UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Scott Mandirola, Director
Division of Water and Waste Management
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, West Virginia 25304-2345

NOV 23 2016

Dear Mr. Mandirola:

The United States Environmental Protection Agency (EPA), Region III, is pleased to approve the Total Maximum Daily Loads (TMDLs) developed for pH and fecal coliform bacteria in the Meadow River Watershed. The TMDLs were established to address impairments of water quality, as identified on West Virginia's 2014 Section 303(d) List. The West Virginia Department of Environmental Protection submitted the report, *Total Maximum Daily Loads for the Meadow River Watershed, West Virginia*, to EPA for review and approval on October 26, 2016. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain applicable water quality standards; (2) include a total allowable loading, and as appropriate, wasteload allocations for point sources and load allocations for nonpoint sources; (3) consider the impacts of background pollutant contributions; (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated); (5) consider seasonal variations; (6) include a margin of safety (which accounts for any uncertainties in the relationship between pollutant loads and instream water quality); and (7) be subject to public participation. The TMDLs for the Meadow River Watershed satisfy each of these requirements. In addition, the TMDLs considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. A rationale of our approval is enclosed.

As you know, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of applicable TMDL wasteload allocations pursuant to 40 CFR §122.44(d)(1)(vii)(B). Please submit all such permits to EPA for review per EPA's letters dated October 1, 1998, and July 7, 2009.

If you have any questions regarding these TMDLs, please contact Ms. Jennifer Sincock, West Virginia TMDL Coordinator, at 215-814-5766.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Mr. John Wirts (WVDEP)
Mr. James Laine (WVDEP)

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Decision Rationale
Total Maximum Daily Loads for the Meadow River Watershed, West Virginia

Jon M. Capacasa, Director
Water Protection Division

Date: 11/23/2016

Decision Rationale
Total Maximum Daily Loads for the
Meadow River Watershed, West Virginia

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based and other controls do not provide for the attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), which may be discharged to a water quality-limited waterbody.

This document will set forth the U.S. Environmental Protection Agency's (EPA's) rationale for approving the TMDLs for pH and fecal coliform bacteria in the Meadow River Watershed. The TMDLs were developed to address impairments of water quality as identified in West Virginia's 2014 Section 303(d) list of impaired waters. The West Virginia Department of Environmental Protection (WVDEP) submitted the report, *Total Maximum Daily Loads for the Meadow River Watershed, West Virginia*, to EPA on October 26, 2016. EPA's rationale is based on the determination that the TMDLs meet the seven regulatory requirements pursuant to 40 CFR§130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3) The TMDLs consider the impacts of background pollutant contributions.
4) The TMDLs consider critical environmental conditions.
5) The TMDLs consider seasonal environmental variations.
6) The TMDLs include a margin of safety.
7) The TMDLs have been subject to public participation.

In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

From this point forward, all references in this rationale can be found in West Virginia's TMDL Report, *Total Maximum Daily Loads for the Meadow River Watershed, West Virginia*, unless otherwise noted.

II. Summary

Table 3-3 of the final TMDL document presents the waterbodies and impairments for which TMDLs have been developed in the Meadow River Watershed. West Virginia identified 20 streams in the Meadow River Watershed as impaired due to exceedances of the numeric water quality criteria for pH or fecal coliform bacteria in the Meadow River Watershed. Attachment 1

of this Decision Rationale presents the impaired waterbodies of the Meadow River Watershed.

Section 7.0 presents the TMDLs developed for the Meadow River Watershed on a daily load basis expressed in pounds per day or counts per day. The TMDLs are also represented in Microsoft Excel spreadsheets (submitted by West Virginia via compact disc) which provide detailed source allocations and successful TMDL scenarios. These spreadsheets also present TMDLs as average annual loads because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The loads are expressed in tons per year or counts per year, which may be divided by 365 days per year to express the TMDLs in tons per day or counts per day. A technical report was included by West Virginia to describe the detailed technical approaches that were used during TMDL development and to display the data upon which the TMDLs were based. West Virginia also provided an ArcView Geographic Information System (GIS) project (and shapefiles) that explores the spatial relationships among the pollutant sources in the watershed.

III. Background

The Meadow River Watershed is located in the high Allegheny Mountains of southeastern West Virginia (Figure 3-1) within the Central Appalachian ecoregion. The Meadow River is a major tributary of the Gauley River, which flows into the Kanawha River, a major tributary of the Ohio River, which then discharges to the Mississippi River and flows to the Gulf of Mexico. The Meadow River is approximately 62 miles long and its watershed encompasses 365 square miles. The Meadow River begins as a mountain headwater stream in Summers County, and ends at the confluence of the Meadow and Gauley rivers five miles below the Summersville Dam. Of the 365 total square miles in the watershed, only 324 square miles were modeled under this TMDL effort. A fecal coliform bacteria TMDL was previously completed in the Sewell Creek Watershed in 2008. The dominant land use for the TMDL watersheds in the Meadow River Watershed is forest, which constitutes 86.2% of the total land use area. Other important modeled land use types include grassland (4.3%), pasture (2.8%), urban/residential (2.1%), wetland (1.4%), and barren (1.3%), as shown in Table 3-1. Individually, all other land cover types compose less than one percent of the total watershed area. The total population living in the subject watersheds of this report is estimated to be 5,000 people.

The impaired streams that are the subject of this TMDL will be included on West Virginia's 2016 Section 303(d) List. Documented impairments are related to numeric water quality criteria for pH and fecal coliform bacteria.

Sections 4.0 and 5.0 discuss the pH and fecal coliform bacteria source assessments in the Meadow River Watershed. The technical report has expanded details of the source assessment in the Meadow River Watershed. The sources of pH impairments in the watershed have been attributed solely to acid deposition but natural conditions may also be an influence due to acidic soils and wetlands/bogs. To restore water quality, streams affected by acid deposition will be treated with instream applications of fine-grained limestone pursuant to the pH TMDLs. The fecal coliform bacteria sources in the watershed include: wastewater treatment plants (WWTP), general sewage permits, and unpermitted sources, including on-site treatment systems,

stormwater runoff, agricultural run-off, and natural background (wildlife).

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the Meadow River Watershed TMDL for pH and fecal coliform bacteria. MDAS was developed to facilitate large scale, data intensive watershed modeling applications. The model is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. MDAS is capable of simulating different flow regimes and pollutant variations. A key advantage of the MDAS development framework is that it has no inherent limitations in terms of modeling size or upper limit model operations. In addition, the MDAS model allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel.

Configuration of the MDAS model involved subdividing the TMDL watershed into subwatershed modeling units connected by stream reaches. The 13 TMDL watersheds were broken into 170 separate subwatershed units, based on the groupings of impaired streams shown in Figure 3-2. The TMDL watershed was divided to allow for the evaluation of water quality and flow at pre-TMDL monitoring stations. The subdivision process also ensures a proper stream network configuration within the basin. The physical characteristics of the subwatersheds, weather data, land use information, continuous discharges, and stream data were used as input for the MDAS model. Flow and water quality were continuously simulated into the model on an hourly time-step. Model setup consisted of configuring two separate MDAS models: pH and fecal coliform bacteria.

The calibrated model provides the basis for performing the allocation analysis. The first step is to simulate baseline conditions, which represent existing nonpoint source loadings and point source loadings at permit limits. Baseline conditions allow for an evaluation of instream water quality under the highest expected loading conditions. The MDAS model was run for baseline conditions using hourly precipitation data for a representative simulation period (January 1, 2008 through December 31, 2013). The precipitation experienced over this period was applied to the land uses and pollutant sources as they existed at the time of TMDL development. Predicted instream concentrations were compared directly with the TMDL endpoints. This comparison allowed for the evaluation of the magnitude and frequency of exceedances under a range of hydrologic and environmental conditions.

The MDAS model provided allocations for pH and fecal coliform bacteria in the 20 impaired streams of the Meadow River Watershed. The TMDLs are shown in Section 7.0 and are presented as average daily loads of net acidity in pounds per day for pH and average number of colonies in counts per day for fecal coliform bacteria. EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA's policy and guidance. EPA's rationale for establishing these TMDLs is set forth according to the regulatory requirements listed below.

1. The TMDLs are designed to implement the applicable water quality standards.

The applicable numeric water quality criteria for pH and fecal coliform bacteria are shown in Table 2-1 of the final TMDL document. The applicable designated uses in the watershed include: propagation and maintenance of aquatic life in warmwater fisheries and troutwaters, water contact recreation, and public water supply. In various streams of the Meadow River Watershed, warmwater fishery aquatic life use impairments and troutwater aquatic life use impairments have been determined pursuant to exceedances of pH numeric water quality criteria. Water contact recreation and/or public water supply use impairments have also been determined in various waters pursuant to exceedances of numeric water quality criteria for fecal coliform bacteria and pH.

All West Virginia waters are subject to the narrative criteria in Section 3 of the Standards. That section, titled *Conditions Not Allowed in State Waters*, contains various general provisions related to water quality. The TMDLs presented in Section 7.0 are based upon the water quality criteria that are currently applicable for the pollutants for which the TMDLs are being developed. Where there is an applicable numeric criterion for a particular pollutant and uses, it is reasonable to use that criterion as the quantitative implementation of the narrative standard and designated uses. If the West Virginia Legislature adopts water quality standard revisions that alter the basis upon which the TMDLs are developed, then the TMDLs and allocations may be modified as warranted. Any future water quality standard revision and/or TMDL modification must receive EPA approval prior to implementation.

2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

A TMDL is the total amount of a pollutant that can be assimilated by receiving waters while still achieving water quality standards. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual WLAs for point sources, LAs for non-point sources, and natural background levels. In addition, TMDLs must include an MOS, either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving stream.

pH TMDLs

Source allocations were developed for all modeled subwatersheds contributing to pH impaired streams of the Meadow River Watershed. The allocation approach focused on increasing pH by assigning buffering capacity using the MDAS model to verify that the resultant pH under these conditions would be in compliance with pH criteria. Load allocation in terms of alkalinity addition are prescribed for each model subwatershed for each impaired stream. These effective loadings and field applications of acid neutralizing agents should be adjusted to compensate for purity and dissolution characteristics. The alkalinity additions associated with existing fine-grained limestone application in the watershed by the WVDNR were considered in model calibration but were not represented in baseline or allocated conditions because continued operation is not legally mandated.

Fecal Coliform Bacteria TMDLs

WLAs were developed for all facilities permitted to discharge fecal coliform bacteria. In the Meadow River Watershed, there are three individually permitted sewage treatment facilities associated with mining bathhouses that discharge to impaired streams via three outlets. There are six facilities under the package plant general permit (WV0103110) that regulates small, privately owned sewage treatment plants. These compliant facilities do not cause fecal coliform bacteria impairments because effluent limitations are more stringent than water quality criteria. There are no municipal separate storm sewer systems (MS4), combined sewer overflows (CSOs), or sanitary sewer overflows (SSOs) within the Meadow River Watershed.

Fecal coliform LAs were assigned to: pasture/cropland, on-site sewage systems including failing septic systems and straight pipes, residential loadings associated with urban/residential runoff from non-MS4 areas, and loadings associated with wildlife sources. Failing on-site septic systems and straight pipes are a significant nonpoint sources of fecal coliform bacteria in the Meadow River Watershed. There are approximately 1,047 homes in the watershed that are not served by a centralized collection and treatment system and are within 100 meters of a stream. To calculate failing septic wastewater flows, the TMDL watershed was divided into four septic failure zones, and septic failure zones were delineated by soil characteristics.

3. The TMDLs consider the impacts of background pollutant contributions.

The Meadow River Watershed TMDLs consider the impact of background pollutant contributions by looking at loadings from background sources like forest and wildlife. MDAS also considers background pollutant contributions by modeling all land uses.

4. The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR §130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the impaired waterbody is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards. Critical conditions for waters impacted by land based sources generally occur during periods of wet weather and high surface runoff. In contrast, critical conditions for non-land-based point source dominated systems generally occur during low flow and low dilution conditions.

Both high-flow and low-flow periods were taken into account during TMDL development for the Meadow River Watershed by using a long period of weather data, (January 1, 2008 to

December 31, 2013) that represented wet, dry, and average flow periods. Figure 6-2 presents the range of precipitation conditions that were used for TMDL development.

5. The TMDLs consider seasonal environmental variations.

Seasonal variations were considered in the formulation of the MDAS modeling analysis. Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrological and source loading variability. The pollutant concentrations simulated on a daily time-step by MDAS were compared with TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed.

6. The TMDLs include a Margin of Safety.

The CWA and Federal regulations require TMDLs to include a MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly be allocating a portion of the allowable load to the MOS. In the TMDLs developed for the Meadow River Watershed, an explicit MOS of five percent was included to counter uncertainty in the modeling process.

7. The TMDLs have been subject to public participation.

An informational public meetings were held in Rainelle, WV at Rainelle City Hall on May 14, 2013. The meeting occurred prior to pre-TMDL stream monitoring and pollutant source tracking and included a general TMDL overview and a presentation of planned monitoring and data gathering activities. A project status update meeting was held in Rainelle, WV at the Rainelle Public Library on March 10, 2016. A public meeting was held to present the draft TMDLs on September 8, 2016 in Rainelle, WV at Rainelle Elementary to provide information to stakeholders intended to facilitate comments on the draft TMDLs. Beginning on August 25, 2016, the availability of draft TMDLs was advertised in various local newspapers. Interested parties were invited to submit comments during the public comment period, which began on August 26, 2016 and ended on September 26, 2016. West Virginia did not receive any written comments on the Draft TMDLs.

IV. Discussion of Reasonable Assurance

Reasonable assurance for maintenance and improvement of water quality in the Meadow River Watershed rests primarily with two programs: the NPDES permitting program and the West Virginia Watershed Network. The NPDES permitting program is implemented by WVDEP to control point source discharges. The West Virginia Watershed Network is a cooperative nonpoint source control effort involving many state and federal agencies, whose task is the protection and/or restoration of water quality.

WVDEP's DWWM is responsible for issuing non-mining permits within the State.

WVDEP's Division of Mining and Reclamation developed NPDES permits for mining activities. As part of the permit review process, permit writers have the responsibility to incorporate the required TMDL WLAs into new or reissued permits. Both the permitting and TMDL development processes have been synchronized with the Watershed Management Framework cycle, such that TMDLs are completed just before the permit expiration/reissuance time frames. Permits for existing nonmining facilities in the Meadow River Watershed will be reissued beginning in July 1, 2017 and the reissuance of mining permits will begin January 1, 2018. New facilities will be permitted in accordance with future growth provisions in Section 8.0.

The Watershed Management Framework is a tool used to identify priority watersheds and coordinate efforts of state and federal agencies with the goal of developing and implementing watershed management strategies through a cooperative, long-range planning effort. The principal area of focus of watershed management through the Framework process is correcting problems related to nonpoint source pollution. Network partners have placed a greater emphasis on identification and correction of nonpoint source pollution. The combined resources of the partners are used to address all different types of nonpoint source pollution through both public education and on-the-ground projects. All nonpoint source restoration projects should include a monitoring component specifically designed to document resultant local improvements in water quality. These data may also be used to predict expected pollutant reductions from similar future projects.

The Meadow River Watershed Association is a citizen-based watershed association representing the Meadow River. Information concerning this association can be found at: http://www.dep.wv.gov/WWE/getinvolved/WSA_Support/Documents/WVWatershedAssoc.PDF

Within WVDEP DWWM, the Engineering and Permitting Branch's Engineering Section will be charged with the responsibility of evaluating sewer projects and providing funding. For information on upcoming projects, a list of funded and pending water and wastewater projects in West Virginia can be found at: http://www.wvinfrastructure.com/projects/index.php.

Attachment 1

Waterbodies and Impairments Addressed in in the Meadow River Watershed TMDL

Subwatershed	Stream Name	NHD Code	WV Code	pH	FC
Meadow River	Meadow River	WV-KG-55	WVKG-19		X
Burdette Creek	Piney Creek	WV-KG-55-AF-1	WVKG-19-L-1	X	
Meadow River	Toms Creek	WV-KG-55-AG	WVKG-19-M	X	
Meadow River	Kates Creek	WV-KG-55-AM	WVKG-19-O	X	
Meadow River	Surbaugh Creek	WV-KG-55-AT	WVKG-19-O.7	X	
Meadow Creek	Meadow Creek	WV-KG-55-AU	WVKG-19-P		X
Big Clear Creek	Big Clear Creek	WV-KG-55-BS	WVKG-19-U		X
Big Clear Creek	Old Field Branch	WV-KG-55-BS-16-G	WVKG-19-U-2-C	X	
Little Clear Creek	Little Clear Creek	WV-KG-55-CA	WVKG-19-V		X
Little Clear Creek	Beaver Creek	WV-KG-55-CA-3	WVKG-19-V-1		X
Otter Creek	Otter Creek	WV-KG-55-CH	WVKG-19-W		X
Otter Creek	UNT/Otter Creek RM 2.81	WV-KG-55-CH-10	WVKG-19-W-4		X
Otter Creek	UNT/Otter Creek RM 4.03	WV-KG-55-CH-11	WVKG-19-W-5		X
Otter Creek	Methodist Branch	WV-KG-55-CH-4	WVKG-19-W-1		X
Otter Creek	Smoot Branch	WV-KG-55-CH-8	WVKG-19-W-2		X
Meadow River	Callahan Branch	WV-KG-55-CM	WVKG-19-W.4		X
Buffalo Creek	Buffalo Creek	WV-KG-55-CU	WVKG-19-Y		X
Meadow River	Morris Fork	WV-KG-55-CV	WVKG-19-Y.1		X
Meadow River	Arrowwood Creek	WV-KG-55-G	WVKG-19-C	X	
Anglins Creek	Sugargrove Creek	WV-KG-55-N-6	WVKG-19-G-3	X	

Note:
RM river mile
UNT unnamed tributary
pH acidity impairment
FC fecal coliform bacteria impairment