



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

SEP 30 2011

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

Dear Mr. <sup>Scott</sup>Mandirola:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the West Virginia Department of Environmental Protection report *Total Maximum Daily Loads for Selected Streams in the North Branch Potomac River Watershed, West Virginia*. The draft TMDLs were subject to a public comment period from May 12, 2011 to June 10, 2011. The final TMDLs were submitted to EPA on July 28, 2011. The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in West Virginia's Section 303(d) List.

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. In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. Based on the information provided by WVDEP, the TMDLs for selected streams in the North Branch/Potomac River watershed satisfy each of these requirements. A copy of EPA's Rationale 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 Mr. Kuo-Liang Lai, P.E., West Virginia TMDL coordinator, at 215-814-5473, or Mrs. Helene Drago at 215-814-5796.

Sincerely,

A handwritten signature in black ink, appearing to read "Jon M. Capacasa". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jon M. Capacasa, Director  
Water Protection Division

cc: Mr. John Wirts (WVDEP)  
Mr. David Montali (WVDEP)



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**Decision Rationale**  
**Total Maximum Daily Loads for**  
**Selected Streams in the North Branch**  
**Potomac River Watershed**  
**West Virginia**

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**Jon M. Capacasa** Director  
**Water Protection Division**

Date: 9/30/2011

**Decision Rationale**  
**Total Maximum Daily Loads for Selected Streams in the**  
**North Branch Potomac River Watershed, West Virginia**

**I. Introduction**

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those waterbodies identified as impaired by a state where technology-based and other controls did 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 bacteria impairments on selected waterbodies in the North Branch Potomac River watershed. The TMDLs were developed to address impairments of water quality as identified in West Virginia's Section 303(d) lists of impaired waters. EPA's rationale is based on the determination that the TMDLs meet the following seven regulatory conditions pursuant to 40 CFR Part 130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLA) and load allocations (LA).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

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

From this point forward, all references in this approval rationale are found in West Virginia's TMDL Report *Total Maximum Daily Loads for Selected Streams in the North Branch Potomac River Watershed, West Virginia (dated September 2011)*, unless otherwise noted.

**II. Summary**

Table 3-3 (included as Attachment 1 in this document) presents the waterbodies and impairments for which TMDLs have been developed for the North Branch Potomac River watershed by the West Virginia Department of Environmental Protection (WVDEP). The majority of the 22 waterbodies were identified on West Virginia's 2010 Section 303(d) list for fecal coliform and biological impairments. Documented impairments are related to numeric water quality criteria for fecal coliform bacteria. Certain waters are also biologically impaired

based on the narrative water quality criteria of 47 CSR §2-3.2.i, which prohibits the presence of wastes in state waters that cause or contribute to significant adverse impacts on the chemical, physical, hydrologic, and biological components of aquatic ecosystems. All waters and impairments excluded from TMDL development in this effort will remain on West Virginia's Section 303(d) list and will have TMDLs developed later in accordance with West Virginia's Watershed Management Framework.

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the MOS. The option is always available to refine the TMDLs for re-submittal to EPA for approval.

The subwatershed appendices provide additional details relative to their respective impaired waters and the applicable TMDLs (sum of wasteload allocations + sum of load allocations + margin of safety). Table 7-1 (fecal coliform bacteria result) presents applicable TMDL for wasteload, LA, and MOS in each stream, as appropriate. Table 7-2 repeats these allocations as the appropriate TMDLs for the biological impaired streams. Allocation spreadsheets also provide applicable TMDLs, WLAs to individual point sources and LAs to categories of nonpoint sources. A Technical Report provides descriptions of the detailed technical approaches used throughout the TMDL development process. West Virginia developed an interactive ArcExplorer Geographic Information System (GIS) project that shows the spatial relationships between source assessment data and subwatershed TMDL allocations for selected streams in the North Branch Potomac River watershed. The TMDLs are presented as average daily loads (and average annual loads in the allocation spreadsheet of Technical Report) because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The loads are in counts per year which was divided by 365 days per year to express the TMDLs in counts per day.

### **III. Background**

The North Branch Potomac River watershed encompasses nearly 348 square miles and is located in the eastern panhandle of West Virginia (Figure 3-1). The three modeled TMDL mainstem drainages (New Creek, Patterson Creek, and Green Spring Run) flow southwest to northeast to their confluences with the North Branch Potomac mainstem. Cities and towns in the vicinity of the modeled watershed are Keyser, Fort Ashby, and Green Spring. The North Branch Potomac River Watershed is dominated by forest land use (77.7%), water (0.3%), wetland (<0.01%), with barren (0.1%), grassland (10.8%), agriculture (5.6%), and urban/residential (5.4%) land uses.

West Virginia conducted extensive water quality monitoring from July 2007 through June 2008, in the North Branch Potomac River watershed. The results of this effort were used to confirm the listing of waterbodies not meeting applicable water quality criteria and to identify impaired waterbodies that were not previously listed. TMDLs were developed for the impaired

waterbodies in three subwatersheds (Figure 3-2). Table 3-3 presents the 22 impaired waters for which TMDLs are developed.

WVDEP recently assumed responsibility for the TMDL Program and utilized the Watershed Management Framework cycle approach for TMDL development. The framework divides the state into 32 major watersheds and operates on a five-year, five-step process. The watersheds are divided into five hydrologic groups (A - E). Each group is assessed once every five years and waters are placed on the Section 303(d) list of impaired waters, as necessary. The TMDL process begins in the first year of the cycle with pre-TMDL sampling and public meetings in the affected watersheds. The data is compiled and TMDL development begins in year two of the cycle. In the third year, TMDL development continues and the TMDL is drafted. The TMDL is finalized in the fourth year. In the fifth year of the cycle, TMDL implementation is initiated through the National Pollutant Discharge Elimination System (NPDES) permitting process and efforts toward limiting nonpoint source loading. Throughout the TMDL development process, there are numerous opportunities for public participation and input.

### Computational Procedures

Section 4 of the TMDL report discusses biological impairments and stressor identification methods. Sources for bacteria and/or biological impairments in the North Branch Potomac River watershed are: individual and general sewage NPDES permits (point sources), and on-site treatment systems, urban/residential runoff, agriculture, and wildlife (nonpoint sources). Stressor identification indicated that biological impairments were caused by organic enrichment. The Technical Report has expanded details of the biological stressor identification and source assessment discussed in Sections 4 and 5 of the TMDL report.

Biological integrity/impairment is based on a rating of the stream's benthic macroinvertebrate community using the multimetric West Virginia Stream Condition Index (WVSCI). Biological impairments were addressed by developing TMDLs for specific stressors. West Virginia utilized a stressor identification process to determine the primary causes of biologically-impaired streams including metals toxicity, pH toxicity, sedimentation, organic enrichment, and ionic toxicity. Stressor identification was followed by stream-specific determinations of the pollutants for which TMDLs must be developed. Organic Enrichment for biological stressors was identified in the waters that also had violations of the numeric bacteria water quality criteria. It is expected that implementation of those bacteria-specific TMDLs would address the related biological impairment.

Section 6 describes the modeling processes employed during TMDL development. The Mining Data Analysis System (MDAS) model was used to represent the source-response linkage in the North Branch Potomac River watershed TMDL. MDAS is a comprehensive data management and modeling system that is capable of representing loads from nonpoint and point sources in the watershed and simulating in-stream processes. MDAS is used to simulate watershed hydrology and pollution transport, as well as stream hydraulics and instream water quality. It is capable of simulating different flow regimes and bacteria loading variations from point and nonpoint sources.

For example, during WVDEP source tracking process, the modeled watershed was divided into four septic failure zones based on the soil permeability, depth to bedrock, depth to groundwater and drainage capacity data, provided by the United States Department of Agriculture (USDA) County soil survey maps. Two types of untreated sewage flow failure rates are assumed (i.e., 25 and 50 gallons per house per day) in combined with the initial bacteria concentration (i.e., 10,000 counts per 100 ml) to calculate the initial bacteria LA from the nonpoint source category. This initial LA will be further refined during model calibration and the comparison of model output to pre-TMDL monitoring data.

West Virginia's numeric and water quality criteria and an explicit MOS were used to identify the TMDL endpoints. Both point and nonpoint sources were considered in the analysis and numeric endpoints were based on the calculated bacteria loading from the modeled watershed. Bacteria load reductions necessary to meet these endpoints were then determined. TMDL allocation scenarios were developed based on an analysis of the degree to which contributing sources could be reasonably reduced.

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 meet the applicable water quality standards.***

The applicable numeric water quality criteria are shown in Table 6-2. The applicable designated uses for all the waters subject to this report are; water contact recreation, and public water supply.

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 provisions relative to water quality. The narrative water quality criterion at 46 CSR §1-3.2.i prohibits the presence of wastes in state waters that cause or contribute to significant adverse impacts on the chemical, physical, hydrologic, and biological components of aquatic ecosystems. This provision is the basis for the biological impairment determinations. Biological impairment signifies a stressed aquatic community. WVDEP determines each stream's biological integrity based on a rating of the stream's benthic macroinvertebrate community using the multimetric WVSCI.

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

A TMDL is the total amount of a pollutant that can be assimilated by the receiving water 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 nonpoint sources, and natural background levels. In addition, the TMDL 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. Conceptually, this definition is denoted by the following equation:

## TMDL = Summation of WLAs + Summation of LAs + MOS

For purposes of these TMDLs only, WLAs are given to NPDES-permitted discharge points and LAs are given to discharges from activities that do not have an associated NPDES such as not-yet-regulated surface runoff. The decision to assign load allocations to these sources does not reflect any determination by WVDEP or EPA as to whether there are, in fact, unpermitted point source discharges. In addition, by establishing these TMDLs with surface runoff discharges treated as LAs, WVDEP and EPA are not determining that these discharges are exempt from NPDES permitting requirements.

Section 5 presents applicable TMDLs for point and nonpoint sources, as appropriate. Allocation spreadsheets also provide applicable TMDLs, WLAs to individual point sources and LAs to categories of unpermitted sources.

Point sources for fecal coliform in the North Branch Potomac River watershed include individual NPDES permits and general sewage permits. There is one permitted POTW (the Frankfort PSD Fort Ashby WWTP, WV0041521) with one outlet in the WV portion of the North Branch Potomac River watershed. Additionally, one privately owned sewage treatment plant (Knobley Estates Sanitation Corporation, WV0088897) discharged at one outlet in the watershed. There are no Sanitary Sewer Overflow or Combined Sewer Overflow, or Municipal Separate Storm Sewer System contributions in the fecal coliform allocations. There are no permitted Home Aeration Units (HAUs) and 11 facilities are registered under the "package plant" general permit (WV0103110). Permits for existing facilities in the North Branch Potomac watershed will be reissued beginning in July 2011. The fecal coliform bacteria WLAs for sewage treatment plant effluents are presented both as annual average loads, for comparison with other pollutant sources, and equivalent allocation concentrations. The prescribed concentrations are the operable allocations for NPDES permit implementation.

Nonpoint sources in the watershed included on-site treatment systems, urban/residential runoff, agriculture, and wildlife (natural background). Failing septic systems and straight pipes are the major contribution sources of fecal coliform bacteria for this watershed. WVDEP estimated that 6,164 homes in the modeled watershed area are not served by centralized sewage collection and treatment systems. Estimated septic system failure rates range from three to 28 percent throughout the modeled watershed.

The Allocation Spreadsheet presents the detailed bacteria TMDLs, LAs, WLAs, and MOS results. The TMDLs are presented as average daily load and average annual load because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year.

The TMDL development methodologies prescribe allocations that achieve water quality criteria throughout the watershed. Various provisions attempt equity between categories of sources and the targeting of pollutant reductions from the most problematic sources. Nonpoint source reductions did not result in loading contributions less than the natural conditions, and point source allocations were not more stringent than numeric water quality criteria.



**3. *The TMDLs consider the impacts of background pollution.***

The TMDL considers the impact of background pollutant contributions by considering loadings from background sources like wildlife. The MDAS model 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.

Critical conditions were considered while considering seasonal variations, by running the daily simulation model for a representative six years, from January 1, 1998 through December 31, 2003, for MDAS.

High and low flow stream conditions and all point and nonpoint source loads were included in the development of these TMDLs, by using a long period of weather data that represented wet, dry, and average flow periods. Accordingly, the TMDL considers critical conditions.

**5. *The TMDLs consider seasonal environmental variations.***

Seasonal variations were considered while considering critical conditions, by running the daily simulation model for six years, from January 1, 1998 to December 31, 2003 for MDAS. Continuous simulation (modeling over a period of several years that captures precipitation extremes) inherently considers seasonal hydrologic and source loading variability.

**6. *The TMDLs include a Margin of Safety.***

The CWA and Federal regulations require TMDLs to include an 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 by allocating a portion of the allowable load to the MOS.

An explicit MOS of five percent was included to counter uncertainty in the modeling process. West Virginia did not include a discussion regarding an implicit MOS, but did use conservative model assumptions (such as assuming all point sources continually discharge at permit limits) to develop the allocations. An explicit MOS of five percent was also included by reducing the applicable West Virginia water quality numeric criteria by five percent as the end points for addressing correspondent pollutants in these TMDLs.

**7. *The TMDL has been subject to public participation.***

Section 9 describes the public participation which included two meetings (May 31, 2007 and October 19, 2010) to present information on fundamental TMDL concepts and to present West Virginia's proposed TMDL allocation strategies, a 30-day public comment period, and a final public informational meeting. The thirty-day public comment period was held from May 12, 2011 to June 10, 2011, with a public meeting held on May 31, 2011, in at the Mineral County Health Department in Keyser, West Virginia. West Virginia received no comments on the draft TMDLs as noted in Section 9.1 of the public version of this TMDL.

**IV. Discussion of Reasonable Assurance**

Section 8 discusses the future growth in the North Branch Potomac River watershed TMDL. A new facility could be permitted in the watershed, provided that effluent limitations are based upon the achievement of water quality standards end-of-pipe for the pollutants of concern in the TMDL. It is expected that the implementation of the TMDLs will consist of providing public sewer service to unsewered areas.

Section 10 addresses reasonable assurance. There are three primary programs in effect which provide reasonable assurance that the TMDLs will be implemented. Section 10.1 discusses permit reissuance by WVDEP's Division of Water and Waste Management scheduled to begin in July 2011. Section 10.2 discusses the Watershed Management Framework Process. Section 10.3 discusses special reclamation projects. West Virginia provides a website for public to search the further information on upcoming projects, a list of funded and pending water and wastewater projects.

Section 11 discusses monitoring activities, including NPDES compliance, nonpoint source project monitoring, and TMDL effectiveness monitoring.

**Attachment 1**

**Table 3.3. Waterbodies and Impairments for which TMDLs have been Developed**

TMDL Watershed	Stream Name	Stream Code	FC	BIO
Green Spring Run	Green Spring Run	WV-PNB-2	x	
Patterson Creek	Patterson Creek	WV-PNB-14	x	
Patterson Creek	Plum Run	WV-PNB-14-B	x	
Patterson Creek	Horseshoe Creek	WV-PNB-14-I	x	x
Patterson Creek	UNT/Painter Run RM 0.9	WV-PNB-14-F-2	x	
Patterson Creek	Cabin Run	WV-PNB-14-AI	x	x
Patterson Creek	Pargut Run	WV-PNB-14-AI-7	x	x
Patterson Creek	UNT/Patterson Creek RM 16.25	WV-PNB-14-AL	x	x
Patterson Creek	Beaver Run	WV-PNB-14-AW	x	
Patterson Creek	Mill Creek	WV-PNB-14-BV	x	x
Patterson Creek	Elliber Run	WV-PNB-14-CH	x	
Patterson Creek	Mikes Run	WV-PNB-14-CK	x	
Patterson Creek	North Fork/Patterson Creek	WV-PNB-14-DM	x	
Patterson Creek	Elklick Run	WV-PNB-14-DM-13	x	
Patterson Creek	UNT/North Fork RM 8.37/ Patterson Creek	WV-PNB-14-DM-14	x	
Patterson Creek	Middle Fork/Patterson Creek	WV-PNB-14-DQ	x	x
New Creek	New Creek	WV-PNB-31	x	x
New Creek	UNT/New Creek RM 1.30	WV-PNB-31-A	x	
New Creek	Stony Run	WV-PNB-31-D	x	
New Creek	Block Run	WV-PNB-31-G	x	
New Creek	UNT/New Creek RM 4.26	WV-PNB-31-H	x	x
New Creek	King Run	WV-PNB-31-K	x	

Note:

RM = River Mile

UNT = unnamed tributary.

FC indicates fecal coliform bacteria impairment

BIO indicates a biological impairment

