pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southeast Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0051250**
Facility Type	**Municipal**	APS ID	**1091012**
Major / Minor	**Minor**	Authorization ID	**1444260**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Bucks County Water & Sewer Authority**	Facility Name	**BCWSA Kings Plaza WWTP**
Applicant Address	1275 Almshouse Road	Facility Address	1275 Almshouse Road
	Warrington, PA 18976-1209		Warrington, PA 18976-1209
Applicant Contact	John Butler	Facility Contact	Leonard Hughes
Applicant Phone	(215) 343-2538	Facility Phone	(267) 718-1225
Client ID	93895	Site ID	458777
Ch 94 Load Status	Not Overloaded	Municipality	Doylestown Township
Connection Status	No Limitations	County	Bucks
Date Application Received	May 3, 2023	EPA Waived?	Yes
Date Application Accepted		If No, Reason	

Purpose of Application: NPDES permit renewal application.

Summary of Review

The Pa Department of Environmental Protection received an NPDES permit renewal application from Environmental Gilmore & Associates, Inc. (consultant) on May 3, 2023 on behalf of Bucks County Water and Sewer Authority (BCWSA/permittee) for Kings Plaza WWTP (facility). This is a minor sewage facility with a design flow of 0.425 MGD that discharges into Neshaminy Creek (TSF, MF) in state watershed 2-F. The current permit expired on October 31, 2023. The terms and conditions of the current permit is automatically extended since the renewal application is received at least 180 days prior to expiration date. Renewal NPDES permit application 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 to existing permit: Quarterly E-Coli monitoring

Sludge use and disposal description and location(s): Aerobically digested sludge is sent to Hervey Ave WWTP.

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	July 27, 2023
X		Pravin Patel Pravin C. Patel, P.E. / Environmental Engineer Manager	07/28/2023

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.425
Latitude	40º 16' 17.97"	Longitude	-75º 7' 28.79"
Quad Name	Doylestown	Quad Code	1644
Wastewater Description:	Effluent		
Receiving Waters	Neshaminy Creek (TSF, MF)	Stream Code	02484
NHD Com ID	25479306	RMI	31.7
Drainage Area	75.8 mi^2	Yield (cfs/mi^2)	0.057
Q_{7-10} Flow (cfs)	4.3	Q_{7-10} Basis	2018 Fact Sheet
Elevation (ft)	171.43	Slope (ft/ft)	
Watershed No.	2-F	Chapter 93 Class.	TSF, MF
Existing Use		Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	NUTRIENTS, ORGANIC ENRICHMENT, PATHOGENS, SILTATION		
Source(s) of Impairment	MUNICIPAL POINT SOURCE DISCHARGES, MUNICIPAL POINT SOURCE DISCHARGES, SOURCE UNKNOWN, SOURCE UNKNOWN		
TMDL Status	Final	Name	Neshaminy Creek

Background/Ambient Data		Data Source
pH (SU)	7.0	Default
Temperature (°C)	20	Default
Hardness (mg/L)	100	Default
Other:		

Nearest Downstream Public Water Supply Intake		Aqua PA Main Neshaminy Creek Intake	
PWS Waters	Neshaminy Creek	Flow at Intake (cfs)	
PWS RMI	9.36	Distance from Outfall (mi)	22.34

Changes Since Last Permit Issuance: A WQM permit amendment was issued on September 15, 2020 to increase Hydraulic Design Capacity from 0.425 MGD to 0.6 MGD.

Other Comments:

Stream flow

The previous permit's fact sheet stated "*The stream flow in the Neshaminy Creek is highly regulated, more so in the past 20 years with the inclusion of flow augmentation from the Point Pleasant Pump Station, increased discharges from sewage treatment facilities, and withdrawals from two major water utilities. There are now several active stream gauges located in the watershed. However, only the gauge located near Langhorne has continuous data for more than the past 10 years. Therefore, the flow from the gauge located near Langhorne is used to calculate the design flow at the point of discharge and is prorated for the relative size of the watershed. (USGS website – Low Flow Statistics for Pennsylvania Streams). Based on a drainage area of 75.9 mi^2 and a low-flow yield of 0.057-cfsm, the Q_{7-10} flow at Kings Plaza STP is estimated at 4.3 cfs.*

Kings Plaza STP discharges to Neshaminy Creek, approximately 8.3 miles downstream of the confluence with North Branch Neshaminy Creek. There are several major sewage facilities located upstream on Neshaminy Creek or its tributaries, including Lansdale Borough, Hatfield Township, and Chalfont-New Britain; and several sewage facilities located in the Little Neshaminy Creek watershed, which intersects with Neshaminy Creek approximately 7.5 miles

downstream of Kings Plaza STP." Based on this discussion, the current Q_{7-10} of 4.3 cfs will be used in modeling. Default Q_{1-10}: Q_{7-10} of 0.64 and default Q_{30-10}: Q_{7-10} ratio of 1.36 will also be used for modeling.

PWS Intake:
The nearest downstream public water supply is Aqua PA Main, Neshaminy intake, on Neshaminy Creek at RMI 9.36. Its approximately 22.34 miles downstream of Outfall 001. Discharge from this facility is expected not to impact the PWS intake.

Wastewater Characteristics:
A median pH of 7.18 was calculated from daily DMR during dry months July through September for the years 2021-22. A default Total Hardness of 100 mg/l and default temperature of 25^0 C will be used for modeling, as appropriate.

Background data:
There is no WQN station near the discharge point. In absence of any site-specific data, a default pH of 7.0, default hardness of 100 mg/l, and default temperature of 20^0 C will be used for modeling.

Neshaminy Creek Watershed TMDL:
Neshaminy Creek Watershed TMDL was finalized on April 9, 2003 for nutrients and sedimentation, nutrient portion of which was withdrawn on January 31, 2008.

2.6 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.

Treatment Facility Summary

Treatment Facility Name: Kings Plaza STP

WQM Permit No.	Issuance Date
0983418 A-1	9/15/2020
0983418	9/5/2008

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Tertiary	Extended Aeration With Solids Removal	Gas Chlorine	0.425

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.6	709	Not Overloaded	Aerobic digestion	Combination of methods

Treatment Plant

Bucks County Water and Sewer Authority (BCWSA) owns and operates Kings Plaza STP (facility). It is a minor STP with average annual design flow of 0.425 MGD, hydraulic design capacity of 0.6 MGD, and organic loading capacity of 709 MGD. The plant consists of an EQ tank, two parallel activated sludge treatment trains with extended aeration tanks, secondary clarifiers, a tertiary sand filter, chlorine disinfection with a contact tank, and dechlorination. The treated effluent is discharged through Outfall 001 into Neshaminy Creek. Wasted sludge is pumped to an aerobic digester and digested sludge is hauled to Harvey Avenue WWTP for further processing. A process flow diagram is provided in the appendix.

The facility uses chlorine for disinfection and sodium bisulfate for dechlorination. The facility receives 100% of its flow from Doylestown Township, 100% of which is separate sewer system. There are no industrial or commercial users within the service area of the STP.

Compliance History

DMR Data for Outfall 001 (from June 1, 2022 to May 31, 2023)

Parameter	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22	NOV-22	OCT-22	SEP-22	AUG-22	JUL-22	JUN-22
Flow (MGD) Average Monthly	0.270	0.204	0.186	0.187	0.244	0.231	0.304	0.310	0.216	0.201	0.202	0.239
Flow (MGD) Daily Maximum	0.655	0.636	0.223	0.207	0.541	0.420	0.325	0.379	0.399	0.272	0.230	0.333
pH (S.U.) Instantaneous Minimum	6.07	6.54	6.65	6.06	6.32	6.55	6.89	6.77	6.88	6.40	6.40	6.81
pH (S.U.) IMAX	7.39	7.34	7.47	7.46	7.42	8.27	8.74	8.06	8.84	7.89	7.89	7.23
DO (mg/L) Instantaneous Minimum	5.17	6.48	7.39	6.72	7.04	5.77	7.13	6.87	6.39	5.84	5.72	5.99
TRC (mg/L) Average Monthly	0.25	0.34	0.34	0.40	0.24	0.22	0.32	0.18	0.21	0.23	0.21	0.17
TRC (mg/L) IMAX	0.84	0.79	0.66	0.72	1.06	0.99	1.60	1.01	0.89	0.62	0.62	0.41
CBOD5 (lbs./day) Average Monthly	< 4.4	< 3.6	< 3.4	< 5.9	< 3.9	7.8	< 4.5	< 6.1	< 6.4	< 4.7	< 4.0	6.9
CBOD5 (lbs/day) Weekly Average	5.9	5.4	3.7	9.1	< 5.5	11.2	< 5.27	8.4	10.0	8.6	4.9	7.8
CBOD5 (mg/L) Average Monthly	< 2.2	< 2.4	< 2.1	< 3.8	< 2.1	5.0	< 2.0	< 2.3	< 3.7	< 2.7	< 2.3	3.5
CBOD5 (mg/L) Weekly Average	2.9	3.4	2.4	5.7	2.4	9.2	2.0	3.2	5.1	4.5	3.3	4.2
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	634.8	320.4	572.7	163.3	430.8	224	551.6	330.7	369.6	260.2	310.8	381.3
BOD5 (mg/L) Raw Sewage Influent Average Monthly	215.4	163.8	280	181.5	186.2	223	301	172	216	162	185	193.4
TSS (lbs/day) Average Monthly	< 15	5.4	< 6	< 12	8.5	< 11	< 9	< 7	8	13	6	10
TSS (lbs/day) Raw Sewage Influent Average Monthly	900	606	610	358.9	418.1	296	226.1	311.6	307.9	258.4	292.9	292.4
TSS (lbs/day) Weekly Average	38	9.3	14	23	16.4	24	24	18	11	29	8	24
TSS (mg/L) Average Monthly	< 7	3.5	< 4	< 8	4.3	< 10	< 3	< 3	5	7	3	5

TSS (mg/L) Raw Sewage Influent Average Monthly	327	310	298	201.8	178.8	248	125	146	180.3	163	179	146.2
TSS (mg/L) Weekly Average	19	6.0	9	15	6.0	25	9	7	7	15	4	13
TDS (lbs/day) Average Quarterly			1171			1781			1667			3062
TDS (mg/L) Average Quarterly			780			680			869			848
Fecal Coliform (CFU/100 ml) Geometric Mean	< 12.2	< 5	6	14	7	56	12	< 10	80	< 67	33	48
Fecal Coliform (CFU/100 ml) IMAX	7500	30	13	18	36	600	18	30	7300	13100	173	800
Nitrate-Nitrite (lbs/day) Average Monthly	14.76	23.5	23.8	20.42	21.45	10.99	14.28	29.90	14.37	18.99	15.65	22.76
Nitrate-Nitrite (mg/L) Average Monthly	7.65	15.2	14.6	13.28	11.48	5.05	6.02	11.38	7.81	11.11	8.87	11.66
Total Nitrogen (lbs/day) Average Monthly	< 17.41	24.93	24.95	21.95	23.66	31.11	< 15.53	32.46	16.41	< 22.57	16.98	25.54
Total Nitrogen (mg/L) Average Monthly	< 8.96	16.13	15.34	14.29	12.80	17.04	< 6.57	12.33	8.98	< 13.13	9.65	13.09
Ammonia (lbs/day) Average Monthly	< 1.13	< 0.20	< 0.05	< 0.03	< 0.63	12.44	< 0.12	< 0.56	0.42	< 2.04	< 0.05	< 0.68
Ammonia (mg/L) Average Monthly	< 0.56	< 0.14	< 0.03	< 0.02	< 0.41	5.97	< 0.05	< 0.20	0.22	< 1.15	< 0.03	< 0.34
TKN (lbs/day) Average Monthly	< 2.66	1.45	1.12	1.53	2.21	20.12	< 1.25	2.56	2.04	< 3.58	1.34	2.78
TKN (mg/L) Average Monthly	< 1.32	0.95	0.70	1.01	1.32	11.99	< 0.55	0.95	1.18	< 2.02	0.78	1.43
Total Phosphorus (lbs/day) Average Monthly	0.43	0.31	0.45	0.41	0.82	1.41	0.20	1.58	1.8	0.58	1.42	0.53
Total Phosphorus (mg/L) Average Monthly	0.22	0.20	0.28	0.27	0.52	0.93	0.09	0.60	1.0	0.33	0.83	0.27

Compliance History

Effluent Violations for Outfall 001, from: July 1, 2022 To: May 31, 2023

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Fecal Coliform	09/30/22	IMAX	7300	CFU/100 ml	1000	CFU/100 ml
Fecal Coliform	08/31/22	IMAX	13100	CFU/100 ml	1000	CFU/100 ml
Fecal Coliform	05/31/23	IMAX	7500	CFU/100 ml	1000	CFU/100 ml
Nitrate-Nitrite	08/31/22	Avg Mo	11.11	mg/L	9.0	mg/L
Nitrate-Nitrite	10/31/22	Avg Mo	11.38	mg/L	9.0	mg/L

Summary of Inspections:
07/13/2022: CEI conducted. No violation noted. One of the treatment tower clarifiers had significant algal growth and appeared to be causing short circuiting in the weirs. Recommended to have the weirs hosed down. The final effluent looked slightly cloudy.

04/12/2021: RTPT conducted. No violation noted. Some floating solids were observed in the CCT but the baffles appeared to be keeping them from the final discharge. The final effluent looked cloudy.

03/03/2021: SSO inspection conducted. Violations noted including failure to immediately report to DEP a pollution incident and unauthorized discharge of sewage to the waters of the commonwealth. Evidence of SSO was discovered during a routine inspection.

01/15/2021: INCDT inspection conducted in response to a dry weather SSO incident from the manhole behind Grundy Hall. Sewage flowed out of the manhole onto the ground and reached the nearby UNT to Neshaminy Creek. The SSO was due to a partial blockage of the line that discharges from the Neshaminy Manor Complex. The line was jetted, and flow was restored.

Other Comments: There is currently no open violation against the facility.

Existing limits								
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 Inst Min	XXX	XXX	9.0	1/day	Grab
Dissolved Oxygen	XXX	XXX	5.0 Inst Min	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5 Nov 1 - Apr 30	88	141	XXX	25	40	50	1/week	24-Hr Composite
CBOD5 May 1 - Oct 31	53	81	XXX	15	23	30	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
Total Suspended Solids	106	159	XXX	30	45	60	1/week	24-Hr Composite
Total Suspended Solids 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 (CFU/100 ml)	XXX	XXX	XXX	200 Geo Mean	XXX	1000 (*)	1/week	Grab
Nitrate-Nitrite as N Nov 1 - Jun 30	Report	XXX	XXX	Report	XXX	XXX	1/month	24-hr Composite
Nitrate-Nitrite as N Jul 1 - Oct 31	31.9	XXX	XXX	9.0	XXX	18	1/week	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	21.2	XXX	XXX	6.0	XXX	12	1/week	24-Hr Composite
Ammonia-Nitrogen May 1 - Oct 31	7.0	XXX	XXX	2.0	XXX	4	1/week	24-Hr Composite
Total Kjeldahl Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Phosphorus Nov 1 - Mar 31	7.2	XXX	XXX	2.0	XXX	4	1/week	24-Hr Composite
Total Phosphorus Apr 1 - Oct 31	3.6	XXX	XXX	1.0	XXX	2	1/week	24-Hr Composite

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.425
Latitude 40º 16' 17.97" **Longitude** -75º 7' 28.79"
Wastewater Description: Effluent

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.

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	200 / 100 ml	Geo Mean	-	DRBC, 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 (10/1 – 4/30)	1,000 / 100 ml	10% rule	-	DRBC
Total Dissolved Solids	1,000	Average Monthly		DRBC
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(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

Water Quality-Based Limitations

Discussion on existing limits:

Per the previous fact sheet, *the limits for facilities that discharge in the Neshaminy Creek basin were established in the early 1980's, as part of basin wide modeling in support of a federal grant initiative*. The WQM7.0 model will be used to verify if the limits on conventional pollutants are still protective.

Model input data

The following data will be used for modeling, as needed:

- Discharge pH 7.18 (median July-Sep 2021-22, daily eDMR data)
- Discharge Temperature 25°C (Default)
- Discharge Hardness 100 mg/l (Default)
- Stream pH 7.0 (Default)

- Stream Temperature 20°C (Default)
- Stream Hardness 100 mg/l (Default)

The following two nodes were used in modeling:

Node 1: At the outfall 001 on Neshaminy Creek (02484)

Elevation:	180.85 ft (The National Map-Advanced Viewer, 07/21/2023)
Drainage Area:	75.8 mi^2 (StreamStat Version 3.0, 07/21/2023)
River Mile Index:	31.7 (PA DEP eMapPA)
Low Flow Yield:	0.057 cfs/mi^2
Q_{7-10}:	4.3 cfs
Discharge Flow:	0.425 MGD

Node 2: At confluence with UNT 02704 to Neshaminy Creek

Elevation:	171.43 ft (The National Map-Advanced Viewer, 07/21/2023)
Drainage Area:	81.2 mi^2 (StreamStat Version 3.0, 07/21/2023)
River Mile Index:	31.47 (PA DEP eMapPA)
Low Flow Yield:	0.057 cfs/mi^2
Discharge Flow:	0.0 MGD

WQM 7.0 Model

WQM 7.0 version 1.11 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 model was utilized for this permit renewal by using Q_{7-10} and current background water quality levels of the stream.

NH_3-N

WQM 7.0 suggested current limits are still protective and will be carried over.

CBOD5

WQM 7.0 suggested current limits are still protective and will be carried over.

DO

WQM 7.0 suggested current limits are still protective and will be carried over.

Additional Consideration:

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. These are existing requirements and will be carried over in this renewal.

E. Coli:

Pa Code 25 § 92a. 61 requires monitoring of 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 sewage dischargers with design flow >= 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), 92a.47) 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 30 mg/L average monthly, 45 mg/l average weekly, and 60 mg/L instantaneous maximum will remain in the permit based on the minimum level of effluent quality attainable by secondary treatment, 25 Pa. Code § 92a.47 and 40CFR 133.102(b). The mass based average monthly and weekly average limits are calculated to be 106 lbs./day and 159 lbs./day respectively, which are the same as were in existing permit and will be carried over.

Total Residual Chlorine (TRC):
The attached computer printout utilizes the equation and calculations as presented in the Department's 2003 Implementation Guidance for Total Residual Chlorine (TRC) (ID#391-2000-015) for developing chlorine limitations. The attached printout indicates that a water quality limit of 0.5 mg/l would be needed to prevent toxicity concerns at the discharge point for Outfall 001. The Instantaneous Maximum (IMAX) limit is 1.6 mg/l. These are the same as existing limits and will be carried over.

Total Nitrogen, Nitrate-Nitrite, and TKN:
Sewage facilities that discharge within the Neshaminy Creek basin have a combined effluent limit for ammonia and nitrite-nitrate equal to 11 mg/l during the critical low-flow period of July thru October. Since the ammonia limit for Kings Plaza STP is 2.0 mg/l, the nitrite-nitrate limit is 9.0 mg/l.

Total Phosphorus:
The current permit has seasonal Total Phosphorus concentration and mass limits that will be carried over.

Total Dissolved Solids:
The average discharge concentration out of 123 data points is 785 mg/l. Existing monitoring requirements will be carried over in this renewal.

Flow and Influent BOD_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.

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).

Anti-Backsliding
The proposed limits are at least as stringent as current permit; therefore, anti-backsliding isn't 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" (386-0400-001), SOPs and/or BPJ.

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

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	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 Inst Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5 Nov 1 - Apr 30	88	141	XXX	25	40	50	1/week	24-Hr Composite
CBOD5 May 1 - Oct 31	53	81	XXX	15	23	30	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS	106	159	XXX	30	45	60	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

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

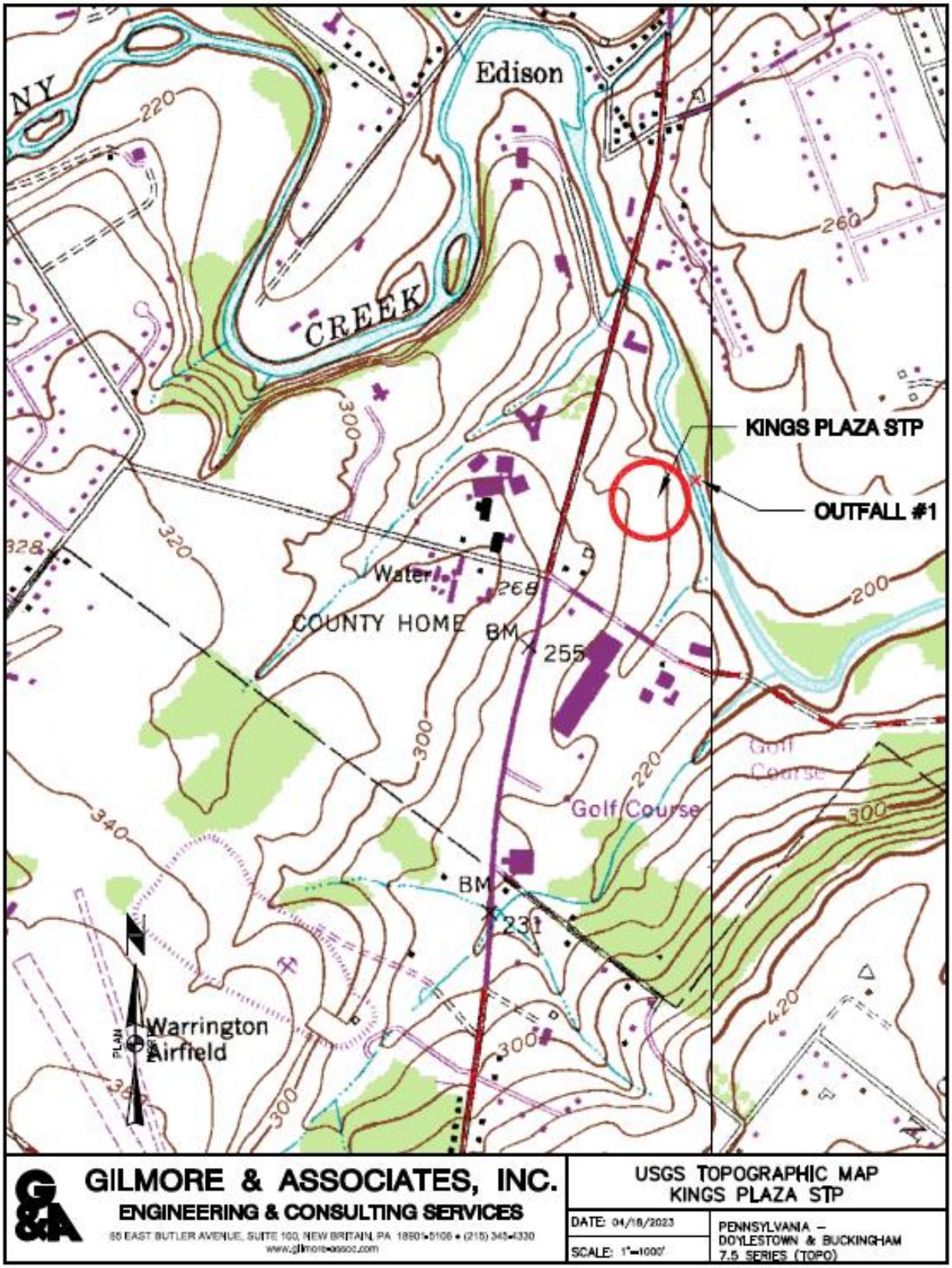
Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Nitrate-Nitrite Nov 1 - Jun 30	Report	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Nitrate-Nitrite Jul 1 - Oct 31	31.9	XXX	XXX	9.0	XXX	18	1/week	24-Hr Composite
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Ammonia Nov 1 - Apr 30	21.2	XXX	XXX	6.0	XXX	12	1/week	24-Hr Composite
Ammonia May 1 - Oct 31	7.0	XXX	XXX	2.0	XXX	4	1/week	24-Hr Composite
TKN	Report	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Total Phosphorus Nov 1 - Mar 31	7.2	XXX	XXX	2.0	XXX	4	1/week	24-Hr Composite
Total Phosphorus Apr 1 - Oct 31	3.6	XXX	XXX	1.0	XXX	2	1/week	24-Hr Composite

Compliance Sampling Location: At Outfall 001

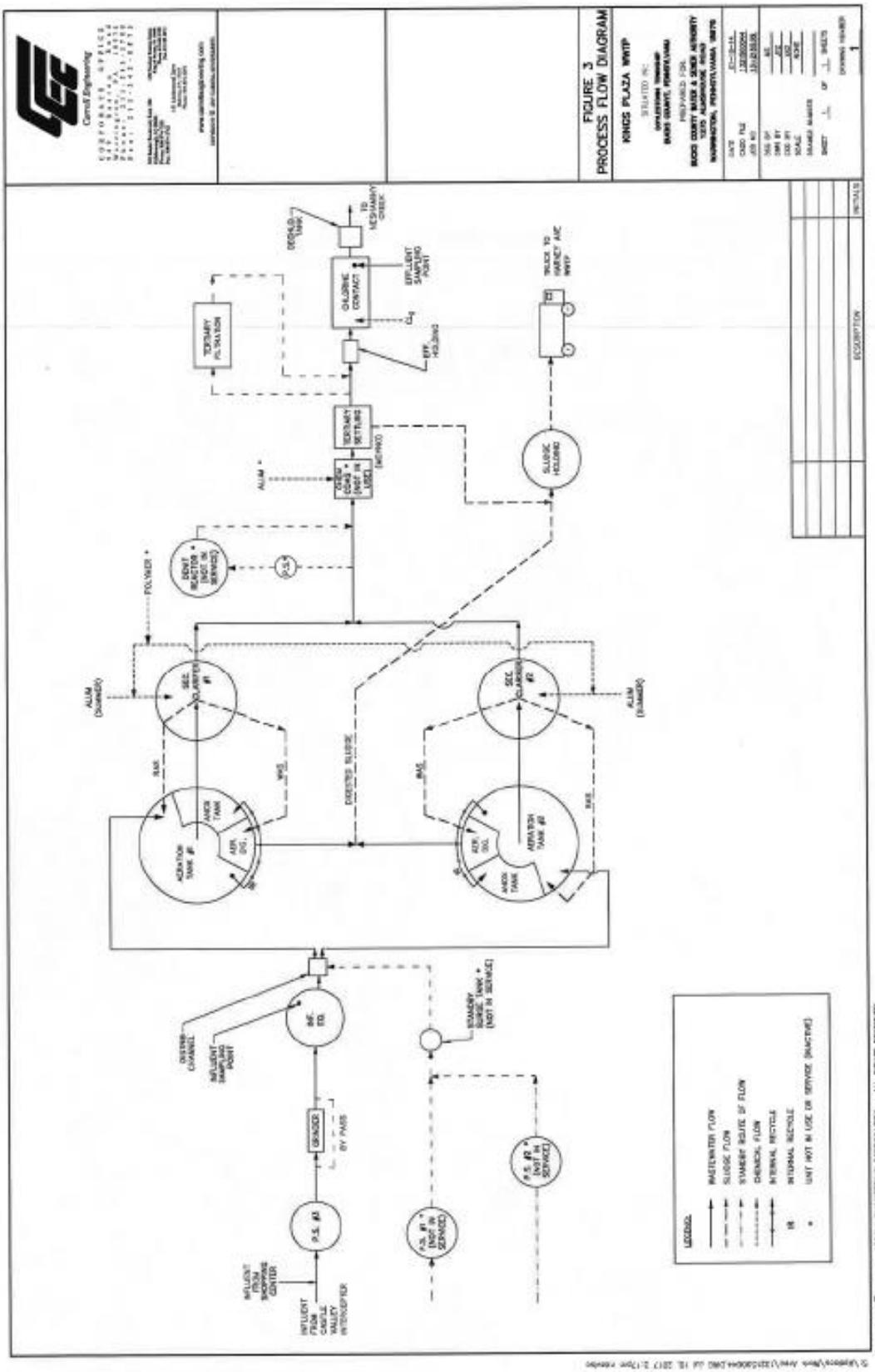
Other Comments: None

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, 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:
☐	Other:

Locational Map



Process flow diagram



StreamStats at Outfall 001

PA0051250 at Outfall 001

Region ID: PA
Workspace ID: PA20230721175751847000
Clicked Point (Latitude, Longitude): 40.27229, -75.12496
Time: 2023-07-21 13:58:14 -0400

Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	2.4627	degrees
DRNAREA	Area that drains to a point on a stream	75.8	square miles
ROCKDEP	Depth to rock	4.1	feet
URBAN	Percentage of basin with urban development	26.1705	percent

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	75.8	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	2.4627	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4.1	feet	4.13	5.21
URBAN	Percent Urban	26.1705	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.

StreamStats at Node 2

At node 2

Region ID: PA
Workspace ID: PA20230721180142084000
Clicked Point (Latitude, Longitude): 40.27658, -75.09563
Time: 2023-07-21 14:02:04 -0400

Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	2.5466	degrees
DRNAREA	Area that drains to a point on a stream	81.2	square miles
ROCKDEP	Depth to rock	4.1	feet
URBAN	Percentage of basin with urban development	27.1748	percent

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	81.2	square miles	4.78	1150
BSLOPD	Mean Basin Slope degrees	2.5466	degrees	1.7	6.4
ROCKDEP	Depth to Rock	4.1	feet	4.13	5.21
URBAN	Percent Urban	27.1748	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.

TRC_Calc Spreadsheet

TRC_CALC

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

4.3	= Q stream (cfs)	0.5	= CV Daily
0.425	= Q discharge (MGD)	0.5	= CV Hourly
30	= no. samples	1	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	1	= CFC_Partial Mix Factor
0	= Chlorine Demand of Discharge	15	= AFC_Criteria Compliance Time (min)
0.5	= BAT/BPJ Value	720	= CFC_Criteria Compliance Time (min)
0	= % Factor of Safety (FOS)		=Decay Coefficient (K)

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 2.105	1.3.2.iii	WLA cfc = 2.045
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.784	5.1d	LTA_cfc = 1.189

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.635	

WLA afc	(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))... ...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))... ...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)

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
02F	2484	NESHAMINY CREEK	31.700	180.85	75.80	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	0.057	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
Kings Plaza STP	PA0051250	0.4250	0.4250	0.4250	0.000	25.00	7.18

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	15.00	2.00	0.00	1.50
Dissolved Oxygen	5.00	8.24	0.00	0.00
NH3-N	2.00	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
02F	2484	NESHAMINY CREEK	31.470	171.43	81.20	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.057	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
02F	2484	NESHAMINY 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												
31.700	4.32	0.00	4.32	.6575	0.00776	.702	34.32	48.88	0.21	0.068	20.66	7.02
Q1-10 Flow												
31.700	2.77	0.00	2.77	.6575	0.00776	NA	NA	NA	0.17	0.084	20.96	7.03
Q30-10 Flow												
31.700	5.88	0.00	5.88	.6575	0.00776	NA	NA	NA	0.24	0.058	20.50	7.02

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	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	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
02F	2484	NESHAMINY 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
31.700	Kings Plaza STP	15.08	4	15.08	4	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
31.700	Kings Plaza STP	1.82	2	1.82	2	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)		
31.70	Kings Plaza STP	15	15	2	2	5	5	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
02F	2484	NESHAMINY CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
31.700	0.425	20.660	7.020
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
34.320	0.702	48.878	0.207
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
3.72	0.780	0.26	0.736
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.815	15.466	Tsivoglou	5
Reach Travel Time (days)			
0.068			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.007	3.70	0.26	7.90
0.014	3.68	0.26	7.98
0.020	3.66	0.26	8.06
0.027	3.64	0.26	8.12
0.034	3.62	0.26	8.14
0.041	3.60	0.26	8.14
0.048	3.58	0.26	8.14
0.054	3.56	0.25	8.14
0.061	3.54	0.25	8.14
0.068	3.52	0.25	8.14

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
02F	2484	NESHAMINY 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)
31.700	Kings Plaza STP	PA0051250	0.425	CBOD5	15		
				NH3-N	2	4	
				Dissolved Oxygen			5