pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**Southcentral Regional Office**
**CLEAN WATER PROGRAM**

| | | | |
|---|---|---|---|
| Application Type | **Renewal** | Application No. | **PA0024708** |
| Facility Type | **Municipal** | APS ID | **46939** |
| Major / Minor | **Minor** | Authorization ID | **1342576** |

# NPDES PERMIT FACT SHEET
# INDIVIDUAL SEWAGE

## Applicant and Facility Information

| | | | |
|---|---|---|---|
| Applicant Name | **Union Township Municipal Authority Mifflin County** | Facility Name | **Union Township STP** |
| Applicant Address | PO Box 5625 | Facility Address | 101 Coldwater Lane |
| | Belleville, PA 17004-5625 | | Belleville, PA 17004-9701 |
| Applicant Contact | Daniel Taptich | Facility Contact | Alfred Fultz |
| Applicant Phone | (717) 935-5202 | Facility Phone | (717) 935-5202 |
| Client ID | 62462 | Site ID | 452092 |
| Ch 94 Load Status | Not Overloaded | Municipality | Union Township |
| Connection Status | No Limitations | County | Mifflin |
| Date Application Received | February 5, 2021 | EPA Waived? | No |
| Date Application Accepted | February 18, 2021 | If No, Reason | Pretreatment, Significant CB Discharge |

Purpose of Application: This is an application for NPDES renewal.

| Approve | Deny | Signatures | Date |
|---|---|---|---|
| X | | Nicholas Hong, P.E. / Environmental Engineer<br>Nick Hong (via electronic signature) | March 16, 2022 |
| x | | Daniel W. Martin, P.E. / Environmental Engineer Manager<br>Maria D. Bebenek for | March 17, 2022 |
| x | | Maria D. Bebenek, P.E. / Environmental Program Manager<br>Maria D. Bebenek | March 17, 2022 |

## Summary of Review

The application submitted by the applicant requests a NPDES renewal permit for the Union Township MA WWTP located at 101 Coldwater Lane, Belleville, PA 17004 in Mifflin County, municipality of Union. The existing permit became effective on September 1, 2016 and expired on August 31, 2021. The application for renewal was received by DEP Southcentral Regional Office (SCRO) on February 5, 2021.

The purpose of this Fact Sheet is to present the basis of information used for establishing the proposed NPDES permit effluent limitations. The Fact Sheet includes a description of the facility, a description of the facility's receiving waters, a description of the facility's receiving waters attainment/non-attainment assessment status, and a description of any changes to the proposed monitoring/sampling frequency. Section 6 provides the justification for the proposed NPDES effluent limits derived from technology based effluent limits (TBEL), water quality based effluent limits (WQBEL), total maximum daily loading (TMDL), antidegradation, anti-backsliding, and/or whole effluent toxicity (WET). A brief summary of the outlined descriptions has been included in the Summary of Review section.

The subject facility is a 0.65 MGD treatment facility. The applicant anticipates proposed upgrades to the treatment facility in the next five years. The facility intends on constructing a new gravity thickened aerobic digester, modification of the existing RAS/WAS pumping station, and replacement of the existing treatment blowers. The NPDES application has been processed as a Minor Sewage Facility (Level 2) due to the type of sewage and the design flow rate for the facility. The applicant disclosed the Act 14 requirement to Mifflin County Commissioners and Union Township Supervisors and the notice was received by the parties on October 2, 2020. A planning approval letter was not necessary as the facility is neither new or expanding.

Utilizing the DEP's web-based Emap-PA information system, the receiving waters has been determined to be Kishacoquillas Creek. The sequence of receiving streams that the Kishacoquillas Creek discharges into are Juniata River and the Susquehanna River which eventually drains into the Chesapeake Bay. The subject site is subject to the Chesapeake Bay implementation requirements. The receiving water has protected water usage for cold water fishes (CWF) and migratory fishes (MF). No Class A Wild Trout fisheries are impacted by this discharge. The absence of high quality and/or exceptional value surface waters removes the need for an additional evaluation of anti-degradation requirements.

The Kishacoquillas Creek is a Category 4c and 5alt stream listed in the 2022 Integrated List of All Waters (formerly 303d Listed Streams). This stream is an impaired stream for aquatic life due to flow regime modification from urban runoff/storm sewers and the stream is also impaired for aquatic life due to siltation from agriculture. The receiving waters is subject to the Kishacoquillas Creek Watershed alternative restoration plan to improve water quality in the subject facility's watershed.

The existing permit and proposed permit differ as follows:

- **Due to the EPA Triennial Review, E. Coli shall be monitored on a 1x/quarter basis.**
- **Monitoring for zinc shall be 2x/yr.**
- **The ammonia-nitrogen effluent limits shall be reduced to 24 lbs/day and 4.5 mg/l during the months of May 1 to October 31. During the months of November 1 to April 30, the effluent limit shall not exceed 73 lbs/day and 13.5 mg/l.**
- **The phosphorus effluent limit shall be 10.8 lbs/day and 2.0 mg/l as an average monthly.**

Sludge use and disposal description and location(s): Sewage sludge disposed at Mifflin Township in Union County and at Kelly Township MA WWTP in Kelly Township.

The proposed permit will expire five (5) years from the effective date.

Based on the review in this report, it is recommended that the permit be drafted. 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.

| **Summary of Review** |
| --- |
| Any additional information or public review of documents associated with the discharge or facility may be available at PA DEP Southcentral Regional Office (SCRO), 909 Elmerton Avenue, Harrisburg, PA 17110. To make an appointment for file review, contact the SCRO File Review Coordinator at 717.705.4700. |

## 1.0 Applicant

### 1.1 General Information

This fact sheet summarizes PA Department of Environmental Protection's review for the NPDES renewal for the following subject facility.

| | |
|---|---|
| Facility Name: | Union Township MA WWTP |
| NPDES Permit # | PA0024708 |
| Physical Address: | 101 Coldwater Lane<br>Belleville, PA 17004 |
| Mailing Address: | PO Box 5625<br>Belleville, PA 17004 |
| Contact: | Alfred Fultz<br>Manager<br>Union Township MA<br>utmamx@embarqmail.com |
| Consultant: | David Cunningham, PE<br>Kelller Engineers, Inc.<br>(814) 696-7430<br>dcunningham@keller-engineers.com |

### 1.2 Permit History

Description of Facility

Union Township MA owns and operates the wastewater collection and treatment facilities serving customers within the Union Township municipal border. On March 14, 2019, the Authority was issued a WQM permit (WQM 4495402 A-4) for modifications to various treatment upgrades. At the time of application, work on those upgrades did not begin. However, the work is expected to be completed within the next five-year permit period.

The wastewater collection system serves the village of Belleville and its surrounding areas. In total, the collection system contains approximately 13 miles of 6 to 18-inch gravity main. The system contains approximately 350 access manholes. The system is strictly gravity fed with no pumping stations with the exception of several individual grinder pumps.

Permit submittal included the following information.

- NPDES Application
- Flow Diagrams
- Effluent Sample Data

## 2.0 Treatment Facility Summary

### 2.1.1 Site location

The physical address for the facility is 101 Coldwater Lane, Belleville, PA 17004. A topographical and an aerial photograph of the facility are depicted as Figure 1 and Figure 2.

Figure 1: Topographical map of the subject facility

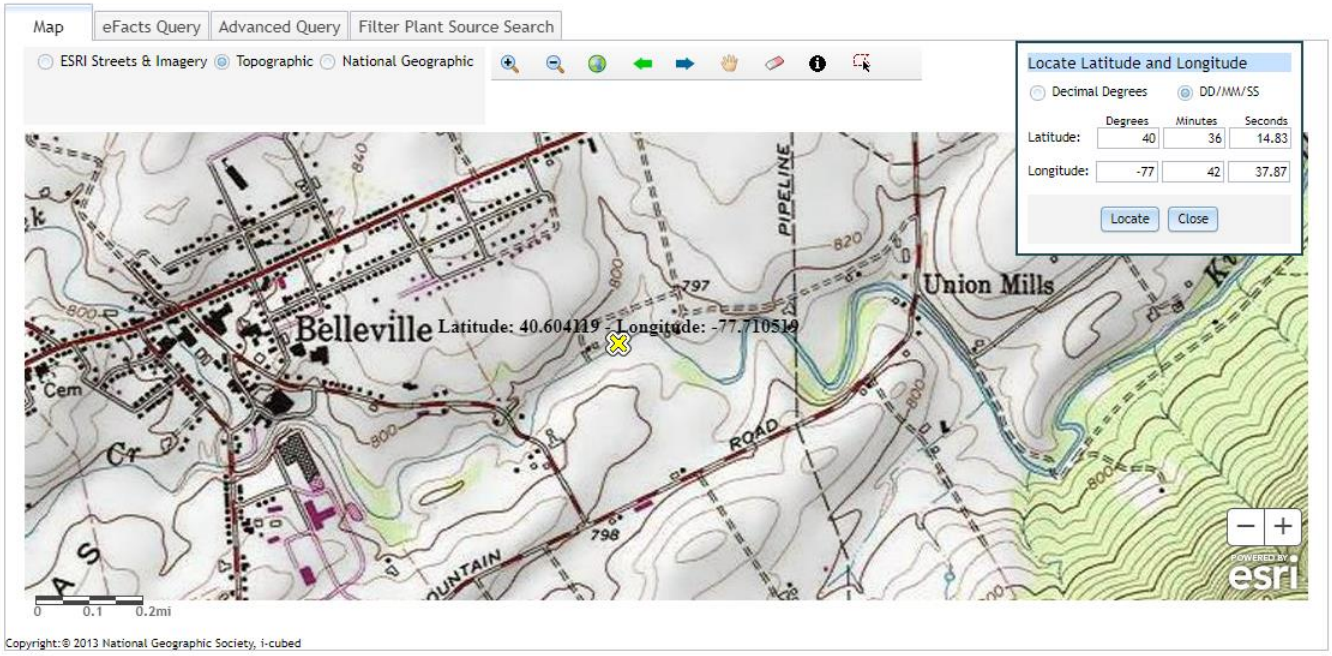



Figure 2: Aerial Photograph of the subject facility

### 2.1.2 Sources of Wastewater/Stormwater

The wastewater treatment plant receives 100% of the wastewater from Union Township.

The facility receives wastewater contributions from Valley View Retirement Community, Internation Poultry Breeders Hatchery, and Belleville Commons.

The facility received hauled-in wastes in the last three years and also anticipates receiving hauled-in wastes in the next five years.

### 2.2 Description of Wastewater Treatment Process

The subject facility is a 0.65 MGD design flow facility. The subject facility treats wastewater consisting of two independent treatment trains. Each train consists of three process segments: an anoxic, an aerobic, and a second anoxic. Processed wastewater is split to one of three final clarifiers before disinfected with chlorine gas and discharge through the outfall. The facility is being evaluated for flow, pH, dissolved oxygen, TRC, CBOD5, TSS, fecal coliform, nitrogen species, and phosphorus. The existing permits limits for the facility is summarized in Section 2.4.

The treatment process is summarized in the table.

**Treatment Facility Summary**

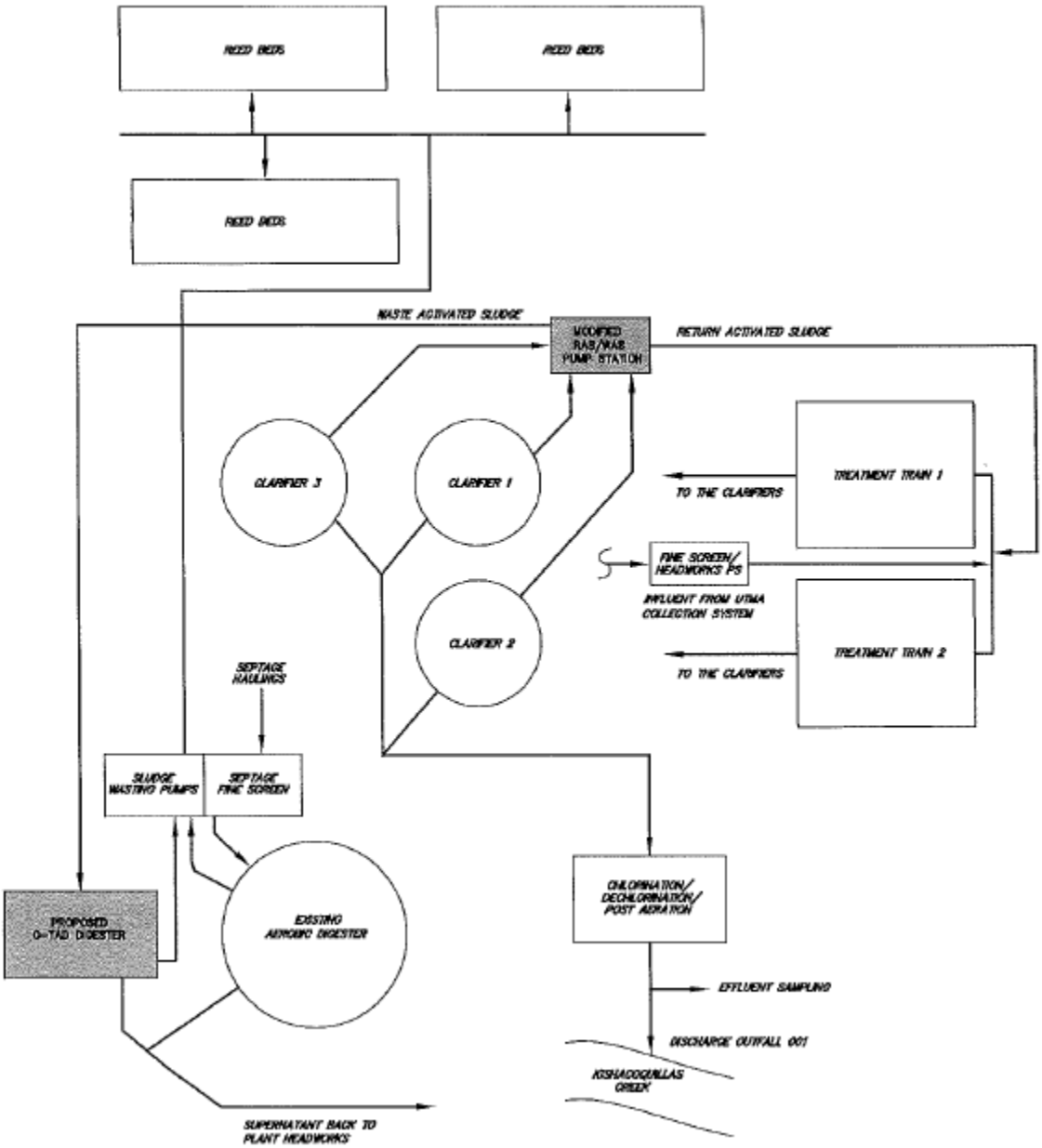
**Treatment Facility Name:** Union Township STP

| WQM Permit No. | Issuance Date |
|---|---|
| 4495402 | TBD |
| 4495402 A-4 | 03/14/2019 |

| Waste Type | Degree of Treatment | Process Type | Disinfection | Avg Annual Flow (MGD) |
|---|---|---|---|---|
| Sewage | Secondary With Ammonia Reduction | Extended Aeration | Gas Chlorine | 0.65 |

| Hydraulic Capacity (MGD) | Organic Capacity (lbs/day) | Load Status | Biosolids Treatment | Biosolids Use/Disposal |
|---|---|---|---|---|
| 0.65 | 1330 | Not Overloaded | Aerobic Digestion | Combination of methods |

A schematic of the process is shown.




## 2.3 Facility Outfall Information

The facility has the following outfall information for wastewater.

| | | | |
|---|---|---|---|
| **Outfall No.** | 001 | **Design Flow (MGD)** | .65 |
| **Latitude** | 40º 36' 14.83" | **Longitude** | -77º 42' 37.87" |
| **Wastewater Description:** | Sewage Effluent | | |

The subject facility outfall is within the vicinity of another sewage/wastewater outfall. An upstream outfall is Fairmont Products, Inc (PA0009571) which is about 1.3 miles from the subject facility. The facility is an industrial waste facility.

## 2.3.1 Operational Considerations- Chemical Additives

Chemical additives are chemical products introduced into a waste stream that is used for cleaning, disinfecting, or maintenance and which may be detected in effluent discharged to waters of the Commonwealth. Chemicals excluded are those used for neutralization of waste streams, the production of goods, and treatment of wastewater.

The subject facility utilizes the following chemicals as part of their treatment process.

- Chlorine gas for disinfection
- DelPac polyaluminum chloride for coagulation in clarifiers.

## 2.4 Existing NPDES Permits Limits

The existing NPDES permit limits are summarized in the table.

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS**

**I. A. For Outfall** 001 , **Latitude** 40° 36' 14.83" , **Longitude** 77° 42' 37.87" , **River Mile Index** 15.82 , **Stream Code** 12429

**Receiving Waters:** Kishacoquillas Creek

**Type of Effluent:** Sewage Effluent

1. The permittee is authorized to discharge during the period from September 1, 2016 through August 31, 2021.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

| Parameter | Effluent Limitations | | | | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| | Mass Units (lbs/day) [1] | | Concentrations (mg/L) | | | | Minimum [2] Measurement Frequency | Required Sample Type |
| | Average Monthly | Daily Maximum | Minimum | Average Monthly | Maximum | Instant. Maximum | | |
| Flow (MGD) | Report | Report | XXX | XXX | XXX | XXX | Continuous | Measured |
| pH (S.U.) | XXX | XXX | 6.0 | XXX | 9.0 | XXX | 1/day | Grab |
| Dissolved Oxygen | XXX | XXX | 5.0 | XXX | XXX | XXX | 1/day | Grab |
| Total Residual Chlorine (TRC) | XXX | XXX | XXX | 0.28 | 0.93 | XXX | 1/day | Grab |
| Carbonaceous Biochemical Oxygen Demand (CBOD5) | 135.0 | 215.0 Wkly Avg | XXX | 25.0 | 40.0 Wkly Avg | 50 | 1/week | 24-Hr Composite |
| Biochemical Oxygen Demand (BOD5) Raw Sewage Influent | Report | Report | XXX | Report | XXX | XXX | 1/week | 24-Hr Composite |
| Total Suspended Solids Raw Sewage Influent | Report | Report | XXX | Report | XXX | XXX | 1/week | 24-Hr Composite |
| Total Suspended Solids | 160.0 | 240.0 Wkly Avg | XXX | 30.0 | 45.0 Wkly Avg | 60 | 1/week | 24-Hr Composite |
| Fecal Coliform (No/100 ml) Oct 1 - Apr 30 | XXX | XXX | XXX | 2000 Geo Mean | XXX | 10000 | 1/week | Grab |
| Fecal Coliform (No/100 ml) May 1 - Sep 30 | XXX | XXX | XXX | 200 Geo Mean | XXX | 1000 | 1/week | Grab |
| Ammonia-Nitrogen Nov 1 - Apr 30 | 76.0 | XXX | XXX | 14.1 | XXX | 28.2 | 2/week | 24-Hr Composite |
| Ammonia-Nitrogen May 1 - Oct 31 | 29.0 | XXX | XXX | 5.4 | XXX | 10.8 | 2/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 | Daily Maximum | Minimum | Average Monthly | Maximum | Instant. Maximum | | |
| Total Phosphorus | 10.8 | XXX | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS**

I. B. **For Outfall** 001 , **Latitude** 40° 36' 14.83" , **Longitude** 77° 42' 37.87" , **River Mile Index** 15.82 , **Stream Code** 12429

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**Type of Effluent:** Sewage Effluent

1. The permittee is authorized to discharge during the period from September 1, 2016 through August 31, 2021.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

| Parameter | Effluent Limitations | | | | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| | Mass Units (lbs/day) (1) | | Concentrations (mg/L) | | | | Minimum (2) Measurement Frequency | Required Sample Type |
| | Monthly | Annual | Monthly | Monthly Average | Maximum | Instant. Maximum | | |
| Ammonia--N | Report | Report Total Annual | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Kjeldahl--N | Report Total Monthly | XXX | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Nitrate-Nitrite as N | Report Total Monthly | XXX | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Total Nitrogen | Report Total Monthly | Report Total Annual | XXX | Report | XXX | XXX | 1/month | Calculation |
| Total Phosphorus | Report | Report Total Annual | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Net Total Nitrogen# | Report | 11,872.0 Total Annual | XXX | XXX | XXX | XXX | 1/month | Calculation |
| Net Total Phosphorus# | Report | 1583.0 Total Annual | XXX | XXX | XXX | XXX | 1/month | Calculation |

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Outfall 001.

Footnotes:
(1) See Part C for Chesapeake Bay Requirements.
(2) This is the minimum number of sampling events required. Permittees are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events required.
(3) The permittee is authorized to use 425 lbs/year as Total Nitrogen (TN) Offsets toward compliance with the Annual Net TN mass load limitations (Cap Loads), in accordance with Part C of this permit. These Offsets may be applied throughout the Compliance Year or during the Truing Period. The application of offsets must be reported to DEP as described in Part C. The Offsets are authorized for the following pollutant load reduction activities: Connection of 17 on-lot sewage disposal systems to the public sewer system after November 15, 2010, in which 25 lbs/year of TN offsets are granted per connection.

## 3.0 Facility NPDES Compliance History

### 3.1 Summary of Inspections

A summary of the most recent inspections during the existing permit review cycle is as follows.

The DEP inspector noted the following during the inspection.

11/22/2016: There was nothing significant to report.

02/13/2018:

- Many of the new treatment units are in place but not in service. New SBRs, blower units, UV lights, and chemical feed system have been installed.
- Two sump pumps are being used to remove groundwater from excavation sites.
- Once new plant is online, the aeration tanks, clarifiers, headworks, chlorine contact tank, and control building will be demolished.

More recent inspection reports were not available in the DEP electronic WMS computer system. DEP operations section has been contacted to perform inspection or upload inspection report to WMS.

### 3.2 Summary of DMR Data

A review of approximately 1-year of DMR data shows that the monthly average flow data for the facility below the design capacity of the treatment system. The maximum average flow data for the DMR reviewed was 0.28 MGD in September 2021. The hydraulic design capacity of the treatment system is 0.65 MGD.

The off-site laboratory used for the analysis of the parameters was Fairway Laboratories, Inc. located at 2019 9th Avenue, Altoona, PA 16602.

**DMR Data for Outfall 001 (from January 1, 2021 to December 31, 2021)**

| Parameter | DEC-21 | NOV-21 | OCT-21 | SEP-21 | AUG-21 | JUL-21 | JUN-21 | MAY-21 | APR-21 | MAR-21 | FEB-21 | JAN-21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow (MGD) Average Monthly | 0.124 | 0.149 | 0.159 | 0.28 | 0.143 | 0.127 | 0.126 | 0.113 | 0.122 | 0.143 | 0.122 | 0.125 |
| Flow (MGD) Daily Maximum | 0.189 | 0.314 | 0.212 | 0.457 | 0.676 | 0.157 | 0.195 | 0.139 | 0.166 | 0.224 | 0.224 | 0.164 |
| pH (S.U.) Minimum | 7.11 | 6.81 | 7.16 | 6.96 | 7.18 | 7.38 | 7.36 | 7.09 | 7.07 | 7.27 | 7.13 | 6.39 |
| pH (S.U.) Maximum | 7.56 | 7.48 | 7.88 | 8.06 | 7.83 | 7.91 | 7.73 | 7.75 | 7.67 | 7.64 | 7.63 | 7.72 |
| DO (mg/L) Minimum | 8.8 | 8.7 | 8.22 | 5.24 | 6.88 | 6.85 | 7.63 | 8.25 | 8.01 | 8.36 | 7.62 | 10.56 |
| TRC (mg/L) Average Monthly | 0.21 | 0.23 | 0.19 | 0.20 | 0.13 | 0.11 | 0.10 | 0.07 | 0.10 | 0.13 | 0.20 | 0.16 |
| TRC (mg/L) Maximum | 0.37 | 0.45 | 0.28 | 0.34 | 0.44 | 0.27 | 0.22 | 0.25 | 0.33 | 0.33 | 0.35 | 0.53 |
| CBOD5 (lbs/day) Average Monthly | < 4.2 | < 3.3 | < 3.8 | 12.1 | < 4.6 | < 3.2 | 0.1 | 3.1 | 3.27 | 3.42 | < 3.8 | 3.03 |
| CBOD5 (lbs/day) Weekly Average | < 7.1 | < 3.4 | < 3.8 | 12.1 | 9.0 | < 3.9 | 0.1 | 4.0 | 3.27 | 3.42 | 5.1 | 3.03 |
| CBOD5 (mg/L) Average Monthly | < 4.1 | < 3.0 | < 3.0 | < 3.8 | < 3.9 | < 3.0 | 3.0 | < 3.3 | 4.69 | 3.0 | < 4.2 | < 3.0 |
| CBOD5 (mg/L) Weekly Average | < 7.0 | < 3.0 | < 3.0 | < 3.8 | 8.0 | < 3.0 | 3.0 | < 3.3 | 4.69 | 3.0 | 6.0 | < 3.0 |
| BOD5 (lbs/day) Raw Sewage Influent Average Monthly | 262 | 332 | 226 | 198 | 385 | 482 | 267 | 313 | 348 | 285 | 307 | 278 |
| BOD5 (lbs/day) Raw Sewage Influent Daily Maximum | 321 | 618 | 253 | 237 | 453 | 1045 | 397 | 367 | 387 | 343 | 424 | 310 |
| BOD5 (mg/L) Raw Sewage Influent Average Monthly | 271 | 247 | 185 | 116 | 334 | 402 | 271 | 317 | 348 | 264 | 342 | 295 |
| TSS (lbs/day) Average Monthly | 2.2 | < 2.5 | < 2.2 | 10.2 | < 1.6 | < 4.6 | 2.7 | < 3.8 | 2.81 | 9.4 | < 3.8 | 2.88 |
| TSS (lbs/day) Raw Sewage Influent Average Monthly | 201 | 135 | 77 | 112 | 208 | 291 | 170 | 295 | 173 | 190 | 201 | 120 |
| TSS (lbs/day) Raw Sewage Influent Daily Maximum | 290 | 246 | 91 | 185 | 342 | 568 | 336 | 532 | 224 | 353 | 381 | 138 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TSS (lbs/day)<br>Weekly Average | 2.7 | < 3.4 | < 2.2 | 10.2 | < 1.9 | 8.8 | 2.7 | < 3.8 | 2.81 | 28.0 | 6.3 | 2.88 |
| TSS (mg/L)<br>Average Monthly | 2.2 | < 2.3 | < 1.4 | < 3.0 | < 1.3 | < 4.2 | 2.7 | < 3.9 | 2.90 | 9.0 | < 4.0 | 2.80 |
| TSS (mg/L)<br>Raw Sewage Influent<br>Average Monthly | 207 | 99 | 63 | 60 | 182 | 246 | 172 | 290 | 172 | 179 | 222 | 127 |
| TSS (mg/L)<br>Weekly Average | 3.0 | < 3.0 | < 1.4 | < 3.0 | < 2.0 | 7.00 | 2.7 | < 3.9 | 2.90 | 9.04 | 6.0 | 2.80 |
| Fecal Coliform<br>(No./100 ml)<br>Geometric Mean | 402 | 235 | 62 | < 50 | 93 | < 32 | 45 | < 51 | 22 | 9.0 | < 6.0 | < 4.0 |
| Fecal Coliform<br>(No./100 ml)<br>Instantaneous<br>Maximum | 1565 | 1553 | 593 | 780 | 1302 | 125.2 | 533 | 226 | 38.4 | 16.4 | 8.0 | 4 |
| Nitrate-Nitrite (mg/L)<br>Average Monthly | < 1.28 | < 1.23 | < 45.9 | < 1.2 | < 1.2 | < 1.2 | < 1.2 | < 1.2 | < 0.118 | < 1.2 | 1.165 | 1.36 |
| Nitrate-Nitrite (lbs)<br>Total Monthly | < 49.5 | < 47.7 | < 45.38 | < 83.7 | < 44.56 | 40.47 | 36.99 | 35.03 | 3.77 | 50.43 | 32 | 42.11 |
| Total Nitrogen (mg/L)<br>Average Monthly | < 4.31 | < 2.27 | < 1.93 | < 2.087 | < 1.73 | 2.15 | < 1.7 | 1.84 | < 1.200 | 2.19 | 2.59 | 1.88 |
| Total Nitrogen (lbs)<br>Effluent Net<br>Total Monthly | < 152.93 | 85.53 | < 73 | < 149.4 | < 63.98 | 67.17 | 52.42 | 50.14 | 55.21 | 93.84 | 85.97 | 54.01 |
| Total Nitrogen (lbs)<br>Total Monthly | < 152.93 | < 83.9 | < 73 | < 149.4 | < 63.98 | 67.17 | 52.42 | 50.14 | 55.21 | 93.84 | 85.97 | 54.01 |
| Total Nitrogen (lbs)<br>Effluent Net<br>Total Annual | | | | < 968.0 | | | | | | | | |
| Total Nitrogen (lbs)<br>Total Annual | | | | < 968 | | | | | | | | |
| Ammonia (lbs/day)<br>Average Monthly | 3.0 | < 0.30 | < 0.100 | < 0.100 | < 0.1 | < 0.100 | 0.100 | < 0.20 | 0.122 | 0.180 | 1.269 | 0.223 |
| Ammonia (mg/L)<br>Average Monthly | 2.16 | < 0.26 | < 0.1 | < 0.104 | < 0.118 | < 0.113 | < 0.1 | < 0.163 | 0.258 | 0.166 | 1.208 | 0.553 |
| Ammonia (lbs)<br>Total Monthly | 81 | < 9.0 | < 4.0 | < 7.2 | < 4.19 | < 4.0 | 3.10 | < 5.0 | 3.77 | 5.57 | 39.33 | 6.90 |
| Ammonia (lbs)<br>Total Annual | | | | < 84 | | | | | | | | |
| TKN (mg/L)<br>Average Monthly | < 3.0 | < 1.04 | < 0.731 | < 0.887 | < 0.53 | 2.24 | < 0.5 | 0.64 | < 0.500 | 1.38 | 1.42 | 0.81 |
| TKN (lbs)<br>Total Monthly | < 112.26 | < 37.54 | < 27.1 | < 65.7 | < 19.41 | 23.30 | 15.40 | 15.08 | 16.33 | 45.25 | 45.54 | 20.58 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorus (lbs/day) Average Monthly | 0.1 | 0.17 | 4.0 | 1.04 | 0.43 | 0.7 | 0.15 | 0.1 | 0.31 | 0.25 | 0.10 | 0.09 |
| Total Phosphorus (mg/L) Average Monthly | 0.129 | 0.13 | < 0.465 | 0.4711 | 0.36 | 0.632 | 0.15 | 0.107 | 0.44 | 0.20 | 0.11 | 0.08 |
| Total Phosphorus (lbs) Effluent Net Total Monthly | 4.4 | 5.38 | 4 | 33.2 | 13.47 | 21.1 | 4.55 | 3.1 | 9.66 | 7.60 | 3.24 | 2.94 |
| Total Phosphorus (lbs) Total Monthly | 4.4 | 5.38 | 4 | 33.2 | 13.47 | 21.1 | 4.55 | 3.1 | 9.66 | 7.60 | 3.24 | 2.94 |
| Total Phosphorus (lbs) Effluent Net Total Annual | | | | 276 | | | | | | | | |
| Total Phosphorus (lbs) Total Annual | | | | 276 | | | | | | | | |

### 3.2.1 Chesapeake Bay Truing

The table summarizes the facility's compliance with Chesapeake Bay cap loads.

| Chesapeake Bay Annual Nutrient Summary<br>Union Township MA<br>PA0024708 | | | | |
|---|---|---|---|---|
| Year for Truing Period (Oct 1 - Nov 28) | Net Effluent Limits | | Compliant with Permit Limits (Yes/No) | |
| | Nitrogen (lbs) | Phosphorus (lbs) | Nitrogen | Phosphorus |
| | ***11,872*** | ***1,583*** | | |
| 2019 | 1,083 | 515 | Yes | Yes |
| 2020 | 968 | 276 | Yes | Yes |

### 3.3 Non-Compliance

### 3.3.1 Non-Compliance- NPDES Effluent

A summary of the non-compliance to the permit limits for the existing permit cycle is as follows.

From the DMR data beginning in September 1, 2016 to March 11, 2022, the following were observed non-compliance with NPDES permit.

**Summary of Non-Compliance with NPDES Permit Limits**
**Beginning September 1, 2016 and Ending March 11, 2022**

| NON_COMPLIANCE_DATE | NON_COMPL_TYPE_DESC | NON_COMPL_CATEGORY_DESC | PARAMETER | SAMPLE_VALUE | VIOLATION_CONDITION | PERMIT_VALUE | UNIT_OF_MEASURE | STAT_BASE_CODE |
|---|---|---|---|---|---|---|---|---|
| 1/30/2017 | Late DMR Submission | Other Violations | | | | | | |
| 5/30/2017 | Late DMR Submission | Other Violations | | | | | | |
| 6/19/2017 | Violation of permit condition | Effluent | Ammonia-Nitrogen | 5.656 | > | 5.4 | mg/L | Average Monthly |
| 8/22/2017 | Violation of permit condition | Effluent | Fecal Coliform | 447 | > | 200 | No./100 ml | Geometric Mean |
| 5/29/2018 | Late DMR Submission | Other Violations | | | | | | |
| 5/28/2020 | Violation of permit condition | Effluent | Total Phosphorus | 13.4 | > | 10.8 | lbs/day | Average Monthly |
| 5/28/2020 | Violation of permit condition | Effluent | Total Suspended Soli | 34 | > | 30 | mg/L | Average Monthly |
| 8/28/2020 | Violation of permit condition | Effluent | Fecal Coliform | 1194.8 | > | 1000 | No./100 ml | Instantaneous Maximum |
| 9/25/2020 | Violation of permit condition | Effluent | Fecal Coliform | 204 | > | 200 | No./100 ml | Geometric Mean |
| 3/30/2021 | Late DMR Submission | Other Violations | | | | | | |
| 9/30/2021 | Late DMR Submission | Other Violations | | | | | | |
| 9/30/2021 | Violation of permit condition | Effluent | Fecal Coliform | 1302 | > | 1000 | No./100 ml | Instantaneous Maximum |

### 3.3.2 Non-Compliance- Enforcement Actions

A summary of the non-compliance enforcement actions for the current permit cycle is as follows:

Beginning in September 1, 2016 to March 11, 2022, there were no observed enforcement actions.

### 3.4 Summary of Biosolids Disposal

A summary of the biosolids disposed of from the facility is as follows.

**2021**

**Sewage Sludge / Biosolids Production Information**

| | Hauled Off-Site | | | | | |
|---|---|---|---|---|---|---|
| 2021 | Gallons | % Solids | Dry Tons | Tons Dewatered | % Solids | Dry Tons |
| January | | | | | | |
| February | | | | | | |
| March | | | | | | |
| April | | | | | | |
| May | | | | 1,223.32 | 79.11 | 970.98 |
| June | 52,000 | 1.2 | 2.602 | | | |
| July | 84,500 | 1.3 | 4.58 | | | |
| August | 45,500 | 1.35 | 2.575 | | | |
| September | 26,000 | 1.6 | 1.735 | | | |
| October | | | | | | |
| November | 26,000 | 1.4 | 1.518 | | | |
| December[1] | 26,000 | 1.4 | 1.518 | | | |

Notes:

Sewage sludge disposed at Kelly Township in Union County as digester sludge

Sewage sludge disposed at Mifflin Township in Union County as digester sludge

1 - Date for December 2022 is suspect. Facility submitted supplemental forms using November 2021 as December 2021

### 3.5 Open Violations

No open violations existed as of March 2022.

### 4.0 Receiving Waters and Water Supply Information Detail Summary

### 4.1 Receiving Waters

The receiving waters has been determined to be Kishacoquillas Creek. The sequence of receiving streams that the Kishacoquillas Creek discharges into are Juniata River and the Susquehanna River which eventually drains into the Chesapeake Bay.

### 4.2 Public Water Supply (PWS) Intake

The closest PWS to the subject facility is Mifflintown MA (PWS ID # 4340008) located approximately 25 miles downstream of the subject facility on the Juniata River. Based upon the distance and the flow rate of the facility, the PWS should not be impacted.

### 4.3 Class A Wild Trout Streams

Class A Wild Trout Streams are waters that support a population of naturally produced trout of sufficient size and abundance to support long-term and rewarding sport fishery. DEP classifies these waters as high-quality coldwater fisheries.

The information obtained from EMAP suggests that no Class A Wild Trout Fishery will be impacted by this discharge.

**4.4 2022 Integrated List of All Waters (303d Listed Streams)**

Section 303(d) of the Clean Water Act requires States to list all impaired surface waters not supporting uses even after appropriate and required water pollution control technologies have been applied. The 303(d) list includes the reason for impairment which may be one or more point sources (i.e. industrial or sewage discharges) or non-point sources (i.e. abandoned mine lands or agricultural runoff and the pollutant causing the impairment such as metals, pH, mercury or siltation).

States or the U.S. Environmental Protection Agency (EPA) must determine the conditions that would return the water to a condition that meets water quality standards. As a follow-up to listing, the state or EPA must develop a Total Maximum Daily Load (TMDL) for each waterbody on the list. A TMDL identifies allowable pollutant loads to a waterbody from both point and non-point sources that will prevent a violation of water quality standards. A TMDL also includes a margin of safety to ensure protection of the water.

The water quality status of Pennsylvania's waters uses a five-part categorization (lists) of waters per their attainment use status. The categories represent varying levels of attainment, ranging from Category 1, where all designated water uses are met to Category 5 where impairment by pollutants requires a TMDL for water quality protection.

**The Kishacoquillas Creek is a Category 4c and 5alt stream listed in the 2022 Integrated List of All Waters (formerly 303d Listed Streams). This stream is an impaired stream for aquatic life due to flow regime modification from urban runoff/storm sewers and the stream is also impaired for aquatic life due to siltation from agriculture. The designated use has been classified as protected waters for cold water fishes (CWF) and migratory fishes (MF).**

**4.5 Low Flow Stream Conditions**

Water quality modeling estimates are based upon conservative data inputs. The data are typically estimated using either a stream gauge or through USGS web based StreamStats program. The NPDES effluent limits are based upon the combined flows from both the stream and the facility discharge.

A conservative approach to estimate the impact of the facility discharge using values which minimize the total combined volume of the stream and the facility discharge. The volumetric flow rate for the stream is based upon the seven-day, 10-year low flow (Q710) which is the lowest estimated flow rate of the stream during a 7 consecutive day period that occurs once in 10 -year time period. The facility discharge is based upon a known design capacity of the subject facility.

The closest WQN station to the subject facility is the Kishacoquillas Creek station (WQN282). This WQN station is located approximately 10 miles downstream of the subject facility.

The closest gauge station to the subject facility is the Kishacoquillas Creek at Reedsville, PA (USGS station number 1565000). This gauge station is located approximately 10 miles downstream of the subject facility.

For WQM modeling, pH and stream water temperature data from the water quality network station was used. pH was estimated to be 8.4 and the stream water temperature was estimated to be 16 C.

The hardness of the stream was estimated from the water quality network to be 133 mg/l $CaCO_3$.

The low flow yield and the Q710 for the subject facility was estimated as shown below.

| Gauge Station Data | | | |
|---|---|---|---|
| USGS Station Number | 1565000 | | |
| Station Name | Kishacoquillas Creek at Reedsville, PA | | |
| Q710 | 18.6 | $ft^3/sec$ | |
| Drainage Area (DA) | 164 | $mi^2$ | |
| | | | |
| ***Calculations*** | | | |
| The low flow yield of the gauge station is: | | | |
| Low Flow Yield (LFY) = Q710 / DA | | | |
| LFY = | ( 18.6 $ft^3/sec$ / 164 $mi^2$) | | |
| LFY = | 0.1134 | $ft^3/sec/mi^2$ | |
| | | | |
| The low flow at the subject site is based upon the DA of | | 30.1 | $mi^2$ |
| | | | |
| Q710 = (LFY@gauge station)(DA@Subject Site) | | | |
| Q710 = (0.1134 $ft^3/sec/mi^2$)(30.1 $mi^2$) | | | |
| Q710 = | 3.414 | $ft^3/sec$ | |

## 4.6 Summary of Discharge, Receiving Waters and Water Supply Information

| | | | |
|---|---|---|---|
| Outfall No. | 001 | Design Flow (MGD) | .65 |
| Latitude | 40º 36' 14.38" | Longitude | -77º 42' 37.67" |
| Quad Name | | Quad Code | |
| Wastewater Description: | Sewage Effluent | | |

| | | | |
|---|---|---|---|
| Receiving Waters | Kishacoquillas Creek (CWF) | Stream Code | 12429 |
| NHD Com ID | 66205577 | RMI | 15.3 |
| Drainage Area | 30.1 | Yield (cfs/mi$^2$) | 0.1134 |
| $Q_{7-10}$ Flow (cfs) | 3.414 | $Q_{7-10}$ Basis | StreamStats/StreamGauge |
| Elevation (ft) | 768 | Slope (ft/ft) | |
| Watershed No. | 12-A | Chapter 93 Class. | CWF, MF |
| Existing Use | Same as Chapter 93 class | Existing Use Qualifier | |
| Exceptions to Use | | Exceptions to Criteria | |
| Assessment Status | Impaired | | |
| Cause(s) of Impairment | FLOW REGIME MODIFICATION, SILTATION | | |
| Source(s) of Impairment | AGRICULTURE, URBAN RUNOFF/STORM SEWERS | | |
| TMDL Status | Final | Name | Kishacoquillas Creek Watershed alternative restoration plan |

| Background/Ambient Data | | Data Source |
|---|---|---|
| pH (SU) | 8.4 | WQN282; median July to Sept |
| Temperature (°C) | 16 | WQN282; median July to Sept |
| Hardness (mg/L) | 133 | WQN282; historical median |
| Other: | | |

| | | | |
|---|---|---|---|
| Nearest Downstream Public Water Supply Intake | Mifflintown MA | | |
| PWS Waters | Juniata River | Flow at Intake (cfs) | |
| PWS RMI | 37 | Distance from Outfall (mi) | 25 |

## 5.0: Overview of Presiding Water Quality Standards

### 5.1 General

There are at least six (6) different policies which determines the effluent performance limits for the NPDES permit. The policies are technology based effluent limits (TBEL), water quality based effluent limits (WQBEL), antidegradation, total maximum daily loading (TMDL), anti-backsliding, and whole effluent toxicity (WET) The effluent performance limitations enforced are the selected permit limits that is most protective to the designated use of the receiving waters. An overview of each of the policies that are applicable to the subject facility has been presented in Section 6.

### 5.2.1 Technology-Based Limitations

TBEL treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act (40 CFR 125.3). Available TBEL requirements for the state of Pennsylvania are itemized in PA Code 25, Chapter 92a.47.

The presiding sources for the basis for the effluent limitations are governed by either federal or state regulation. The reference sources for each of the parameters is itemized in the tables. The following technology-based limitations apply, subject to water quality analysis and best professional judgement (BPJ) where applicable:

| Parameter | 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) |

### 5.2.2 Mass Based Limits

For publicly owned treatment works (POTW), mass loadings are calculated based upon design flow rate of the facility and the permit limit concentration. The generalized calculation for mass loadings is shown below:

$$Quantity\left(\frac{lb}{day}\right) = (MGD)(Concentration)(8.34)$$

### 5.3 Water Quality-Based Limitations

WQBEL are based on the need to attain or maintain the water quality criteria and to assure protection of designated and existing uses (PA Code 25, Chapter 92a.2). The subject facility that is typically enforced is the more stringent limit of either the TBEL or the WQBEL.

Determination of WQBEL is calculated by spreadsheet analysis or by a computer modeling program developed by DEP. DEP permit engineers utilize the following computing programs for WQBEL permit limitations: (1) MS Excel worksheet for Total Residual Chorine (TRC); (2) WQM 7.0 for Windows Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen Version 1.1 (WQM Model) and (3) Toxics using DEP Toxics Management Spreadsheet for Toxics pollutants.

The modeling point nodes utilized for this facility are summarized below.

| ***General Data 1 (Modeling Point #1)*** | ***Input Value*** | ***Units*** |
|---|---|---|
| Stream Code | 12429 | |
| River Mile Index | 15.3 | miles |
| Elevation | 768 | feet |
| Latitude | 40.604119 | |
| Longitude | -77.710519 | |
| Drainage Area | 30.1 | sq miles |
| Low Flow Yield | 0.1134 | cfs/sq mile |
| | | |
| ***General Data 2 (Modeling Point #2)*** | ***Input Value*** | ***Units*** |
| Stream Code | 12429 | |
| River Mile Index | 13.39 | miles |
| Elevation | 740 | feet |
| Latitude | 40.60596 | |
| Longitude | -77.688353 | |
| Drainage Area | 34.6 | sq miles |
| Low Flow Yield | 0.1134 | cfs/sq mile |

**5.3.1 Water Quality Modeling 7.0**

The WQM Model is a computer model that is used to determine NPDES discharge effluent limitations for Carbonaceous BOD (CBOD5), Ammonia Nitrogen (NH3-N), and Dissolved Oxygen (DO) for single and multiple point source discharges scenarios. WQM Model is a complete-mix model which means that the discharge flow and the stream flow are assumed to instantly and completely mixed at the discharge node.

WQM recommends effluent limits for DO, CBOD5, and $NH_3$-N in mg/l for the discharge(s) in the simulation.

Four types of limits may be recommended. The limits are

*(a)* a *minimum concentration for DO in the discharge as 30-day average;*
*(b) a 30-day average concentration for CBOD5 in the discharge;*
*(c) a 30-day average concentration for the $NH_3$-N in the discharge;*
(d) *24-hour average concentration for $NH_3$-N in the discharge*.

The WQM Model requires several input values for calculating output values. The source of data originates from either EMAP, the National Map, or Stream Stats. Data for stream gauge information, if any, was abstracted from USGS Low-Flow, Base-Flow, and Mean-Flow Regression Equations for Pennsylvania Streams authored by Marla H. Stuckey (Scientific Investigations Report 2006-5130).

**The applicable WQM Effluent Limit Type are discussed in Section 6 under the corresponding parameter which is either DO, CBOD, or ammonia-nitrogen.**

**5.3.2 Toxics Modeling**

The Toxics Management Spreadsheet model is a computer model that is used to determine effluent limitations for toxics (and other substances) for single discharge wasteload allocations. This computer model uses a mass-balance water quality analysis that includes consideration for mixing, first-order decay, and other factors used to determine recommended water quality-based effluent limits. Toxics Management Spreadsheet does not assume that all discharges completely mix with the stream. The point of compliance with water quality criteria are established using criteria compliance times (CCTs). The available CCTs are either acute fish criterion (AFC), chronic fish criterion (CFC), or human health criteria (THH & CRL).

**Acute Fish Criterion (AFC)** measures the criteria compliance time as either the maximum criteria compliance time (i.e.15 minutes travel time downstream of the current discharge) or the complete mix time whichever comes first. AFC is evaluated at Q710 conditions.

**Chronic Fish Criterion (CFC)** measures the criteria compliance time as either the maximum criteria compliance time (i.e. 12 hours travel time downstream of the current discharge) or the complete mix time whichever comes first. CFC is evaluated at Q710 conditions.

**Threshold Human Health (THH)** measures the criteria compliance time as either the maximum criteria compliance time (i.e. 12 hours travel time downstream of the current discharge) or the estimated travel time downstream to the nearest potable water supply intake whichever comes first. THH is evaluated at Q710 conditions.

**Cancer Risk Level (CRL)** measures the criteria compliance time as either the maximum criteria compliance time (i.e. 12 hours travel time downstream of the current discharge) or the complete mix time whichever comes first. CRL is evaluated at Qh (harmonic mean or normal flow) conditions.

The Toxics Model requires several input values for calculating output values. The source of data originates from either EMAP, the National Map, or Stream Stats. Data for stream gauge information, if any, was abstracted from USGS Low-Flow, Base-Flow, and Mean-Flow Regression Equations for Pennsylvania Streams authored by Marla H. Stuckey (Scientific Investigations Report 2006-5130).

#### 5.3.2.1 Determining if NPDES Permit Will Require Monitoring/Limits in the Proposed Permit for Toxic Pollutants

To determine if Toxics modeling is necessary, DEP has developed a Toxics Management Spreadsheet to identify toxics of concern. Toxic pollutants whose maximum concentrations as reported in the permit application or on DMRs are greater than the most stringent applicable water quality criterion are pollutants of concern. A Reasonable Potential Analysis was utilized to determine (a) if the toxic parameters modeled would require monitoring or (b) if permit limitations would be required for the parameters. The toxics reviewed for reasonable potential were the following pollutants: TDS, chloride, bromide, sulfate, total copper, total lead, and total zinc.

Based upon the SOP- Establishing Water Quality-Based Effluent Limitations (WQBELs) and Permit Conditions for Toxic Pollutants (Revised January 10, 2019), monitoring and/or limits will be established as follows.

(a) When reasonable potential is demonstrated, establish limits where the maximum reported concentration equals or exceeds 50% of the WQBEL.
(b) For non-conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 25% - 50% of the WQBEL.
(c) For conservative pollutants, establish monitoring requirements where the maximum reported concentration is between 10% - 50% of the WQBEL.

**Applicable monitoring or permit limits for toxics are summarized in Section 6.**

**The Toxics Management Spreadsheet output has been included in Attachment B.**

### 5.3.3 Whole Effluent Toxicity (WET)

The facility is not subject to WET.

## 5.4 Total Maximum Daily Loading (TMDL)

### 5.4.1 TMDL

The goal of the Clean Water Act (CWA), which governs water pollution, is to ensure that all of the Nation's waters are clean and healthy enough to support aquatic life and recreation. To achieve this goal, the CWA created programs designed to regulate and reduce the amount of pollution entering United States waters. Section 303(d) of the CWA requires states to assess their waterbodies to identify those not meeting water quality standards. If a waterbody is not meeting standards, it is listed as impaired and reported to the U.S. Environmental Protection Agency. The state then develops a plan to clean up

the impaired waterbody. This plan includes the development of a Total Maximum Daily Load (TMDL) for the pollutant(s) that were found to be the cause of the water quality violations. A Total Maximum Daily Load (TMDL) calculates the maximum amount of a specific pollutant that a waterbody can receive and still meet water quality standards.

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

$$TMDL = \Sigma WLAs + \Sigma LAs + MOS$$

Pennsylvania has committed to restoring all impaired waters by developing TMDLs and TMDL alternatives for all impaired waterbodies. The TMDL serves as the starting point or planning tool for restoring water quality.

**5.4.1.1 Local TMDL/Alternative Resoration PLan**

The subject facility discharges into a local TMDL/Alternative Restoration Plan called the Kishacoquillas Creek Watershed alternative restoration plan.

Kishacoquillas Creek is a tributary of the Juniata River in Mifflin County, North Central Pennsylvania (PA). Seven impaired subwatersheds within the greater Kishacoquillas Watershed have been identified for restoration. A phased approach to restoration was developed for all of the impaired subwatersheds and will be implemented by the Mifflin County Conservation District as they have a successful history of restoring their local water quality.

This Alternative Restoration Plan (ARP) established load reductions needed from specific sources in the impaired subwatersheds

There is one permitted discharge in the Upper Kishacoquillas Creek Subwatershed that has effluent limits. The total annual allowable total phosphorus (TP) for the Union Township Sewage Treatment Plant, NPDES permit number PA0024708 is 1,583 pounds per year (daily allowable load calculated based on Chesapeake Bay TMDL). This point source is not responsible for the phosphorus impairment in the watershed as it is located at the bottom of the watershed with no influence on any of the phosphorus impairments in the watershed. Then 1.13 miles below the Union Township STP discharge, the Upper Kishacoquillas empties to the mainstem Kishacoquillas which meets water quality standards until its confluence with the Juniata River. Therefore, this ARP will hold the Union Township STP to the cap load issued in the Chesapeake Bay TMDL, but will recommend a biological assessment point and monitoring of the 1.13 mile impaired stretch of the Upper Kishacoquillas Creek Subwatershed be conducted in the future.

On April 30, 2011, the Total Maximum Daily Load was developed to provide a full picture of and solution to water quality problems identified in the Kishacoquillas Creek Subwatershed. Once the Kishacoquillas Creek Subwatershed TMDL is finalized, the Department may reopen the permit to reflect the allocated Total Suspended Solids and Phosphorus loading addressed in the TMDL.

**5.4.1.2 Chesapeake Bay TMDL Requirement**

The Chesapeake Bay Watershed is a large ecosystem that encompasses approximately 64,000 square miles in Maryland, Delaware, Virginia, West Virginia, Pennsylvania, New York and the District of Columbia. An ecosystem is composed of interrelated parts that interact with each other to form a whole. All of the plants and animals in an ecosystem depend on each other in some way. Every living thing needs a healthy ecosystem to survive. Human activities affect the Chesapeake Bay ecosystem by adding pollution, using resources and changing the character of the land.

Most of the Chesapeake Bay and many of its tidal tributaries have been listed as impaired under Section 303(d) of the federal Water Pollution Control Act (“Clean Water Act”), 33 U.S.C. § 1313(d). While the Chesapeake Bay is outside the boundaries of Pennsylvania, more than half of the State lies within the watershed. Two major rivers in Pennsylvania are part of the Chesapeake Bay Watershed. They are (a) the Susquehanna River and (b) the Potomac River. These two rivers total 40 percent of the entire Chesapeake Bay watershed.

The overall management approach needed for reducing nitrogen, phosphorus and sediment are provided in the Bay TMDL document and the Phase I, II, and III WIPs which is described in the Bay TMDL document and Executive Order 13508.

The Bay TMDL is a comprehensive pollution reduction effort in the Chesapeake Bay watershed identifying the necessary pollution reductions of nitrogen, phosphorus and sediment across the seven Bay watershed jurisdictions of Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia and the District of Columbia to meet applicable water quality standards in the Bay and its tidal waters.

The Watershed Implementation Plans (WIPs) provides objectives for how the jurisdictions in partnership with federal and local governments will achieve the Bay TMDL's nutrient and sediment allocations.

Phase 3 WIP provides an update on Chesapeake Bay TMDL implementation activities for point sources and DEP's current implementation strategy for wastewater. The latest revision of the supplement was September 13, 2021.

The Chesapeake Bay TMDL (Appendix Q) categorizes point sources into four sectors:

- Sector A- significant sewage dischargers;
- Sector B- significant industrial waste (IW) dischargers;
- Sector C- non-significant dischargers (both sewage and IW facilities); and
- Sector D- combined sewer overflows (CSOs).

All sectors contain a listing of individual facilities with NPDES permits that were believed to be discharging at the time the TMDL was published (2010). All sectors with the exception of the non-significant dischargers have individual wasteload allocations (WLAs) for TN and TP assigned to specific facilities. Non-significant dischargers have a bulk or aggregate allocation for TN and TP based on the facilities in that sector that were believed to be discharging at that time and their estimated nutrient loads.

Cap Loads will be established in permits as Net Annual TN and TP loads (lbs/yr) that apply during the period of October 1 – September 30. For facilities that have received Cap Loads in any other form, the Cap Loads will be modified accordingly when the permits are renewed.

Offsets have been incorporated into Cap Loads in several permits issued to date. From this point forward, permits will be issued with the WLAs as Cap Loads and will identify Offsets separately to facilitate nutrient trading activities and compliance with the TMDL.

**Based upon the supplement the subject facility has been categorized as a Sector A discharger. The supplement defines Sector A as a sewage facility is considered significant if it has a design flow of at least 0.4 MGD.**

Table 5 of the Phase 3 WIP (revised September 13, 2021) presents all NPDES permits for Significant Sewage dischargers with Cap Loads. The NPDES Permit No., phase, facility name, latest permit issuance date, expiration date, Cap Load compliance start date, TN and TP Cap Loads, and TN and TP Delivery Ratios are presented. In addition, if TN Offsets were incorporated into the TN Cap Loads when the permit was issued, the amount is shown; these Offsets will be removed from Cap Loads upon issuance of renewed permits to implement Section IV of this document (i.e., a facility may use Offsets for compliance but may not register them as credits).

The total nitrogen (TN) and total phosphorus (TP) cap loads itemized by Table 5 for the subject facility are as follows:

| | |
|---|---|
| TN Cap Load (lbs/yr) | 11,872 |
| TN Delivery Ratio | 0.88 |
| TP Cap Load (lbs/yr) | 1,583 |
| TP Delivery Ratio | 0.436 |

Expansions by any Significant Sewage discharger will not result in any increase in Cap Loads. Where non-significant facilities expand to a design flow of 0.4 MGD or greater, the lesser of baseline Cap Loads of 7,306 lbs/yr TN and 974 lbs/yr TP or existing performance will be used for permits, and the load will be moved from the Non-Significant sector load to the Significant Sewage sector load. If considered necessary for environmental protection, DEP may decide to move load from the Point Source Reserve to the Significant Sewage sector in the future.

The minimum monitoring frequency for TN species and TP in new or renewed NPDES permits for Significant Sewage dischargers is 2/week.

**This facility is subject to Sector A monitoring requirements. Monitoring for nitrogen species and phosphorus shall be required at least 2x/wk**

*Reporting*

Cap Loads will be established in permits as Net Annual TN and TP loads (lbs/yr) that apply during the period of October 1 – September 30.

Facilities with NPDES permits must use DEP's eDMR system for reporting, except small flow treatment facilities. An Annual DMR must be submitted by the end of the Truing Period, November 28. As attachments to the Annual DMR a facility must submit a completed Annual Chesapeake Bay Spreadsheet, available through DEP's Supplemental Reports website, which contains an Annual Nutrient Monitoring worksheet and an Annual Nutrient Budget worksheet. This Spreadsheet will be submitted once per Compliance Year only, and reflect all nutrient sample results (for the period October 1 – September 30), Credit transactions (including the Truing Period) and Offsets applied during the Compliance Year.

## 5.5 Anti-Degradation Requirement

Chapter 93.4a of the PA regulations requires that surface water of the Commonwealth of Pennsylvania may not be degraded below levels that protect the existing uses. The regulations specifically state that *Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected*. Antidegradation requirements are implemented through DEP's guidance manual entitled Water Quality Antidegradation Implementation Guidance (Document #391-0300-02).

The policy requires DEP to protect the existing uses of all surface waters and the existing quality of High Quality (HQ) and Exceptional Value (EV) Waters. Existing uses are protected when DEP makes a final decision on any permit or approval for an activity that may affect a protected use. Existing uses are protected based upon DEP's evaluation of the best available information (which satisfies DEP protocols and Quality Assurance/Quality Control (QA/QC) procedures) that indicates the protected use of the waterbody.

For a new, additional, or increased point source discharge to an HQ or EV water, the person proposing the discharge is required to utilize a nondischarge alternative that is cost-effective and environmentally sound when compared with the cost of the proposed discharge. If a nondischarge alternative is not cost-effective and environmentally sound, the person must use the best available combination of treatment, pollution prevention, and wastewater reuse technologies and assure that any discharge is nondegrading. In the case of HQ waters, DEP may find that after satisfaction of intergovernmental coordination and public participation requirements lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In addition, DEP will assure that cost-effective and reasonable best management practices for nonpoint source control in HQ and EV waters are achieved.

**The subject facility's discharge will be to a non-special protection waters and the permit conditions are imposed to protect existing instream water quality and uses. Neither HQ waters or EV waters is impacted by this discharge.**

## 5.6 Anti-Backsliding

Anti-backsliding is a federal regulation which prohibits a permit from being renewed, reissued, or modified containing effluent limitations which are less stringent than the comparable effluent limitations in the previous permit (40 CFR 122.l.1 and 40 CFR 122.l.2). A review of the existing permit limitations with the proposed permit limitations confirm that the facility is consistent with anti-backsliding requirements. The facility has proposed effluent limitations that are as stringent as the existing permit.

## 6.0 NPDES Parameter Details

The basis for the proposed sampling and their monitoring frequency that will appear in the permit for each individual parameter are itemized in this Section. The final limits are the more stringent of technology based effluent treatment (TBEL) requirements, water quality based (WQBEL) limits, TMDL, antidegradation, anti-degradation, or WET.

The reader will find in this section:

a) a justification of recommended permit monitoring requirements and limitations for each parameter in the proposed NPDES permit;
b) a summary of changes from the existing NPDES permit to the proposed permit; and
c) a summary of the proposed NPDES effluent limits.

## 6.1 Recommended Monitoring Requirements and Effluent Limitations

A summary of the recommended monitoring requirements and effluent limitations are itemized in the tables. The tables are categorized by (a) Conventional Pollutants and Disinfection, (b) Nitrogen Species and Phosphorus, and (c) Toxics.

## 6.1.1 Conventional Pollutants and Disinfection

**Summary of Proposed NPDES Parameter Details for Conventional Pollutants and Disinfection**
**Union Township MA WWTP; PA0024708**

| Parameter | Permit Limitation Required by[1]: | Recommendation | |
|---|---|---|---|
| **pH (S.U.)** | TBEL | Monitoring: | The monitoring frequency shall be daily as a grab sample (Table 6-3). |
| | | Effluent Limit: | Effluent limits may range from pH = 6.0 to 9.0 |
| | | Rationale: | The monitoring frequency has been assigned in accordance with Table 6-3 and the effluent limits assigned by Chapter 95.2(1). |
| **Dissolved Oxygen** | BPJ | Monitoring: | The monitoring frequency shall be daily as a grab sample (Table 6-3). |
| | | Effluent Limit: | Effluent limits shall be greater than 5.0 mg/l. |
| | | Rationale: | The monitoring frequency has been assigned in accordance with Table 6-3 and the effluent limits assigned by best professional judgement. |
| **CBOD** | TBEL | Monitoring: | The monitoring frequency shall be 1x/week as 24-hr composite sample (Table 6-3). |
| | | Effluent Limit: | Effluent limits shall not exceed 135 lbs/day and 25 mg/l as an average monthly. |
| | | Rationale: | The monitoring frequency has been assigned in accordance with Table 6-3 and the effluent limits assigned by Chapter 92a.47(a)(1). WQM modeling indicates that the TBEL is more stringent than the WQBEL. Thus, the permit limit is confined to TBEL. |
| **TSS** | TBEL | Monitoring: | The monitoring frequency shall be 1x/week as a 24-hr composite sample (Table 6-3). |
| | | Effluent Limit: | Effluent limits shall not exceed 160 lbs/day and 30 mg/l as an average monthly. |
| | | Rationale: | The monitoring frequency has been assigned in accordance with Table 6-3 and the effluent limits assigned by Chapter 92a.47(a)(1). While there is no WQM modeling for this parameter, the permit limit for TSS is generally assigned similar effluent limits as CBOD or BOD. Since the TBEL is more stringent than TBEL, TBEL will apply. |
| **TRC** | WQBEL/Antibacksliding | Monitoring: | The monitoring frequency shall be on a daily basis as a grab sample (Table 6-3). |
| | | Effluent Limit: | The average monthly limit should not exceed 0.28 mg/l and/or 0.93 mg/l as an instantaneous maximum. |
| | | Rationale: Chlorine in both combined (chloramine) and free form is extremely toxic to freshwater fish and other forms of aquatic life (Implementation Guidance Total Residual Chlorine 1). The TRC effluent limitations to be imposed on a discharger shall be the more stringent of either the WQBEL or TBEL requirements and shall be expressed in the NPDES permit as an average monthly and instantaneous maximum effluent concentration (Implementation Guidance Total Residual Chlorine 4).<br>Based on the stream flow rate (lowest 7-day flow rate in 10 years) and the design flow rate of the subject facility calculated by the TRC Evaluation worksheet, the WQBEL is more stringent than the TBEL.<br>The monitoring frequency has been assigned in accordance with Table 6-3. TRC modeling run for this renewal cycle resulted in 0.5 mg/l as an aveage monthly and 1.6 mg/l as an instanteous maximum. These results were less stringent than the previous renewal. The previous renewal calculated drainage area using a planimeter whereas this renewal used StreamStats for drainage area. StreamStats gave a slightly larger drainage area. Consequently the Q710 was larger. Due to antibacksliding provisions, the current permit limit shall continue to the proposed permit. | |
| **Fecal Coliform** | TBEL | Monitoring: | The monitoring frequency shall be 1x/week as a grab sample (Table 6-3). |
| | | Effluent Limit: | Summer effluent limits shall not exceed 200 No./100 mL as a geometric mean. Winter effluent limits shall not exceed 2000 No./100 mL as a geometric mean. |
| | | Rationale: | The monitoring frequency has been assigned in accordance with Table 6-3 and the effluent limits assigned by Chapter 92a.47(a)(4) and 92a.47(a)(5). |
| **E. Coli** | SOP; Chapter 92a.61 | Monitoring: | The monitoring frequency shall be 1x/quarter as a grab sample (SOP). |
| | | Effluent Limit: | No effluent requirements. |
| | | Rationale: | Consistent with the SOP- Establishing Effluent Limitations for Individual Sewage Permits (Revised March 22, 2019) and under the authority of Chapter 92a.61, the facility will be required to monitor for E.Coli. |

**Notes:**

1 The NPDES permit was limited by (a) anti-Backsliding, (b) Anti-Degradation, (c) SOP, (d) TBEL, (e) TMDL, (f) WQBEL, (g) WET, or (h) Other

2 Monitoring frequency based on flow rate of 0.65 MGD.

3 Table 6-3 (Self Monitoring Requirements for Sewage Discharges) in Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits) (Document # 362-0400-001) Revised 10/97

4 Water Quality Antidegradation Implementaton Guidance (Document # 391-0300-002)

5 Chesapeake Bay Phase 3 Watershed Implementation Plan Wastewater Supplement, Revised September 13, 2021

### 6.1.2 Nitrogen Species and Phosphorus

**Summary of Proposed NPDES Parameter Details for Nitrogen Species and Phosphorus**

**Union Township MA WWTP; PA0024708**

| Parameter | Permit Limitation Required by[1]: | Recommendation | |
|---|---|---|---|
| **Ammonia-Nitrogen** | WQBEL | Monitoring: | The monitoring frequency shall be 2x/wk as a 24-hr composite sample |
| | | Effluent Limit: | During the months of May 1 to October 31, the effluent limits should not exceed 24 lbs/day and 4.5 mg/l. During the months of November 1 to April 30, the effluent limit should not exceed 73 lbs/day and 13.5 mg/l. |
| | | Rationale: | Water quality modeling recommends limits for ammonia-nitrogen. |
| **Nitrate-Nitrite as N** | Chesapeake Bay TMDL | Monitoring: | The monitoring frequency shall be 2x/wk as a 24-hr composite sample |
| | | Effluent Limit: | No effluent requirements. |
| | | Rationale: | Due to the Chesapeake Bay Implementation Plan, the facility is required to be monitored on a frequency at least 2x/wk. |
| **Total Nitrogen** | Chesapeake Bay TMDL | Monitoring: | The monitoring frequency shall be 1x/mo as a calculation |
| | | Effluent Limit: | No effluent requirements. |
| | | Rationale: | Due to the Chesapeake Bay Implementation Plan, the facility is required to be monitored on a frequency at least 1x/mo. |
| **TKN** | Chesapeake Bay TMDL | Monitoring: | The monitoring frequency shall be 2x/wk as a 24-hr composite sample |
| | | Effluent Limit: | No effluent requirements. |
| | | Rationale: | Due to the Chesapeake Bay Implementation Plan, the facility is required to be monitored on a frequency at least 2x/wk. |
| **Total Phosphorus** | Anti-backsliding | Monitoring: | The monitoring frequency shall be 2x/wk as a 24-hr composite sample |
| | | Effluent Limit: | Effluent limits shall not exceed 10.8 lbs/day and 2 mg/l as an average monthly. |
| | | Rationale: | Due to anti-backsliding regulations, the current permit limit shall continue to the proposed permit |
| **Net Total Nitrogen** | Chesapeake Bay TMDL | Monitoring: | The monitoring frequency shall be 1x/yr as a calculation |
| | | Effluent Limit: | The effluent limit shall not exceed 11,872 lbs/yr. |
| | | Rationale: | Due to the Chesapeake Bay Implementation Plan, the facility is required to be monitored on a frequency at least 2x/yr. |
| **Net Total Phosphorus** | Chesapeake Bay TMDL | Monitoring: | The monitoring frequency shall be 1x/yr as a calculation |
| | | Effluent Limit: | The effluent limit shall not exceed 1,583 lbs/yr. |
| | | Rationale: | Due to the Chesapeake Bay Implementation Plan, the facility is required to be monitored on a frequency at least 2x/yr. |

**Notes:**

1 The NPDES permit was limited by (a) anti-Backsliding, (b) Anti-Degradation, (c) SOP, (d) TBEL, (e) TMDL, (f) WQBEL, (g) WET, or (h) Other

2 Monitoring frequency based on flow rate of 0.65 MGD.

3 Table 6-3 (Self Monitoring Requirements for Sewage Discharges) in Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits) (Document # 362-0400-001) Revised 10/97

4 Water Quality Antidegradation Implementaton Guidance (Document # 391-0300-002)

5 Chesapeake Bay Phase 3 Watershed Implementation Plan Wastewater Supplement, Revised September 13, 2021

### 6.1.3 Toxics

**Summary of Proposed NPDES Parameter Details for Toxics**

**Union Township MA WWTP; PA0024708**

| Parameter | Permit Limitation Required by[1]: | Recommendation | |
|---|---|---|---|
| **Total Zinc** | WQBEL | Monitoring: | Monitoring shall be required 2x/yr |
| | | Effluent Limit: | No effluent requirement. |
| | | Rationale: | Toxics Management Spreadsheet recommends monitoring. Pending favorable sampling results, future renewals may eliminate or reduce monitoring for this parameter. |

Notes:

1 The NPDES permit was limited by (a) anti-Backsliding, (b) Anti-Degradation, (c) SOP, (d) TBEL, (e) TMDL, (f) WQBEL, (g) WET, or (h) Other

2 Monitoring frequency based on flow rate of 0.65 MGD.

3 Table 6-3 (Self Monitoring Requirements for Sewage Discharges) in Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits) (Document # 362-0400-001) Revised 10/97

4 Water Quality Antidegradation Implementaton Guidance (Document # 391-0300-002)

5 Chesapeake Bay Phase 3 Watershed Implementation Plan Wastewater Supplement, Revised September 13, 2021

#### 6.1.3.1 Implementation of Regulation- Chapter 92a.61

Chapter 92a.61 provides provisions to DEP to monitor for pollutants that may have an impact on the quality of waters of the Commonwealth. Based upon DEP policy directives issued on March 22, 2021 and in conjunction with EPA's 2017 Triennial Review, monitoring for E. Coli shall be required.

## 6.2 Summary of Changes From Existing Permit to Proposed Permit

A summary of how the proposed NPDES permit differs from the existing NPDES permit is summarized as follows.

**Changes in Permit Monitoring or Effluent Quality**

| Parameter | Existing Permit | Draft Permit |
|---|---|---|
| E.coli | No monitoring or effluent limit | Due to the EPA Triennial Review, monitoring shall occur 1x/quarter |
| Zinc | No monitoring or effluent limit | Toxics Management Spreadsheet recommends monitoring. Monitoring shall occur 2x/yr. Pending favorable sampling results, monitoring in future renwals may be reduced or eliminated. |
| Ammonia-Nitrogen | During the months of May 1 to October 31, the effluent limits should not exceed 29 lbs/day and 5.4 mg/l. During the months of November 1 to April 30, the effluent limit should not exceed 76 lbs/day and 14.1 mg/l. | During the months of May 1 to October 31, the effluent limits should not exceed 24 lbs/day and 4.5 mg/l. During the months of November 1 to April 30, the effluent limit should not exceed 73 lbs/day and 13.5 mg/l. A review of 2021 DMR data suggests the facility should be able to meet the reduced ammonia-nitrogen limit. |
| Phosphorus | The effluent should not exceed 10.8 lbs/day | The effluent should not exceed 10.8 lbs/day and 2 mg/l as an average monthly. Based upon the Fact Sheet from April 2016, the mass loading was based upon the mass loading formula using 2 mg/l (i.e. 8.34 * 2 mg/l * 0.65 MGD = 10.8 lbs/day). Appropriately, a limit in concentration should be included in the permit. A review of 2021 DMR data suggests the facility should be able to meet the phosphorus limit. |

### 6.3.1 Summary of Proposed NPDES Effluent Limits

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.

The proposed NPDES effluent limitations are summarized in the table below.

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS**

**I. A. For Outfall** 001 , **Latitude** 40° 36' 14.83" , **Longitude** 77° 42' 37.87" , **River Mile Index** 15.3 , **Stream Code** 12429

**Receiving Waters:** Kishacoquillas Creek (CWF)

**Type of Effluent:** Sewage Effluent

1. The permittee is authorized to discharge during the period from **Permit Effective Date** through **Permit Expiration Date**.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

| Parameter | Effluent Limitations | | | | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| | Mass Units (lbs/day) (1) | | Concentrations (mg/L) | | | | Minimum (2) Measurement Frequency | Required Sample Type |
| | Average Monthly | Weekly Average | Minimum | Average Monthly | Weekly Average | Instant. Maximum | | |
| Flow (MGD) | Report | Report Daily Max | XXX | XXX | XXX | XXX | Continuous | Measured |
| pH (S.U.) | XXX | XXX | 6.0 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 | 0.28 | XXX | 0.93 | 1/day | Grab |
| Carbonaceous Biochemical Oxygen Demand (CBOD5) | 135.0 | 215.0 | XXX | 25.0 | 40.0 | 50 | 1/week | 24-Hr Composite |
| Biochemical Oxygen Demand (BOD5) Raw Sewage Influent | Report | Report Daily Max | XXX | Report | XXX | XXX | 1/week | 24-Hr Composite |
| Total Suspended Solids | 160.0 | 240.0 | XXX | 30.0 | 45.0 | 60 | 1/week | 24-Hr Composite |
| Total Suspended Solids Raw Sewage Influent | Report | Report Daily Max | XXX | Report | XXX | XXX | 1/week | 24-Hr Composite |
| Fecal Coliform (No./100 ml) Oct 1 - Apr 30 | XXX | XXX | XXX | 2000 Geo Mean | XXX | 10000 | 1/week | Grab |
| Fecal Coliform (No./100 ml) May 1 - Sep 30 | XXX | XXX | XXX | 200 Geo Mean | XXX | 1000 | 1/week | Grab |

**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 | | |
| E. Coli (No./100 ml) | XXX | XXX | XXX | XXX | Report Daily Max | XXX | 1/quarter | Grab |
| Ammonia-Nitrogen Nov 1 - Apr 30 | 73.0 | XXX | XXX | 13.5 | XXX | 26 | 2/week | 24-Hr Composite |
| Ammonia-Nitrogen May 1 - Oct 31 | 24.0 | XXX | XXX | 4.5 | XXX | 9 | 2/week | 24-Hr Composite |
| Total Phosphorus | 10.8 | XXX | XXX | 2.0 | XXX | 4 | 2/week | 24-Hr Composite |
| Zinc, Total | Report SEMI AVG | XXX | XXX | Report SEMI AVG | XXX | XXX | 1/6 months | 24-Hr Composite |

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS**

**I. B. For Outfall** 001 , **Latitude** 40° 36' 14.83" , **Longitude** 77° 42' 37.87" , **River Mile Index** 15.3 , **Stream Code** 12429

**Receiving Waters:** Kishacoquillas Creek (CWF)

**Type of Effluent:** Sewage Effluent

1. The permittee is authorized to discharge during the period from **Permit Effective Date** through **Permit Expiration Date**.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

| Parameter | Effluent Limitations | | | | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| | Mass Units (lbs/day) (1) | | Concentrations (mg/L) | | | | Minimum (2) Measurement Frequency | Required Sample Type |
| | Monthly | Annual | Monthly | Monthly Average | Maximum | Instant. Maximum | | |
| Ammonia--N | Report | Report | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Kjeldahl--N | Report | XXX | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Nitrate-Nitrite as N | Report | XXX | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Total Nitrogen | Report | Report | XXX | Report | XXX | XXX | 1/month | Calculation |
| Total Phosphorus | Report | Report | XXX | Report | XXX | XXX | 2/week | 24-Hr Composite |
| Net Total Nitrogen | XXX | 11872 | XXX | XXX | XXX | XXX | 1/year | Calculation |
| Net Total Phosphorus | XXX | 1583 | XXX | XXX | XXX | XXX | 1/year | Calculation |

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

at Outfall 001

Footnotes:
(1) See Part C for Chesapeake Bay Requirements.
(2) This is the minimum number of sampling events required. Permittees are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events required.

(3) The permittee is authorized to use 425 lbs/year as Total Nitrogen (TN) Offsets toward compliance with the Annual Net TN mass load limitations (Cap Loads), in accordance with Part C of this permit. These Offsets may be applied throughout the Compliance Year or during the Truing Period. The application of offsets must be reported to DEP as described in Part C. The Offsets are authorized for the following pollutant load reduction activities: Connection of 17 on-lot sewage disposal systems to the public sewer system after November 15, 2010, in which 25 lbs/year of TN offsets are granted per connection.

## 6.3.2 Summary of Proposed Permit Part C Conditions

The subject facility has the following Part C conditions.

- Chlorine Minimization
- Hauled-in Waste Restrictions
- Chesapeake Bay Nutrient Definitions
- Solids Management for Non-Lagoon Treatment Systems

| 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: New and Reissuance Sewage Individual NPDES Permit Applications, rev 2/3/2022 |
| ☐ | Other: |

# Attachment A

# Stream Stats/Gauge Data

**Table 1.** List of U.S. Geological Survey streamgage locations in and near Pennsylvania with updated streamflow statistics.—Continued

[Latitude and Longitude in decimal degrees; mi², square miles]

| Streamgage number | Streamgage name | Latitude | Longitude | Drainage area (mi²) | Regulated[1] |
|---|---|---|---|---|---|
| 01561000 | Brush Creek at Gapsville, Pa. | 39.956 | -78.254 | 36.8 | N |
| 01562000 | Raystown Branch Juniata River at Saxton, Pa. | 40.216 | -78.265 | 756 | N |
| 01562500 | Great Trough Creek near Marklesburg, Pa. | 40.350 | -78.130 | 84.6 | N |
| 01563200 | Raystown Branch Juniata River below Rays Dam nr Huntingdon, Pa. | 40.429 | -77.991 | 960 | Y |
| 01563500 | Juniata River at Mapleton Depot, Pa. | 40.392 | -77.935 | 2,030 | Y |
| 01564500 | Aughwick Creek near Three Springs, Pa. | 40.213 | -77.925 | 205 | N |
| 01565000 | Kishacoquillas Creek at Reedsville, Pa. | 40.655 | -77.583 | 164 | N |
| 01565700 | Little Lost Creek at Oakland Mills, Pa. | 40.605 | -77.311 | 6.52 | N |
| 01566000 | Tuscarora Creek near Port Royal, Pa. | 40.515 | -77.419 | 214 | N |
| 01566500 | Cocolamus Creek near Millerstown, Pa. | 40.566 | -77.118 | 57.2 | N |
| 01567000 | Juniata River at Newport, Pa. | 40.478 | -77.129 | 3,354 | Y |
| 01567500 | Bixler Run near Loysville, Pa. | 40.371 | -77.402 | 15.0 | N |
| 01568000 | Sherman Creek at Shermans Dale, Pa. | 40.323 | -77.169 | 207 | N |
| 01568500 | Clark Creek near Carsonville, Pa. | 40.460 | -76.751 | 22.5 | LF |
| 01569000 | Stony Creek nr Dauphin, Pa. | 40.380 | -76.907 | 33.2 | N |
| 01569800 | Letort Spring Run near Carlisle, Pa. | 40.235 | -77.139 | 21.6 | N |
| 01570000 | Conodoguinet Creek near Hogestown, Pa. | 40.252 | -77.021 | 470 | LF |
| 01570500 | Susquehanna River at Harrisburg, Pa. | 40.255 | -76.886 | 24,100 | Y |
| 01571000 | Paxton Creek near Penbrook, Pa. | 40.308 | -76.850 | 11.2 | N |
| 01571500 | Yellow Breeches Creek near Camp Hill, Pa. | 40.225 | -76.898 | 213 | N |
| 01572000 | Lower Little Swatara Creek at Pine Grove, Pa. | 40.538 | -76.377 | 34.3 | N |
| 01572025 | Swatara Creek near Pine Grove, Pa. | 40.533 | -76.402 | 116 | N |
| 01572190 | Swatara Creek near Inwood, Pa. | 40.479 | -76.531 | 167 | N |
| 01573000 | Swatara Creek at Harper Tavern, Pa. | 40.403 | -76.577 | 337 | N |
| 01573086 | Beck Creek near Cleona, Pa. | 40.323 | -76.483 | 7.87 | N |
| 01573160 | Quittapahilla Creek near Bellegrove, Pa. | 40.343 | -76.562 | 74.2 | N |
| 01573500 | Manada Creek at Manada Gap, Pa. | 40.397 | -76.709 | 13.5 | N |
| 01573560 | Swatara Creek near Hershey, Pa. | 40.298 | -76.668 | 483 | N |
| 01574000 | West Conewago Creek near Manchester, Pa. | 40.082 | -76.720 | 510 | N |
| 01574500 | Codorus Creek at Spring Grove, Pa. | 39.879 | -76.853 | 75.5 | Y |
| 01575000 | South Branch Codorus Creek near York, Pa. | 39.921 | -76.749 | 117 | Y |
| 01575500 | Codorus Creek near York, Pa. | 39.946 | -76.755 | 222 | Y |
| 01576000 | Susquehanna River at Marietta, Pa. | 40.055 | -76.531 | 25,990 | Y |
| 01576085 | Little Conestoga Creek near Churchtown, Pa. | 40.145 | -75.989 | 5.82 | N |
| 01576500 | Conestoga River at Lancaster, Pa. | 40.050 | -76.277 | 324 | N |
| 01576754 | Conestoga River at Conestoga, Pa. | 39.946 | -76.368 | 470 | N |
| 01578310 | Susquehanna River at Conowingo, Md. | 39.658 | -76.174 | 27,100 | Y |
| 01578400 | Bowery Run near Quarryville, Pa. | 39.895 | -76.114 | 5.98 | N |
| 01580000 | Deer Creek at Rocks, Md. | 39.630 | -76.403 | 94.4 | N |
| 01581500 | Bynum Run at Bel Air, Md. | 39.541 | -76.330 | 8.52 | N |
| 01581700 | Winters Run near Benson, Md. | 39.520 | -76.373 | 34.8 | N |
| 01582000 | Little Falls at Blue Mount, Md. | 39.604 | -76.620 | 52.9 | N |
| 01582500 | Gunpowder Falls at Glencoe, Md. | 39.550 | -76.636 | 160 | Y |
| 01583000 | Slade Run near Glyndon, Md. | 39.495 | -76.795 | 2.09 | N |
| 01583100 | Piney Run at Dover, Md. | 39.521 | -76.767 | 12.3 | N |

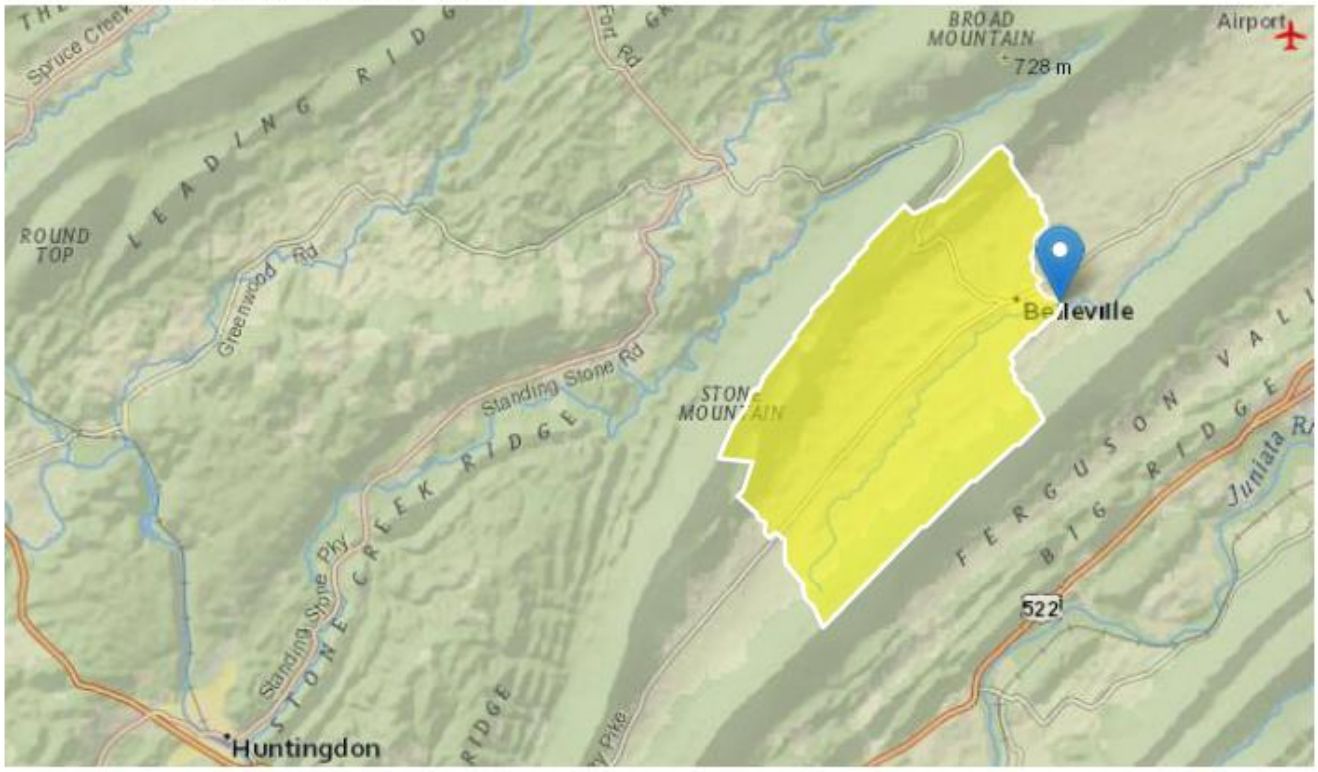
**Table 2.** Selected low-flow statistics for streamgage locations in and near Pennsylvania.—Continued

[ft³/s; cubic feet per second; —, statistic not computed; <, less than]

| Streamgage number | Period of record used in analysis[1] | Number of years used in analysis | 1-day, 10-year (ft³/s) | 7-day, 10-year (ft³/s) | 7-day, 2-year (ft³/s) | 30-day, 10-year (ft³/s) | 30-day, 2-year (ft³/s) | 90-day, 10-year (ft³/s) |
|---|---|---|---|---|---|---|---|---|
| 01565000 | 1941–2008 | 37 | 17.6 | 18.6 | 28.6 | 20.3 | 32.4 | 24.4 |
| 01565700 | 1965–1981 | 17 | .4 | .4 | .9 | .5 | 1.1 | .8 |
| 01566000 | 1913–2008 | 52 | 4.3 | 7.9 | 18.8 | 12.4 | 25.6 | 19.2 |
| 01566500 | 1932–1958 | 27 | 1.7 | 2.4 | 4.0 | 3.2 | 5.7 | 4.9 |
| 01567000 | [2]1974–2008 | 35 | 504 | 534 | 725 | 589 | 857 | 727 |
| 01567000 | [3]1901–1972 | 72 | 311 | 367 | 571 | 439 | 704 | 547 |
| 01567500 | 1955–2008 | 54 | 2.0 | 2.2 | 3.3 | 2.6 | 3.8 | 3.1 |
| 01568000 | 1931–2008 | 78 | 12.7 | 15.5 | 25.5 | 19.2 | 32.0 | 26.0 |
| 01568500 | [2]1943–1997 | 55 | 1.8 | 2.3 | 4.3 | 2.7 | 5.0 | 3.1 |
| 01569000 | 1939–1974 | 14 | 2.6 | 4.0 | 7.4 | 5.1 | 9.4 | 7.8 |
| 01569800 | 1978–2008 | 31 | 15.9 | 17.0 | 24.4 | 18.4 | 26.1 | 20.3 |
| 01570000 | [3]1913–1969 | 35 | — | 63.1 | 110 | 76.1 | 124 | 95.3 |
| 01570000 | [2]1971–2008 | 38 | 63.1 | 69.3 | 109 | 78.3 | 125 | 97.8 |
| 01570500 | [3]1901–1972 | 72 | 2,310 | 2,440 | 4,000 | 2,830 | 4,950 | 3,850 |
| 01570500 | [2]1974–2008 | 35 | 3,020 | 3,200 | 5,180 | 3,690 | 6,490 | 4,960 |
| 01571000 | 1941–1995 | 16 | .1 | .2 | .6 | .3 | 1.2 | .8 |
| 01571500 | 1911–2008 | 62 | 81.6 | 86.8 | 115 | 94.0 | 124 | 105 |
| 01572000 | 1921–1984 | 14 | 2.1 | 2.3 | 4.8 | 3.0 | 6.5 | 4.5 |
| 01572025 | 1990–2008 | 17 | 15.2 | 16.4 | 26.7 | 18.5 | 34.6 | 27.7 |
| 01572190 | 1990–2008 | 17 | 19.1 | 20.5 | 36.2 | 23.9 | 45.8 | 35.3 |
| 01573000 | 1920–2008 | 89 | 18.0 | 22.0 | 52.0 | 30.8 | 69.2 | 50.9 |
| 01573086 | 1965–1981 | 17 | .5 | .6 | 2.6 | .8 | 3.3 | 1.1 |
| 01573160 | 1977–1994 | 18 | 26.9 | 29.6 | 46.4 | 33.6 | 51.9 | 39.5 |
| 01573500 | 1939–1958 | 20 | 1.3 | 1.4 | 2.5 | 1.8 | 3.2 | 2.6 |
| 01573560 | 1977–2008 | 30 | 50.3 | 62.0 | 104 | 76.9 | 131 | 108 |
| 01574000 | 1930–2008 | 79 | 8.0 | 11.1 | 32.0 | 17.7 | 47.0 | 33.9 |
| 01574500 | [2]1968–2008 | 41 | 14.2 | 24.0 | 35.9 | 29.4 | 42.0 | 33.3 |
| 01574500 | [3]1930–1966 | 34 | 2.3 | 7.1 | 11.5 | 9.3 | 14.8 | 12.7 |
| 01575000 | [2]1973–1995 | 23 | .7 | 1.4 | 6.7 | 3.2 | 12.0 | 9.3 |
| 01575000 | [3]1929–1971 | 43 | .1 | .6 | 10.3 | 2.3 | 15.0 | 6.1 |
| 01575500 | [2]1948–1996 | 49 | 12.1 | 18.7 | 41.3 | 23.9 | 50.0 | 33.8 |
| 01576000 | [3]1933–1972 | 40 | 2,100 | 2,420 | 4,160 | 2,960 | 5,130 | 4,100 |
| 01576000 | [2]1974–2008 | 35 | 2,990 | 3,270 | 5,680 | 3,980 | 7,180 | 5,540 |
| 01576085 | 1984–1995 | 12 | .4 | .5 | .8 | .7 | 1.2 | 1.2 |
| 01576500 | 1931–2008 | 78 | 27.2 | 38.6 | 79.4 | 49.1 | 97.3 | 66.1 |
| 01576754 | 1986–2008 | 23 | 74.2 | 84.9 | 151 | 106 | 189 | 147 |
| [4]01578310 | 1969–2008 | 40 | 549 | 2,820 | 5,650 | 4,190 | 7,380 | 6,140 |
| 01578400 | 1964–1981 | 18 | 1.4 | 1.5 | 2.7 | 1.9 | 3.2 | 2.5 |
| [4]01580000 | 1928–2008 | 81 | 19.7 | 22.8 | 48.1 | 28.1 | 51.8 | 35.4 |
| [4]01581500 | 1946–2008 | 28 | .2 | .3 | 1.2 | .8 | 1.7 | 1.5 |
| [4]01581700 | 1969–2008 | 40 | 4.7 | 5.5 | 17.5 | 8.1 | 18.3 | 12.0 |
| [4]01582000 | 1946–2008 | 63 | 11.3 | 12.5 | 25.0 | 15.5 | 28.0 | 20.3 |
| [4]01582500 | 1979–2008 | 27 | 41.2 | 43.9 | 78.8 | 53.8 | 90.6 | 74.1 |
| [4]01583000 | 1949–1981 | 33 | .3 | .3 | .7 | .3 | 1.0 | .6 |
| [4]01583100 | 1984–2008 | 15 | 2.1 | 2.4 | 5.5 | 3.2 | 6.0 | 4.2 |

# StreamStats Report

**Region ID:** PA
**Workspace ID:** PA20220228182455068000
**Clicked Point (Latitude, Longitude):** 40.60418, -77.71055
**Time:** 2022-02-28 13:25:15 -0500




Union Township MA WWTP PA0024708 Modeling Point #1 February 2022

## Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|---|---|---|---|
| DRNAREA | Area that drains to a point on a stream | 30.1 | square miles |
| PRECIP | Mean Annual Precipitation | 39 | inches |
| STRDEN | Stream Density -- total length of streams divided by drainage area | 1.86 | miles per square mile |
| ROCKDEP | Depth to rock | 5.1 | feet |
| CARBON | Percentage of area of carbonate rock | 41.98 | percent |

## Low-Flow Statistics Parameters [Low Flow Region 2]

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|---|---|---|---|---|---|
| DRNAREA | Drainage Area | 30.1 | square miles | 4.93 | 1280 |
| PRECIP | Mean Annual Precipitation | 39 | inches | 35 | 50.4 |
| STRDEN | Stream Density | 1.86 | miles per square mile | 0.51 | 3.1 |
| ROCKDEP | Depth to Rock | 5.1 | feet | 3.32 | 5.65 |
| CARBON | Percent Carbonate | 41.98 | percent | 0 | 99 |

## Low-Flow Statistics Flow Report [Low Flow Region 2]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

| Statistic | Value | Unit | SE | ASEp |
|---|---|---|---|---|
| 7 Day 2 Year Low Flow | 5.69 | ft^3/s | 38 | 38 |
| 30 Day 2 Year Low Flow | 6.75 | ft^3/s | 33 | 33 |
| 7 Day 10 Year Low Flow | 3.6 | ft^3/s | 51 | 51 |
| 30 Day 10 Year Low Flow | 4.2 | ft^3/s | 46 | 46 |
| 90 Day 10 Year Low Flow | 5.2 | ft^3/s | 36 | 36 |

*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/)**

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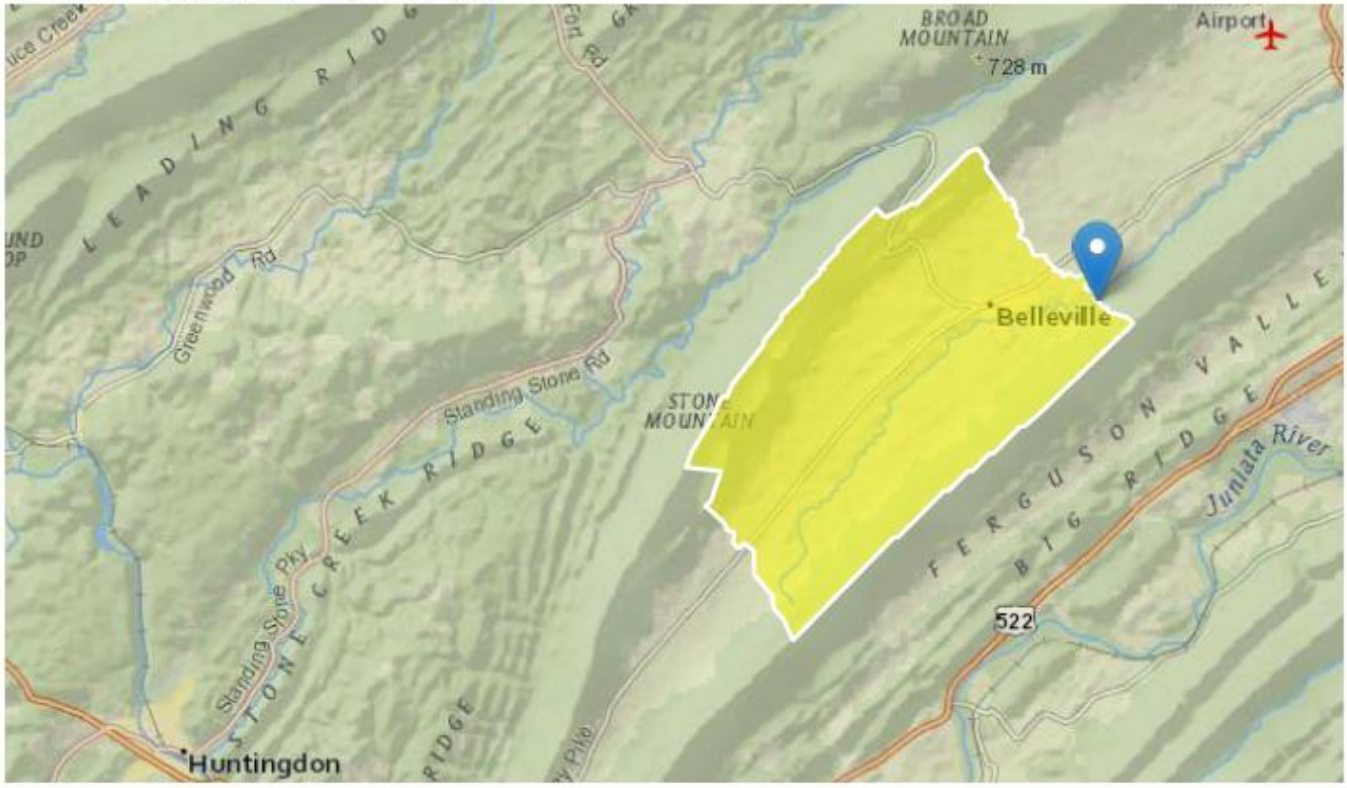
USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.7.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

# StreamStats Report

**Region ID:** PA
**Workspace ID:** PA20220228182825135000
**Clicked Point (Latitude, Longitude):** 40.60595, -77.68840
**Time:** 2022-02-28 13:28:48 -0500




Union Township MA WWTP PA0024708 Modeling Point #2 February 2022

## Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|---|---|---|---|
| DRNAREA | Area that drains to a point on a stream | 34.6 | square miles |
| PRECIP | Mean Annual Precipitation | 39 | inches |
| STRDEN | Stream Density -- total length of streams divided by drainage area | 1.86 | miles per square mile |
| ROCKDEP | Depth to rock | 5.1 | feet |
| CARBON | Percentage of area of carbonate rock | 42.72 | percent |

## Low-Flow Statistics Parameters [Low Flow Region 2]

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|---|---|---|---|---|---|
| DRNAREA | Drainage Area | 34.6 | square miles | 4.93 | 1280 |
| PRECIP | Mean Annual Precipitation | 39 | inches | 35 | 50.4 |
| STRDEN | Stream Density | 1.86 | miles per square mile | 0.51 | 3.1 |
| ROCKDEP | Depth to Rock | 5.1 | feet | 3.32 | 5.65 |
| CARBON | Percent Carbonate | 42.72 | percent | 0 | 99 |

## Low-Flow Statistics Flow Report [Low Flow Region 2]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

| Statistic | Value | Unit | SE | ASEp |
|---|---|---|---|---|
| 7 Day 2 Year Low Flow | 6.69 | ft^3/s | 38 | 38 |
| 30 Day 2 Year Low Flow | 7.9 | ft^3/s | 33 | 33 |
| 7 Day 10 Year Low Flow | 4.27 | ft^3/s | 51 | 51 |
| 30 Day 10 Year Low Flow | 4.96 | ft^3/s | 46 | 46 |
| 90 Day 10 Year Low Flow | 6.1 | ft^3/s | 36 | 36 |

*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/)**

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.7.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

# Attachment B

# WQM 7.0 Modeling Output Values
# Toxics Management Spreadsheet Output Values

# WQM 7.0 Effluent Limits

| SWP Basin | Stream Code | Stream Name |
|---|---|---|
| 12A | 12429 | KISHACOQUILLAS CREEK |

| RMI | Name | Permit Number | Disc Flow (mgd) | Parameter | Eff. Limit 30-day Ave. (mg/L) | Eff. Limit Maximum (mg/L) | Eff. Limit Minimum (mg/L) |
|---|---|---|---|---|---|---|---|
| 15.300 | Union Twp WWTP | PA0024708 | 0.650 | CBOD5 | 25 | | |
| | | | | NH3-N | 4.85 | 9.7 | |
| | | | | Dissolved Oxygen | | | 5 |

# WQM 7.0 Wasteload Allocations

| SWP Basin | Stream Code | Stream Name |
|---|---|---|
| 12A | 12428 | KISHACOQUILLAS 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 |
|---|---|---|---|---|---|---|---|
| 15.300 | Union Twp WWT | 5.93 | 25.04 | 5.93 | 25.04 | 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 |
|---|---|---|---|---|---|---|---|
| 15.300 | Union Twp WWT | 1.03 | 4.85 | 1.03 | 4.85 | 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) | | |
| 15.30 | Union Twp WWTP | 25 | 25 | 4.85 | 4.85 | 5 | 5 | 0 | 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 |
|---|---|---|---|---|---|---|---|---|
| 12A | 12429 | KISHACOQUILLAS CREEK | 15.300 | 768.00 | 30.10 | 0.00000 | 0.00 | ☑ |

**Stream Data**

| Design Cond. | LFY (cfsm) | Trib Flow (cfs) | Stream Flow (cfs) | Rch Trav Time (days) | Rch Velocity (fps) | WD Ratio | Rch Width (ft) | Rch Depth (ft) | Tributary Temp (°C) | Tributary pH | Stream Temp (°C) | Stream pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q7-10 | 0.113 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 | 0.00 | 0.00 | 16.00 | 8.40 | 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 |
|---|---|---|---|---|---|---|---|
| Union Twp WWTP | PA0024708 | 0.6500 | 0.6500 | 0.6500 | 0.000 | 20.00 | 7.41 |

**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 |
|---|---|---|---|---|---|---|---|---|
| 12A | 12429 | KISHACOQUILLAS CREEK | 13.390 | 740.00 | 34.60 | 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 | 0.113 | 0.00 | 0.00 | 0.000 | 0.000 | 0.0 | 0.00 | 0.00 | 16.00 | 8.40 | 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 | 0.00 | 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 D.O.Simulation

| SWP Basin | Stream Code | Stream Name |
|---|---|---|
| 12A | 12429 | KISHACOQUILLAS CREEK |

| RMI | Total Discharge Flow (mgd) | Analysis Temperature (°C) | Analysis pH |
|---|---|---|---|
| 15.300 | 0.650 | 16.910 | 7.923 |
| **Reach Width (ft)** | **Reach Depth (ft)** | **Reach WDRatio** | **Reach Velocity (fps)** |
| 30.859 | 0.659 | 46.854 | 0.217 |
| **Reach CBOD5 (mg/L)** | **Reach Kc (1/days)** | **Reach NH3-N (mg/L)** | **Reach Kn (1/days)** |
| 7.23 | 1.060 | 1.10 | 0.552 |
| **Reach DO (mg/L)** | **Reach Kr (1/days)** | **Kr Equation** | **Reach DO Goal (mg/L)** |
| 7.505 | 5.331 | Tsivoglou | 5 |
| **Reach Travel Time (days)** | | | |
| 0.537 | | | |

**Subreach Results**

| TravTime (days) | CBOD5 (mg/L) | NH3-N (mg/L) | D.O. (mg/L) |
|---|---|---|---|
| 0.054 | 6.88 | 1.07 | 7.47 |
| 0.107 | 6.54 | 1.04 | 7.46 |
| 0.161 | 6.22 | 1.01 | 7.49 |
| 0.215 | 5.91 | 0.98 | 7.53 |
| 0.268 | 5.62 | 0.95 | 7.58 |
| 0.322 | 5.35 | 0.92 | 7.64 |
| 0.376 | 5.09 | 0.90 | 7.71 |
| 0.429 | 4.84 | 0.87 | 7.78 |
| 0.483 | 4.60 | 0.85 | 7.85 |
| 0.537 | 4.37 | 0.82 | 7.93 |

# WQM 7.0 Hydrodynamic Outputs

| SWP Basin | Stream Code | Stream Name |
|---|---|---|
| 12A | 12429 | KISHACOQUILLAS 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** | | | | | | | | | | | | |
| 15.300 | 3.41 | 0.00 | 3.41 | 1.0055 | 0.00278 | .659 | 30.86 | 46.85 | 0.22 | 0.537 | 16.91 | 7.92 |
| **Q1-10 Flow** | | | | | | | | | | | | |
| 15.300 | 3.24 | 0.00 | 3.24 | 1.0055 | 0.00278 | NA | NA | NA | 0.21 | 0.549 | 16.95 | 7.91 |
| **Q30-10 Flow** | | | | | | | | | | | | |
| 15.300 | 3.72 | 0.00 | 3.72 | 1.0055 | 0.00278 | NA | NA | NA | 0.23 | 0.517 | 16.85 | 7.94 |

# 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 | 1.09 | Temperature Adjust Kr | ☑ |
| D.O. Saturation | 90.00% | Use Balanced Technology | ☑ |
| D.O. Goal | 5 | | |

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

# Discharge Information

Instructions | Discharge | Stream

Facility: Union Township MA WWTP  NPDES Permit No.: PA0024708  Outfall No.: 001

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

| Discharge Characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Design Flow (MGD)* | Hardness (mg/l)* | pH (SU)* | Partial Mix Factors (PMFs) | | | | Complete Mix Times (min) | |
| | | | AFC | CFC | THH | CRL | $Q_{7-10}$ | $Q_h$ |
| 0.65 | 100 | 7.41 | | | | | | |

| | | | | | 0 If left blank | | 0.6 If left blank | | 0 If left blank | | | 1 If left blank | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Discharge Pollutant | Units | Max Discharge Conc | | Trib Conc | Stream Conc | Daily CV | Hourly CV | Stream CV | Fate Coeff | FOS | Criteria Mod | Chem Transl |
| Group 1 | Total Dissolved Solids (PWS) | mg/L | | 214 | | | | | | | | | |
| | Chloride (PWS) | mg/L | | 97 | | | | | | | | | |
| | Bromide | mg/L | < | 2 | | | | | | | | | |
| | Sulfate (PWS) | mg/L | | 28.5 | | | | | | | | | |
| | 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 | mg/L | | 0.003 | | | | | | | | | |
| | Free Cyanide | µg/L | | | | | | | | | | | |
| | Total Cyanide | µg/L | | | | | | | | | | | |
| | Dissolved Iron | µg/L | | | | | | | | | | | |
| | Total Iron | µg/L | | | | | | | | | | | |
| | Total Lead | mg/L | | 0.0002 | | | | | | | | | |
| | Total Manganese | µg/L | | | | | | | | | | | |
| | Total Mercury | µg/L | | | | | | | | | | | |
| | Total Nickel | µg/L | | | | | | | | | | | |
| | Total Phenols (Phenolics) (PWS) | µg/L | | | | | | | | | | | |
| | Total Selenium | µg/L | | | | | | | | | | | |
| | Total Silver | µg/L | | | | | | | | | | | |
| | Total Thallium | µg/L | | | | | | | | | | | |
| | Total Zinc | mg/L | | 0.08 | | | | | | | | | |
| | Total Molybdenum | µg/L | | | | | | | | | | | |
| | Acrolein | µg/L | < | | | | | | | | | | |
| | Acrylamide | µg/L | < | | | | | | | | | | |
| | Acrylonitrile | µg/L | < | | | | | | | | | | |
| | Benzene | µg/L | < | | | | | | | | | | |
| | Bromoform | µg/L | < | | | | | | | | | | |

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

## Stream / Surface Water Information

**Union Township MA WWTP, NPDES Permit No. PA0024708, Outfall 001**

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Kishacoquillas 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 | 012429 | 15.3 | 768 | 30.1 | | | Yes |
| End of Reach 1 | 012429 | 13.39 | 740 | 34.6 | | | Yes |

$Q_{7-10}$

| Location | RMI | LFY ($cfs/mi^2$)* | Flow (cfs) | | W/D Ratio | Width (ft) | Depth (ft) | Velocity (fps) | Travel Time (days) | Tributary | | Stream | | Analysis | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Stream | Tributary | | | | | | Hardness | pH | Hardness* | pH* | Hardness | pH |
| Point of Discharge | 15.3 | 0.1134 | | | | | | | | | | 133 | 8.4 | | |
| End of Reach 1 | 13.39 | 0.1134 | | | | | | | | | | 133 | 8.4 | | |

$Q_h$

| 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 | 15.3 | | | | | | | | | | | | | | |
| End of Reach 1 | 13.39 | | | | | | | | | | | | | | |

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.3, March 2021

## Model Results

**Union Township MA WWTP, NPDES Permit No. PA0024708, Outfall 001**

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | ◉ All ○ Inputs ○ Results ○ Limits

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.737 Analysis Hardness (mg/l): 123.57 Analysis pH: 7.86

| Pollutants | Stream Conc (µg/L) | Stream CV | Trib Conc (µg/L) | Fate Coef | WQC (µg/L) | WQ Obj (µg/L) | WLA (µg/L) | Comments |
|---|---|---|---|---|---|---|---|---|
| Total Dissolved Solids (PWS) | 0 | 0 | | 0 | N/A | N/A | N/A | |
| Chloride (PWS) | 0 | 0 | | 0 | N/A | N/A | N/A | |
| Sulfate (PWS) | 0 | 0 | | 0 | N/A | N/A | N/A | |
| Total Copper | 0 | 0 | | 0 | 16.405 | 17.1 | 59.8 | Chem Translator of 0.96 applied |
| Total Lead | 0 | 0 | | 0 | 81.255 | 107 | 374 | Chem Translator of 0.76 applied |
| Total Zinc | 0 | 0 | | 0 | 140.197 | 143 | 502 | Chem Translator of 0.978 applied |

☑ ***CFC*** CCT (min): 27.651 PMF: 1 Analysis Hardness (mg/l): 125.49 Analysis pH: 7.92

| 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 | 10.873 | 11.3 | 49.8 | Chem Translator of 0.96 applied |
| Total Lead | 0 | 0 | | 0 | 3.220 | 4.25 | 18.7 | Chem Translator of 0.758 applied |
| Total Zinc | 0 | 0 | | 0 | 143.201 | 145 | 638 | Chem Translator of 0.986 applied |

☑ ***THH*** CCT (min): 27.651 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): 14.362 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 Zinc | Report | Report | Report | Report | Report | mg/L | 0.32 | AFC | Discharge Conc > 10% WQBEL (no 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 Copper | 0.038 | mg/L | Discharge Conc ≤ 10% WQBEL |
| Total Lead | 0.019 | mg/L | Discharge Conc ≤ 10% WQBEL |

# Attachment C

# TRC Evaluation

Union Twp MA
PA0024708

March 2022

## TRC EVALUATION

Input appropriate values in B4:B8 and E4:E7

| | | | | | |
|---|---|---|---|---|---|
| 4 | 3.414 | = Q stream (cfs) | 0.5 | = CV Daily | |
| 5 | 0.65 | = Q discharge (MGD) | 0.5 | = CV Hourly | |
| 6 | 30 | = no. samples | 1 | = AFC_Partial Mix Factor | |
| 7 | 0.3 | = Chlorine Demand of Stream | 1 | = CFC_Partial Mix Factor | |
| 8 | 0 | = Chlorine Demand of Discharge | 15 | = AFC_Criteria Compliance Time (min) | |
| 9 | 0.5 | = BAT/BPJ Value | 720 | = CFC_Criteria Compliance Time (min) | |
| | 0 | = % Factor of Safety (FOS) | 0 | =Decay Coefficient (K) | |

| | Source | Reference | AFC Calculations | Reference | CFC Calculations |
|---|---|---|---|---|---|
| 11 | TRC | 1.3.2.iii | WLA afc = 1.102 | 1.3.2.iii | WLA cfc = 1.067 |
| 12 | PENTOXSD TRG | 5.1a | LTAMULT afc = 0.373 | 5.1c | LTAMULT cfc = 0.581 |
| 13 | PENTOXSD TRG | 5.1b | LTA_afc= 0.411 | 5.1d | LTA_cfc = 0.620 |
| 14 | | | | | |

| | Source | | Effluent Limit Calculations | |
|---|---|---|---|---|
| 15 | | | | |
| 16 | PENTOXSD TRG | 5.1f | AML MULT = 1.231 | |
| 17 | PENTOXSD TRG | 5.1g | AVG MON LIMIT (mg/l) = 0.500 | BAT/BPJ |
| 18 | | | 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) |