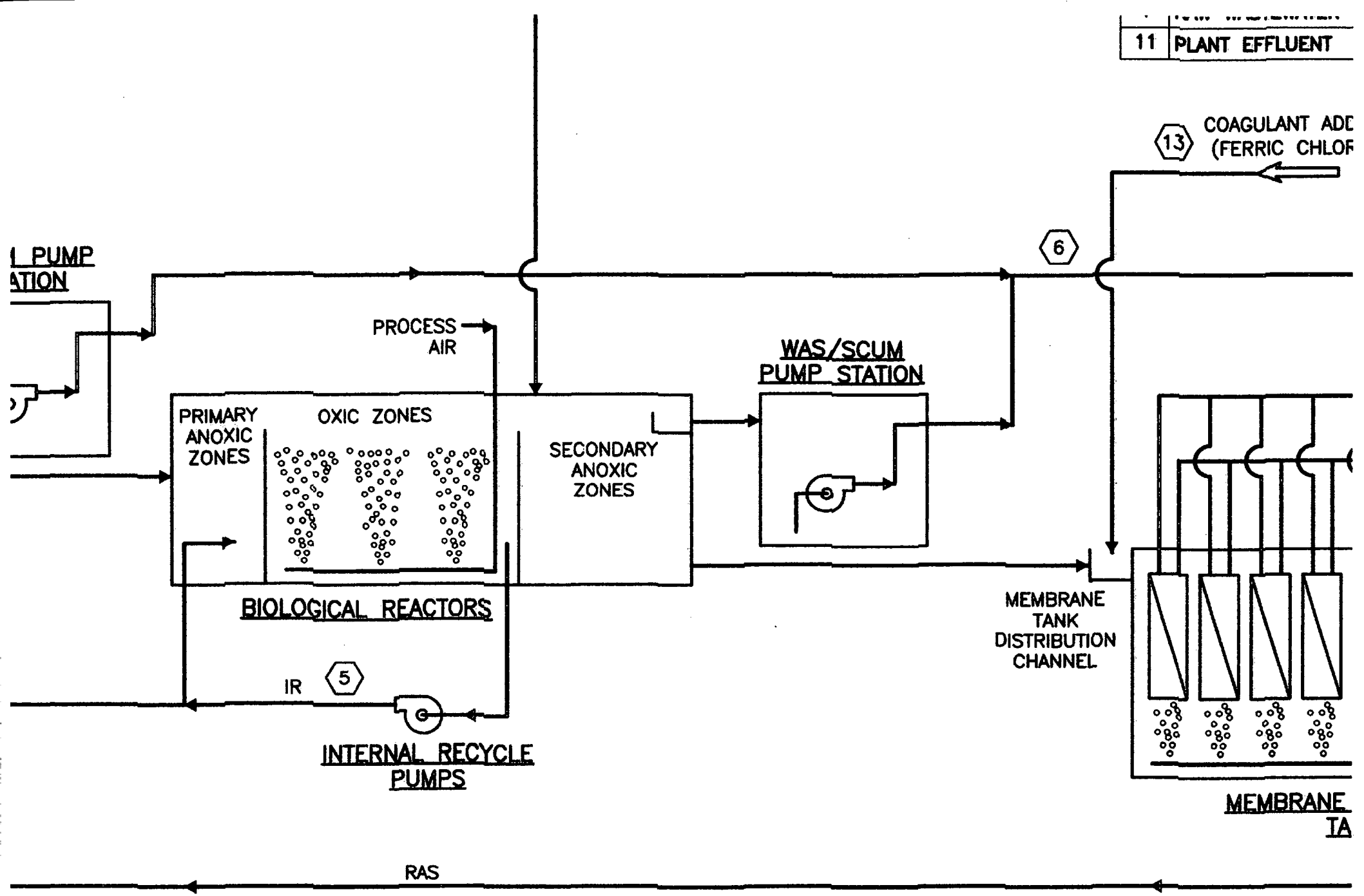
LOWER YARD SITE PIPING


30" BTE-DIP
1 1/:
WELL
4" SL-DIP TO SLUDGE HOLDING TANK
PIPE BRIDGE. SEE STRUCTURAL DRAWINGS FOR DETAILS. SEE NOTE
SEE ENLARGED PLAN, THIS SHEET, FOR DETAIL IN THIS AREA
4" PRD-DIP
4" UTIL-DIP
YH
4" SAN-DIP
@ 0.0073 MIN.
3" UTIL
SEE NOTE 1
6" SAN
8" SAN
6" TPM-DIP
4" SAN
CO
PROPOSED PLANT DRAIN PUMP STATION
PROPOSED SOLIDS HANDLING BUILDING
2" GV
CHEMICAL FILL STATION NO. 3
YH
3" PRD-PVC
6" UTIL
PROPOSED VALVE VAULT
CHH-2
EHH-2
PROPOSED EFFLUENT FLOW METER VAULT
2" CW
8" PRD-DIP
YH
YH
PROPOSED LIME SILO
2" UTIL
6" UTIL-DIP
24" EFF-DIP
6"x2" TEE
F
B
REA

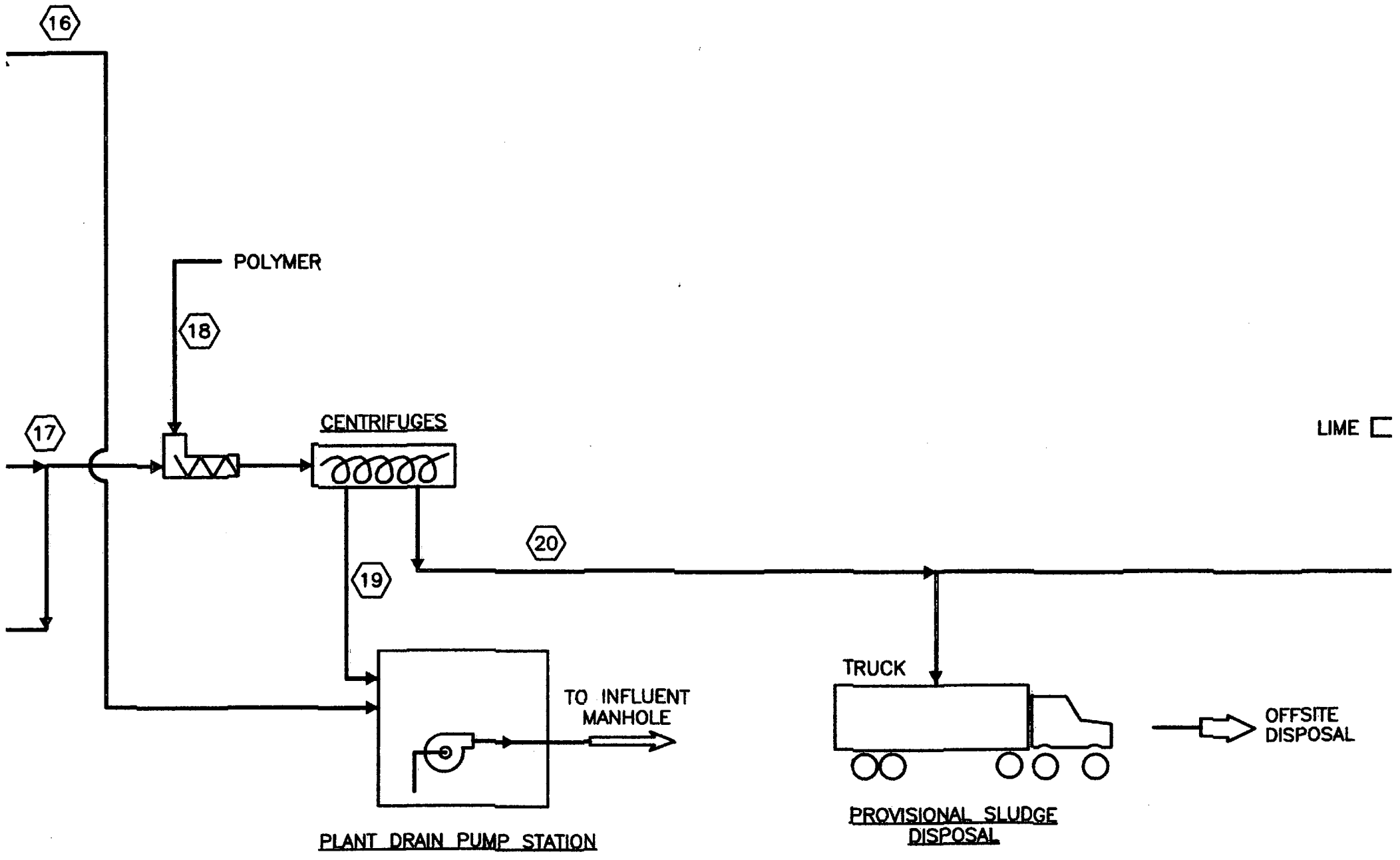
UPPER YARD SITE PIPING


EX. PED.
EX. GATE CONTROL
EX. FLAG POLE
/C
294'
EX. COVERED CONC. W/BLOWERS
EX. 1-1/4" NPW-
TO REMAIN
TYP.)
EX. METAL STEPS
EX. SLUDGE STORAGE TANK
TOP OF TANK
ELEV=727.15
EX. 8" SL
PROVIDE REDUCING FITTING AND MECHANICAL COUPLING AS NECESSARY TO MEET FIELD CONDITIONS
EX. SPIGOT
UGE
EX. 2" NPW
EX. E.P.
EX. 8" SL
EX. MONITOR WELL
EX. VALVES
EX. 2" NPW
EX. VALVE
EX. BUSHES
EX. 2" NPW-
TO REMAIN
EX. SEWER VALVE
30.0'
EX. METAL BUILDING
FFE=715.76
36.0'
EX. GRAVEL
EX. 8" SUP
UGE
EX. UGE (RED PAINT)
EX. CONC.
EX. ELEC. PANEL
EX. POLE BARN WITH TEMPORARY FILTER PRESS
EX. PIPE
EX. 8" SUP
EX. GRAVEL
EX. SLUDGE DRYING BED #4
TOP OF WALL ELEV=718.76

LIQUID STREAM SCHEMATIC


11
PLANT EFFLUENT
13
COAGULANT ADD
(FERRIC CHLOR
6
PUMP
ATION
PROCESS
AIR
WAS/SCUM
PUMP STATION
PRIMARY
ANOXIC
ZONES
OXIC ZONES
SECONDARY
ANOXIC
ZONES
BIOLOGICAL REACTORS
MEMBRANE
TANK
DISTRIBUTION
CHANNEL
IR
5
INTERNAL RECYCLE
PUMPS
MEMBRANE
TA
RAS

SOLIDS STREAM SCHEMATIC


16
POLYMER
18
17
CENTRIFUGES
LIME
20
19
TRUCK
TO INFLUENT MANHOLE
OFFSITE DISPOSAL
PLANT DRAIN PUMP STATION
PROVISIONAL SLUDGE DISPOSAL

WASTEWATER TREATMENT PLANT EFFLUENT TESTING SUMMARY

Town of Woodstock STP Summary of Whole Effluent Toxicity Testing
Outfall 001 (VA0026468)

Period: November, 2010-June, 2015

S=survival; R=reproduction; B=biomass

Sample Period	Testing Dates	Species	Test Type	EPA Method	NOAEC	NOEC	Criteria
11/15/10-11/18/10	11/17/10-11/19/10	*C. dubia*	Acute	2002.0	100		S
11/15/10-11/18/10	11/17/10-11/19/10	*P. promelas*	Acute	2000.0	100		S
11/15/10-11/18/10	11/16/10-11/22/10	*C. dubia*	Chronic	1002.0		100	S&R
11/15/10-11/18/10	11/16/10-11/23/10	*P. promelas*	Chronic	1000.0		100	S&B
2/14/11-2/17/11	2/16/11-2/18/11	*C. dubia*	Acute	2002.0	100		S
2/14/11-2/17/11	2/16/11-2/18/11	*P. promelas*	Acute	2000.0	100		S
2/14/11-2/17/11	2/15/11-2/21/11	*C. dubia*	Chronic	1002.0		100	S&R
2/14/11-2/17/11	2/15/11-2/22/11	*P. promelas*	Chronic	1000.0		100	S&B
5/23/11-5/26/11	5/25/11-5/27/11	*C. dubia*	Acute	2002.0	50		S
5/23/11-5/26/11	5/25/11-5/27/11	*P. promelas*	Acute	2000.0	100		S
5/23/11-5/26/11	5/24/11-5/30/11	*C. dubia*	Chronic	1002.0		100	S&R
5/23/11-5/26/11	5/24/11-5/31/11	*P. promelas*	Chronic	1000.0		100 61.6	S B
8/1/11-8/4/11	8/3/11-8/5/11	*C. dubia*	Acute	2002.0	100		S
8/1/11-8/4/11	8/3/11-8/5/11	*P. promelas*	Acute	2000.0	100		S
8/1/11-8/4/11	8/2/11-8/8/11	*C. dubia*	Chronic	1002.0		100	S&R
8/1/11-8/4/11	8/2/11-8/8/11	*P. promelas*	Chronic	1000.0		100	S&B
6/25/12-6/28/12	6/27/12-6/29/12	*C. dubia*	Acute	2002.0	100		S
6/25/12-6/28/12	6/27/12-6/29/12	*P. promelas*	Acute	2000.0	100		S
6/25/12-6/28/12	6/26/12-7/2/12	*C. dubia*	Chronic	1002.0		100	S&R
6/25/12-6/28/12	6/26/12-7/2/12	*P. promelas*	Chronic	1000.0		100	S&B
6/24/13-6/27/13	6/26/13-6/28/13	*C. dubia*	Acute	2002.0	100		S

Sample Period	Testing Dates	Species	Test Type	EPA Method	NOAEC	NOEC	Criteria
6/24/13-6/27/13	6/26/13-6/28/13	*P. promelas*	Acute	2000.0	100		S
6/24/13-6/27/13	6/25/13-7/1/13	*C. dubia*	Chronic	1002.0		100	S&R
6/24/13-6/27/13	6/25/13-7/1/13	*P. promelas*	Chronic	1000.0		100	S&B
6/23/14-6/26/14	6/25/14-6/27/14	*C. dubia*	Acute	2002.0	100		S
6/23/14-6/26/14	6/25/14-6/27/14	*P. promelas*	Acute	2000.0	100		S
6/23/14-6/26/14	6/24/14-6/30/14	*C. dubia*	Chronic	1002.0		100	S&R
6/23/14-6/26/14	6/24/14-7/1/14	*P. promelas*	Chronic	1000.0		100	S&B
6/22/15-6/25/15	6/24/15-6/26/15	*C. dubia*	Acute	2002.0	100		S
6/22/15-6/25/15	6/24/15-6/26/15	*P. promelas*	Acute	2000.0	100		S
6/22/15-6/25/15	6/23/15-6/29/15	*C. dubia*	Chronic	1002.0		100	S&R
6/22/15-6/25/15	6/23/15-6/30/15	*P. promelas*	Chronic	1000.0		100	S&B

SHENANDOAH LANDFILL ACCEPTANCE LETTER

County of Shenandoah

Department of Solid Waste Management
349 Landfill Road
Edinburg, Virginia 22824

Pat Felling, Director
Email: pfelling@shenandoahcountyva.us

Brad Dellinger, Operations Manager
Email: bdellinger@shenandoahcountyva.us

Office: 540-984-8573
Fax: 540-984-4591

website:www.shenandoahcountyva.us/landfill

July 17, 2015

Mr. Bill Ryan
Town of Woodstock
Wastewater Plant
943 Mill Road
Woodstock, VA 22664

Subject: Disposal of Sewage Treatment Plant Sludge at the Shenandoah Co. Landfill – Permit# 469

Dear Mr. Ryan:

Per the Department of Environmental Quality requirements, please accept this letter as confirmation that our facility, the Shenandoah County Landfill, will accept sewage sludge from your wastewater treatment plant for disposal.

Attached you will find a copy of our guidelines for testing and acceptance of such materials. Please be aware that the most frequent problem our customers have experienced with sludge testing has been moisture content. Other than the paint filter test for moisture, which is required of every batch, the entire battery of tests listed is required initially, then on an annual basis.

Our current cost for sludge disposal is $45.00 per ton.

Sincerely,

Pat Felling

Pat Felling
Operations Manager

INFLOW AND INFILTRATION REDUCTION PLAN

Inflow and Infiltration Reduction Plan

Town of Woodstock, Virginia

Reid A. Wodicka, PhD
Town Manager

Brent T. Manuel
Assistant Town Manager for Operations

James E. Didawick
Superintendent of Public Works

John B. O'Neill
Director of Finance

Joshua Burner
Deputy Superintendent of Public Works and Water and Sewer Foreman

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Introduction and Background

Like all utilities, the Town of Woodstock's Wastewater Collection system is made up of a network of pipes that collect sewage from businesses and residences from throughout the town and from some select locations outside of the Town limits. The network of pipes is used to transport wastewater from residences and businesses to the wastewater treatment plant on Mill Road for treatment prior to being deposited into the North Fork of the Shenandoah River. Ideally, the only water that enters into the collection system comes directly from residences and businesses purposefully tied into the system.

Unfortunately, over time the underground system of pipes degrades to the point that physical problems in the system reduce the waterproofing capability of the pipe structure. As a result, groundwater and other water leaks into the collection system, causing system overflow for rainwater. Additionally, standard construction practices from prior periods that are no longer acceptable today contribute to this excess problem. Storm drains and basement sump pumps that are directly connected to the sanitary sewer collection system introduce excess rainwater into the system that must be treated at the wastewater treatment plant.

Because of these problems, as well as other concerns, the Town of Woodstock built a new wastewater treatment plant, which went online in 2010. However, the problem of excess water, known and Inflow and Infiltration, in the system did not go away. In the coming years, the identification, quantification, and remediation of inflow and infiltration in the Town of Woodstock's wastewater collection will need to become a priority before the problem gets bad enough to require an additional upgrade. The purpose of this document is to describe a program to identify problem areas, quantify how much inflow and infiltration is occurring in each section of town, and how we plan to fix those problems. This is accomplished through a discussion of historical data of inflow and infiltration, a literature review of relevant literature related developed by practitioners and scholars who have studied inflow and infiltration problems in wastewater collection systems worldwide, the development of a statistical model that accounts for several variables that can affect wastewater flow and provides an output showing how much inflow and infiltration is found within a particular sewer basin, a discussion of data collection techniques and data management practices, and a discussion of next steps. Finally, schedule and budget figures for the analysis are provided.

Woodstock Inflow and Infiltration Data

In November 2013, the Town of Woodstock conducted an analysis of the impact that inflow and infiltration has on the flow data at the wastewater treatment plant. This analysis utilized data from the previous twelve months of flow data, as well as daily rainfall data. The purpose of the analysis was to determine what impact a one inch rainfall events has on the daily flow characteristics. That analysis determined that a one inch rainfall event on the day of observation results in approximately 530,000 more gallons of wastewater to be treated during that day. Because groundwater can continue to infiltrate the wastewater collection system for several days after the rainfall event. For that reason, the model used in this analysis lagged the data for two days. The analysis suggested that a rainfall event one day and two days prior the observation date resulted in approximately 375,000 more gallons and 180,000 more gallons, respectively, of wastewater collected in that system than in days in which there are no rain events. The model also included control variables that considered water distribution system demand and the day of the week during which the observation was taken.

These findings suggest that there is a significant problem of inflow and infiltration within the wastewater collection system in the Town of Woodstock that must be addressed. Though the town constructed a wastewater plant that is substantially larger than is necessarily required on daily basis,

the impact of inflow and infiltration reduces the amount of actual wastewater that can be treated, and therefore billed to customers. During the period between October 2012 and November 2013, there were several incidents during which the capacity of the wastewater treatment plant was tested: 15 instances during which flow was greater than 1 million gallons per day, 6 instances in which flow was greater than 1.5 million gallons per day, and 4 instances during which flow exceeded the design capacity of 2 million gallons per day. This extraneous water has the potential to require a future upgrade earlier than would otherwise be necessary, though the Town receives no benefits from treating this water.

Theory and Model Development

Theory and Literature Review

For the last twenty years, the problem of poorly constructed and ineffectively maintained wastewater collection systems has been extensively researched by both academics and practitioners (Ellis 2001). Extraneous water reaching sewage collection pipes as a result of the structural degradation of the system (Benedittis and Bertrand-Krajewski 2005) results in sanitary sewer overflows (Zhang 2007; Zhang 2005). From the perspective of sewer systems worldwide, estimates of the amount of treated wastewater that is a result of these "parasite waters" (Brombach et al. 2002) range from ten percent (deMonsabert et al 1999) to forty percent (Shebab and Moselhi 2005), obviously depending on the structural characteristics and the age of the physical infrastructure in the system (Karpf and Krebs 2011). This leads to substantial operating costs and capital improvement costs that otherwise would not be necessary if inflow and infiltration in the system were reduced (Zhang 2007). Additionally, the problems of inflow and infiltration are the primary reasons for sewer system repairs (deMonsabert and Thornton 1997).

Like any closed system, all sewer systems have a defined maximum capacity (Zhang 2008). Any extraneous flow reduces the flow of actual wastewater that can be effectively transported without environmental and health and safety impacts (Zhang 2008; Karpf and Krebs 2005). When considering a sewer collection system as a whole, each section of pipe contributes to inflow and infiltration-related extraneous sewage flow in a quantitatively different manner (deMonsabert and Thornton 1997), but affecting the system in a consistent manner (Karpf and Krebs 2005). The global failure to properly maintain sewage collection systems has resulted in systems that are now degrading to the point that utilities have taken large capital costs to treat water that enters the system as either rain or groundwater (Zhang 2005). Certainly, this is not a newly explored problem and many scholars and practitioners have written protocols to assess and address systemic problems.

In general, there have been two primary methods of inflow and infiltration calculation: flow rate methods and chemical/pollutant methods that focus on the contents of the water to determine sources. However, there does not appear to be a compelling case to use one of these two principle types over the other (Benedittis and Bertrand-Krajewski 2005). With respect to the capabilities of municipal governments, flow rate studies appear to be more feasible. Generally, flow studies ideally provide a systematic evaluation of the quantity of flow, hopefully identifying problem areas, and prioritizing repairs through an economic evaluation (deMonsabert and Thornton 1997). Engineers that have conducted flow analyses have been *ad hoc* and have had somewhat questionable statistical validity (Zhang 2007). Zhang (2007) makes this argument because without a robust statistical procedure flow issues are developed through a process of "subjective judgment" (2007, 102) that relies on simple comparisons. A proper statistical analysis procedure would ensure a sufficient number of data points (Zhang 2005), without which tend to underestimate the total amount of inflow and infiltration in the system (Brombach et al. 2002).

Model Specification

While there is no completely ideal model to measure inflow and infiltration (deBenedittis and Bertrand-Krajewski 2005), appropriate specification of the statistical model can improve the model performance. Generally, the best performing models appear to use a regression model that provides an analysis of the impact that rainfall has on the flow within the entire sewer system. Various scholars provide analyses that range from relatively simple linear ordinary least squares regression models (such as Karpf and Krebs 2001) to far more complex time series models (such as Zhang 2008). These statistical protocols provide an analysis that determines the impact that a rainfall event has on the outcome variable, which is sewer flow. The regression models tend to perform better than the more *ad hoc* methods because they are capable of parsing out the effect of a quantity of rainfall from systematic responses to rainfall events. More complex models take more parameters into account, improving the model performance (Lewis-Beck 1980). The basic linear regression model can be defined in the following equation:

$$y = \alpha + \beta X_1 + \varepsilon$$

Where y is the amount of sewer flow being measured, X is the amount of rainfall, alpha is the baseline flow with no rain, and the ε accounts for unaccounted for variation in the model. The beta (b-looking coefficient) provides a multiplier of the effect of a change in the rainfall on the outcome of sewer flow. The beta coefficient provides the most important information on the effect that rainfall has on a particular sewer basin: a larger, positive beta coefficient indicates a larger rainfall event effect. However, this is not an appropriate function for our model because it does not take into account several concerns. Essentially, our model will attempt to minimize the unaccounted for variation and model and include it into our explanatory model.

The basic linear function does not take into account systemic flow characteristics, such as various uses of the system throughout the day, which can be standardized by adding a vector of variables into the model that show what time of day the observation is occurring. Essentially, there are 96 15-minute periods in day (Zhang 2007) and we can identify each, assuming that generally people do the same kinds of things (on average) throughout the day every day. For this reason, we can add to the above equation a term that takes into account typical daily variation:

$$\sum_{i=1}^{95} \beta_i \times period_i$$

Where there are 95 periods observed, with one period captured in the baseline of the flow (this deals with statistical rules on non-multicollinearity). Next, we need to take into account the day of the week that the observation is taking place, either during the weekday or on the weekend (Zhang 2005). This can be added to the model by adding the term:

$$\gamma w$$

Where w is a variable valued at 1 for weekdays and 0 for weekends. The γ (gamma) term provides a multiplier to the effect on sewer flow of system demands during the week (school in session, etc.). Essentially, this does not really matter in the analysis and detection of inflow and infiltration, but allows the analysis to take into account when water usage demands is typically lower, which likely occurs on the weekends.

Most importantly, we need to take into account rainfall measured in the town. Because we know that inflow and infiltration is affected not only by the amount of rain that is falling at the time of the measurement, but also the rain that fell in previous time periods (15 minutes ago, 30 minutes ago, etc.), we must lag those time periods into the predictor for a present flow measurement. This could go back forever, but this model will just limit the time periods to two hours of rainfall prior to the present measurement. The follow describes the time-lagged flows:

$$\sum_{k=0}^{8} \theta_k r_{(t-k)}$$

Where r is the amount of rainfall for the present time (t-0), fifteen minutes ago (t-1), thirty minutes ago (t-2), 45 minutes ago (t-3), 1 hour ago (t-4), 1 hour 15 minutes ago (t-5), 1 hour 30 minutes ago (t-6), 1 hour 45 minutes ago (t-7), and two hours ago (t-8), for a total of 8 time period lag variables to be included in the model. θ is multiplier for each time lag k which show us how much effect each lagged term has on the model. θ is the most important term to consider for the effect of rainfall on flow in each meter.

Since we are measuring several flow meters at once, we need to include a term that tells us which meter each observation relates to. This allows for the use of a panel data analysis that essentially conducts multiple analyses at once, and improves the model by taking into account individual differences in the basins that are not otherwise observed. We can simply use a term that tell us whether we are measuring one basin or another. This is operationalized as a 1 to j variable that is assigned to each basin meter, assuming we have j number of meters. E refers to which basin meter we are observing in each observations and is a dichotomous variable with value either 0 (observation is not in that meter) or 1 (observation is in that meter).

$$\varphi_1 E_1 + \ldots + \varphi_j E_j$$

In addition to identifying the individual basin in which flows are being recorded, it is necessary to include a term that include the interaction between the rainfall and each individual flow meter. In ordinary least squares regression, it is necessary to "[determine] whether a linear additive model is appropriate in a concrete research application…[requiring] the researcher to consider whether, for each independent variable, the slope of the relationship between it and the expected value of the dependent variable depends on the context – the value of that independent variable and/or the value of other independent variables" (Berry 1993, 60). Because the impact that each meter has on the outcome variable (flow) depends upon the rainfall variable, it is necessary to include an interactive specification of the model in which the values of the two terms are multiplied together. This will parse out the specific effect of rainfall on each individual meter, which allows for the calculation in each basin.

$$\sigma_1 r_t E_1 + \ldots + \sigma_j r_t E_j$$

Finally, we need an overall time period that shows us which observations of the panel of flow meters relate to one another. That is, we need to know which observations were taken at the same time. For this, we can use a term that begins at 1 and ends at the end of the all of the observations. The parameters of this term is all integers. This can be added to the model as the

following with π as the multiplier effect of each time period and t denoting the time periods that we are referring to.

$$\pi t$$

This leads to a complete model for the measurement of the effect of rainfall flow meter basins as follows:

$$y_i(t) = \alpha + \sum_{i=1}^{95} \beta_i \times period_i + \gamma w + \sum_{k=0}^{8} \theta_k r_{(t-k)} + \varphi_{1\ldots j} E_{1\ldots j} + \sigma_{1\ldots j} r_t E_{1\ldots j} + \pi t + \varepsilon(t)$$

While the above model seems pretty complex, all this model is doing is telling the computer exactly what is going on in each observation and allows for the computer parse out the effects of various concerns. First, what time of day is the observation occurring? Is it during the week or on the weekend? How much rain was occurring at the time? Which meter are we observing? What effect is the rain having on each meter at this time? Which period during the course of the analysis does that observation relate to? From an analytical perspective it is imperative that we take all of those concerns into account. Without parsing out the effect of those individual concerns, it would be impossible to determine the effects of rainfall on the system, and that of individual basins. Descriptive statistical, such as averages do not allow for the entire set of effects to be consider all at one time. While this model looks complex, statistically, it is pretty simple to construct and interpret. The Town Manager's Office has resources available to discuss this type of statistical model and how it is applied and interpreted.

Data Collection Methods

Aggregate Data Collection

Twelve flow meter data spreadsheets will be kept to identify the flows of each meter. They will be placed on the Town's "Public" server (P:\ drive) in the file path as follows:

P:\Water and Sewer\Flow Data

They will be titled for their number with FM (for "flow meter") and the number of the flow meter. They will be saved as Excel sheets. For instance, the Excel sheet for flow meter 1 will be titled "FM1.csv". Note that these files must be saved as .csv files. This is accomplished using the "Save As" menu in Excel and saving the document as a Comma-Separated Variable (*.csv) file. A statistical script in the R software will be developed to manage and analyze the data.

Flow Meter Locations and Identification

Flow meters utilized for data collection will be placed in existing manholes, allowing us to isolate individual sewer basins. The below chart identifies the manholes into which the flow meters will be installed, based on the 2005 flow analysis of the system conducted by O'Brien and Gere engineers. A map of each location is also available in the appendix.

Flow Meter ID	Manhole ID	Location Notes
1	469	Rt. 11 at Foundry St.
2	27	Cemetery Rd. behind Dairy
3	WWTP	At influent pump station
4	34	E. Spring Street between Church and Water, collect coming from the south
5	78	Off Indian Spring Road, behind Skate Rink
6	237	E. Spring between Rt. 11 and Church Street, collect coming from the south
7	279	Park Avenue, between Mass. Hgts and Washington
8	No number	Between Muhlenberg and Rt. 11 on W. Spring
9	419	West Court Street at Rt. 11, collection coming from the west
10	295	Hisey Ave, collect coming from FVN/Woodstock Fitness area across Rt. 42
11	99	North of Off Rt. 42 behind Rescue Squad
12	99A	South of Rt. 42 near town sign

Table 1: Flow Meter Locations

Basin Flow Calculation Methods

The theory behind the basin flow calculation methods is to measure the flow through the manhole at the bottom point of each individual basin. Of course, because there are upstream basins that have flow that many times travels through the same manhole, the flows is upstream basins must be subtracted from the flow within the subject basin. This should provide a figure of the exact amount of sewage that is flowing from within that particular basin, including both actual wastewater and inflow and infiltration-related water. In some cases, in basins on the upstream periphery of the collection system, there are no upstream basins. In those cases, the single flow meter reading at the bottom of the basin is sufficient for calculating total basin contribution to plant flow. In other cases, such as in Basin 7, there are five separate basins flows that must be subtracted to determine actual flow from that basin.

THEORY:

Individual Basin Flow = Flow meter reading at bottom of basin – Flows from upstream basins

Basin ID	Take reading from flow meter…	Subtract readings from flow meter(s)…
1	1	
2	3	2
3	4	5
4	6	7
5	8	
6	9	
7	2	1, 9, 8, 6, and 4

8	10	
9	5	11
10	7	
11	12	
12	11	12

Table 2: Basin Flow Calculation

After the aggregate analysis is complete, a similar analysis will be conducted on each smaller basin, with prioritization of the basins that have the highest rainfall flow effects during the statistical analysis.

Preliminary Schedule

So that we can avoid snowfall, we should wait until spring to begin the six-month data collection period. That means we will begin actual data collection in Spring 2016.

- November 2014 – Water and Sewer Committee Discussion
- Spring 2015 – CIP Budget Process
- Fall 2016 – Specification writing, bidding on flow meters, purchase; Practice Runs of Data Collection; finalize statistical scripts
- November 2016 – Conduct analysis on practice data; alter statistical scripts as necessary
- April 2017 – Begin system-wide data collection
- October 2017 – End system-wide data collection
- Winter 2017/18 – Analyze collected data
- Spring 2018 – Begin sub-basin data collection, follow similar above procedure
- Spring 2019 – Budget process with repair recommendations

Preliminary Project Budget

Capital Purchases:

Item	Unit Price	Total
13 Flow Meters	$3,825	$49,725
13 Mounting Rings	$76.50	$994.50
Updated FlowLink Software	*$1,030.00*	*$1,030.00*
Total		$51,749.50
FY 16 Capital Budget Figure		$55,000.00

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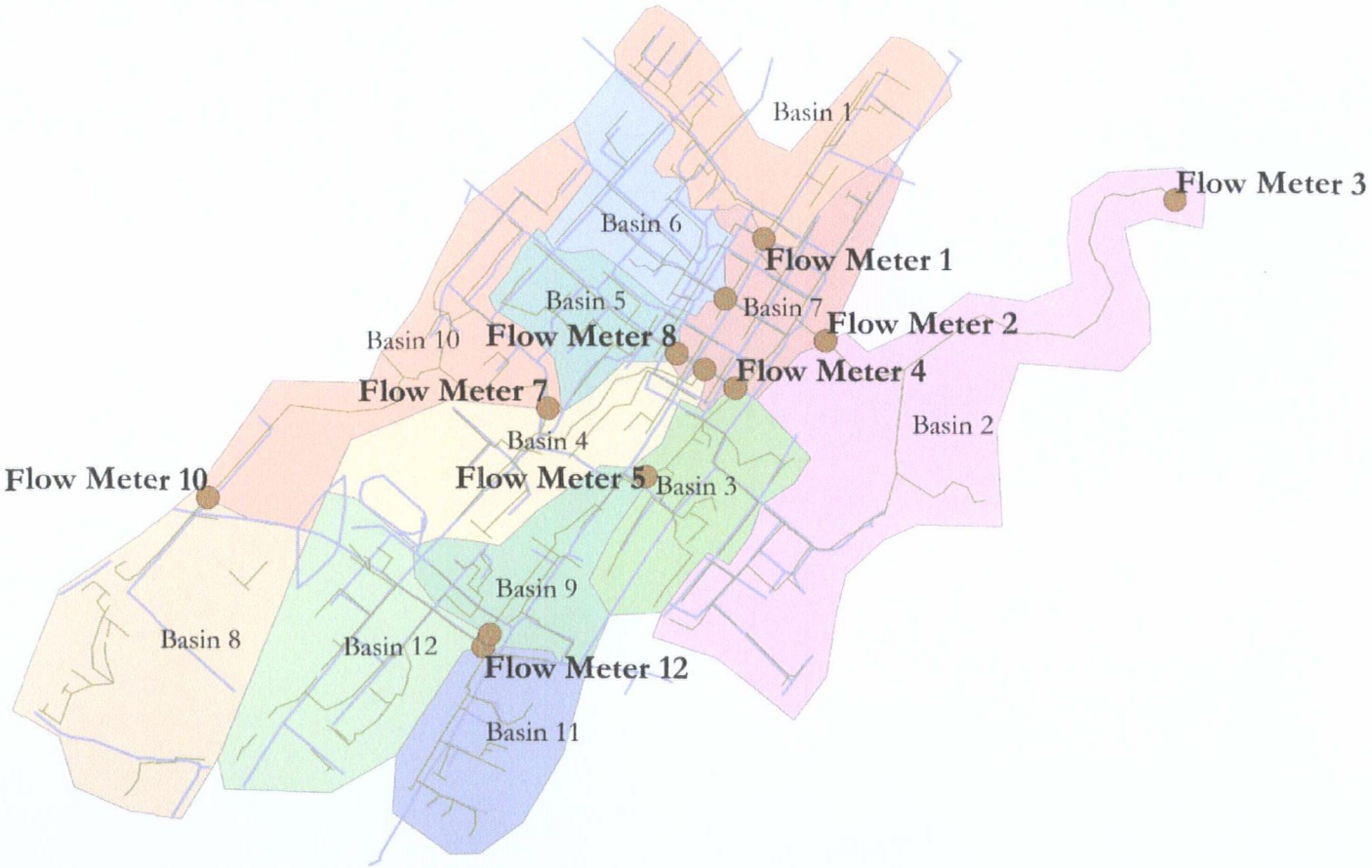
Appendix: Flow Meter Locations

Town of Woodstock
Sewer Flow Meter Locations

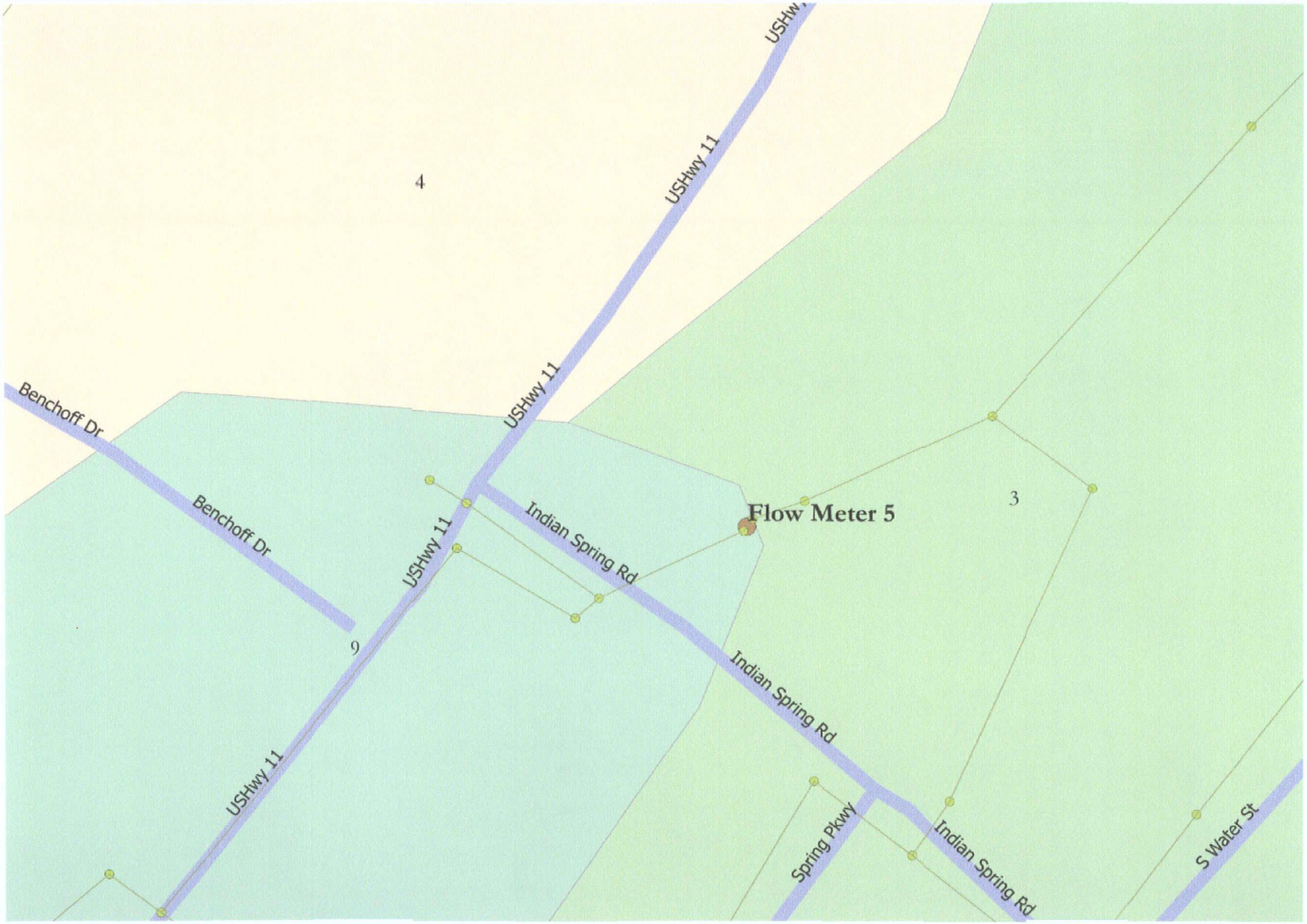


North St
North St
Muhlenburg St
Muhlenburg St
Muhlenburg St
USHwy 11
USHwy 11
USHwy 11
USHwy 11
USHwy 11
1
Foundry St
East North St
N Church St
N Church St
Flow Meter 1
6
7
E. Foundry St
East North St
Church St
Church St
West Locust St
East Locust St
Foundry St

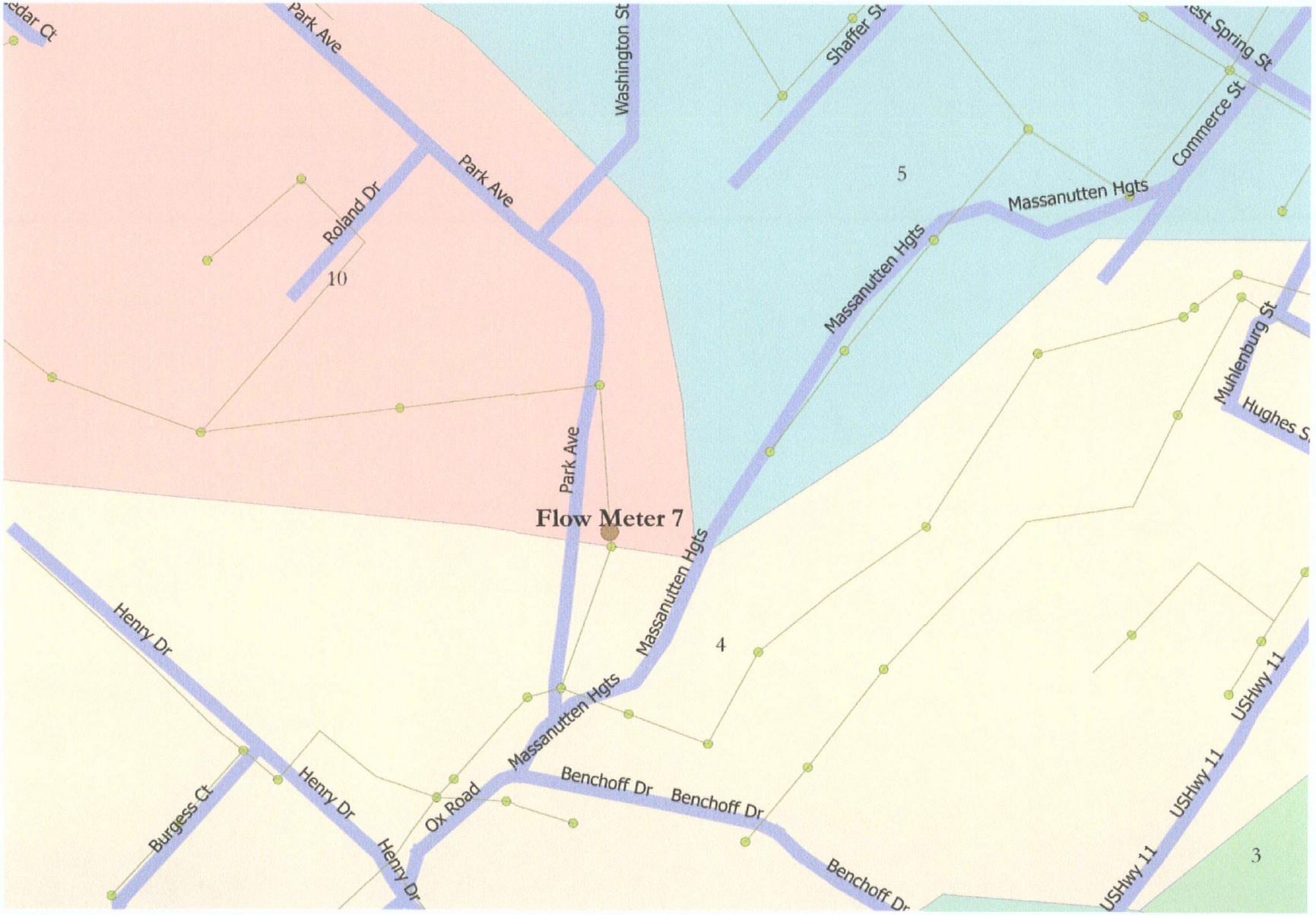
West Locust St
USHwy 11
Foundry St
Church St
East North St
N. Water St
Water St
East Locust St
7
East Court St
StHwy 758
Flow Meter 2
East High St
2
Spring St

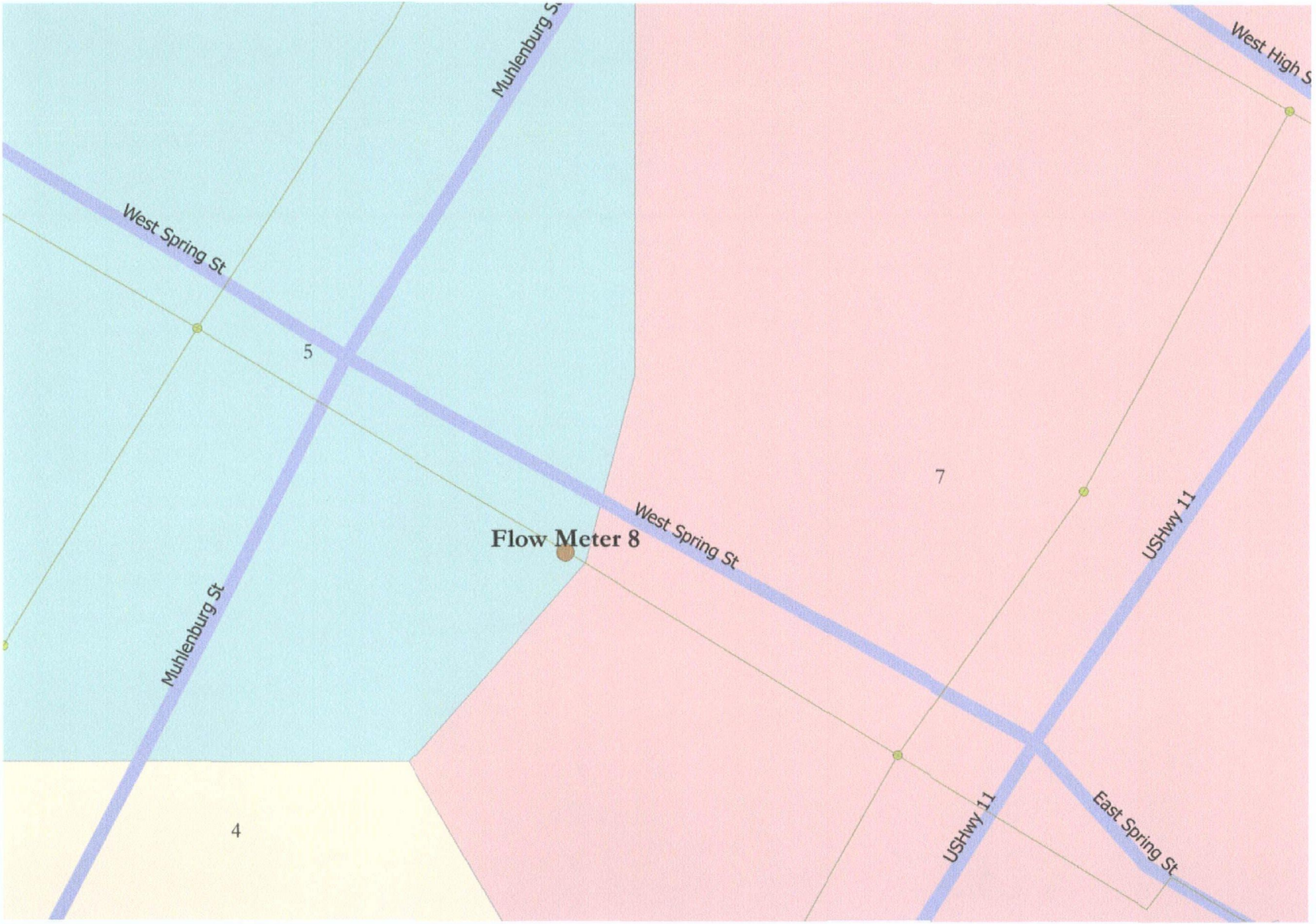
Ave
N. Lee St
StHwy 664
USHwy 11
N. Water St
USHwy 11
1
StHwy 665
USHwy 11
USHwy 11
North St
N. Water St
Church St
7
Water St
Water St
Water St
Flow Meter 2
2
Flow Meter 3
3
Eagle St

East Spring St
East Spring St
Church St
Church St
Church St
East Spring St
Flow Meter 4
Water St
Water St
7
3
2


USHwy 11
4
USHwy 11
Benchoff Dr
Benchoff Dr
USHwy 11
Indian Spring Rd
Flow Meter 5
3
9
Indian Spring Rd
USHwy 11
Spring Pkwy
Indian Spring Rd
S Water St

5
West Spring St
USHwy 11
7
East Spring St
Flow Meter 6
USHwy 11
4
USHwy 11
East Spring St
Church St
Church St
East Spring St
East High St


Park Ave
Washington St
Shaffer St
Commerce St
Roland Dr
Park Ave
5
Massanutten Hgts
Massanutten Hgts
10
Muhlenburg St
Park Ave
Flow Meter 7
Massanutten Hgts
Henry Dr
4
Massanutten Hgts
USHwy 11
Benchoff Dr
Benchoff Dr
Ox Road
Henry Dr
Burgess Ct
Henry Dr
USHwy 11
USHwy 11
Benchoff Dr
3


Muhlenburg St
West High St
West Spring St
5
7
Flow Meter 8
West Spring St
USHwy 11
Muhlenburg St
4
USHwy 11
East Spring St

West Locust St
USHwy 11
Commerce St
Commerce St
West Court St
West Court St
Muhlenburg St
East Locust St
West Court St
6
Commerce St
USHwy 11
Muhlenburg St
West Court St
Dingledine St
Flow Meter 9
7
Church St
Muhlenburg St
East Court St
5
USHwy 11
West High St
West High St
Church St
East Court St

StHwy 780
Hisey Ave
10
4
I-81 Ramp
Flow Meter 10
StHwy 42
StHwy 42
StHwy 42
StHwy 42
StHwy 42
12
I-81 Ramp
I-81 Ramp
I-81 Ramp
8
Deerfield Dr

Motel Dr
Fairground Rd
Ox Road
StHwy 42
Ox Road
Fairground Rd
Kim Ct
Susan Ave
Susan Ave
Miller Ct
Bowman Ave
Bowman Ave
USHwy 11
USHwy 11
9
Susan Ave
StHwy 42
Fairground Rd
Ox Road
Warren Dr
Fairground Rd
USHwy 11
Valley Vista Dr
Valley Vista Dr
12
Susan Ave
StHwy 42
Flow Meter 11
StHwy 42
USHwy 11
Flow Meter 12
Falcon Dr
Susan Ave
StHwy 670
11
USHwy 11
Susan Ave

FACILITY NAME: Woodstock STP
ADDRESS: 135 North Main St.
Woodstock, VA 22664

Permit No. VA0026468
Attachment A

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING

OUTFALL NO. 001

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL(1)	REPORTING RESULTS	SAMPLE TYPE(2)	SAMPLE FREQUENCY
	PESTICIDES/PCBS					
309-00-2	Aldrin	608	0.05	<0.05	G or C	1/5 YR
57-74-9	Chlordane	608	0.2	<0.2	G or C	1/5 YR
2921-88-2	Chlorpyrifos	622	(4)	<1.0	G or C	1/5 YR
72-54-8	DDD	608	0.1	<0.05	G or C	1/5 YR
72-55-9	DDE	608	0.1	<0.05	G or C	1/5 YR
50-29-3	DDT	608	0.1	<0.05	G or C	1/5 YR
8065-48-3	Demeton	(3)	(4)	<2.0	G or C	1/5 YR
333-41-5	Diazinon	(3)	(4)	<1.0	G or C	1/5 YR
60-57-1	Dieldrin	608	0.1	<0.05	G or C	1/5 YR
959-98-8	Alpha-Endosulfan	608	0.1	<0.05	G or C	1/5 YR
33213-65-9	Beta-Endosulfan	608	0.1	<0.05	G or C	1/5 YR
1031-07-8	Endosulfan Sulfate	608	0.1	<0.05	G or C	1/5 YR
72-20-8	Endrin	608	0.1	<0.05	G or C	1/5 YR
7421-93-4	Endrin Aldehyde	(3)	(4)	<0.05	G or C	1/5 YR
86-50-0	Guthion (Methyl Azinphos)	622	(4)	<1.0	G or C	1/5 YR
76-44-8	Heptachlor	608	0.05	<0.05	G or C	1/5 YR
1024-57-3	Heptachlor Epoxide	(3)	(4)	<0.05	G or C	1/5 YR
319-84-6	Hexachlorocyclohexane Alpha-BHC	608	(4)	<0.05	G or C	1/5 YR
319-85-7	Hexachlorocyclohexane Beta-BHC	608	(4)	<0.05	G or C	1/5 YR
58-89-9	Hexachlorocyclohexane Gamma-BHC (synonym = Lindane)	608	(4)	<0.05	G or C	1/5 YR
143-50-0	Kepone	(6)	(4)	<1.0	G or C	1/5 YR
121-75-5	Malathion	(3)	(4)	<1.0	G or C	1/5 YR
72-43-5	Methoxychlor	(3)	(4)	<0.05	G or C	1/5 YR
2385-85-5	Mirex	(3)	(4)	<0.05	G or C	1/5 YR
56-38-2	Parathion	(3)	(4)	<2.0	G or C	1/5 YR
1336-36-3	PCB Total	608	7.0	<0.5	G or C	1/5 YR
8001-35-2	Toxaphene	608	5.0	<0.5	G or C	1/5 YR
60-10-5	Tributyltin	(3)	(4)		G or C	1/5 YR
	VOLATILES					
74-83-9	Methyl Bromide (bromomethane)	(3)	(4)	<10.0	G	1/5 YR
79-01-6	Trichloroethylene	624	10.0	<5.0	G	1/5 YR

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DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING

OUTFALL NO. 001

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL(2)	REPORTING RESULTS	SAMPLE TYPE(2)	SAMPLE FREQUENCY
ACID EXTRACTABLES (5)						
104-40-51	Nonylphenol	(3)	(4)	<5	G or C	1/5 YR
MISCELLANEOUS						
16887-00-6	Chloride	(3)	(4)	91.4 mg/L	C	1/5 YR
7783-06-4	Hydrogen Sulfide	(3)	(4)	<0.10	G or C	1/5 YR

Name of Principal Exec. Officer or Authorized Agent/Title

Signature of Principal Officer or Authorized Agent/Date

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. See 18 U.S.C. Sec. 1001 and 33 U.S.C. Sec. 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)