Pennsylvania Department of Environmental Protection

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0081311**
Facility Type	**Municipal**	APS ID	**276555**
Major / Minor	**Minor**	Authorization ID	**1456835**

NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**South Londonderry Township Municipal Authority**	Facility Name	**South Londonderry Colebrook STP**
Applicant Address	27 W Market Street	Facility Address	1267 Mount Gretna Road
	Palmyra, PA 17078-8736		Lebanon, PA 17042
Applicant Contact	Samuel Blauch	Facility Contact	Samuel Blauch
Applicant Phone	(717) 781-9238	Facility Phone	(717) 781-9238
Client ID	43038	Site ID	250903
Ch 94 Load Status	Not Overloaded	Municipality	South Londonderry Township
Connection Status	No Limitations	County	Lebanon
Date Application Received	October 3, 2023	EPA Waived?	Yes
Date Application Accepted		If No, Reason	

Purpose of Application: NPDES Permit Renewal.

Summary of Review

1.0 General Discussion

This fact sheet supports the renewal of an existing NPDES permit for discharge of treated sewage from Colebrook wastewater treatment plant that serves the Township of South Londonderry. South Londonderry Township Municipal Authority owns, maintains, and operates Colebrook wastewater treatment plant located in South Londonderry Township, Lebanon County. The treatment facility is a sequential batch reactor (SBR) treatment system. The collection system has no combined sewers and no bypasses and overflows are authorized in the collection system. The facility has a design average annual flow of 0.044 MGD and hydraulic design capacity of 0.0572 MGD. The organic design capacity is 161lbs/day. The SBR discharges 4 cycles per day (6hrs/cycle) treated municipal wastewater to Conewago Creek which is classified for Trout Stocking (TSF). The existing NPDES permit was issued on March 28, 2019 with an effective date of April 1, 2019 and expiration date of March 31, 2024. The applicant submitted a timely NPDES permit renewal application to the Department and is currently operating under the terms and conditions in the existing permit under administrative extension provisions pending Department action on the renewal application. Topographical Map showing the discharge location is presented in attachment A

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

Digested sludge is hauled to Annville Township STP by a license hauler for further processing.

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*,

Approve	Deny	Signatures	Date
X		*J. Pascal Kwedza* J. Pascal Kwedza, P.E. / Environmental Engineer	October 31, 2024
X		*Maria D. Bebenek for* Daniel W. Martin, P.E. / Environmental Engineer Manager	November 8, 2024
X		*Maria D. Bebenek* Maria D. Bebenek, P.E / Program Manager	November 8, 2024

Summary of Review
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 Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.044
Latitude	40º 14' 25.81"	Longitude	-76º 30' 29.80"
Quad Name	Elizabethtown	Quad Code	1733
Wastewater Description:	Sewage Effluent		

Receiving Waters	Conewago Creek	Stream Code	09217
NHD Com ID	56401799	RMI	18.25
Drainage Area	4.8	Yield (cfs/mi^2)	0.10
Q_{7-10} Flow (cfs)	0.48	Q_{7-10} Basis	USGS Gage Station
Elevation (ft)	510	Slope (ft/ft)	
Watershed No.	7-G	Chapter 93 Class.	TSF
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	Final	Name	Conewago Creek Watershed

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

Nearest Downstream Public Water Supply Intake		Elizabethtown Water Company	
PWS Waters	Conewago Creek	Flow at Intake (cfs)	
PWS RMI		Distance from Outfall (mi)	10

Changes Since Last Permit Issuance: None

1.3.1 Water Supply Intake

The nearest water supply intake is about 10 miles downstream at West Donegal Township, Lancaster County on the Conewago Creek by the Elizabethtown Water Company. No impact is expected from this discharge

2.0 Treatment Facility Summary

Treatment Facility Name: S Londonderry Colebrook STP

WQM Permit No.	Issuance Date
3814402	04/10/2015

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia And Phosphorus	Sequencing Batch Reactor	Ultraviolet	0.044

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.0572	161	Not Overloaded	Aerobic Digestion	Other WWTP

Changes Since Last Permit Issuance: None

2.1 Treatment Facility Description

The treatment system consists of a fine-screen rated for 0.304 mgd, 2 influent pumps pump flow to the two 80,000-gallon SBR reactors operating in parallel, two 12,750-gallon aerobic digesters, two 1,200-gallon post-SBR flow equalization tanks, and two inline UV disinfection system each capable of treating 1.2 mgd of flow. One UV on duty and the other standby and gets switched every month. UV has screen prior to UV lights and citric acid is used for automatic bulb cleaning. Delpac 2000 is used for Total Phosphorus removal.

3.0 Existing Effluent Limitations 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	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	XXX	9.0 Daily Max	XXX	1/day	Grab
DO	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
CBOD5	9.2	14.7	XXX	25	40	50	2/month	24-Hr Composite
CBOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	24-Hr Composite
TSS	11	16.5	XXX	30	45	60	2/month	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
UV Transmittance (%)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
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/month	24-Hr Composite
Ammonia May 1 - Oct 31	5.5	XXX	XXX	15.0	XXX	30	2/month	24-Hr Composite
TKN	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Phosphorus	0.73	XXX	XXX	2.0	XXX	4	2/month	24-Hr Composite

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 Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus (lbs)	XXX	268 Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation

3.1 Compliance History

3.1.1 DMR Data for Outfall 001 (from August 1, 2023 to July 31, 2024)

Parameter	JUL-24	JUN-24	MAY-24	APR-24	MAR-24	FEB-24	JAN-24	DEC-23	NOV-23	OCT-23	SEP-23	AUG-23
Flow (MGD) Average Monthly	0.014	0.016	0.016	0.024	0.021	0.017	0.021	0.019	0.015	0.013	0.014	0.014
Flow (MGD) Daily Maximum	0.017	0.021	0.019	0.089	0.046	0.021	0.053	0.055	0.024	0.017	0.022	0.017
pH (S.U.) Daily Minimum	7.09	6.76	7.01	6.88	7.01	7.01	7.44	6.96	6.90	7.01	7.08	6.68
pH (S.U.) Daily Maximum	7.98	7.89	7.83	7.78	7.76	7.64	7.77	7.86	7.83	8.05	7.96	7.98
DO (mg/L) Daily Minimum	5.09	5.07	5.23	5.71	5.89	5.35	6.95	6.44	5.65	6.52	5.61	5.61
CBOD5 (lbs/day) Average Monthly	< 0.22	0.31	0.29	< 0.52	< 0.39	0.52	0.55	0.37	0.37	< 0.24	< 0.23	0.33
CBOD5 (lbs/day) Raw Sewage Influent Average Monthly	11.2	25.3	35.1	19.6	22.7	23.6	27.1	22.2	10.3	14.7	7.3	14.6
CBOD5 (lbs/day) Raw Sewage Influent Daily Maximum	13.9	26.6	45.3	26.6	25.4	23.8	28.2	25.2	13.9	16.5	9.1	17.5
CBOD5 (lbs/day) Weekly Average	< 0.23	0.39	0.33	< 0.57	0.41	0.53	0.56	0.37	0.48	0.25	0.26	0.37
CBOD5 (mg/L) Average Monthly	< 2.00	< 2.30	2.30	< 2.35	< 2.30	3.55	3.60	2.50	2.80	< 2.15	< 2.30	3.05
CBOD5 (mg/L) Raw Sewage Influent Average Monthly	105.4	202.0	250	98.2	134.5	161.5	179.5	152.5	77.2	129.5	73	134.5
CBOD5 (mg/L) Weekly Average	< 2.00	2.60	2.40	2.70	2.60	3.60	4.20	2.60	3.20	2.30	2.60	0.040
TSS (lbs/day) Average Monthly	< 0.72	0.80	0.99	< 1.15	< 0.86	0.81	0.77	< 0.73	< 1.17	1.19	1.50	1.30
TSS (lbs/day) Raw Sewage Influent Average Monthly	23.9	19.1	16.4	12.7	23.1	17.1	22.3	17.3	14.2	6.6	6.90	12.25
TSS (lbs/day) Raw Sewage Influent Daily Maximum	35.4	28.0	23.27	12.8	26.8	18.9	26.7	18.1	17.3	6.8	8.5	17.5
TSS (lbs/day) Weekly Average	0.93	1.05	1.35	< 1.42	< 0.92	0.90	0.88	< 0.75	1.80	1.40	1.70	1.41

TSS (mg/L) Average Monthly	< 6.50	6.00	7.00	< 5.00	< 5.00	5.50	5.00	< 5.00	< 8.50	10.50	15.00	11.50
TSS (mg/L) Raw Sewage Influent Average Monthly	230	163.0	115.5	58.5	134	117	151	119.0	108.5	58.5	69.0	113.0
TSS (mg/L) Weekly Average	8.00	7.00	9.00	< 5.00	< 5.00	6.00	5.00	5.00	12.00	12.00	17.00	13.00
Fecal Coliform (No./100 ml) Geometric Mean	4	26	16	72	60	120	845	30	20	2	2	7
Fecal Coliform (No./100 ml) Instantaneous Max	5	220	85	200	123	210	2100	882	10	4	4	56
UV Transmittance (%) Daily Minimum	65	65	65	65	65	65	65	65	65	65	65	65
Nitrate-Nitrite (mg/L) Average Monthly	2.87	2.63	1.83	2.88	2.25	2.73	2.50	3.26	7.12	2.58	2.30	2.12
Total Nitrogen (mg/L) Average Monthly	< 3.97	4.38	< 2.93	4.03	3.60	4.68	4.35	4.91	8.92	4.48	3.85	3.32
Total Nitrogen (lbs) Total Monthly	< 13.64	17.40	< 12.40	27.90	19.22	20.01	21.08	22.32	35.70	15.50	11.70	11.16
Ammonia (lbs/day) Average Monthly	< 0.011	< 0.013	< 0.014	< 0.027	< 0.017	< 0.015	0.017	< 0.016	< 0.029	< 0.012	< 0.012	0.017
Ammonia (mg/L) Average Monthly	< 0.100	< 0.100	< 0.100	< 0.120	< 0.100	< 0.100	0.110	< 0.105	< 0.205	< 0.100	< 1.20	0.155
TKN (mg/L) Average Monthly	< 1.10	1.75	< 1.10	1.15	1.35	1.95	1.85	1.65	1.80	1.90	1.55	1.20
Total Phosphorus (lbs/day) Ave. Monthly	0.05	0.03	< 0.02	0.07	< 0.02	0.02	0.04	0.03	0.08	0.02	< 0.01	0.01
Total Phosphorus (mg/L) Ave. Monthly	0.39	0.19	< 0.11	0.27	< 0.10	0.13	0.23	0.19	0.54	0.20	< 0.11	0.13
Total Phosphorus (lbs) Total Monthly	1.55	0.90	< 0.62	2.10	< 0.62	0.58	1.24	0.93	2.40	0.62	< 0.30	0.31
Total Phosphorus (lbs) Total Annual											< 7.90	

3.1.2 Summary of DMRs:

DMRs review for the facility for the last 12 months of operation, presented on the table above in section 3.1.1 indicates permit limits have been met consistently. No effluent violations noted during the period reviewed.

3.1.3 Summary of Inspections:

The facility has been inspected a couple of times during the previous 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)** .044
Latitude 40º 14' 25.52" **Longitude** -76º 30' 29.76"
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

4.1.1 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 limitation not required, the facility utilizes UV for disinfection.

4.2 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 Water Quality-Based Limitations

4.3.1 WQM 7.0 Stream Model

WQM 7.0 is a steady state model that simplifies many natural processes into a reach-by-reach simulation is used for water quality analysis. DEP utilizes the model 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

4.3.2 Receiving Stream

The receiving stream is Conewago Creek. According to 25 PA § 93.9o, this stream is protected for Trout Stocking (TSF) and Migratory Fishes (MF). It is located in Drainage List O and State Watershed 7-G. It has been assigned stream code 09217. According to the Department's *Integrated Water Quality Monitoring and Assessment Report*, this segment of the stream is not attaining its designated uses. A TMDL was developed for Conewago Watershed for Total phosphorus and was approved by EPA in 2001. See further discussion under section 4.3.8 for waste load allocation to this discharge.

4.3.3 Stream flows

Streamflows flows were determined by correlating with the yield of USGS gage station No. 01571500 on Susquehanna River at Harrisburg. The Q_{7-10} and drainage area at the gage is 2610ft^3/s and 24100mi^2 respectively. The resulting yields are as follows:

- Q_{7-10} = (2610ft^3/s)/24100 mi^2 = 0.11 $ft^3/s/ mi^2$
- Q_{30-10} / Q_{7-10} = 1.17
- Q_{1-10} / Q_{7-10} = 0.95
- Q_{7-10} (winter) / Q_{7-10} =1.18

The drainage area at discharge taken from the previous permit= 4.8 mi^2

The Q_{7-10} at discharge = 4.8 mi^2 x 0.110 $ft^3/s/mi^2$ = 0.53 ft^3/s.

4.3.4 NH_3N Calculations

NH_3N calculations is 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 modelling of the stream:

STP pH	=	7.08 (Based on past DMRs between July-September.)
STP Temp	=	25°C (Default)
Stream pH	=	7.0 (Default)
Stream Temp	=	20°C (Default)
Background NH_3N	=	0 mg/l (Assumed)

4.3.5 $CBOD_5$

This model was run with the inclusion of Mount Gretna 7,900 feet upstream and the Lawn STP about 14,000 feet downstream due to their proximity to each other. The model predicts that Mount Gretna has an impact on the Colebrook STP, however, the impact is not significant, DO recovers prior to Colebrook discharge. The attached WQM 7.0 model results (attachment B) indicates a monthly average limit of 25 mg/l is needed to protect the water quality of the stream. This limit is consistent with the existing permit limits. DMRs and inspection reports show that the STP has been achieving less than 25 mg/l $CBOD_5$. Therefore, a limit of 25mg/l monthly average with 40mg/l weekly average and 50 mg/l instantaneous maximum will again be applied for this current permit cycle.

Mass based AML (lb/day) = 30 (mg/L) × 0.044(mgd) × 8.34 = 9.2
Mass based AWL (lb/day) = 45(mg/L) × 0.044(mgd) × 8.34 = 14.7

4.3.6 NH_3-N

The attached results of the WQM 7.0 stream model (attachment B) also indicates that a summer limitation of mg/l 15 NH_3-N as a monthly average is necessary to protect the aquatic life from toxicity effects. This limit is consistent with the existing limit which the facility has been meeting consistently. Therefore, the existing summer average monthly limit of 15 NH_3-N will remain in the permit with monitoring for winter months.

Mass based AML for summer months (lb/day) = 15 (mg/L) × 0.044(mgd) × 8.34 = 5.5

4.3.7 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 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.

4.3.8 Phosphorus

An average monthly limit of 2mg/l was established in the previous permits prior to TMDL development. A TMDL for the Conewago Creek basin was completed and approved on March 2, 2001 and revised on June 27, 2006. The TMDL allocates Phosphorus annual load of 268 lbs/yr based on the design flow of 0.044 MGD and a concentration of 2 mg/l. This allocation was incorporated into the NPDES permit during previous permit cycles and will be continued in the permit. Due to anti-backsliding restrictions, the existing average monthly phosphorus limitation of 2mg/l will remain in the permit.

4.3.9 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. The daily UV transmittance monitoring in % in the existing permit will remain to ensure efficiency of the UV unit.

4.3.10 Total Suspended Solids (TSS):

There is no water quality criterion for TSS. A limit of 30 mg/l AML in the existing permit 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) will remain the permit.

Mass based AML (lb/day) = 30 (mg/L) × 0.044(mgd) × 8.34 = 11
Mass based AWL (lb/day) = 45(mg/L) × 0.044(mgd) × 8.34 = 16.5

4.3.11 Toxics

The facility treats mainly domestic sewage, there are no toxic parameters of concern associated with this discharge.

4.3.12 Chesapeake Bay Strategy

The Department formulated a strategy in April 2007, to comply with the EPA and Chesapeake Bay requirements to reduce point source loadings of Total Nitrogen (TN) and Total Phosphorus (TP) to the Bay. In the Strategy, sewage dischargers have been prioritized by DEP based on their delivered TN loadings to the Bay. The highest priority (Phases 1, 2, and 3) dischargers received annual loading caps based on their design flow on August 29, 2005 and concentrations of 6 mg/l TN and 0.8 mg/l TP. Phase 4 (0.2 -0.4mgd) and Phase 5(below 0.2mdg) are required to monitor and report TN and TP during permit renewal and any facility in Phases 4 and 5 that undergoes expansion is subjected to cap load right away. EPA published Chesapeake Bay TMDL in December of 2010. In order to address the TMDL, Pennsylvania developed Chesapeake Watershed Implementation Plan (WIP) Phase 1, Phase 2 and currently Phase 3 WIP and a supplement to the WIPs to be implemented with the original Chesapeake Bay Strategy.

Phase 3 WIP and the supplement to the WIP, indicates renewing permits for significant dischargers would follow the same phased approach formulated in the original Bay strategy whilst Phase 4 and Phase 5 will be required to monitor and report TN and TP during permit renewals. This facility is, classified as a phase 5, will be required to monitor and report Nitrate-Nitrite as N, Total Kjeldahl Nitrogen and Total Nitrogen monthly throughout the next permit cycle. No monitoring is required for Total Phosphorus since there is a Total phosphorus limit in the permit.

4.4.13 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 and < 0.05 MGD. The facility discharges 0.044MGD and requires 1/year monitoring as included in the permit.

4.3.14 Influent BOD and TSS Monitoring

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

4.3.15 Industrial Users

Colebrook STP does not receive wastewater from any significant industrial users.

4.3.16 Pretreatment Requirements

The design annual average flow of the treatment plant is 0.044MGD and the facility receives no 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

5.1The 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 Batch discharge condition.

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 located on a 303d listed stream segment. A TMDL for the Conewago Watershed basin was completed and approved on March 2, 2001 and revised on June 27, 2006. The TMDL allocates a Phosphorus annual load of 268 lbs/yr based on the design flow of 0.044 MGD and a concentration of 2 mg/l. This allocation has been added to the NPDES permit during the past permit cycles and will remain in the permit. The facility has been complying with the TMDL limitation.

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)	Required
	Average Monthly	Weekly Average	Daily Minimum	Average Monthly	Weekly Average	Instant. Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
CBOD5	9.2	14.7	XXX	25	40	50	2/month	24-Hr Composite
CBOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	24-Hr Composite
TSS	11	16.5	XXX	30	45	60	2/month	24-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/year	Grab
UV Transmittance (%)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded
Nitrate-Nitrite	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	Calculation

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

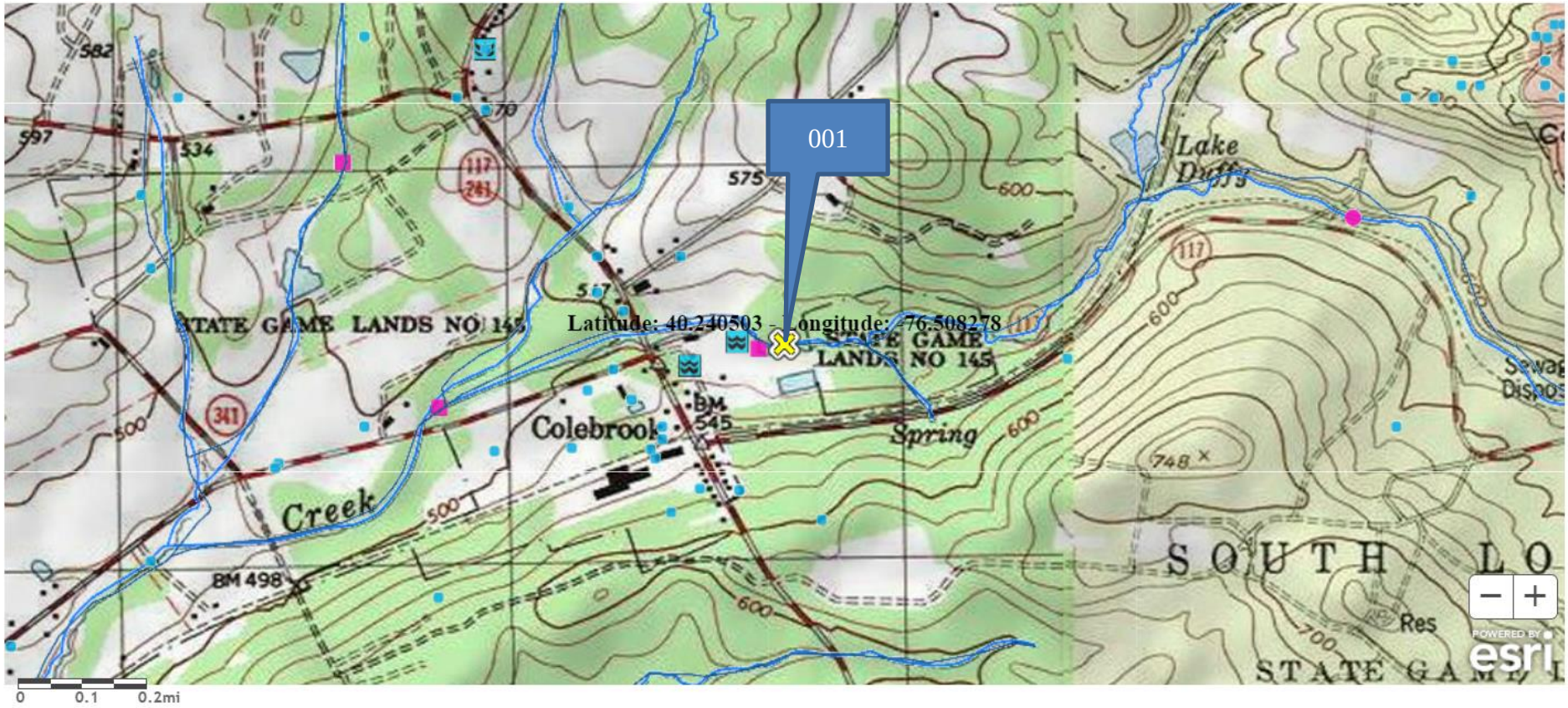
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Daily Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Nitrogen (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Ammonia Nov 1 - Apr 30	Report	XXX	XXX	Report	XXX	XXX	2/month	24-Hr Composite
Ammonia May 1 - Oct 31	5.5	XXX	XXX	15.0	XXX	30	2/month	24-Hr Composite
TKN	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Phosphorus	0.73	XXX	XXX	2.0	XXX	4	2/month	24-Hr Composite
Total Phosphorus (lbs)	Report Total Mo	XXX	XXX	XXX	XXX	XXX	1/month	Calculation
Total Phosphorus (lbs)	XXX	268 Total Annual	XXX	XXX	XXX	XXX	1/year	Calculation

Compliance Sampling Location: Outfall 001

7.0 Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment **B**)
☐	Toxics Management Spreadsheet (see Attachment)
☐	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 limitations for individual sewage pemit.
☐	Other:

8. Attachment

A. Topographical Map



B. WQM Model Results

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07G	9217	CONEWAGO 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)
19.750	Mt Gretna	PA0020591	0.200	CBOD5	25		
				NH3-N	3.08	6.16	
				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)
18.250	Colebrook	PA0081311	0.044	CBOD5	25		
				NH3-N	15.77	31.54	
				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)
15.640	Lawn	PA0081329	0.023	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			5

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
07G	9217	CONEWAGO CREEK	19.750	590.00	3.00	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	0.110	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
Mt Gretna	PA0020591	0.2000	0.2000	0.2000	0.000	25.00	7.14

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
07G	9217	CONEWAGO CREEK	**18.250**	510.00	4.80	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	0.110	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
Colebrook	PA0081311	0.0440	0.0440	0.0440	0.000	25.00	7.08

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
07G	9217	CONEWAGO CREEK	15.640	455.00	9.50	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	0.100	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
Lawn	PA0081329	0.0225	0.0225	0.0225	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

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
07G	9217	CONEWAGO CREEK	**14.640**	440.00	9.60	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	0.100	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 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07G	9217	CONEWAGO 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												
19.750	0.33	0.00	0.33	.3094	0.01010	.468	10.04	21.48	0.14	0.673	22.42	7.06
18.250	0.53	0.00	0.53	.3775	0.00399	.5	13.12	26.26	0.14	1.155	22.08	7.05
15.640	1.00	0.00	1.00	.4123	0.00284	.544	17.49	32.14	0.15	0.413	21.46	7.03
Q1-10 Flow												
19.750	0.31	0.00	0.31	.3094	0.01010	NA	NA	NA	0.13	0.683	22.48	7.06
18.250	0.50	0.00	0.50	.3775	0.00399	NA	NA	NA	0.14	1.174	22.15	7.05
15.640	0.95	0.00	0.95	.4123	0.00284	NA	NA	NA	0.15	0.421	21.52	7.03
Q30-10 Flow												
19.750	0.39	0.00	0.39	.3094	0.01010	NA	NA	NA	0.14	0.642	22.22	7.06
18.250	0.62	0.00	0.62	.3775	0.00399	NA	NA	NA	0.15	1.095	21.90	7.04
15.640	1.17	0.00	1.17	.4123	0.00284	NA	NA	NA	0.16	0.387	21.30	7.03

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	0.95	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.17	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	6		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
07G	9217	CONEWAGO 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
19.750	Mt Gretna	12.87	25.9	12.87	25.9	0	0
18.250	Colebrook	15.83	50	13.4	50	0	0
15.640	Lawn	16.52	50	14.36	50	0	0

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
19.750	Mt Gretna	1.6	3.59	1.6	3.08	2	14
18.250	Colebrook	1.82	18.36	1.64	15.77	2	14
15.640	Lawn	1.87	25	1.72	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
19.75	Mt Gretna	25	25	3.08	3.08	5	5	0	0
18.25	Colebrook	25	25	15.77	15.77	5	5	0	0
15.64	Lawn	25	25	25	25	5	5	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07G	9217	CONEWAGO CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
19.750	0.200	22.419	7.062
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
10.043	0.468	21.476	0.136
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
13.13	1.298	1.49	0.843
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.674	24.653	Owens	6
Reach Travel Time (days)			
0.673			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.067	11.91	1.41	7.30
0.135	10.80	1.33	7.51
0.202	9.80	1.26	7.64
0.269	8.88	1.19	7.74
0.337	8.06	1.12	7.83
0.404	7.31	1.06	7.89
0.471	6.63	1.00	7.89
0.539	6.01	0.95	7.89
0.606	5.45	0.90	7.89
0.673	4.95	0.85	7.89

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
18.250	0.244	22.084	7.049
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
13.120	0.500	26.257	0.138
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
5.81	0.790	1.78	0.822
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.747	21.845	Owens	6
Reach Travel Time (days)			
1.155			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.115	5.25	1.62	7.93
0.231	4.75	1.47	7.93
0.346	4.30	1.34	7.93
0.462	3.89	1.22	7.93
0.577	3.52	1.11	7.93
0.693	3.18	1.01	7.93
0.808	2.88	0.92	7.93
0.924	2.60	0.83	7.93
1.039	2.35	0.76	7.93
1.155	2.13	0.69	7.93

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07G	9217	CONEWAGO CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
15.640	0.266	21.462	7.031
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
17.494	0.544	32.138	0.148
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.65	0.352	1.06	0.783
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.964	4.139	Tsivoglou	6
Reach Travel Time (days)			
0.413			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.041	2.61	1.03	7.92
0.083	2.57	0.99	7.88
0.124	2.53	0.96	7.86
0.165	2.49	0.93	7.84
0.206	2.45	0.90	7.83
0.248	2.41	0.87	7.83
0.289	2.38	0.85	7.83
0.330	2.34	0.82	7.84
0.371	2.30	0.79	7.85
0.413	2.27	0.77	7.86