pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	**NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE**	Application No.	**PA0261670**
Facility Type	**Municipal**		APS ID	**762640**
Major / Minor	**Minor**		Authorization ID	**1411610**

Applicant and Facility Information

Applicant Name	**Fredericksburg S&W Authority**	Facility Name	**Fredericksburg Little Swatara STP**
Applicant Address	PO Box 161	Facility Address	North Side Sr022
	Fredericksburg, PA 17026-0161		Fredericksburg, PA 17026
Applicant Contact	Dale Bevans	Facility Contact	Dustin Keller
Applicant Phone	(717) 865-7452	Facility Phone	(717) 865-0774
Client ID	85895	Site ID	753917
Ch 94 Load Status	Not Overloaded	Municipality	Bethel Township
Connection Status	No Exceptions Allowed	County	Lebanon
Date Application Received	September 26, 2022	EPA Waived?	No
Date Application Accepted	October 11, 2022	If No, Reason	Significant CB Discharge

Purpose of Application: Permit renewal to discharge treated sewage

Summary of Review

1.0 General Discussion

This fact sheet supports the renewal of an existing NPDES permit for discharge of treated domestic wastewater from Fredericksburg Sewer and Water Authority (Authority) wastewater treatment plant. The Authority owns, operates, and maintains the wastewater treatment plant. The facility is located in Bethel Township, Lebanon County. The sewer collection system is not combined and there are no bypasses or overflows approved in the collection system. The facility receives influent via gravity with the aid of three collection system pump stations. Influent enters wet well of influent pump station where it is combined with internal plant flows such as filter backwash, filtrate from sludge dewatering and decant from digesters. Influent pump station has 3 pumps to pump flow to the mechanical screen/backup manual bar screen. Influent is directed to one of three SBRs. SBRs complete cycle in 320-minute, which include mix/fill, react/fill, react, settle, and decant phases. SBRs are monitored for pH, DO and ORP. Delpac is added for phosphorus removal. Five blowers are available to support the SBRs process. SBR decants are directed to the post EQ tank and then pumped to the two cloth disc filters. Filtered effluent is directed to one of four UV units for disinfection. Final effluent flows over a cascade prior to discharging to Little Swatara Creek which is classified for warm water fishes (WWF) and Migratory Fishes (MF). The facility has a hydraulic capacity of 0.65MGD and organic capacity of 2994 lbs/day- BOD5). The existing NPDES permit was issued on June 15, 2018 with an effective date of July 1, 2018 and expiration date of June 30, 2023. The permit was amended on August 18, 2020 to increase the hydraulic and organic capacities to 0.65MGD and 2994 lbs/day- BOD5 respectively. The applicant submitted a timely permit renewal application to the Department and is currently operating under the terms and conditions in the existing permit pending Department action on the renewal application. A topographic map showing the discharge location is presented in attachment A.

Approve	Deny	Signatures	Date
X		*J. Pascal Kwedza* J. Pascal Kwedza, P.E. / Environmental Engineer	December 8, 2023
X		*Maria D. Bebenek for Daniel W. Martin* Daniel W. Martin, P.E. / Environmental Engineer Manager	December 8, 2023
X		*Maria D. Bebenek* Maria D. Bebenek, P.E./ Program Manager	December 8, 2023

Summary of Review

1.1 Sludge use and disposal description and location(s):

Digested sludge is dewatered with a trailer mounted volute press prior to ultimate disposal at Greater Lebanon Refuse Authority Landfill.

1.2 Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

1.3 Changes to the existing Permit

Quarterly E. Coli monitoring has been added.

1.4 Existing limitation and Monitoring Requirements

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) [1]		Concentrations (mg/L)				Minimum [2] Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	9.0 Daily Max	XXX	1/day	Grab
DO	XXX	XXX	5.0 Daily Min	XXX	XXX	XXX	1/day	Grab
CBOD5	136	217	XXX	25	40	50	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	163	244	XXX	30	45	60	1/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	1/week	Grab
Ammonia-Nitrogen Nov 1 - Apr 30	XXX	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ammonia-Nitrogen May 1 - Oct 31	73	XXX	XXX	13.5	XXX	27.0	1/week	24-Hr Composite
Total Phosphorus	11	XXX	XXX	2.0	XXX	4	2/week	24-Hr Composite
Total Zinc	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ultraviolet Light Transmittance (%)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded

1.4.1 Chesapeake Bay Requirements

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Monthly	Monthly Average	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	Report	7,306	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report	974	XXX	XXX	XXX	XXX	1/month	Calculation

1.5 Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.65
Latitude	40º 24' 40.59"	Longitude	-76º 25' 55.81"
Quad Name	Fredericksburg	Quad Code	1534
Wastewater Description:	Sewage Effluent		
Receiving Waters	Little Swatara Creek	Stream Code	09888
NHD Com ID	56396387	RMI	3.52
Drainage Area	86.15	Yield (cfs/mi^2)	0.0565
Q_{7-10} Flow (cfs)	5.65	Q_{7-10} Basis	USGS Gage Station
Elevation (ft)		Slope (ft/ft)	
Watershed No.	7-D	Chapter 93 Class.	WWF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	

Background/Ambient Data		Data Source
pH (SU)		
Temperature (°F)		
Hardness (mg/L)		
Other:		

Nearest Downstream Public Water Supply Intake	Pennsylvania American Water Company		
PWS Waters	Swatara Creek	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	33

Changes Since Last Permit Issuance:

1.6 Water Supply Intake:

The closest water supply intake located downstream from the discharge is Pennsylvania American Water Company in South Hanover Township, Dauphin County on Swatara Creek. The distance downstream from the discharge to the intake is approximately 33 miles. No impact is expected from this discharge

2.0 Treatment Facility Summary

Treatment Facility Name: Fredericksburg Little Swatara STP

WQM Permit No.	Issuance Date
3811404	02/27/2012
3811404 A-1	03/2/2017
3811404 A-2	07/01/2020
3811404 A-3	05/19/2023

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia And Phosphorus	Sequencing Batch Reactor	Ultraviolet	0.65

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.650	2,994	Not Overloaded	Aerobic Digestion	Landfill

Changes Since Last Permit Issuance: Permit was amended on 07/01/2020 to add an additional SBR treatment train to the 2 existing SBRs trains to increase the hydraulic capacity to 0.65MGD and organic capacity to 2994lb/day-BOB5. The permit was amended again on 05/19/2023 to eliminate a sidestream aerated flow equalization tank that was proposed but never built.

2.1 Treatment Facility Details

The existing wastewater Treatment facility consists of influent pumping station, screening unit with grit removal, 3 SBRs, 2 cloth media filters, ultraviolet disinfection, cascade aeration, alum feed system, supplemental carbon feed system, a caustic feed system and aerobic sludge digesters to process sludge generated at the site and sludge received from the Authority's Camp Strauss Monroe Valley treatment facility. Digested sludge is dewatered utilizing a trailer mounted volute press prior to hauling out to landfill.

3.0 Compliance History

3.1 DMR Data for Outfall 001 (from September 1, 2022 to August 31, 2023)

Parameter	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22	NOV-22	OCT-22	SEP-22
Flow (MGD) Average Monthly	0.3196	0.3436	0.321	0.3089	0.2977	0.317	0.3332	0.3863	0.3749	0.2926	0.3214	0.3576
Flow (MGD) Daily Maximum	0.4062	0.4665	0.5175	0.4166	0.3816	0.4679	0.4995	0.5376	0.6878	0.4271	0.4973	0.5228
pH (S.U.) Daily Minimum	6.73	7.14	6.53	6.85	6.69	6.89	6.92	6.66	7.04	7.22	6.64	6.78
pH (S.U.) Daily Maximum	7.75	7.95	7.52	7.66	8.12	7.76	7.66	8.18	8.37	8.41	7.71	7.41
DO (mg/L) Daily Minimum	6.76	7.34	7.44	7.81	7.84	8.03	8.39	8.36	8.39	7.65	7.31	7.21
CBOD5 (lbs/day) Average Monthly	< 8.8	< 7.7	< 7.9	7.6	12.6	< 13.8	< 6.7	9.2	< 8.7	10.9	18.6	< 11.6
CBOD5 (lbs/day) Weekly Average	11.2	10.3	11.2	10.7	20.9	38.6	7.0	9.9	9.8	14.1	25.4	15.4
CBOD5 (mg/L) Average Monthly	< 2.9	< 2.3	< 2.6	2.6	4.3	< 4.6	< 2.1	2.6	< 2.7	3.8	5.7	< 3.4
CBOD5 (mg/L) Weekly Average	3.8	3.2	4.5	3.4	7.0	12.1	2.4	3.2	3.1	4.9	7.9	5.2
BOD5 (lbs/day) Raw Sewage Influent Ave. Monthly	736	875	1169	688	1222	825	1158	892	806	806	911	804
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	933	1090	1360	1016	1520	1196	1740	1134	1119	1089	1137	985
BOD5 (mg/L) Raw Sewage Influent Ave. Monthly	278	290	408	249	432	302	359	263	279	312	316	259
TSS (lbs/day) Average Monthly	< 14.2	< 13.5	< 12.6	< 11.7	< 11.8	< 12.0	< 12.6	< 14.8	< 13.2	< 11.5	< 14.3	< 20.8
TSS (lbs/day) Raw Sewage Influent Ave. Monthly	636	729	711	532	732	454	465	406	622	517	636	604
TSS (lbs/day) Raw Sewage Influent Daily Maximum	725	762	788	887	966	737	689	517	916	585	1096	791
TSS (lbs/day) Weekly Average	23.7	< 14.3	< 17.2	< 12.6	< 12.4	15.3	< 13.8	< 16.5	< 13.8	< 14.2	< 16.6	40.3

TSS (mg/L) Average Monthly	< 4.6	< 4.0	< 4.0	< 4.0	< 4.0	< 4.2	< 4.0	< 4.0	< 4.0	< 4.0	< 4.3	< 5.8
TSS (mg/L) Raw Sewage Influent Ave. Monthly	240	243	250	190	258	168	145	119	216	200	225	173
TSS (mg/L) Weekly Average	7.0	< 4.0	< 4.0	< 4.0	< 4.0	4.8	< 4.0	< 4.0	< 4.0	< 4.0	5.0	11.0
Fecal Coliform (No./100 ml) Geometric Mean	< 2	< 3	< 2	< 2	< 2	2	< 3	< 2	< 1	< 1	< 1	< 1
Fecal Coliform (No./100 ml) Instant. Maximum	8	10	3	3	20	14	10	5	3	< 1	2	4
UV Transmittance (%) Daily Minimum	54	57	57	58	60	60	64	65	65	65	60	48
Nitrate-Nitrite (mg/L) Average Monthly	4.56	3.22	3.78	3.2	2.49	3.6	3.07	4.51	4.64	4.39	6.39	6.51
Nitrate-Nitrite (lbs) Total Monthly	377	270	265	248	176	290	226	455	434	336	500	549
Total Nitrogen (mg/L) Average Monthly	5.8	< 4.43	5.32	4.91	4.22	< 15	< 4.86	< 5.51	< 5.38	< 5.45	8.28	< 8.01
Total Nitrogen (lbs) Effluent Net Total Monthly	< 471.3	< 368	370.0	376	< 299	< 452	< 362	< 547	< 499	< 410	640	< 667
Total Nitrogen (lbs) Total Monthly	471	< 368	370.0	376	< 299	< 452	< 362	< 547	< 499	< 410	640	< 667
Total Nitrogen (lbs) Effluent Net Total Annual												< 4336
Total Nitrogen (lbs) Total Annual												< 4336
Ammonia (lbs/day) Average Monthly	< 0.3	< 0.4	< 0.3	< 1.0	< 0.7	< 0.5	< 1.9	< 0.7	< 0.3	< 0.2	< 0.3	< 0.3
Ammonia (mg/L) Average Monthly	< 0.1	< 0.16	< 0.12	< 0.36	< 0.25	< 0.18	< 0.61	< 0.24	< 0.1	< 0.1	< 0.1	< 0.1
Ammonia (lbs) Total Monthly	< 7.9	< 13.5	< 8.4	< 31.4	< 19.8	< 14.0	< 53.4	< 21.2	< 8.7	< 6.9	< 9.4	< 8.0
Ammonia (lbs) Total Annual												< 1958
TKN (mg/L) Average Monthly	1.24	< 1.22	1.54	1.71	< 1.73	< 1.98	< 1.8	< 1	< 0.75	< 1.06	1.89	< 1.5
TKN (lbs) Total Monthly	94	< 98	105	127	< 123	< 161	< 139	< 92	< 65	< 74	140	< 117

Total Phosphorus (lbs/day) Ave. Monthly	2.0	1.3	1.0	1.0	1.4	1.4	0.4	0.5	< 0.4	0.5	1.2	3.2
Total Phosphorus (mg/L)Ave. Monthly	0.85	0.57	0.42	0.4	0.55	0.5	0.14	0.16	< 0.13	0.21	0.52	1.2
Total Phosphorus (lbs) Effluent Net Total Monthly	60.9	41.4	28.9	32.3	41.8	43.5	9.9	14.4	< 11.0	14.5	37.9	96.7
Total Phosphorus (lbs) Total Monthly	60.9	41.4	28.9	32.3	41.8	43.5	9.9	14.4	< 11.0	14.5	37.9	96.7
Total Phosphorus (lbs) Effluent Net Total Annual												< 412
Total Phosphorus (lbs) Total Annual												< 412
Total Zinc (lbs/day) Average Monthly	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.4
Total Zinc (mg/L) Average Monthly	0.075	0.065	0.078	0.079	0.084	0.085	0.073	0.062	0.064	0.095	0.139	0.114

3.2 Summary of Discharge Monitoring Reports (DMRs):

DMRs reviewed for the facility for the last 12 months of operation, presented on the table above in section 3.1 indicate permit limits have been met consistently. No effluent violations were noted on DMRs for the period reviewed.

3.3 Summary of Inspections:

The facility has been inspected a couple times during last permit cycle. No effluent violations were found during plant inspections. The facility is operated and maintained well.

4.0 Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .65
Latitude 40º 24' 41.00" **Longitude** -76º 25' 56.00"
Wastewater Description: Sewage Effluent

4.1 Basis for Effluent Limitations

In general, the Clean Water Act (CWA) requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards applicable to a waterbody are being met and may be more stringent than technology-based effluent limits.

4.2 Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Comments: TRC is not applicable to this facility

4.3 Water Quality-Based Limitations

4.3.1 Mass-Based Limits

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass-based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.34

4.3.2 WQM 7.0 Stream Model

WQM 7.0 is a water quality model DEP utilizes to establish appropriate effluent limits for $CBOD_5$, NH_3-N and DO in permits. The model simulates mixing and degradation of NH_3-N in the stream and compares calculated instream NH_3-N concentrations to NH_3-N water quality criteria and also simulates mixing and consumption of D.O. in the stream due to the degradation of $CBOD_5$ and NH_3N and compares calculated instream D.O. concentrations to D.O. water quality criteria and recommends effluent limits.

4.3.3 Receiving Stream

The receiving stream is the Little Swatara Creek. According to 25 PA § 93.9o, this stream is protected for Warm Water Fishes (WWF) and Migratory Fishes (MF). It is located in Drainage List o and State Watershed 7-D. It has been assigned stream code 09888. According to eMapPA, Little Swatara Creek is attaining its designated uses.

4.3.4 Streamflow

Streamflows for the water quality analysis were determined by correlating with the yield of USGS gauging station No 01573000 on Swatara Creek at Harper Tavern. The Q_{7-10} and drainage area at the gage is 22.1ft3/s and 337 mi^2 respectively. The resulting yields are as follows:

- Q_{7-10} = (22.1ft^3/s)/337 mi^2 = 0.0656ft^3/s/ mi^2
- Q_{30-10} / Q_{7-10} = 1.40
- Q_{1-10} / Q_{7-10} = 0.80

The drainage area at discharge is calculated by USGS StreamStats = 86.15mi^2

The Q_{7-10} at discharge = 86.15 mi^2 x 0.0.0656ft^3/s/mi^2 = 5.65 ft^3/s.

4.3.5 NH_3N Calculations

NH_3N calculations will be based on the Department's Implementation Guidance of Section 93.7 Ammonia Criteria, dated 11/4/97 (ID No. 391-2000-013). The following data is necessary to determine the instream NH_3N criteria used in the WQM 7.0 model:

*	Discharge pH	= 6.45 (July -Sept DMR median)
*	Discharge Temperature	= 25 ^{o} C (Default)
*	Stream pH	= 7.0 (Default)
*	Stream Temperature	= 20^{o}C (Default)
*	Background NH_3-N	= 0.0 (Default)

4.3.6 $CBOD_5$

Due to their proximity, the discharges from Keystone Protein IW and Fredericksburg STP were modelled together. The results of the WQM 7.0 Model presented in attachment B indicate that for a discharge of 0.65 MGD from Fredericksburg STP, an average monthly limit (AML) of 25mg/l $CBOD_5$ is required to protect the water quality of the stream. This limit is consistent with the existing permit and the STP is consistently complying with the limitation. Therefore, a limit of 25mg/l AML, 40mg/l average weekly limit (AWL) and 50 mg/l IMAX are again recommended for the current permit renewal. Mass limits are calculated as follows:

Mass based AML (lb/day) = 25 (mg/L) × 0.65(mgd) × 8.34 = 136
Mass based AWL (lb/day) = 40(mg/L) × 0.65(mgd) × 8.34 = 217

4.3.7 NH_3-N

The attached results of the WQM 7.0 stream model (attachment B) also indicates that a summer limitation of 15 NH_3 as a monthly average and 30 mg/l instantaneous maximum is necessary to protect the aquatic life from toxicity effects. The existing summer limitation of 13.5 NH_3 as a monthly average and 27 mg/l instantaneous maximum are more stringent and will remain in the permit due to anti-backsliding restrictions. Existing monitoring requirement for ammonia will continue for winter months in the permit to ensure treatment efficiency.

Mass limits are calculated as follows:

Mass based summer AML (lb/day) = 13.5 (mg/L) × 0.65(mgd) × 8.34 = 73

4.3.8 Dissolved Oxygen

The existing permit contains a limit of 5 mg/l for Dissolved Oxygen (DO). DEP's Technical Guidance for the Development and Specification of Effluent Limitations (362-0400-001, 10/97) suggests that either the adopted minimum stream D.O. criteria for the receiving stream or the effluent level determined through water quality modeling be used for the limit. Since the WQM 7.0 model was run using a minimum D.O. of 5.0 mg/l, this limit will be continued in the renewed permit with a daily monitoring requirement.

4.3.9 Total Suspended Solids (TSS)

There is no water quality criterion for TSS. A limit of 30 mg/l AML will be required based on the minimum level of effluent quality attainable by secondary treatment as defined in 40 CFR 133.102b(1) and 25 PA § 92a.47(a)(1) and an AWL of 45mg/l per 40CFR 133.102(b)(2) and 25 PA § 92a.47(a)(2). Mass limits are calculated as follows:

Mass based AML (lb/day) = 30 (mg/L) × 0.65(mgd) × 8.34 = 163
Mass based AWL (lb/day) = 45(mg/L) × 0.65(mgd) × 8.34 = 244

4.3.10 Total Residual Chlorine

The discharge does not have any reasonable potential to cause or contribute to a water quality standards violation for total residual chlorine since the permittee utilizes UV instead of chlorine for wastewater disinfection. Therefore, the proposed permit does not contain effluent limits for total residual chlorine. The permittee may use chlorine-based chemicals for cleaning and is required to optimize chlorine usage to prevent negative impacts on receiving stream. Daily UV intensity monitoring (mW/cm^2) is required in the permit to ensure efficiency of the UV unit..

4.3.11 Toxics

A reasonable potential (RP) analysis was done for pollutants sampled in support of the permit renewal application. All pollutants that were presented in the application sampling and additional sampling data submitted were entered into DEP's Toxics Management Spreadsheet (TMS) to calculate WQBELs. The facility has been monitoring Total Zinc and the data was analyzed using TOXCON to determine Average Monthly Effluent Concentration (Amec) of 0.093 mg/l and a daily coefficient of variation (CV) of 0.292 for Total Zinc presented in attachment C. The results from the TOXCON analysis were also added to the TMS for further analysis. The results of the TMS presented in attachment D indicate discharge levels for all pollutants except Total Zinc are well below DEP's target quantitation limits and the calculated WQBELs, therefore, no monitoring or limitation is recommended. Monitoring is recommended for Total Zinc; therefore the facility will continue monitoring Total Zinc.

Limitation and /or monitoring recommendation on the spreadsheet follow the logic presented in DEPs SOP, to establish limits in the permit where the maximum reported concentration exceeds 50% of the WQBEL, or for non-conservative pollutants to establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL, or to establish monitoring requirements for conservative pollutants where the maximum reported concentration is between 10% - 50% of the WQBEL.

4.3.12 Fecal Coliform and E. Coli

The existing Fecal Coliform limit is consistent with the technology limits recommended in 92a.47(a)(4) and (a)(5) and will remain in the permit. In March of 2021, EPA approved DEP's Triennial Review of Water Quality Standards, which included a new swimming season criterion for E.coli. As a result, DEP is including monitoring requirements for E. Coli in new and renewed sewage permits above 2000gpd. Monitoring frequency is based on annual average flow as follows: 1/month for design flows >= 1 MGD, 1/quarter for design flows >= 0.05 and < 1 MGD and 1/year for design flows of 0.002 – 0.05 MGD. Your discharge of 0.65 MGD requires 1/quarter monitoring as included in the permit

4.3.13 Chesapeake Bay Strategy

The facility is a phase 5 facility that was expanded from 0.15mgd to 0.433mgd and to 0.65MGD. Under the Chesapeake Bay Strategy, implementation of Phase 4 & 5 cap loads if needed was to start after Phases 1 through 3 were completed. However, any facility in phases 4 & 5 that undergoes expansion gets a cap load immediately based on approved flow prior to August 29, 2005 with no net increase in loading. Planning approval for the expanded flow of 0.65mgd was granted after the August 29, 2005 CBS date, hence the facility's cap load was based on 0.15MGD. For phases 4 & 5 that undergoes expansion, DEP's strategy is to establish cap loads for TN and TP based upon the lesser of existing performance levels at design annual average daily flow approved prior to August 29, 2005 or cap loads equivalent to 6 mg/l TN and 0.8mg/l TP using a flow of 0.4 mgd (7306 lbs. TN and 974 lbs. TP). Since this was a new wastewater treatment plant at the time of the phase1 expansion, there was no existing performance data. The facility's cap load was based on default values of 4mg/l TP and 22mg/l TN using a flow of 0.15mgd (1,850lbs/yr TP and 10,051lbs/yr) compared to 974lbs/yr TP and 7,306lbs/yr TN. The lesser of the two scenarios is 974lbs/year TP and 7306 lbs/year TN has been allocated to the facility. The cap load was transferred from the abandoned facility with permit number PA0080705 to PA0261670 and it has been documented in the Department's Phase III WIP Supplement. Treatment and/or credits or offsets maybe used to meet the cap load. The facility is in compliance with the Bay Cap Load requirement.

4.3.14 Total Phosphorus

The limit of 2 mg/l established in the existing permit was for the protection of the Lower Susquehanna River basin which has been superseded by the Chesapeake Bay Strategy but will remain in the permit due to anti-backsliding restrictions. Mass limits are calculated as follows:

Mass based AML (lb/day) = 2 (mg/L) × 0.65(mgd) × 8.34 = 11

4.3.15 Influent BOD and TSS Monitoring

The permit includes influent BOD5 and TSS monitoring at the same frequency as is done for effluent in order to implement Chapter 94.12 and assess percent removal requirements.

4.3.16 Pretreatment Requirements

The design annual average flow of the treatment plant is 0.65 MGD and the facility only receives sewage flow from significant Industrial users. EPA does not require development of pretreatment program for facilities with design flow less than 5MGD. However, the permit contains standard conditions requiring the permittee to monitor and control industrial users if applicable.

5.0 Other Requirements

5.1 The permit contains the following special conditions:

The permit contains the following special conditions:

Stormwater Prohibition, Approval Contingencies, Proper Waste/solids Management, Restriction on receipt of hauled in waste under certain conditions and Chlorine minimization requirement

5.2 Stormwater

There is no stormwater outfall associated with this facility.

5.3 Anti-backsliding

Not applicable to this permit

5.4 Antidegradation (93.4):

The effluent limits for this discharge have been developed to ensure that existing instream water uses and the level of water quality necessary to protect the existing uses are maintained and protected. No High-Quality Waters are impacted by this discharge. No Exceptional Value Waters are impacted by this discharge.

5.5 Class A Wild Trout Fisheries:

No Class A Wild Trout Fisheries are impacted by this discharge.

5.6 303d listed stream

The discharge is not located on a 303d listed stream segment.

5.7 Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs).

5.8 Effluent Monitoring Frequency

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA-approved test methods (generally found in 40 CFR 136) and if the Method Detection Limits are less than the effluent limits. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

6.0 Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (386-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Daily Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
CBOD5	136	217	XXX	25.0	40.0	50	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	163	244	XXX	30.0	45.0	60	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/quarter	Grab
UV Intensity (mW/cm^2)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation

Outfall 001, Continued (from Permit Effective Date through Permit Expiration Date)

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Daily Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	Calculation
Total Nitrogen (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Ammonia Nov 1 - Apr 30	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Ammonia May 1 - Oct 31	73	XXX	XXX	13.5	XXX	27	2/week	24-Hr Composite
Ammonia (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
TKN	XXX	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
TKN (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus	11.0	XXX	XXX	2.0	XXX	4	2/week	24-Hr Composite
Total Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Zinc	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite

Compliance Sampling Location: At Outfall 001

6.1 Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, to comply with Pennsylvania's Chesapeake Bay Tributary Strategy.

Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

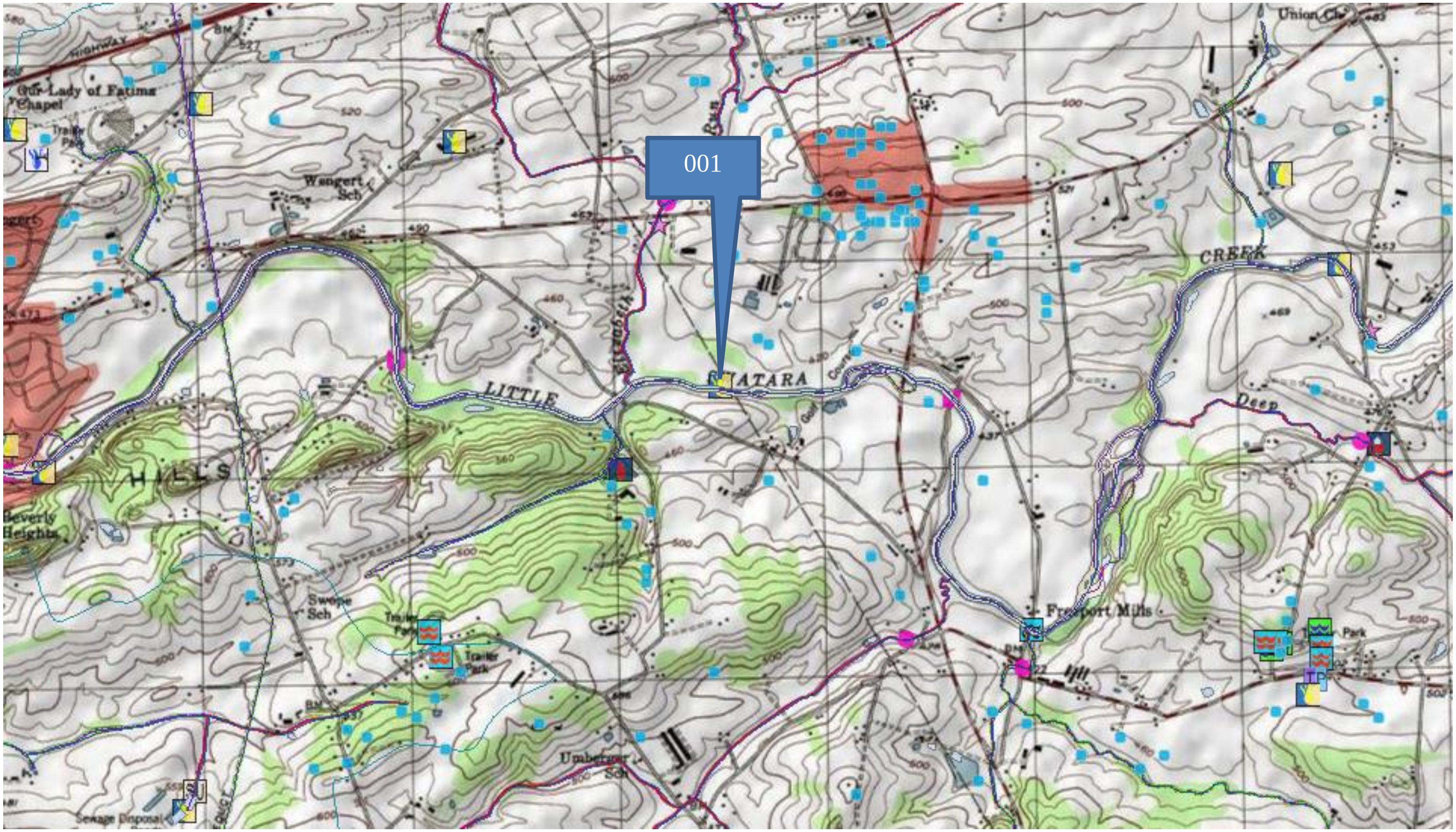
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Monthly	Annual	Monthly	Monthly Average	Maximum	Instant. Maximum		
Ammonia--N	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	XXX	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Net Total Nitrogen	XXX	7306	XXX	XXX	XXX	XXX	1/year	Calculation
Net Total Phosphorus	XXX	974	XXX	XXX	XXX	XXX	1/year	Calculation

Compliance Sampling Location: At Outfall 001

7.0 Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment **B**)
☒	Toxics Management Spreadsheet (see Attachment C)
☐	TRC Model Spreadsheet (see Attachment)
☐	Temperature Model Spreadsheet (see Attachment)
☒	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☒	Technical Guidance for the Development and Specification of Effluent Limitations, 386-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 386-2000-019, 3/98.
☒	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 386-2000-018, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 386-2183-001, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 386-2183-002, 12/97.
☐	Pennsylvania CSO Policy, 386-2000-002, 9/08.
☒	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 386-2000-008, 4/97.
☒	Determining Water Quality-Based Effluent Limits, 386-2000-004, 12/97.
☐	Implementation Guidance Design Conditions, 386-2000-007, 9/97.
☒	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 386-2000-016, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 386-2000-012, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 386-2000-009, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 386-2000-015, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 386-2000-022, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 386-2000-013, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 386-2000-011, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 386-2000-001, 4/09.
☒	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 386-2000-021, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 386-2000-020, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 386-2000-005, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 386-2000-010, 3/1999.
☒	Design Stream Flows, 386-2000-003, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 386-2000-006, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 386-3200-001, 6/97.
☒	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☒	SOP: Establishing Effluent limitation for individual sewage permit
☒	Other: WIP III and Supplement

8. Attachments

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
6.970	Keystone Prot	PA0266345	3.000	CBOD5	10.25		
				NH3-N	3.07	6.14	
				Dissolved Oxygen			5

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
3.520	Fredericksburg	PA026160	0.650	CBOD5	25		
				NH3-N	15.14	30.28	
				Dissolved Oxygen			5

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Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9888	LITTLE SWATARA CREEK	6.970	435.00	69.70	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Keystone Prot	PA0266345	3.0000	3.0000	3.0000	0.000	20.00	6.60

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9888	LITTLE SWATARA CREEK	3.520	423.00	86.15	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (ºC)	Tributary pH	Stream Temp (ºC)	Stream pH
Q7-10	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (ºC)	Disc pH
Fredericksburg	PA026160	0.6500	0.6500	0.6500	0.000	25.00	6.45

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9888	LITTLE SWATARA CREEK	3.100	414.00	94.20	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
07D	9888	LITTLE SWATARA CREEK	**2.950**	410.00	97.10	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.066	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.8	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.4	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
6.970	Keystone Prot	20.31	36.31	20.31	36.31	0	0
3.520	Fredericksburg	17.67	50	19.74	50	0	0
3.100		NA	NA	19.67	NA	NA	NA

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
6.970	Keystone Prot	2.02	4.8	2.02	4.34	2	10
3.520	Fredericksburg	1.89	16.76	1.98	15.14	2	10
3.100		NA	NA	1.98	NA	NA	NA

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5 Baseline (mg/L)	CBOD5 Multiple (mg/L)	NH3-N Baseline (mg/L)	NH3-N Multiple (mg/L)	Dissolved Oxygen Baseline (mg/L)	Dissolved Oxygen Multiple (mg/L)	Critical Reach	Percent Reduction
6.97	Keystone Prot	10.25	10.25	3.07	3.07	5	5	0	0
3.52	Fredericksburg	25	25	15.14	15.14	5	5	0	0
3.10		NA	NA	NA	NA	NA	NA	NA	NA

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
6.970	4.57	0.00	4.57	4.641	0.00066	.78	48.82	62.61	0.24	0.871	20.00	6.75
3.520	5.65	0.00	5.65	5.6465	0.00406	.77	48.69	63.19	0.30	0.085	20.45	6.73
3.100	6.18	0.00	6.18	5.6465	0.00505	.779	49.23	63.22	0.31	0.030	20.43	6.74
Q1-10 Flow												
6.970	3.66	0.00	3.66	4.641	0.00066	NA	NA	NA	0.23	0.924	20.00	6.73
3.520	4.52	0.00	4.52	5.6465	0.00406	NA	NA	NA	0.28	0.090	20.49	6.71
3.100	4.94	0.00	4.94	5.6465	0.00505	NA	NA	NA	0.29	0.032	20.47	6.72
Q30-10 Flow												
6.970	6.40	0.00	6.40	4.641	0.00066	NA	NA	NA	0.27	0.787	20.00	6.79
3.520	7.91	0.00	7.91	5.6465	0.00406	NA	NA	NA	0.33	0.077	20.37	6.77
3.100	8.65	0.00	8.65	5.6465	0.00505	NA	NA	NA	0.34	0.027	20.35	6.78

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WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.8	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.4	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

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WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (ºC)	Analysis pH
6.970	3.000	20.000	6.754
Reach Width (ft)	Reach Depth (ft)	Reach WDRatio	Reach Velocity (fps)
48.819	0.780	62.615	0.242
Reach CBOD5 (mg/L)	Reach Kc (1/days)	Reach NH3-N (mg/L)	Reach Kn (1/days)
6.15	0.491	1.55	0.700
Reach DO (mg/L)	Reach Kr (1/days)	Kr Equation	Reach DO Goal (mg/L)
6.609	1.515	Tsivoglou	5
Reach Travel Time (days)			
0.871			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.087	5.90	1.46	6.17
0.174	5.65	1.37	5.83
0.261	5.41	1.29	5.56
0.348	5.19	1.21	5.36
0.436	4.97	1.14	5.22
0.523	4.76	1.07	5.12
0.610	4.56	1.01	5.07
0.697	4.37	0.95	5.05
0.784	4.19	0.89	5.06
0.871	4.01	0.84	5.10

RMI	Total Discharge Flow (mgd)	Analysis Temperature (ºC)	Analysis pH
3.520	3.650	20.445	6.733
Reach Width (ft)	Reach Depth (ft)	Reach WDRatio	Reach Velocity (fps)
48.688	0.770	63.192	0.301
Reach CBOD5 (mg/L)	Reach Kc (1/days)	Reach NH3-N (mg/L)	Reach Kn (1/days)
5.69	0.839	2.03	0.724
Reach DO (mg/L)	Reach Kr (1/days)	Kr Equation	Reach DO Goal (mg/L)
5.388	8.430	Tsivoglou	5
Reach Travel Time (days)			
0.085			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.009	5.65	2.02	5.53
0.017	5.61	2.01	5.66
0.026	5.57	2.00	5.78
0.034	5.53	1.98	5.90
0.043	5.49	1.97	6.01
0.051	5.45	1.96	6.11
0.060	5.41	1.95	6.21
0.068	5.37	1.94	6.30
0.077	5.33	1.92	6.38
0.085	5.29	1.91	6.46

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07D	9888	LITTLE SWATARA CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (ºC)	Analysis pH
3.100	3.650	20.425	6.742
Reach Width (ft)	Reach Depth (ft)	Reach WDRatio	Reach Velocity (fps)
49.228	0.779	63.221	0.309
Reach CBOD5 (mg/L)	Reach Kc (1/days)	Reach NH3-N (mg/L)	Reach Kn (1/days)
5.14	0.806	1.83	0.723
Reach DO (mg/L)	Reach Kr (1/days)	Kr Equation	Reach DO Goal (mg/L)
6.539	10.741	Tsivoglou	5
Reach Travel Time (days)			
0.030			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.003	5.13	1.82	6.58
0.006	5.12	1.82	6.63
0.009	5.10	1.81	6.67
0.012	5.09	1.81	6.71
0.015	5.08	1.81	6.75
0.018	5.07	1.80	6.78
0.021	5.06	1.80	6.82
0.024	5.04	1.80	6.86
0.027	5.03	1.79	6.89
0.030	5.02	1.79	6.92

C. TOXCON Results

	Facility:	Fredericksburg Sewer and Water Auth
	NPDES #:	PA0261670
	Outfall No:	001
	n (Samples/Month):	4

Parameter Name	Total Zinc				
Number of Samples	100				
Samples Nondetected	0				
LOGNORMAL					
Log MEAN	-2.7413803				
Log VAR.	0.0818777				
(LTA) [E(x)]	0.0671758				
Variance [V(x)]	0.0003850				
CV (raw)	0.2921011				
CV (n)	0.1460505				
Monthly Avg. (99%, n-day)	0.0931940				

		Reviewer/Permit Engineer:	Pascal Kwedza
Facility:	Fredericksburg Sewer and Water Auth		
NPDES #:	PA0261670		
Outfall No:	001		
n (Samples/Month):	4		

Parameter	**Distribution Applied**	**Coefficient of Variation (daily)**	**Avg. Monthly**
Total Zinc (mg/l)	Lognormal	0.2921011	0.0931940

D. TMS Analysis Results

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Fredericksburg SW Auth Little Swatara** NPDES Permit No.: **PA0261670** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Industrial Waste**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	$Q_{7\text{-}10}$	Q_h
0.65	100	6.45						

	Discharge Pollutant	Units	Max Discharge Conc		Trib Conc (0 if left blank)	Stream Conc (0 if left blank)	Daily CV (0.5 if left blank)	Hourly CV (0.5 if left blank)	Stream CV (0 if left blank)	Fate Coeff (0 if left blank)	FOS (0 if left blank)	Criteria Mod (1 if left blank)	Chem Transl (1 if left blank)
Group 1	Total Dissolved Solids (PWS)	mg/L		756									
	Chloride (PWS)	mg/L		367									
	Bromide	mg/L	<	1									
	Sulfate (PWS)	mg/L		73.4									
	Fluoride (PWS)	mg/L											
Group 2	Total Aluminum	µg/L											
	Total Antimony	µg/L											
	Total Arsenic	µg/L											
	Total Barium	µg/L											
	Total Beryllium	µg/L											
	Total Boron	µg/L											
	Total Cadmium	µg/L											
	Total Chromium (III)	µg/L											
	Hexavalent Chromium	µg/L											
	Total Cobalt	µg/L											
	Total Copper	mg/L											
	Free Cyanide	µg/L											
	Total Cyanide	µg/L											
	Dissolved Iron	µg/L											
	Total Iron	µg/L											
	Total Lead	µg/L											
	Total Manganese	µg/L											
	Total Mercury	µg/L											
	Total Nickel	µg/L											
	Total Phenols (Phenolics) (PWS)	µg/L											
	Total Selenium	µg/L											
	Total Silver	µg/L											
	Total Thallium	µg/L											
	Total Zinc	mg/L		0.09			0.292						
	Total Molybdenum	µg/L											

Stream / Surface Water Information

Fredericksburg SW Auth Little Swatara, NPDES Permit No. PA0261670, Outfall 001

Instructions | Discharge | Stream

Receiving Surface Water Name: Little Swatara Creek

No. Reaches to Model: 1

- (●) Statewide Criteria
- ( ) Great Lakes Criteria
- ( ) ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	009888	3.52	423	85.15			Yes
End of Reach 1	009888	3.1	414	94.2			Yes

Q_{7-10}

Location	RMI	LFY (cfs/mi^2)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	3.52	0.066										100	7		
End of Reach 1	3.1	0.066													

Q_h

Location	RMI	LFY (cfs/mi^2)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	3.52														
End of Reach 1	3.1														

Model Results

Fredericksburg SW Auth Little Swatara, NPDES Permit No. PA0261670, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | (●) All ( ) Inputs ( ) Results ( ) Limits

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.603 Analysis Hardness (mg/l): 100 Analysis pH: 6.80

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	117.180	120	524	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): 41.210 PMF: 1 Analysis Hardness (mg/l): 100 Analysis pH: 6.86

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	118.139	120	789	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): 41.210 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): 18.137 PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

Pollutants	Mass Limits AML (lbs/day)	Mass Limits MDL (lbs/day)	Concentration Limits AML	Concentration Limits MDL	Concentration Limits IMAX	Concentration Limits Units	Governing WQBEL	WQBEL Basis	Comments
Total Zinc	Report	Report	Report	Report	Report	mg/L	0.27	AFC	Discharge Conc > 10% WQBEL (no RP)

Model Results 12/1/2023 Page

☑ ***Other Pollutants without Limits or Monitoring***

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., <= Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable