Documents Used in Development of TMDL (Brush Creek)

- ☐ Water Quality Model, Implementation Guidance and Section 95.4 Phosphorus Discharge to Lakes, Ponds and Impoundments
- ☒ Water Quality Analysis Model 6.3 and Supporting Documentation
- ☒ Water Quality Model for Ammonia Toxicity, Implementation Guidance and Section 93.7 Ammonia Criteria
- ☐ Water Quality Model, Implementation Guidance and Total residual Chlorine Regulation
- ☐ Water Quality Model and Implementation Guidance for temperature Criteria
- ☐ Implementation Guidance and Section 95.9 Phosphorus Discharges to Free Flowing Streams
- ☐ Protocol for Estimating First Order fate Coefficients for Volatile Organic Subtances
- ☐ PENNTOXSD Water Quality Model and Supporting Documentation
- ☒ Pennsylvania Process for Documentation and Submission of TMDLs for Low Flow Conditions
- ☒ Other Water Quality Protection Report for the Mun. Sewer & Water Auth. of Cranberry Twp.

  DEP/EPA - Implementation Guidance for Determining Water Quality Based Point Source Effluent Limitations

SUMMARY TMDL TABLE

This summary table is provided with the Fact Sheet in order to clearly show the computation of the proposed TMDLs developed for low flow for the parameters identified in the table. The Department requests EPA review and approval of the TMDLs in accordance with 40 CFR § 130.7(d). All data used in the calculations are derived from the detailed modeling/analysis attached to the WQPR. Only the relevant data actually used in the TMDL calculations are summarized in the table. The stream flow represents the appropriate flow for the governing water quality criteria duration/frequency. All other pertinent and supporting technical, public participation and administrative requirements are also included with the submission. Unless a TMDL for a particular parameter requires to be in other units, all TMDLs are to be expressed in lbs/day units.

Parameter Name	Disch. Flow (mgd) (Qd)	Total Stream Flow(cfs) (Qt)	Partial Mix Factor (Pmf)	Governing WQ Criteria(mg/l) (CC)	Background Water Quality (mg/l) (Cb)	Wasteload Allocations (lbs/day) (WLA)	Load Allocations (lbs/day) (LA)	Factor of Safety (lbs/day) (FOS)	TMDLs (lbs/day) (TMDL)
CBOD	4.5	0.7084	1.0	----	2.0	375.3	7.64	131.4*	512.3
DO**	4.5	0.7084	1.0	5.0	7.54	187.7	***	9.8	197.5
NH_3-N	4.5	0.7084	1.0	1.81	0.1	75.1	0.38	**	75.5

No site-specific background dissolved oxygen or temperature measurements were available for the Brush Creek watershed. Therefore, the background dissolved oxygen was estimated using the following equation $DO_{sat.}$= 490/ (33.5+ T°C). Using a temperature of 25°C, for a warm water fishery receiving stream , and 90% saturation the background dissolved oxygen concentration equates to 7.54 mg/l.

* **The various guidance documents interchange the phrase Factor of Safety and Margin of Safety. These guidance's are also inconsistent with the units of FOS/MOS. For these exercises, the units will be lbs/day. The 131.4 lbs/day number is equal to 35% of the WLA. An additional modeling run was performed at 95% of Q7-10 (ie., 5% FOS) which resulted in no change to the present permit limits.**

** **Dissolved Oxygen is not evaluated like a typical TMDL parameter. The Department uses a two-stage, Streeter-Phelps model to determine the dissolved oxygen "deficit" in the stream. DO is indirectly controlled by limiting CBOD/BOD and Ammonia-Nitrogen (NH_3-N). The impact of NH_3-N on both the toxicity and DO was considered, but the limit is based on toxicity since it was the controlling concern. The CBOD was reduced from a starting concentration of 25 mg/l (secondary treatment) to a value of 13.5 mg/l (the limit being rounded down to 10 mg/l). However, the discharge needed a specific DO limitation to control the initial dissolved oxygen deficit occurring right at the discharge point. This is due to the small streamflow to wasteflow dilution. The resulting limit is equal to the 5 mg/l criteria itself. The following shows the calculation of the FOS/MOS for dissolved oxygen.**

$$(Q_s)(C_b) + (Q_w)(C_w) = (Q_{s+w})(C_{crit.})$$

$$(0.46\ cfs)(7.54\ mg/l) + (4.5\ MGD)(x) = (4.96\ MGD)(5\ mg/l)$$

$$x = 4.74\ mg/l$$

Requiring the 5 mg/l limit results in 0.26 mg/l (9.76 lb/day) more dissolved oxygen discharged to the stream than required by the above equation. This difference serves as the FOS/MOS.

*****There is no load allocation for dissolved oxygen. Dissolved oxygen is unlike other parameters in that its' criteria is expressed as a minimum instead of a maximum amount. The more dissolved oxygen in the stream background the better off the stream is and the more assimulative capacity is available. Since a load allocation represents the amount of assimulative capacity being used up by the background quality of the stream it is not appropriate to include a value for dissolved oxygen.**

1.) The receiving stream is Brush Creek, Stream Code 34787, and is classified as a Warm Water Fishery. The impaired segment is from the Municipal Sewer and Water Authority's discharge, River Mile Index 11.2 to RMI 5.7 (the 5.5 stream miles identified in the 303(d) list). The cause of impairment is Municipal Point Sources. No other discharges were considered in this TMDL.

2.) Based on current information, the Cranberry Township discharge is the only significant pollutant contributor to the waterbody during low flow conditions. NPS loadings are considered insignificant and are accounted for through the determination and use of appropriate background data used in the determination of the TMDL.

3.) The Carbonaceous Biochemical Oxygen Demand limit is seasonal. The calculated TMDL is applied in the NPDES permit as a seasonal value. A seasonal multiplier was developed for CBOD/BOD which accounts for temperature and streamflow which greatly affect the DO of a stream. In addition, temperature affects the BOD treatment efficiency of a wastewater treatment plant. Temperature affects the in-stream DO and the "k" rate of the treatment process, which in turn affects the BOD removal rate, and streamflow provides assimilative capacity according to the amount of dilution available. Using a first order decay equation, for BOD, allows direct mathematical correlation between the average seasonal temperature and streamflow values, and the resulting BOD loads and DO assimilative capacities. By comparing the seasonal variations of each, the most appropriate seasonal multiplier can be determined, based on the lesser of the BOD variation (a measure of the need for seasonal relaxation based on variable treatment efficiencies) and the DO variation (a measure of the stream's capacity for seasonal relaxation). This approach assumes that the extent of relaxation allowed should exceed neither the need, based on treatment performance variation, nor the capacity, based on the varying assimilative capacity of the stream. This process yielded a seasonal multiplier of 2.

Dissolved Oxygen is specified as a year-round, minimum value to be maintained at all times.

4.) The Implementation Schedule for the TMDL is found in the NPDES permit.

INFORMATION SHEET
Proposed Total Maximum Daily Loads for Brush Creek

What is being proposed?
A TMDL plan to improve the quality of water in Brush Creek, a tributary to Connoquenessing Creek, in Cranberry Township, Butler County.

Who is proposing the plan? To whom? Why?
The Pennsylvania Department of Environmental Protection is proposing to submit the plan to the US EPA for review and approval as required by the federal regulations.

In 1995, EPA was sued for not developing TMDLs when Pennsylvania did not do so. DEP has entered into an agreement with EPA to develop TMDLs for certain specified waters over the next several years. DEP developed this TMDL in compliance with the state/EPA agreement

What is a TMDL?
A Total Maximum Daily Load (TMDL) sets a ceiling on the pollutant loads that can enter a waterbody so that the water will meet water quality standards. The Clean Water Act requires states to list all waters that do not meet their water quality standards even after pollution controls required by law are in place. For these waters, the state must calculate how much of a substance can be put in the water without violating the standard, and then distribute that quantity to all the sources of the pollutant on that waterbody. A TMDL plan includes waste load allocations for point sources, load allocations for nonpoint sources and a margin of safety.

The Clean Water Act requires states to submit their TMDLs to EPA for approval. Also, if a state does not develop the TMDL, the Clean Water Act states that EPA must do so.

What is a water quality standard?
The Clean Water Act sets a national minimum goal that all waters be "fishable" and "swimmable." To support this goal, states must adopt water quality standards.

Water quality standards are state regulations which have two components. The first component is a designated use, such as "warm water fishes" or "recreation." States must assign a use, or several uses to each of their waters. The second component relates to the instream conditions necessary to protect the use(s). These conditions or "criteria" are physical, chemical or biological characteristics such as temperature and the minimum concentration of dissolved oxygen, and the maximum concentrations of toxic pollutants.

It is the combination of the "designated use" and the "criteria" to support the use that make up a water quality standard. If any criteria are being exceeded, then the use is not being met, and the water is said to be violating water quality standards.

What is the purpose of the plan?
Brush Creek has several designated uses including that for Warm Water Fishes. One of the criteria necessary to protect that use is maintenance of instream dissolved oxygen (D.O.) at or above its water quality criterion of 5 mg/l. The amount of oxygen dissolved in the water of Brush Creek has been measured below the water quality criterion - a minimum amount necessary for aquatic life to survive and the plan is needed to restore its water quality.

The plan includes a calculation of the total pollutant load that can safely be put into Brush Creek without causing the oxygen levels to fall below the water quality standard. The proposed TMDL plan, when implemented, is expected to achieve the D.O. standard.

Why did we choose Brush Creek?
In 1996, the Department listed a segment of Brush Creek under Section 303(d) of the Clean Water Act as not meeting or not expected to meet water quality standards for Biochemical Oxygen Demand and Dissolved Oxygen even though all the pollution controls required by law are already in place. The listed stream segment is from river mile 11.2 to 5.7 mile.

What pollutants does this TMDL address?
The proposed plan provides calculations of Brush Creek's total capacity to absorb Biochemical Oxygen Demand and Ammonia Nitrogen and its allocation to point source discharges in Brush Creek.

Where do the pollutants come from?
The pollutants can come from point sources like wastewater treatment plants and nonpoint sources like runoff from fields. Nutrients can also enter a waterbody from its tributaries.

For Brush Creek, the Municipal Sewer and Water Authority of Cranberry Township discharge is the dominant or primary source of the oxygen depleting pollutants at the low flow conditions.

There are several causes (organic matter and ammonia in wastewaters) of the low dissolved oxygen in Brush Creek. The algae use oxygen at night when they are not photosynthesized. When the algae die, they settle to the creek bottom where more oxygen is consumed as they

decompose. Certain forms of carbon and nitrogen in the water also consume oxygen as they change into different chemical forms. We use the term 'biochemical oxygen demand' (BOD) to measure how much oxygen will be used by the organic matter in waste.

How was the TMDL developed?
We used the WQM 6.3 model, a computer program that uses a series of mathematical formulas to simulate what's happening in a stream, to help decide how to maintain the dissolved oxygen above 5 mg/l. This predicts the amount of dissolved oxygen in stream as we reduce the amount of pollution entering from the sources.

By experimenting with a variety of different scenarios, we were able to develop the proposed TMDL plan to reduce the pollutant(s) that ensure that Brush Creek meets the Dissolved Oxygen water quality standards.

How much pollution is too much?
The allowable amount of a pollutant in a stream varies depending on several conditions. TMDLs are set for point sources at low flow of the stream because this is the time when the stream is most sensitive to most pollutants.

The maximum amount of biological oxygen demanding (BOD) organic material and ammonia that can safely be absorbed by Brush Creek, on a daily basis, under low flow conditions, without violating the dissolved oxygen standard are as follows:

BOD (CBOD)	512.3 lb/day
Ammonia-Nitrogen	75.5 lb/day

How will these limits be met?
Each source of the pollutants must reduce the amount it contributes in accordance with the proposed TMDL plan, when it is put into effect. The Municipal Sewer and Water Authority of Cranberry Township is constructing a wastewater treatment plant to meet their load allocations for these pollutants.

How can I get more information on the TMDL?
To request a copy of the full report, contact Patrick G. Williams, P.E. at 814-332-6942 during business hours or by writing to him at Department of Environmental Protection 230 Chestnut Street, Meadville, PA 16335.

How can I comment on the proposal?
You can provide written comments and/or attend the public meeting. The meeting is scheduled for February 25, 1998 at 1:00 PM in the Northwest Field Office of the DEP in Meadville. For more information on the meeting, you may contact Patrick G. Williams at the above telephone number. You also can submit written comments to the Department. The comments must be postmarked no later than March 2, 1998.

Pollutant	*TMDL = (Total Maximum Daily Load)*	*WLA + (Wasteload Allocation —by source)*	*LA + (Nonpoint Source Allocation)*	*MOS (Margin of Safety)*
Ammonia Nitrogen	1.52 lbs/day	1.46 lbs/day	0 lb/day	0.06 lb/day

Point Source Discharges Affected

Department of Environmental Protection has determined that Cedar Manor Mobile Home Park NPDES Permit Number PA0080721 is the only significant contributor of ammonia nitrogen to the unnamed tributary under critical conditions (the 7 day—10 year low flow). Nonpoint source contributions for ammonia nitrogen is negligible at critical low flow conditions.

The data and all supporting information used to develop the proposed TMDL are available from the Department. To request a copy of the proposed TMDL and an information sheet, contact Roger Musselman, Water Management Program, PA DEP Southcentral Region, One Ararat Boulevard, Harrisburg, PA 17110, (717) 541-7996. Persons with a disability may use the AT&T Relay Service by calling 1 (800) 654-5984 (TDD users) or 1 (800) 654-5988 (voice users).

Written comments will be accepted at the above address and must be postmarked by March 2, 1998. Persons who plan to make a presentation at the public meeting, should notify DEP no later than 4 p.m. on February 20, 1998. The Department of Environmental Protection will consider all comments in developing the final TMDL, which will be submitted to the EPA for approval.

Brush Creek Basin

The Department of Environmental Protection is holding a public meeting on February 25, 1998 beginning at 1 p.m. at the Meadville Regional Office of the Department of Environmental Protection. Brush Creek was listed on Pennsylvania's 1996 Section 303(d) List because water quality standards for CBOD and Dissolved Oxygen needed to support the designated use of the warm water fishery are not expected to be met even after technology-based controls required by law are installed. This TMDL establishes the following allowable pollutant loadings for Brush Creek from the Municipal Sewer and Water Authority of Cranberry Township discharge downstream for 5.5 miles. Brush Creek is a tributary to Connoquenessing Creek in Cranberry Township, Butler County:

Pollutant	*TMDL = (Total Maximum Daily Load)*	*WLA + (Wasteload Allocation —by source)*	*LA + (Load Allocation)*	*MOS (Margin of Safety)*
CBOD	512.3	375.3	7.64	131.4
Dissolved Oxygen	190.9	187.7	0	3.2

DEP has determined that the Municipal Sewer and Water Authority of Cranberry Township is the only significant contributor of these pollutants to the affected segment in Brush Creek under critical conditions. Nonpoint source contributions for the D. O. goal violation are negligible at critical low flow conditions.

The data and all supporting information used to develop the proposed TMDL are available from the Department. To request a copy of the proposed TMDL and an information sheet, contact Patrick G. Williams, P. E., Chief, Permits Section, PA DEP Northwest Field Office, 230 Chestnut Street, Meadville, PA 16335, (814) 332-6942. Persons with a disability may use the AT&T Relay Service by calling 1(800) 654-5984 (TDD) or 1 (800) 654-5988 (voice users).

Written comments will be accepted at the above address and must be postmarked by March 2, 1998. Persons who plan to make a presentation at the public meeting, should notify DEP no later than 4 p.m. on February 20, 1998. Department of Environmental Protection will consider all comments in developing the final TMDL, which will be submitted to the EPA for approval.

French Creek Basin

The Department of Environmental Protection is holding a public meeting on February 25, 1998 beginning at 10 a.m. at the Meadville Regional Office of the Department of Environmental Protection. French Creek was listed on Pennsylvania's 1996 Section 303(d) List because water quality standards for ammonia nitrogen and phosphorus needed to support the designated use of the warm water fishery are not expected to be met even after technology-based controls required by law are installed. This TMDL establishes the following allowable pollutant loadings for French Creek from the City of Meadville downstream for 3.5 miles, a tributary to the Allegheny River, in West Mead and Vernon Townships, Crawford County:

Pollutant	*TMDL = (Total Maximum Daily Load)*	*WLA + (Wasteload Allocation —by source)*	*LA + (Load Allocation)*	*MOS (Margin of Safety)*
NH3-N	663.8	578	67.8	18
Phosphorus	162.4	121.7	40.7	*

* MOS is implicit in determination of water quality criteria, but is unquantifiable.

DEP has determined that Meadville Area Sewer Authority, NPDES PA0026271 is the only significant contributor of these pollutants to the affected segment in French Creek under critical conditions.

Classified Dept. For Information And Rates:

1-800-535-5237

NOTICES

001 Legal Notice

Request for Comment and Notice of Public Meeting for the proposed Total Maximum Daily Load (TMDL) for the Brush Creek Basin

The Department of Environmental Protection is hosting a public meeting on February 25, 1998 beginning at 1:00 p.m. at the Meadville Regional Office of the Department of Environmental Protection to discuss and accept comments on a proposed TMDL. A TMDL provides the basis for water quality controls for a waterbody as required by Section 303(d) of the Clean Water Act. The controls will provide the pollutant reductions necessary to meet water standards in the affected water. This TMDL establishes the following allowable pollutant loadings for Brush Creek, a tributary to Connoquenessing Creek in Butler County.

CBOD	512.0 lbs/day
D.O.	196.8 lbs/day

When implemented, these TMDLs will achieve compliance with water quality standards by application of effluent limitations for a single point source discharge at the low flow condition. There are no other sources of these pollutants that affect the quality of this water at critical environmental conditions. The data and supporting information used to develop the proposed TMDL are available from DEP.

To request a copy of the proposed TMDL and all information about, please contact Patrick M. Williams, P.E. Chief, Permits Section, PA DEP Northwest Field Office, 230 Chestnut Street, Meadville, PA 16335, 814-332-6942. Persons with a disability may use the AT&T Relay Service by calling 1-800-654-5984 (TDD) or 1-800-654-5988 (voice user).

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10 Personal

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4 Card Of Thanks

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(Never Known to fail). Oh, most beautiful flower of Mt. Carmel, fruitful vine, splendor of Heaven, Blessed Mother of the son of God, Immaculate Virgin, assist me in necessity. Oh, Star of the Sea, help me and show me, herein you are my Mother. Oh, Holy Mary, Mother of God, Queen of Heaven and Earth I humbly beseech you from the bottom of my heart to succor me in this necessity. There are none that can withstand you power. Oh, show me herein you are my Mother. Oh Mary conceived without sin, pray for us who have recourse in thee (3X). Holy Mother, I place this cause in your hands (3X). Say this prayer 3 consecutive days. After 3 days the request will be granted. This prayer must be published after favor is granted. KMS

10 Personal

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12 Announcements

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