pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southeast Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0055671**
Facility Type	**Municipal**	APS ID	**1034742**
Major / Minor	**Minor**	Authorization ID	**1347263**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Worcester Township**	Facility Name	**Berwick Place STP & Sew System**
Applicant Address	1721 Valley Forge Road PO Box 767	Facility Address	E Mt Kirk Road
	Worcester, PA 19490-0767		Worcester, PA 19490-0767
Applicant Contact	Thomas Ryan	Facility Contact	Thomas Ryan
Applicant Phone	(610) 584-1410X103	Facility Phone	(610) 584-1410X103
Client ID	43063	Site ID	458578
Ch 94 Load Status	Not Overloaded	Municipality	Worcester Township
Connection Status	No Limitations	County	Montgomery
Date Application Received	March 25, 2021	EPA Waived?	Yes
Date Application Accepted	August 27, 2021	If No, Reason	
Purpose of Application	Permit renewal.		

Summary of Review

The PA Department of Environmental Protection (PADEP/Department) received an NPDES permit renewal application from CKS Engineers, Inc. (consultant) on behalf of Worchester Township (permittee) on March 25, 2021 for permittee's Berwick Place WWTP (facility). The facility a minor sewage treatment facility with an average annual design flow of 0.15 MGD. The treated effluent is discharged through Outfall 001 into an UNT to Skippack Creek (TSF, MF) at RMI 2.0 in state watershed 3-E. The existing permit will expire on September 3o, 2021. The terms and conditions of the existing permit was automatically extended since the renewal application was received at least 180 days prior to expiration date. Renewal NPDES permit applications under Clean Water program are not covered by PADEP's PDG per 021-2100-001.

This fact sheet is developed in accordance with 40 CFR §124.56.

Changes in this renewal: E. Coli, Total Copper, and Total Zinc quarterly monitoring were added.

Sludge use and disposal description and location(s): Sludge is hauled off to Warminster NAWC WWTP for further processing and/or disposal.

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.

Approve	Deny	Signatures	Date
√		Reza H. Chowdhury, E.I.T. / Project Manager	August 31, 2021
X		Pravin Patel Pravin C. Patel, P.E. / Environmental Engineer Manager	08/31/2021

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.15
Latitude	40º 10' 4.30"	Longitude	-75º 23' 32.85"
Quad Name	Collegeville	Quad Code	1742
Wastewater Description:	Sewage Treatment Effluent		
Receiving Waters	Unnamed Tributary to Skippack Creek (TSF, MF)	Stream Code	01029
NHD Com ID	25966138	RMI	2.0
Drainage Area	0.23 mi^2	Yield (cfs/mi^2)	0.035
Q_{7-10} Flow (cfs)	0.00805	Q_{7-10} Basis	Please see below
Elevation (ft)	381.7	Slope (ft/ft)	
Watershed No.	3-E	Chapter 93 Class.	TSF, MF
Existing Use	**TSF**	Existing Use Qualifier	Ch. 93
Exceptions to Use	None	Exceptions to Criteria	N/A
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status	Final on April 9, 2005, withdrawn on 2008	Name	Skippack Creek Watershed TMDL

Background/Ambient Data		Data Source
pH (SU)	7.0	Default per 391-2000-013
Temperature (°C)	20	Default per 391-2000-007
Hardness (mg/L)	100 mg/l	Default
Other:		

Nearest Downstream Public Water Supply Intake		PA American Water Co. Norristown Dist.	
PWS Waters	Schuylkill River	Flow at Intake (cfs)	
PWS RMI	25	Distance from Outfall (mi)	15.74

Changes Since Last Permit Issuance: None

Other Comments:
USGS's web based watershed delineation tool StreamStats (accessible at https://streamstats.usgs.gov/ss/, accessed on August 27, 2021) was utilized to determine the drainage area and low flow statistics of the receiving stream at discharge point. The drainage area was found to be 0.23 mi^2. However, some parameters were below threshold for regression analysis and therefore, the resulting low flow statistics may not be accurate. Therefore, data from the nearby StreamGage 01473120 was considered. This gage is located in Skippack Creek near Collegeville, PA. Q_{7-10}, Q_{1-10}, and Q_{30-10} values at this gage are 1.9 cfs, 1.4 cfs, and 3.2 cfs respectively for the reporting years of 1968-1994. The drainage area was found to be 53.7 mi^2. These values were obtained from the latest USGS streamflow report (1).

Q_{7-10} runoff rate = 1.9 cfs/53.7 mi^2 = 0.035 cfs/mi^2
Q_{7-10} = 0.035 cfs/mi^2 * 0.23 mi^2 = 0.00805 cfs
Q_{1-10}/Q_{7-10} = 1.4 cfs/1.9 cfs = 0.74
Q_{30-10}/Q_{7-10} = 3.2 cfs/1.9 cfs = 1.68

(1) Stuckey, M.H., Roland, M.A., 2011, Selected streamflow statistics for streamgage locations in and near Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2011-1070, PP 10, PP 23.

PWS Intake:
The nearby downstream PWS intake is PA American Water Co. Norristown Dist. on Schuylkill River at RMI 25. The distance from the Outfall to the PWS intake is approximately 15.74 miles which is calculated as below:

Outfall 001 in UNT to Skippack Creek (01029) ---------- 2.0 mile
RMI at Skippack Creek (01024) at confluence with 01029 ----------+2.68 mile
RMI at Perkiomen Creek (01017) at confluence with 01024 ---------- + 2.9 mile
RMI at Schuylkill River (00833) at confluence with 01017 ----------+33.05 mile
RMI at downstream node from PWS intake on 00833 ---------- - 25.07 mile
Distance from downstream node to PWS intake on 00833 ---------- +0.18 mile

15.74 mile

Wastewater Characteristics:
A default pH of 7.52 (median July- September 2020-2021), default temperature of 20^0C (Default per 391-2000-007), and default Hardness value of 100 mg/l will be used for modeling, if needed.

Background data:
The nearby WQN station WQN0163 stored the site-specific data for the period of 1973-1987. However, the reporting period is not long enough to be considered as historic data and therefore can't be used. In absence of site-specific data, default values were taken from technical guidance/SOP. A default pH of 7.0 (Default per 391-2000-013), default temperature of 20^0C (Default per 391-2000-007), and default Hardness value of 100 mg/l will be used for modeling, if needed.

Skippack Creek Total Maximum Daily Load (TMDL):
Skippack Creek is a 15.2-mile stream located in sub-sub-basin 03E, Montgomery County, PA. it is a tributary to Perkiomen Creek whose drainage basin is composed of urban, suburban, agricultural, and rural components. Skippack Creek begins within Souderton Borough limits and flows generally southwest to its confluence with Perkiomen Creek at RMI 3.0. The Skippack Creek TMDL was finalized in April 9, 2005 for Sediments and Nutrients. There were 11 active NPDES permitted point source discharges in the watershed including 7 STPs, 1 meat packing plant, 1 dairy farm, and 2 manufacturers. No reduction for sediment load from point sources were proposed in the final TMDL. The nutrient portion of the TMDL was withdrawn in summer of 2007. No WLA was assigned to this treatment plant. The effluent limitations in the permit will be applied in a way that the discharge from this facility will not add to the existing impairment of the receiving stream.

Antidegradation (93.4):
The effluent limits for this discharge have been developed to ensure that existing in-stream water uses and the level of water quality necessary to protect the existing uses are maintained and protected. The receiving streams are designated as Trout Stocking (TSF) and Migratory Fishes (MF.) No High-Quality stream or Exceptional Value water is impacted by this discharge; therefore, no Antidegradation Analysis is performed for the discharge.

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

Dry Stream Discharge:
The ratio of stream flow at low flow condition (Q_{7-10}) to the discharge flow is 0.00805 cfs: (0.15 MGD*1.547 cfs/MGD) or 0.03:1, which qualifies the receiving stream as dry stream. However, the dry stream guidance (391-2000-014) was published after the issuance of the permit for this facility, therefore, the dry stream guidance requirements are not applicable to this facility. The existing permit has nitrate-nitrite limits requirements due to dry stream/drinking water concerns. WQM 7.0 and DEP Toxics Management Spreadsheet (TMS) modeling, will be performed for this discharge despite being a dry stream, since the design low flow is not zero or near zero. Most stringent limits will be applied.

Treatment Facility Summary

Treatment Facility Name: Berwick Place STP

WQM Permit No.	Issuance Date
4602403	02/26/2003

4697402	03/19/1997

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia And Phosphorus	Activated Sludge	Ultraviolet	0.15

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.15		Not Overloaded	Hauled off	Other WWTP

Changes Since Last Permit Issuance: None

Other Comments:

Treatment Plant Description

Berwick Place WWTP is an extended aeration activated sludge process with a design flow of 0.15 MGD. The application form indicated the following treatment units at the facility: influent pumping station, comminutor with bypass bar screen, flow EQ basins, extended aeration activated sludge, secondary clarification, chemical addition and flocculation, gravity filtration, and disinfection by UV. The following chemicals are used for treatment purpose:

Chemical name	Purpose	Maximum use rate	Units
Aluminum Chloride	Coagulation	5-16	Gpd
Methanol	Dentification	0-8.5	Gpd

Private Utility Enterprises are responsible for overall STP O&M and sludge disposal. Franc Environmental is responsible for sludge hauling to Warminster NAWC WWTP where it is further treated and/or disposed.

Summary of Inspection:

07/02/2021: CEI conducted. No violation noted during the inspection. Discharge from the plant looked clear and there was no evidence of solids in the receiving stream. Overall, the plant appeared to be running properly.

12/23/2020: RTPT conducted. No violation noted. The plant appeared to be operating properly and no significant issues were noted during the inspection.

06/04/2020: RTPT conducted. No violation noted. The plant appeared to be operating properly. The sand filter was replaced recently. Final effluent was clear.

10/26/2018: RTPT conducted. No violation noted. Recommendation made to move the chemical storage back within containment.

Compliance History

DMR Data for Outfall 001 (from July 1, 2020 to June 30, 2021)

Parameter	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21	DEC-20	NOV-20	OCT-20	SEP-20	AUG-20	JUL-20
Flow (MGD) Average Monthly	0.0696	0.0725	0.0723	0.0846	2.3594	0.0758	0.0841	0.0711	0.0695	0.0656	0.0742	0.0722
Flow (MGD) Daily Maximum	0.1027	0.103	0.0984	0.1229	0.1422	0.1201	0.1016	0.101	0.1291	0.0829	0.1592	0.1119
pH (S.U.) Minimum	6.52	7.09	7.13	6.7	6.34	6.4	6.18	7.07	6.8	6.95	7.05	6.32
pH (S.U.) Maximum	8.12	8.2	8.62	8.9	8.26	8.4	8.16	8.77	8.56	8.31	8.25	8.7
DO (mg/L) Minimum	6.11	5.07	5.04	5.51	5.55	6.59	6.15	6.98	7.65	5.86	6.34	5.06
CBOD5 (lbs/day) Average Monthly	< 3.8	4.1	< 1.8	2.8	< 2.2	1.7	2.5	2.2	2.8	< 2.9	< 3.9	< 2.8
CBOD5 (lbs/day) Weekly Average	10.5	6.1	2.4	4.1	3.4	2.1	3.4	2.7	3.1	4.1	6.1	4.5
CBOD5 (mg/L) Average Monthly	< 7	8	< 4	4	< 3	3	4	4	6	< 6	< 6	< 5
CBOD5 (mg/L) Weekly Average	18	12	7	6	5	4	5	5	6	9	10	9
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	161	169	167	147	164	168	290	159	111	148	212	170
BOD5 (mg/L) Raw Sewage Influent Average Monthly	290	326	295	213	245	286	468	260	227	295	258	303
TSS (lbs/day) Average Monthly	4.9	2.8	< 4.6	6.3	< 1.2	1.5	< 0.9	4.5	< 0.6	1.4	< 3.5	< 1.3
TSS (lbs/day) Raw Sewage Influent Average Monthly	142	174	150	105	152	169	171	219	152	146	106	145
TSS (lbs/day) Weekly Average	11.0	6.1	13.6	16.6	2.0	2.8	1.6	16.0	0.9	3.4	11.4	2.0
TSS (mg/L) Average Monthly	9	6	< 8	9	< 2	3	< 1	8	< 1	3	< 6	< 2
TSS (mg/L) Raw Sewage Influent Average Monthly	261	339	320	158	226	290	282	355	303	283	149	257
TSS (mg/L) Weekly Average	17	13	22	22	3	4	2	28	2	6	21	4

Total Dissolved Solids (lbs/day) Average Quarterly	193			169			257			381		
Total Dissolved Solids (mg/L) Average Quarterly	313			290			555			589		
Fecal Coliform (CFU/100 ml) Geometric Mean	< 4	< 4	< 3	< 17	< 24	< 10	25	< 2	< 4	< 4	< 3	< 3
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	33	23	5	1100	490	52	72	3	11	18	5	18
UV Transmittance (%) Minimum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nitrate-Nitrite (lbs/day) Average Monthly	< 4.1	< 0.8	< 1.9	< 4.2	< 3.4	< 4.6	< 6.4	< 4.5	< 3.4	< 3.4	< 3.0	< 1.7
Nitrate-Nitrite (lbs/day) Weekly Average	< 7.1	< 1.6	< 3.4	< 7.8	< 4.5	< 5.8	< 17.3	< 6.8	< 3.9	< 4.6	< 5.5	< 3.9
Nitrate-Nitrite (mg/L) Average Monthly	< 8	< 1	< 3	< 6	< 5	< 8	< 10	< 7	< 7	< 7	< 5	< 3
Nitrate-Nitrite (mg/L) Weekly Average	< 15	< 3	< 5	< 9	< 6	< 10	< 22	< 9	< 8	< 8	< 8	< 6
Total Nitrogen (lbs/day) Average Monthly	< 5	< 2	< 3	< 5	< 6	< 6	< 7	< 5	< 4.0	< 4	< 4	< 2
Total Nitrogen (mg/L) Average Monthly	< 8.9	< 3	< 4.61	< 7.33	< 4	< 9.76	< 10.67	< 8.55	< 7.64	< 7.58	< 5.72	< 3.98
Ammonia (lbs/day) Average Monthly	< 0.3	0.3	< 0.2	< 0.3	0.6	0.4	< 0.1	< 0.2	< 0.05	< 0.07	< 0.08	< 0.3
Ammonia (lbs/day) Weekly Average	1.2	0.5	0.4	0.5	1.0	1.0	0.3	0.4	< 0.06	< 0.1	< 0.1	0.9
Ammonia (mg/L) Average Monthly	< 0.5	0.6	< 0.5	< 0.5	0.4	0.7	< 0.2	< 0.3	< 0.1	< 0.1	< 0.1	< 0.4
Ammonia (mg/L) Weekly Average	1.9	1.0	1.2	0.9	0.7	1.4	0.5	0.7	< 0.1	0.2	0.2	1.5
Total Phosphorus (lbs/day) Average Monthly	0.2	0.2	< 0.2	0.3	< 0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2
Total Phosphorus (mg/L) Average Monthly	0.4	0.3	< 0.4	0.4	< 0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.3

Compliance History

Effluent Violations for Outfall 001, from: August 1, 2020 To: June 30, 2021

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
CBOD5	06/30/21	Wkly Avg	18	mg/L	15	mg/L
TSS	06/30/21	Wkly Avg	17	mg/L	15	mg/L
TSS	04/30/21	Wkly Avg	22	mg/L	15	mg/L
TSS	03/31/21	Wkly Avg	22	mg/L	15	mg/L
TSS	11/30/20	Wkly Avg	28	mg/L	15	mg/L
TSS	08/31/20	Wkly Avg	21	mg/L	15	mg/L
Fecal Coliform	03/31/21	IMAX	1100	CFU/100 ml	1000	CFU/100 ml
Nitrate-Nitrite	12/31/20	Wkly Avg	< 22	mg/L	15	mg/L

Other Comments: June 2021 violations were due to pinch valve on sand filter failure which was corrected on same day. Cause for April 2021 violation was unknown. Equipment failure caused the March violation. November 2020 violation was due to equipment malfunction.

Existing Effluent Limitations and Monitoring Requirements

The table below summarizes effluent limitations and monitoring requirements specified in the existing final NPDES (amended) permit that was in effect between October 1, 2016 to September 30, 2021.

Outfall 001 , Continued (from October 1, 2016 through September 30, 2021)

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	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	9.0 Max	XXX	1/day	Grab
DO	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
CBOD5	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite
Total Dissolved Solids	Report	XXX	XXX	Report	XXX	XXX	1/quarter	24-Hr Composite
Fecal Coliform (CFU/100 ml)	XXX	XXX	XXX	200 Geo Mean	XXX	1000 (*)	1/week	Grab
UV Intensity (%)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Measured
Nitrate-Nitrite	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	3.8	5.6	XXX	3.0	4.5	6	1/week	24-Hr Composite
Ammonia May 1 - Oct 31	1.9	2.9	XXX	1.5	2.3	3	1/week	24-Hr Composite
Total Phosphorus	0.7	XXX	XXX	1.5	XXX	3	1/week	24-Hr Composite

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .15
Latitude 40º 10' 5" **Longitude** -75º 23' 34"
Wastewater Description: Water Treatment Effluent

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)
Fecal Coliform	200 / 100 ml	Geo Mean	DRBC	92a.47(a)(5)
Fecal Coliform	1,000 / 100 ml	IMAX	DRBC	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Comments: These standards apply, subject to Water Quality Analysis and BPJ where applicable.

Water Quality-Based Limitations

WQM 7.0:
WQM 7.0 version 1.0b is a water quality model designed to assist DEP to determine appropriate effluent limits for $CBOD_5$, NH_3-N and DO. The model simulates two basic processes. In the NH_3-N module, the model simulates the 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. In the D.O. module, the model simulates the 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. The following data were used in the attached computer model of the stream:

- Discharge pH 7.52 (median Jul-Sep, 2020-2021, DMR data)
- Discharge Temperature 20°C (Default per 391-2000-007)
- Discharge Hardness 100 mg/l (Default)
- Stream pH 7.0 (Default per 391-2000-013)
- Stream Temperature 20°C (Default per 391-2000-007, TSF/CWF)
- Stream Hardness 100 mg/l (Default)

The following nodes were considered in modeling:

Node 1: Berwick Place WWTP (PA0055671) Outfall 001 at UNT to Skippack Creek (01029)
Elevation: 381.7 ft (USGS National Map viewer, 08/27/2021)
Drainage Area: 0.23 mi^2 (StreamStat Version 3.0, 08/27/2021)
River Mile Index: 2.0 (PA DEP eMapPA)
Low Flow Yield: 0.035 cfs/mi^2
Discharge Flow: 0.15 MGD

Node 2: At confluence with Skippack Creek (01024)

Elevation:	119.94 ft (USGS National Map viewer, 08/27/2021)
Drainage Area:	1.67 mi^2 (StreamStat Version 3.0, 08/27/2021)
River Mile Index:	0.0 (PA DEP eMapPA)
Low Flow Yield:	0.035 cfs/mi^2
Discharge Flow:	0.0 MGD

NH_3-N:
WQM 7.0 suggested NH_3-N limit of 1.5 mg/l as monthly average and 3.0 mg/l as IMAX limit during summer to protect water quality standards. The weekly average limit is calculated by multiplying average monthly limit by a factor of 1.5, that resulted in a limit of 2.3 mg/l. These values are the same as existing permitted limits. Recent DMR data show that the plant is meeting the permit limits. The existing winter season limits of 3.0 mg/l as average monthly, 4.5 mg/l as weekly average, and 6.0 mg/l as IMAX limit will be carried over in this renewal. The mass-based limits are calculated as concentration in mg/l * conversion factor of 8.34 * flow in MGD.

$CBOD_5$:
The WQM 7.0 model suggests a monthly average $CBOD_5$ limit of 10 mg/l. The average monthly and average weekly mass loadings were calculated as 12.5 lbs/day and 18.8 lbs/day respectively. These are the same as existing limits.

Dissolved Oxygen (DO):
The existing permit has a minimum DO of 5.0 mg/l. Per Pa Code 25 Ch.93.7, a minimum DO of 5.0 is required for TSF. This is also supported by WQM 7.0 output.

Toxics:
Based on the available data, PADEP utilizes Toxics Management Spreadsheet (TMS) to (1) evaluate reasonable potential for toxic pollutants to cause or contribute to an excursion above the water quality standards and (2) develop WQBELs for those such toxic pollutants (i.e., 40 CFR § 122.44(d)(1)(i)). It is noteworthy that some of these pollutants that may be reported as “non-detect”, but still exceeded the criteria, were determined to be candidates for modeling because the method detection levels used to analyze those pollutants were higher than target QLs and/or the most stringent Chapter 93 criteria. The model then recommended the appropriate action for the Pollutants of Concerns based on the following logic:

1. In general, establish limits in the draft permit where the effluent concentration determined in B.1 or B.2 equals or exceeds 50% of the WQBEL (i.e., RP is demonstrated). Use the average monthly, maximum daily and instantaneous maximum (IMAX) limits for the permit as recommended by the TMS (or, if appropriate, use a multiplier of 2 times the average monthly limit for the maximum daily limit and 2.5 times the average monthly limit for IMAX).

2. For non-conservative pollutants, in general, establish monitoring requirements where the effluent concentration determined in B.1 or B.2 is between 25% - 50% of the WQBEL.

3. For conservative pollutants, in general, establish monitoring requirements where the effluent concentration determined in B.1 or B.2 is between 10% - 50% of the WQBEL.

NOTE 4 – If the effluent concentration determined in B.1 or B.2 is “non-detect” at or below the target quantitation limit (TQL) for the pollutant as specified in the TMS and permit application, the pollutant may be eliminated as a candidate for WQBELs or monitoring requirements unless 1) a more sensitive analytical method is available for the pollutant under 40 CFR Part 136 where the quantitation limit for the method is less than the applicable water quality criterion and 2) a detection at the more sensitive method may lead to a determination that an effluent limitation is necessary, considering available dilution at design conditions.

NOTE 5 – If the effluent concentration determined in B.1 or B.2 is a detection below the TQL but above or equal to the applicable water quality criterion, WQBELs or monitoring may be established for the pollutant.

4. Application managers may, on a site- and pollutant-specific basis, deviate from these guidelines where there is specific rationale that is documented in the fact sheet.

The TMS output table is provided below:

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

No. Samples/Month: 4

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Copper	0.012	0.018	9.65	14.5	14.5	µg/L	9.65	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	0.15	0.16	120	124	124	µg/L	120	AFC	Discharge Conc ≥ 50% WQBEL (RP)

Total Copper:
The application provided one sample result for Total Copper. The reported concentration is 0.005 mg/l (5.0 ug/l). This value was plugged into TMS. As shown in above table, TMS recommended numeric limitation for copper. The permittee had Total Copper monitoring requirements during 2011-2016 permit term which was removed for 2016-2021 permit term due as no reasonable potential was determined at the time. Due to the reasonable potential in this review, PADEP decided to include a quarterly monitoring for Total Copper for this permit term to collect sufficient data for a reasonable potential analysis during next renewal.

Total Zinc:
The application reported one sample result for Total Zinc which is 0.111 mg/l (111 ug/l). TMS recommended limitation on it. As described above, PADEP decided to include a quarterly monitoring requirement for this permit term to collect sufficient data for a reasonable potential analysis during next renewal.

Additional Considerations

Fecal Coliform:
The recent coliform guidance in 25 Pa. code § 92a.47.(a)(4) requires a summer technology limit of 200/100 ml as a geometric mean and an instantaneous maximum not greater than 1,000/100ml and § 92a.47.(a)(5) requires a winter limit of 2,000/100ml as a geometric mean and an instantaneous maximum not greater than 10,000/100ml. Delaware River Basin Commission's (DRBC's) Water Quality Regulations at Section 4.30.4.A requires that during winter season from October through April, the instantaneous maximum concentration of fecal coliform organisms shall not be greater than 1,000 per 100 milliliters in more than 10 percent of the samples tested. Therefore, the summer limit is governed by DEP's regulation while winter limit is governed by DRBC's regulation.

E. Coli:
DEP's SOP titled "Establishing Effluent Limitations for Individual Sewage Permits (BCW-PMT-033, revised March 24, 2021) recommends quarterly E. Coli monitoring for all sewage dischargers with a design flow between 0.05 MGD and <1.0 MGD. This requirement will be applied from this permit term.

pH:
The TBEL for pH is above 6.0 and below 9.0 S.U. (40 CFR §133.102(c) and Pa Code 25 § 95.2(1)) which are existing limits and will be carried over.

Total Suspended Solids (TSS):
There is no water quality criterion for TSS. The existing limits of 10 mg/L average monthly, 15 mg/l average weekly, and 20 mg/L instantaneous maximum will remain in the permit. These limits were set in the permit with the requirements that if the $CBOD_5$ limits are based on WQBEL, the TSS limits will be the same as $CBOD_5$.The mass based average monthly and weekly average limits are calculated to be 12.5 lbs./day and 18.8 lbs./day respectively.

UV Disinfection:
PADEP's SOP BCW-PMT-033 recommends UV parameter monitoring where UV is used as a method of disinfection, with the same frequency as would be if Chlorine is used for disinfection. The existing permit has a daily UV intensity reporting requirement, as %. % is not a suitable unit for UV intensity and can't be coded in WMS. A discussion with the WWTP's Operator Mr. Mike Sullivan indicated that the facility can monitor and report UV Intensity in mW/cm^2, which is a compatible unit. Therefore, UV Intensity with unit of mW/cm^2 will be applied in this renewal.

Flow and Influent BOD_5, $CBOD_5$, and TSS Monitoring Requirement:
The requirement to monitor the volume of effluent will remain in the draft permit per 40 CFR § 122.44(i)(1)(ii). Influent BOD_5 and TSS monitoring requirements are established in the permit per the requirements set in Pa Code 25 Chapter 94.

Best Professional Judgement (BPJ):

Total Phosphorus:
Current permit has average monthly and IMAX limit of 1.5 mg/l and 3.0 mg/l respectively, and an average monthly mass loading of 0.7 lbs./day. These limits will be carried over in this renewal to keep the facility at the current achieving load for nutrients. The previous fact sheet indicated that the maximum permitted discharge load was determined in 2011 by capping the load at what the facility was able to meet 99% of the time, based on 3 years of DMR data.

Monitoring Frequency and Sample Types:
Otherwise specified above, the monitoring frequency and sample type of compliance monitoring for existing parameters are recommended by DEP's SOP and Permit Writers Manual and/or on a case-by-case basis using best professional judgment (BPJ).

Total Nitrogen:
PADEP's SOP BCW-PMT-033 suggests monitoring requirement, at a minimum, for facilities with design flow greater than 2,000 GPD. This is an existing requirement which will be carried over in this renewal.

Nitrate-Nitrite:
As discussed in the page 3 of this fact sheet, due to drinking water concern from this discharge, a nitrite-nitrate average monthly limit of 10 mg/l, average weekly limit of 15 mg/l, and IMAX of 20 mg/l was imposed. Corresponding average monthly mass limit of 12.5 lbs./day and weekly average limit of 18.8 lbs./day was also applied. All these limits will be carried over in this renewal.

Anti-Backsliding

The proposed limits are at least as stringent as are in existing permit, unless otherwise stated; therefore, anti-backsliding is not applicable.

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" (362-0400-001), 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	Metered
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	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Dissolved Solids	Report Avg Qrtly	XXX	XXX	Report Avg Qrtly	XXX	XXX	1/quarter	24-Hr Composite
Fecal Coliform (No./100 ml)	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/cm²)	XXX	XXX	Report	XXX	XXX	XXX	1/day	Measured
Total Copper	XXX	XXX	XXX	Report Avg.Qrtly	XXX	Report Daily Max	1/quarter	24-Hr Composite
Total Zinc	XXX	XXX	XXX	Report Avg.Qrtly	XXX	Report Daily Max	1/quarter	24-Hr Composite
Nitrate-Nitrite	12.5	18.8	XXX	10	15	20	1/week	24-Hr Composite

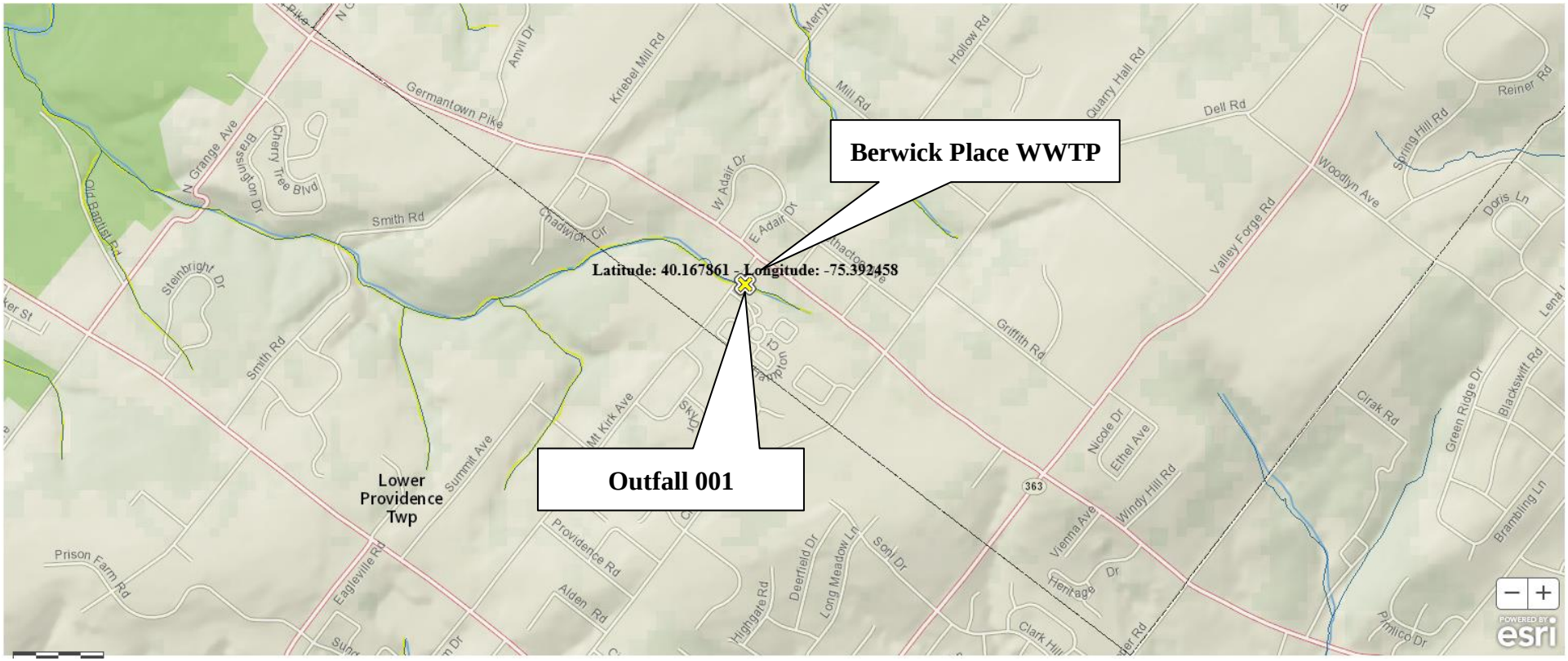
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Daily Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Ammonia Nov 1 - Apr 30	3.8	5.6	XXX	3.0	4.5	6	1/week	24-Hr Composite
Ammonia May 1 - Oct 31	1.9	2.9	XXX	1.5	2.3	3	1/week	24-Hr Composite
Total Phosphorus	0.7	XXX	XXX	1.5	XXX	3	1/week	24-Hr Composite

Compliance Sampling Location: At Outfall 001

Other Comments: None

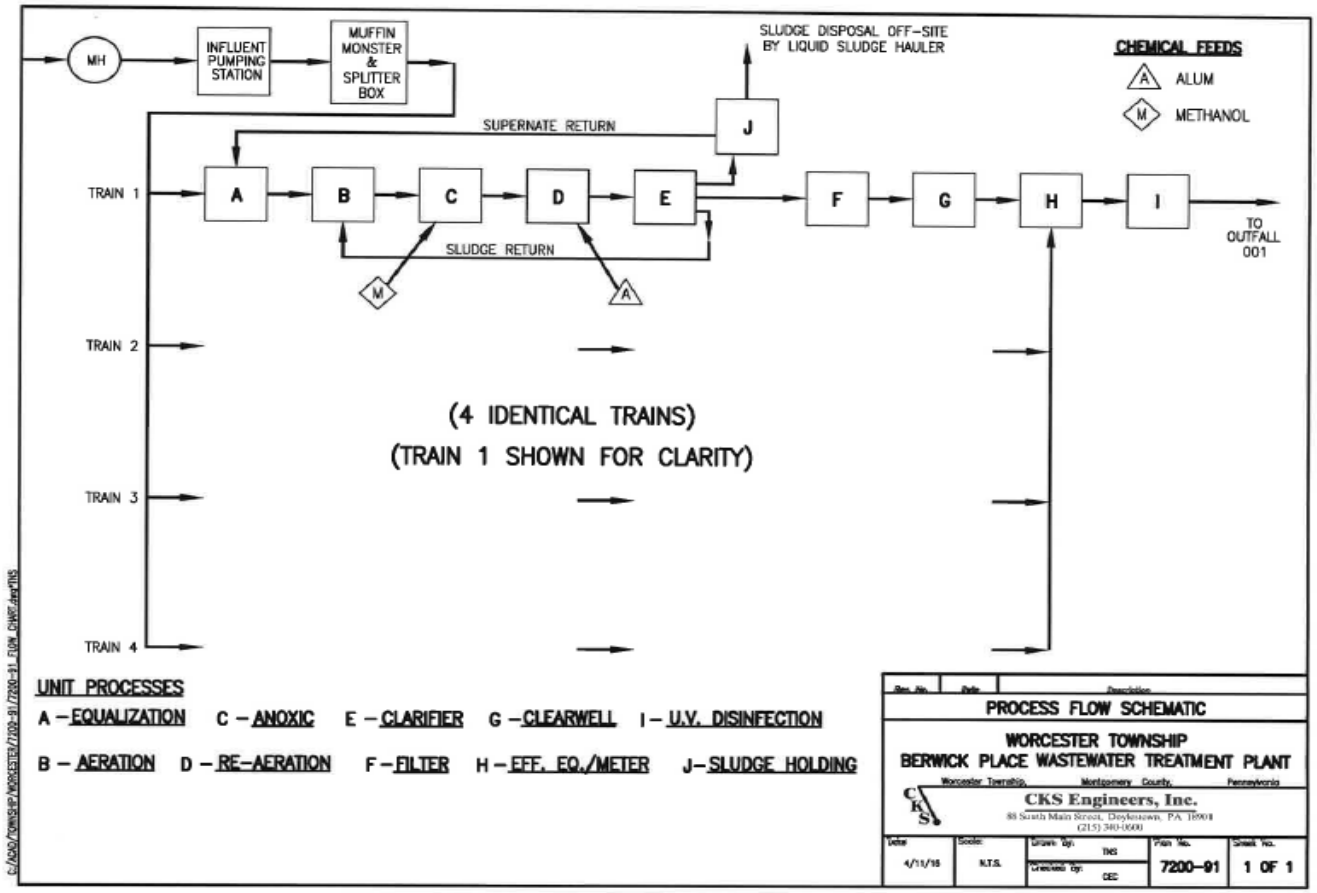
Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment)
☒	Toxics Management Spreadsheet (see Attachment)
☐	TRC Model Spreadsheet (see Attachment)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☒	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☐	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☐	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☒	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☒	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 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, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 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, 391-2000-022, 3/1999.
☐	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☐	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☒	SOP: BCW-PMT-033
☐	Other:

Locational Map



Berwick Place WWTP NPDES Permit #: PA0055671 Worchester Township, Montgomery County		pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION	Reza H Chowdhury Project Manager August 31, 2021

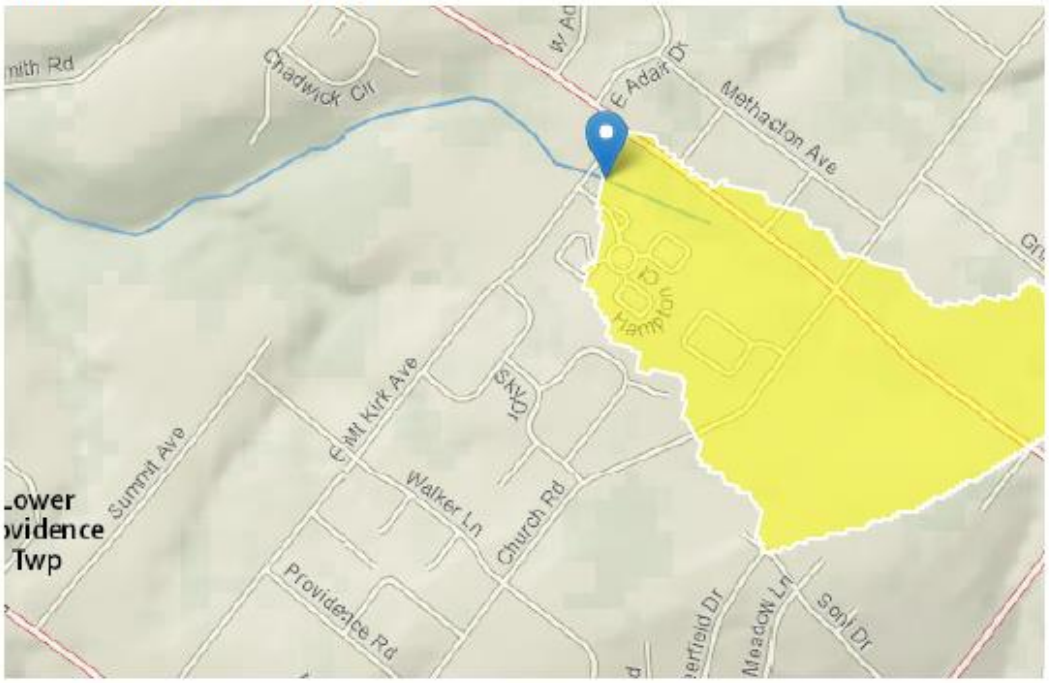
Process flow diagram



StreamStats delineation report

PA0055671 at Outfall 001

Region ID: PA
Workspace ID: PA20210827175633002000
Clicked Point (Latitude, Longitude): 40.16784, -75.39248
Time: 2021-08-27 13:56:52 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.23	square miles
BSLOPD	Mean basin slope measured in degrees	1.5974	degrees
ROCKDEP	Depth to rock	4	feet
URBAN	Percentage of basin with urban development	48.7072	percent

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.23	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	1.5974	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4	feet	4.13	5.21
URBAN	Percent Urban	48.7072	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [Low Flow Region 1]

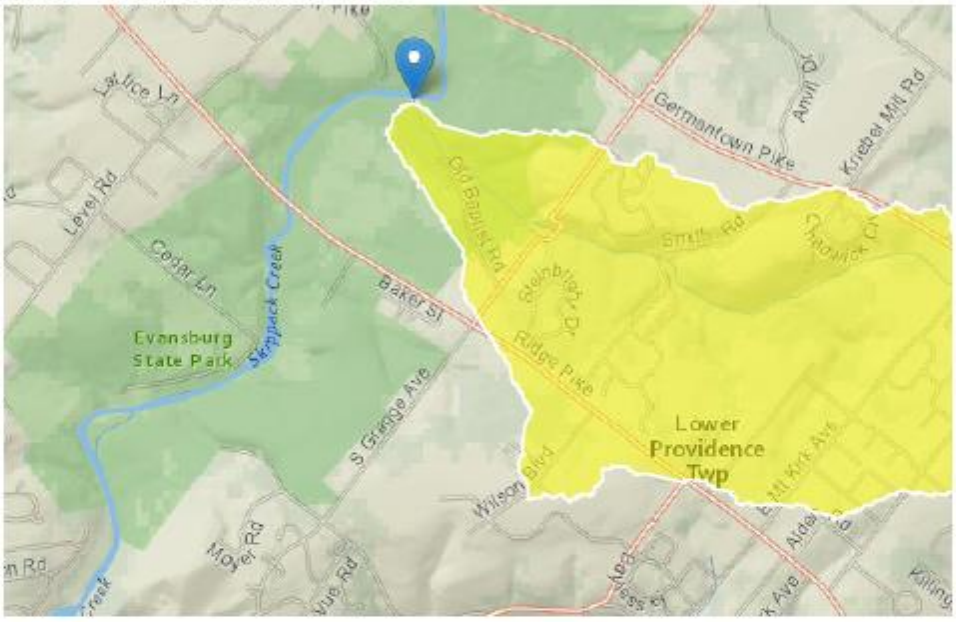
Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0122	ft^3/s
30 Day 2 Year Low Flow	0.0227	ft^3/s
7 Day 10 Year Low Flow	0.00339	ft^3/s
30 Day 10 Year Low Flow	0.00684	ft^3/s
90 Day 10 Year Low Flow	0.0204	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

PA0055671 at Node 2

Region ID: PA
Workspace ID: PA20210827180138772000
Clicked Point (Latitude, Longitude): 40.17584, -75.42337
Time: 2021-08-27 14:02:05 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.67	square miles
BSLOPD	Mean basin slope measured in degrees	3.3043	degrees
ROCKDEP	Depth to rock	4.1	feet
URBAN	Percentage of basin with urban development	24.1323	percent

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.67	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	3.3043	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4.1	feet	4.13	5.21
URBAN	Percent Urban	24.1323	percent	0	89

Low-Flow Statistics Disclaimers [Low Flow Region 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [Low Flow Region 1]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.174	ft^3/s
30 Day 2 Year Low Flow	0.268	ft^3/s
7 Day 10 Year Low Flow	0.0641	ft^3/s
30 Day 10 Year Low Flow	0.105	ft^3/s
90 Day 10 Year Low Flow	0.213	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

WQM 7.0

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
03E	1029	Trib 01029 to Skippack Creek	2.000	381.70	0.23	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	0.035	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
Berwick Place	PA0055671	0.1500	0.1500	0.1500	0.000	20.00	7.52

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	10.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	1.50	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
03E	1029	Trib 01029 to Skippack Creek	0.000	119.94	1.67	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	0.035	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

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
03E	1029	Trib 01029 to Skippack 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												
2.000	0.01	0.00	0.01	.2321	0.02479	.428	3.76	8.78	0.15	0.820	20.00	7.49
Q1-10 Flow												
2.000	0.01	0.00	0.01	.2321	0.02479	NA	NA	NA	0.15	0.824	20.00	7.50
Q30-10 Flow												
2.000	0.01	0.00	0.01	.2321	0.02479	NA	NA	NA	0.15	0.809	20.00	7.47

Monday, August 30, 2021 Version 1.0b Page 1 of 1

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	0.74	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.68	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
03E	1029	Trib 01029 to Skippack 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
2.000	Berwick Place	5.89	3	5.89	3	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
2.000	Berwick Place	1.46	1.5	1.46	1.5	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)		
2.00	Berwick Place	10	10	1.5	1.5	5	5	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
03E	1029	Trib 01029 to Skippack Creek

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
2.000	0.150	20.000	7.488
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
3.760	0.428	8.781	0.149
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
9.73	1.480	1.45	0.700
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
5.109	29.122	Owens	5
Reach Travel Time (days)			
0.820			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.082	8.62	1.37	8.03
0.164	7.64	1.29	8.24
0.246	6.76	1.22	8.24
0.328	5.99	1.15	8.24
0.410	5.31	1.09	8.24
0.492	4.70	1.03	8.24
0.574	4.16	0.97	8.24
0.656	3.69	0.92	8.24
0.738	3.27	0.87	8.24
0.820	2.89	0.82	8.24

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
03E	1029	Trib 01029 to Skippack 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)
2.000	Berwick Place	PA0055671	0.150	CBOD5	10		
				NH3-N	1.5	3	
				Dissolved Oxygen			5

TMS

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

Discharge Information

Instructions | Discharge | Stream

Facility: **Berwick Place WWTP** NPDES Permit No.: **PA0055671** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Treated sewage effluent**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.15	100	7.52						

	Discharge Pollutant	Units	Max Discharge Conc		0 if left blank: Trib Conc	0 if left blank: Stream Conc	0.5 if left blank: Daily CV	0.5 if left blank: Hourly CV	0 if left blank: Stream CV	0 if left blank: Fate Coeff	0 if left blank: FOS	1 if left blank: Criteria Mod	1 if left blank: Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		522									
	Chloride (PWS)	mg/L		171									
	Bromide	mg/L	<	1									
	Sulfate (PWS)	mg/L		55.5									
	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	µg/L		5									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L											
	Dissolved Iron	µg/L											
	Total Iron	µg/L											
	Total Lead	µg/L	<	1									
	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	µg/L		111									
	Total Molybdenum	µg/L											
	Acrolein	µg/L	<										
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<										
	Benzene	µg/L	<										
	Bromoform	µg/L	<										

Group 3	Carbon Tetrachloride	µg/L	<										
	Chlorobenzene	µg/L											
	Chlorodibromomethane	µg/L	<										
	Chloroethane	µg/L	<										
	2-Chloroethyl Vinyl Ether	µg/L	<										
	Chloroform	µg/L	<										
	Dichlorobromomethane	µg/L	<										
	1,1-Dichloroethane	µg/L	<										
	1,2-Dichloroethane	µg/L	<										
	1,1-Dichloroethylene	µg/L	<										
	1,2-Dichloropropane	µg/L	<										
	1,3-Dichloropropylene	µg/L	<										
	1,4-Dioxane	µg/L	<										
	Ethylbenzene	µg/L	<										
	Methyl Bromide	µg/L	<										
	Methyl Chloride	µg/L	<										
	Methylene Chloride	µg/L	<										
	1,1,2,2-Tetrachloroethane	µg/L	<										
	Tetrachloroethylene	µg/L	<										
	Toluene	µg/L	<										
	1,2-trans-Dichloroethylene	µg/L	<										
	1,1,1-Trichloroethane	µg/L	<										
	1,1,2-Trichloroethane	µg/L	<										
	Trichloroethylene	µg/L	<										
	Vinyl Chloride	µg/L	<										
Group 4	2-Chlorophenol	µg/L	<										
	2,4-Dichlorophenol	µg/L	<										
	2,4-Dimethylphenol	µg/L	<										
	4,6-Dinitro-o-Cresol	µg/L	<										
	2,4-Dinitrophenol	µg/L	<										
	2-Nitrophenol	µg/L	<										
	4-Nitrophenol	µg/L	<										
	p-Chloro-m-Cresol	µg/L	<										
	Pentachlorophenol	µg/L	<										
	Phenol	µg/L	<										
	2,4,6-Trichlorophenol	µg/L	<										
Group 5	Acenaphthene	µg/L	<										
	Acenaphthylene	µg/L	<										
	Anthracene	µg/L	<										
	Benzidine	µg/L	<										
	Benzo(a)Anthracene	µg/L	<										
	Benzo(a)Pyrene	µg/L	<										
	3,4-Benzofluoranthene	µg/L	<										
	Benzo(ghi)Perylene	µg/L	<										
	Benzo(k)Fluoranthene	µg/L	<										
	Bis(2-Chloroethoxy)Methane	µg/L	<										
	Bis(2-Chloroethyl)Ether	µg/L	<										
	Bis(2-Chloroisopropyl)Ether	µg/L	<										
	Bis(2-Ethylhexyl)Phthalate	µg/L	<										
	4-Bromophenyl Phenyl Ether	µg/L	<										
	Butyl Benzyl Phthalate	µg/L	<										
	2-Chloronaphthalene	µg/L	<										
	4-Chlorophenyl Phenyl Ether	µg/L	<										
	Chrysene	µg/L	<										
	Dibenzo(a,h)Anthrancene	µg/L	<										
	1,2-Dichlorobenzene	µg/L	<										
	1,3-Dichlorobenzene	µg/L	<										
	1,4-Dichlorobenzene	µg/L	<										
	3,3-Dichlorobenzidine	µg/L	<										
	Diethyl Phthalate	µg/L	<										
	Dimethyl Phthalate	µg/L	<										
	Di-n-Butyl Phthalate	µg/L	<										
	2,4-Dinitrotoluene	µg/L	<										

	2,6-Dinitrotoluene	µg/L	<											
	Di-n-Octyl Phthalate	µg/L	<											
	1,2-Diphenylhydrazine	µg/L	<											
	Fluoranthene	µg/L	<											
	Fluorene	µg/L	<											
	Hexachlorobenzene	µg/L	<											
	Hexachlorobutadiene	µg/L	<											
	Hexachlorocyclopentadiene	µg/L	<											
	Hexachloroethane	µg/L	<											
	Indeno(1,2,3-cd)Pyrene	µg/L	<											
	Isophorone	µg/L	<											
	Naphthalene	µg/L	<											
	Nitrobenzene	µg/L	<											
	n-Nitrosodimethylamine	µg/L	<											
	n-Nitrosodi-n-Propylamine	µg/L	<											
	n-Nitrosodiphenylamine	µg/L	<											
	Phenanthrene	µg/L	<											
	Pyrene	µg/L	<											
	1,2,4-Trichlorobenzene	µg/L	<											
Group 6	Aldrin	µg/L	<											
	alpha-BHC	µg/L	<											
	beta-BHC	µg/L	<											
	gamma-BHC	µg/L	<											
	delta BHC	µg/L	<											
	Chlordane	µg/L	<											
	4,4-DDT	µg/L	<											
	4,4-DDE	µg/L	<											
	4,4-DDD	µg/L	<											
	Dieldrin	µg/L	<											
	alpha-Endosulfan	µg/L	<											
	beta-Endosulfan	µg/L	<											
	Endosulfan Sulfate	µg/L	<											
	Endrin	µg/L	<											
	Endrin Aldehyde	µg/L	<											
	Heptachlor	µg/L	<											
	Heptachlor Epoxide	µg/L	<											
	PCB-1016	µg/L	<											
	PCB-1221	µg/L	<											
	PCB-1232	µg/L	<											
	PCB-1242	µg/L	<											
	PCB-1248	µg/L	<											
	PCB-1254	µg/L	<											
	PCB-1260	µg/L	<											
	PCBs, Total	µg/L	<											
	Toxaphene	µg/L	<											
	2,3,7,8-TCDD	ng/L	<											
Group 7	Gross Alpha	pCi/L												
	Total Beta	pCi/L	<											
	Radium 226/228	pCi/L	<											
	Total Strontium	µg/L	<											
	Total Uranium	µg/L	<											
	Osmotic Pressure	mOs/kg												

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Toxics Management Spreadsheet
Version 1.3, March 2021

Stream / Surface Water Information

Berwick Place WWTP, NPDES Permit No. PA0055671, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **UNT to Skippack 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	001029	2	381.7	0.23			Yes
End of Reach 1	001029	0	119.94	1.67			Yes

$Q_{7\text{-}10}$

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	2	0.035										100	7		
End of Reach 1	0	0.035													

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	2														
End of Reach 1	0														

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Toxics Management Spreadsheet
Version 1.3, March 2021

Model Results

Berwick Place WWTP, NPDES Permit No. PA0055671, Outfall 001

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

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 0.000 PMF: 1 Analysis Hardness (mg/l): 100 Analysis pH: 7.49

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 Copper	0	0		0	13.439	14.0	14.5	Chem Translator of 0.96 applied
Total Lead	0	0		0	64.581	81.6	84.5	Chem Translator of 0.791 applied
Total Zinc	0	0		0	117.180	120	124	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): 0.000 PMF: 1 Analysis Hardness (mg/l): 100 Analysis pH: 7.49

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 Copper	0	0		0	8.956	9.33	9.65	Chem Translator of 0.96 applied
Total Lead	0	0		0	2.517	3.18	3.29	Chem Translator of 0.791 applied
Total Zinc	0	0		0	118.139	120	124	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): 0.000 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 Copper	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ *CRL* CCT (min): 0.036 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 Copper	0	0		0	N/A	N/A	N/A	
Total Lead	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

	Mass Limits		*Concentration Limits*						
Pollutants	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units	Governing WQBEL	WQBEL Basis	Comments
Total Copper	0.012	0.018	9.65	14.5	14.5	µg/L	9.65	CFC	Discharge Conc ≥ 50% WQBEL (RP)
Total Zinc	0.15	0.16	120	124	124	µg/L	120	AFC	Discharge Conc ≥ 50% WQBEL (RP)

☑ ***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
Total Lead	N/A	N/A	Discharge Conc < TQL