

TMDL: Final Nutrient Total Maximum Daily Load for Locust Fork and Village Creek

ATTAINS TMDL ID: 67682

LOCATION: Blount/Jefferson County, Alabama

STATUS: Final

IMPAIRMENT/POLLUTANT: Five segments of Locust Fork and one segment of Village Creek (see next page) in the Locust Fork watershed are not meeting water quality criteria for nutrients and are not supporting the designated uses of fish and wildlife, public water supply, and swimming. A TMDL was submitted by Alabama Department of Environmental Management (ADEM) that provides nutrient loads to address the impairment.

BACKGROUND: ADEM submitted the final *Nutrient Total Maximum Daily Loads for Locust Fork and Village Creek* (the “TMDL,” “Submission,” or “Report”) with a submittal letter, requesting review and approval, to the EPA Region 4 dated December 21, 2017. The letter was electronically signed by Kimberly Minton, Chief of the Modeling and Analysis Section of the Water Quality Branch at ADEM. The initial draft TMDL was submitted to EPA on March 28, 2017 for review, and a revised draft was submitted to EPA on September 5, 2017.

The submission included:

- Submittal letter
- Final *Nutrient Total Maximum Daily Load for Locust Fork and Village Creek* with the following elements:
 - Public Notice for the Draft TMDLs
 - Public Notice Extension for the Draft TMDLs
 - ADEM’s Response to Public Comments
 - Model Calibration Report

This document explains how the Submission meets the statutory and regulatory requirements of TMDLs in accordance with section 303(d) of the Clean Water Act and the EPA’s implementing regulations in 40 CFR Part 130.

REVIEWERS: Chauncey Orr, MPH, TMDL/Assessment and Listing Coordinator,
orr.chauncey@epa.gov

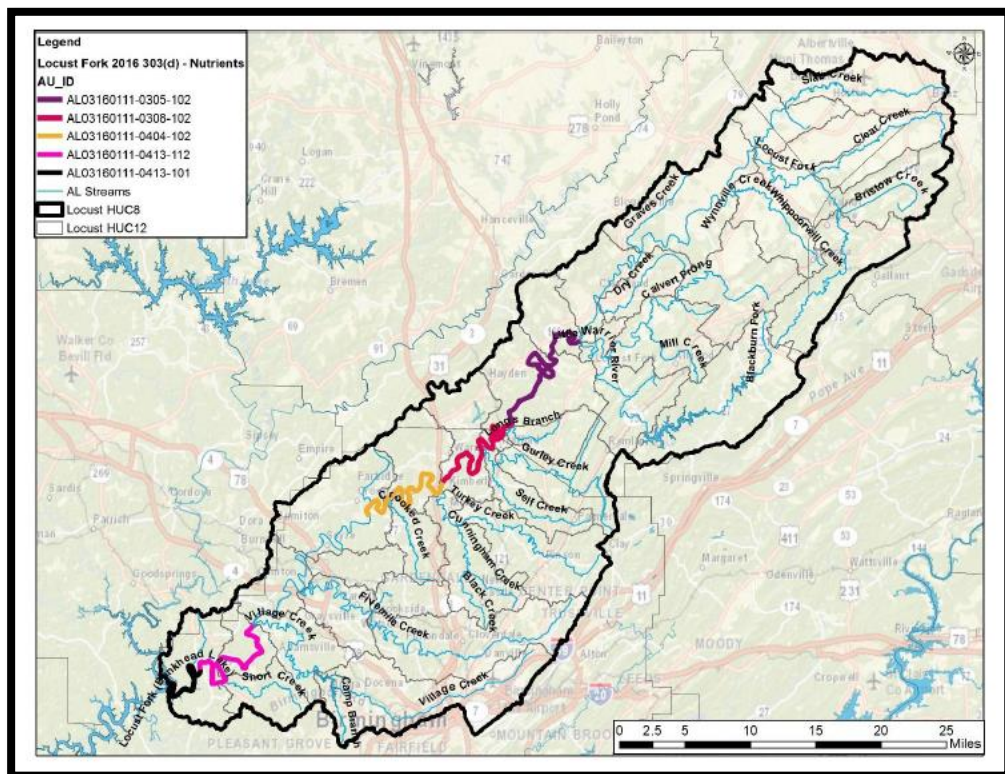
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Waters Addressed in this TMDL Approval Action:

Waterbody Name	Assessment Unit ID	River Basin	Impaired Reach (miles/acres)
Locust Fork	AL03160111-0305-102	Black Warrior	18.15 miles
Locust Fork	AL03160111-0308-102	Black Warrior	14.86 miles
Locust Fork	AL03160111-0404-102	Black Warrior	14.25 miles
Locust Fork	AL03160111-0413-112	Black Warrior	426.66 acres
Locust Fork	AL03160111-0413-101	Black Warrior	625.96 acres
Village Creek	AL03160111-0409-100	Black Warrior	17.90 miles

Location of Waters Addressed in this TMDL Approval Action:

The Locust Fork watershed flows primarily through Jefferson and Blount counties, and the north-eastern headwaters flow through Marshall and Etowah counties. Locust Fork flows southwest for a total stream length of 160 miles before its confluence with Mulberry Fork in Bankhead Lake Reservoir. The total drainage area is approximately 1209 square miles.

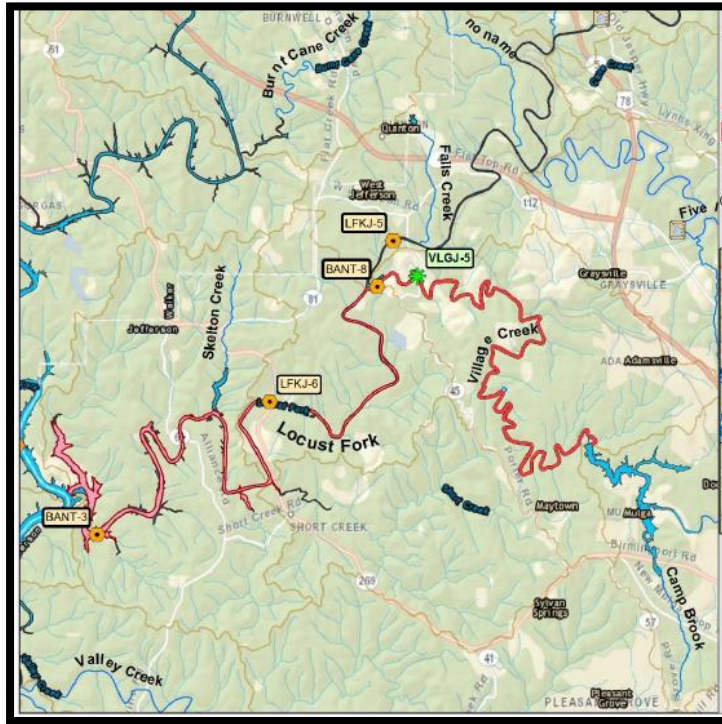


Locust Fork Watershed-Waterbody Designated Uses and 2016 §303(d) Segments
(Figure 1.2.2 in the Nutrient Total Maximum Daily Loads for Locust Fork and Village Creek)

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Village Creek is located in the Black Warrior River basin in Jefferson County. Village Creek is a tributary to Locust Fork located west of Birmingham. The total drainage area of the impaired segment is 17.90 square miles.



Village Creek Nutrient 2016 §303(d) Segment
(Figure 2.2.2.1 in the Nutrient Total Maximum Daily Loads for Locust Fork and Village Creek)

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This document contains the EPA's review of the above-referenced TMDL. This TMDL review document includes TMDL review guidelines that summarize currently effective statutory and regulatory requirements relating to TMDLs. These TMDL review guidelines are not themselves regulations. Any differences between these guidelines and the EPA's TMDL regulations should be resolved in favor of the regulations themselves. The italicized sections of this document describe the EPA's statutory and regulatory requirements for approvable TMDLs. The sections in regular type reflect the EPA's analysis of the state/tribe's compliance with these requirements.

Section 303(d) of the Clean Water Act (CWA) and the EPA's implementing regulations at 40 CFR Part 130 set out the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for the EPA to determine if a submitted TMDL fulfills the legal requirements for approval under section 303(d) and the EPA regulations and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Water Body, Pollutant of Concern and Pollutant Sources

*The TMDL analytical document must identify the water body as it appears on the state/tribe's 303(d) list, including the pollutant of concern. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for the EPA's review of the load and wasteload allocations, which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll *a* and phosphorus loadings for excess algae.*

Locust Fork is a major tributary to the Black Warrior River. A length of 47.24 stream miles and an area of 1,052.62 acres of the Locust Fork watershed is within the United States Geological Survey (USGS) Hydrologic Unit Code (HUC) 03160111, and the stream is impaired for nutrients. Locust Fork is located in Blount and Jefferson counties Alabama. Locust Fork flows southwest for a total stream length of 160 miles before its confluence with the Mulberry Fork in Bankhead Lake Reservoir.

The TMDL report also addresses impairments in Village Creek. A length of 17.90 stream miles of Village Creek is impaired for nutrients. Identical to Locust Fork, the USGS HUC for Village Creek is 03160111. Village Creek is located in Jefferson County.

The TMDL report notes that Locust Fork was originally added to the §303(d) List of Impaired Waters in 1998 for a nutrient impairment. The impaired segment was added based upon a review of federally threatened and endangered species data published by the U.S. Fish and Wildlife Service (USFWS) in 1996. In 2004, the impaired reach was re-segmented from one segment to three individual segments. In 2012, ADEM added two additional segments of Locus Fork, that were also impaired for nutrients, to the 2012 §303(d) list.

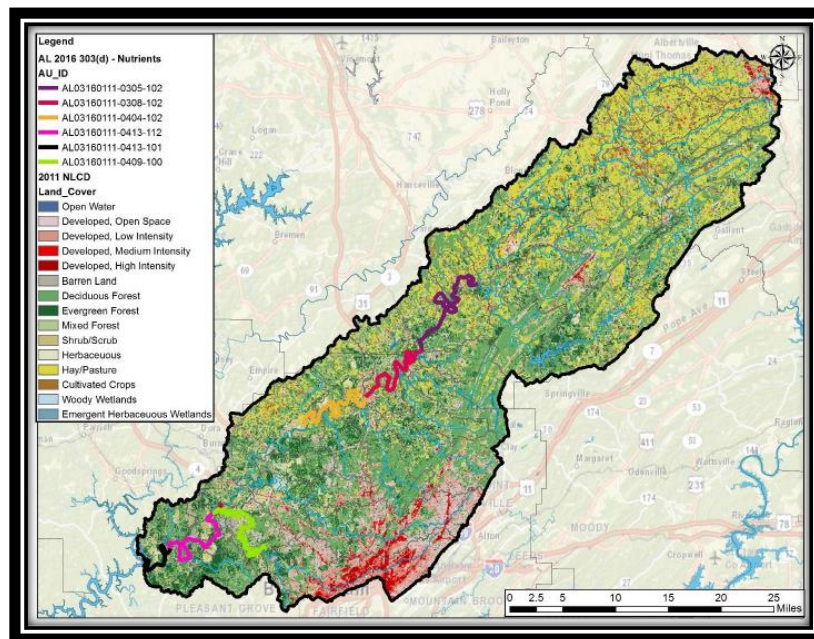
There are several maps in the TMDL report that identify land use, impaired segments, eco-regions, point sources, etc.

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Figures in the TMDL Report

Figure Number	Description
1.2.1	Location of Locust Fork Watershed
1.2.2	Waterbody Designated Use and 2016 303(d) Segments
1.2.1.2	Location of USGS Flow Gages
1.2.2.1	Watershed Eco-regions
2.2.1.1	Watershed 2016 303(d) Segments
2.2.2.1	Village Creek 303(d) Segment
3.2.1	Monitoring Project Stations
4.2.1.1	NPDES Continuous Point Sources
4.2.2.1	Phase 1 and 2 MS4 Boundary Areas
4.3.1	National Land Cover Dataset
4.3.2	Impervious Cover Percentage

There are 33 National Pollutant Discharge Elimination System (NPDES) permitted continuous point source facilities that discharge within the Locust Fork and Village Creek watersheds. There are 4 industrial facilities and 29 municipal facilities. There are several NPDES permitted Concentrated Animal Feeding Operation (CAFO) in the Locust Fork/Village Creek watersheds. Landcover, as shown in Figure 4.3.1 in the TMDL report, is primarily forested (50.5%), followed by agriculture (22.0%) and then followed by developed land (15.1%).



*Land Use Map for the Locust Fork Watershed
(Taken from the TMDL Report- Figure 4.3.1)*

The source of nutrients has been linked to the point sources throughout the Locust Fork/Village Creek watersheds. Water quality data reveal elevated levels of nutrients, specifically phosphorus, immediately downstream of point sources throughout the watersheds.

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Assessment: The EPA concludes that Alabama has adequately identified the impaired water bodies, the pollutant of concern, and the magnitude and location of the pollutant sources.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable state/tribe water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the statewide antidegradation policy. Such information is necessary for the EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

The impaired segments of Locust Fork and Village Creek have the following designated uses: fish and wildlife (F&W), public water supply (PWS), and swimming (S). Narrative criteria serve as a basis for determining attainability and subsequently listing and delisting waters from Alabama's §303(d) List. The narrative criteria for minimum conditions for all state waters can be found in ADEM's Administrative Code 335-6-10-.06(a)-(c):

335-6-10-.06 Minimum Conditions Applicable to All State Waters: The following minimum conditions are applicable to all State waters, at all places and at all times, regardless of their uses:

- (a) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes that will settle to form bottom deposits which are unsightly, putrescent or interfere directly or indirectly with any classified water use.
- (b) State waters shall be free from floating debris, oil, scum, and other floating materials attributable to sewage, industrial wastes or other wastes in amounts sufficient to be unsightly or interfere directly or indirectly with any classified water use.
- (c) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes in concentrations or combinations, which are toxic or harmful to human, animal or aquatic life to the extent commensurate with the designated usage of such waters.

Under this criteria, Locust Fork was listed as impaired in the 1998 section 303(d) list and Village Creek was listed as impaired in the 2012 section 303(d) list for nutrients.

The non-wadeable tributary segment of Locust Fork is greatly improved in comparison to the wadeable segments. Elevated concentrations of nutrients in the wadeable segments and major tributaries are being expressed downstream in the lake segments. Therefore, ADEM has established a TMDL endpoint of a chlorophyll-a (Chla) concentration of 18 µg/L. This Chla concentration is protective of the designated use of the tributary lake embayment, lake segments and the wadeable segments.

Assessment: The EPA concludes that Alabama has properly addressed its water quality standard when setting a numeric water quality target.

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3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in the EPA guidance, a TMDL identifies the loading capacity of a water body for a particular pollutant. The EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 CFR section 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 CFR section 130.2(i)). The TMDL submittal must identify the water body's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for the EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the water body as part of the analysis of loading capacity (40 CFR section 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the water body in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. 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.

The loading capacity is explained in Chapter 5 of the TMDL report. ADEM used the following models to calculate the nutrient TMDLs for Locust Fork and Village Creek:

- Loading Simulation Program in C++ model (LSPC version 4.1.0)
- The Environmental Fluid Dynamics Code (EFDC) program
- The Water Quality Analysis Simulation Program (WASP 7.52)

Water quality models were used to predict the necessary nutrient reductions needed in the Locust Fork/Village Creek watersheds. A series of model runs using the 3 water quality models were used to compare the predicted response of Chla concentration at station BANT-3 in the Locust Fork watershed. Multiple TMDL reduction scenarios (Table 6.3.3.1) were assessed in order to achieve the target Chla concentration of 18 µg/L. The department decided that the TMDL will be based on the TMDL scenario run #16 (Table 6.3.3.1). The final applicable total phosphorus effluent limitations for point sources will be 0.25 mg/L for Class 1 facilities; 2 mg/L for Class 2 facilities; and 6 mg/L for Class 3 facilities. Description of classes can be found on table 6.3.2.1 in the TMDL report.

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Table 6.3.3.1 Locust Fork TMDL Reduction Scenario Results

ID	Description			Station	Chlorophyll-a µg/l - Growing Season Average (April 1 st – October 31 st)						Overall GS Average 2007-2012
					2007	2008	2009	2010	2011	2012	
M	Measured			BANT-3	27.2 n=7 ^a		24.6 n=1 ^a		11.7 n=7 ^a	15.1 n=7 ^a	19.7
CAL	Calibrated			BANT-3	19.2	12.6	12.7	12.8	13.6	20.6	15.3
NC	Natural Conditions			BANT-3	1.1	1.8	2	1.5	1.5	2.4	1.7
PC	Permit Conditions			BANT-3	73.2	36.8	25.6	55.8	40.2	33.5	44.2
Run #1	LA Reduction Only			BANT-3	73.2	36.7	25.5	55.7	40.1	33.5	44.1
TMDL Run	Class 1 Qw ≥ 1 mgd	Class 2 1 mgd > Qw ≥ 0.1 mgd	Class 3 Qw < 0.1 mgd	Station	Chlorophyll-a µg/l - Growing Season Average (April 1 st – October 31 st)						Overall GS Average 2007-2012
					2007	2008	2009	2010	2011	2012	
Run #2	2 mg/L	3 mg/L	3 mg/L	BANT-3	77	40.1	26.2	62	42.8	34.9	47.2
Run #3	2 mg/l	2 mg/l	2 mg/l	BANT-3	76.8	39.9	26.2	61.6	42.6	34.8	47.0
Run #4	1 mg/l	3 mg/L	3 mg/L	BANT-3	59.1	28.3	20.8	40.6	30.4	28.4	34.6
Run #5	1 mg/l	2 mg/l	2 mg/l	BANT-3	58.6	28	20.6	40	30	28.2	34.2
Run #6	1 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	61.1	29.5	21.6	42.7	31.9	29.2	36.0
Run #7	0.5 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	46.1	21.2	16.5	28	22.8	24.4	26.5
Run #8	0.3 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	38.4	17.3	13.7	21.5	18.4	21.4	21.8
Run #9	0.2 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	34.1	15	11.9	18.1	15.9	19.6	19.1
Run #10	0.15 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	31.8	13.8	11.0	16.3	14.5	18.6	17.7
Run #11	0.10 mg/L	8.34 lbs/day	8.34 lbs/day	BANT-3	29.4	12.5	10.0	14.6	13.2	17.4	16.2
Run #12	0.3 mg/L	1 mg/l	5 mg/l	BANT-3	33.8	14.6	11.4	17.5	15.0	18.9	18.5
Run #13	0.2 mg/L	1 mg/l	8.34 lbs/day	BANT-3	31.7	13.6	10.7	16.1	14.1	18.3	17.4
Run #14	0.25 mg/L	2 mg/l	5 mg/l	BANT-3	32.3	13.8	10.8	16.4	14.2	18.3	17.6
Run #15 ^b	0.25 mg/L	2 mg/l	6 mg/l	BANT-3	32.6	14.1	11.1	16.8	14.6	18.6	18.0
Run #16	0.25 mg/L	2 mg/l	6 mg/l	BANT-3	32.5	13.9	10.8	16.5	14.3	18.4	17.7

a: n=Number of samples

b: Scenario run with 0% LA reduction

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Table 6.3.2.1 Point Source Categories

Point Source Category	Effluent Flowrate (Qw)
Class 1	Qw ≥ 1.0 MGD
Class 2	Qw < 1.0 MGD & Qw ≥ 0.1 MGD
Class 3	Qw < 0.1 MGD

Assessment: The EPA concludes that the loading capacity, having been calculated using the EPA-reviewed water quality models, and using observed concentration data and water quality targets consistent with numeric water quality criteria, has been appropriately set at a level necessary to attain and maintain the applicable water quality standard. The TMDL is based on a reasonable approach for establishing the relationship between pollutant loading and water quality.

4. Load Allocation (LA)

The EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 CFR section 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 CFR section 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

There are several land use types in the Locust Fork/Village Creek watersheds and their drainage areas. Figure 4.3.1 in the TMDL report describes the land cover for the Locust Fork watershed. The mid and upper regions of the watershed are forested and agriculture. Forested land cover generally minimally contributes to sources of nutrient enrichment. Forested areas tend to serve as a natural filter of pollution. Agricultural practices in the watershed are significant contributors to nonpoint source pollution in rivers and streams.

In the south eastern portion of the watershed, the land is predominantly developed. Urban development changes the hydrological regime within the watershed. Stormwater runoff from impervious surfaces, such as sidewalks and asphalt parking lots can deposit excessive nutrients into nearby waterbodies.

Nutrient reductions to nonpoint sources will reduce the impact of nutrient enrichment in the Locust Fork watershed. According to the TMDL report, the establishment of BMPs at a localized level will help improve water quality within the watershed.

The local allocation was derived from the LSPC watershed model output for the Locust Fork segment located in the headwaters of the watershed. The load allocation reduction was based on an evaluation of

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the median daily TP load under the existing conditions compared to the median daily TP load under natural conditions, and can be found in table 7.5.1.2 in the TMDL report.

Table 7.5.1.2 Load Allocation Calculations for Locust Fork Sub-watershed 461

	Existing Conditions	Natural Conditions
Statistic	TP Daily Load (ppd)	TP Daily Load (ppd)
Minimum	0.05	0.03
10th percentile	0.36	0.15
Median	3.85	2.46
90th Percentile	58.00	20.18
Maximum	3499.31	637.54
Average	33.03	10.22
	Percent Reduction	36%

According to the TMDL report, “In order to explore the sensitivity of the model network to the load allocation component of the TMDL, a globalized 36% reduction was implemented to the total phosphorus loads originating from those land use types in the watershed associated with nonpoint source pollution identified earlier.” Based upon the model, when **solely** addressing the nonpoint source of nutrient loading in the watershed, a 36% reduction will minimally impact the instream Chla concentrations.

Assessment: The EPA concludes that the LAs provided in the Report are reasonable and will result in attainment of the water quality standards.

5. Wasteload Allocation (WLA)

The EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 CFR section 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. However, it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the state/tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

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The TMDL development utilized a series of water quality models (LSPC, EFDC, and WASP) to accurately predict the necessary nutrient reduction in the watershed to meet the established Chla target. ADEM ran a calibrated model run, a natural conditions scenario, and a permit conditions scenario, and compared them against a series of reduction scenarios (Table 6.3.2.2 and Table 6.3.3.1 in the TMDL report). Multiple TMDL reduction scenarios were assessed in order to achieve an overall growing season average concentration less than the established Chla target concentration of 18 µg/L. The TMDL WLA will be based on effluent limits considered in TMDL scenario run #16.

Table 6.3.2.2 Locust Fork and Village Creek TMDL Reduction Scenarios

Scenario Description	March - October Total Phosphorus Effluent Limit			Urban Nonpoint Source (MS4)	Nonpoint Source
	Class 1	Class 2	Class 3	TP Load Percent Reduction	TP Load Percent Reduction
	Effluent Flowrate ≥ 1 MGD	1 MGD > Effluent Flowrate ≥ 0.1 MGD	Effluent Flowrate < 0.1 MGD		
Calibrated Run	Existing (20062012)	Existing (20062012)	Existing (20062012)	N/A	N/A
Natural Condition	No Point Source Discharges	No Point Source Discharges	No Point Source Discharges	100% Forested Landuse	100% Forested Landuse
Permit Condition	DMR - TP @ 90 th Percentile	DMR - TP @ 90 th Percentile	DMR - TP @ 90 th Percentile	N/A	N/A
Reduction Scenario #1	DMR - TP @ 90 th Percentile	DMR - TP @ 90 th Percentile	DMR - TP @ 90 th Percentile	36%	36%
Scenario #2	2 mg/L	3 mg/L	3 mg/L	36%	36%
Scenario #3	2 mg/l	2 mg/l	2 mg/l	36%	36%
Scenario #4	1 mg/l	3 mg/L	3 mg/L	36%	36%
Scenario #5	1 mg/l	2 mg/l	2 mg/l	36%	36%
Scenario #6	1 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #7	0.5 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #8	0.3 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #9	0.2 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #10	0.15 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #11	0.10 mg/L	8.34 lbs/day	8.34 lbs/day	36%	36%
Scenario #12	0.3 mg/L	1 mg/l	5 mg/l	36%	36%
Scenario #13	0.2 mg/L	1 mg/l	8.34 ppd	36%	36%
Scenario #14	0.25 mg/L	2 mg/l	5 mg/l	36%	36%

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Scenario #15	0.25 mg/L	2 mg/l	6 mg/l	0%	0%
Scenario #16	0.25 mg/L	2 mg/l	6 mg/l	36%	36%

There are MS4 NPDES Phase 1 municipalities (Table 4.2.2.1 in the TMDL report), MS4 NPDES Phase 2 municipalities (Table 4.2.2.2 in the TMDL report), NPDES CAFOs, NPDES permitted mining facilities, and NPDES construction stormwater general permit holders that also discharge to the Locust Fork/Village Creek watersheds. ADEM has determined that total phosphorus loads originating from mining facilities and general construction permits are not contributing factors to the existing nutrient impairment in the Locust Fork/Village Creek watersheds. Therefore, a WLA will not be established for NPDES permitted mining facilities and NPDES permitted construction stormwater facilities in the Locust Fork/Village Creek watersheds. ADEM prohibits the discharge of pollutants from CAFO facilities and land application to nearby waters of the state. CAFOs are required to implement and maintain effective BMPs for animal waste production, storage, treatment, transport, and proper disposal or land application that meet or exceed USDA-Natural Resources Conservation Service (NRCS) technical standards and guidelines. NPDES MS4 permits do not include numeric total phosphorus limitations. Therefore, compliance with the WLA in the TMDL report will be demonstrated through the implantation of stormwater management plans (SWMPs). SWMPs will address nutrient reductions by implementing BMPs, eliminating illicit discharges, conducting instream water quality monitoring, education, and outreach. The 36% reduction as explained in the TMDL report should not be interpreted as a numeric permit limitation to existing MS4 total phosphorus loads.

ADEM has issued NPDES permits to 33 regulated continuous point source municipal and industrial facilities that discharge within the Locust Fork watershed (Table 4.2.1.1)

Table 4.2.1.1 NPDES Continuous Point Source Discharges in the Locust Fork Watershed

NPDES #	Latitude	Longitude	Facility	Type	Receiving Waterbody	County	Design Flow (MGD)
AL0023647	33.5267	-86.8933	Jefferson County Village Creek WWTP	Municipal	Village Creek	Jefferson	60
AL0023647	33.5339	-86.9061	Jefferson County Village Creek WWTP	Municipal	Village Creek	Jefferson	60
AL0026913	33.5942	-86.8676	Jefferson County Fivemile Creek	Municipal	Fivemile Creek	Jefferson	30
AL0049603	34.206	-86.1908	Boaz Slab Creek WWTP	Municipal	Slab Creek UT	Marshall	4.88
AL0003247	33.5853	-86.7908	ERP Compliant Coke LLC	Industrial	Fivemile Creek	Jefferson	4.73
AL0022926	33.7133	-86.6997	Jefferson County Turkey Creek WWTP	Municipal	Turkey Creek	Jefferson	5
AL0049549	33.9261	-86.5292	Oneonta WWTP	Municipal	Mill Creek	Blount	2.2
AL0001449	34.0499	-86.577	Tyson Farms Blountsville	Industrial	Graves Creek	Blount	1.339
AL0056120	33.6416	-86.9522	Jefferson County Prudes Creek WWTP	Municipal	Fivemile Creek	Jefferson	0.9

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AL0053121	33.7419	-86.8131	Morris Manor Apartments WWTP	Municipal	Turkey Creek	Jefferson	0.5
AL0001554	33.5482	-86.7608	CMC Steel Alabama	Industrial	Village Creek UT	Jefferson	0.380
AL0003417	33.5886	-86.7814	ABC Coke, Drummond Company Inc.	Industrial	Fivemile Creek	Jefferson	0.404
AL0058572	34.1328	-86.413	Snead WWTP	Municipal	Locust Fork	Blount	0.15
AL0073261	33.9741	-86.5752	Cleveland WWTP	Municipal	Dry Creek UT	Blount	0.15
AL0050881	33.8081	-86.8319	Jefferson County Warrior WWTP	Municipal	Cane Creek	Jefferson	0.10
AL0071170	33.8269	-86.6961	County Line Industrial Park WWTP	Municipal	Longs Branch	Blount	0.099
AL0051055	33.6861	-86.8139	Peachtree Crossing Mobile Home Park	Municipal	Black Creek UT	Jefferson	0.09
AL0076261	33.8349	-86.7838	West Blount Lagoon	Municipal	Hogeland Creek	Jefferson	0.09
AL0021237	34.0379	-86.3318	Altoona Lagoon	Municipal	Locust Fork	Etowah	0.07
AL0027642	33.6125	-86.8956	Forestdale MHP	Municipal	Fivemile Creek	Jefferson	0.03
AL0050563	34.0887	-86.435	Susan Moore High School	Municipal	Locust Fork UT	Blount	0.03
AL0056553	33.7518	-86.8174	The Cove Mobile Home Park	Municipal	Turkey Creek	Jefferson	0.024
AL0054348	33.9208	-86.6328	Locust Fork High School Lagoon	Municipal	Blackburn Fork	Blount	0.022
AL0062251	33.64	-86.9136	Brookside Village WWTP	Municipal	Newfound Creek	Jefferson	0.022
AL0032301	33.7312	-86.6936	Dixie-Manor Housing Project	Municipal	Self Creek UT	Jefferson	0.020
AL0071170	33.8269	-86.6961	County Line Industrial Park WWTP	Municipal	Longs Branch	Blount	0.020
AL0051161	33.5958	-86.9333	Bottenfield Junior High School	Municipal	Prudes Creek UT	Jefferson	0.017
AL0047546	33.8253	-86.8736	Bradford Parkside Health Services	Municipal	Thomas Creek	Jefferson	0.015
AL0054011	33.7448	-86.8175	River Bend Townhouses WWTP	Municipal	Turkey Creek	Jefferson	0.015
AL0075256	33.7764	-86.805	North Jefferson Middle School WWTP	Municipal	Lick Creek	Jefferson	0.012
AL0051195	33.7461	-86.6955	Johnson Elementary School Lagoon	Municipal	Self Creek UT	Jefferson	0.01
AL0068675	33.8339	-86.5811	Southeastern Elementary School	Municipal	Campbell Creek	Blount	0.005

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AL0057827	33.6256	-86.91	Sharon Heights MHP	Municipal	Fivemile Creek	Jefferson	0.003
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The required total phosphorus effluent limitations for Class 1 (Effluent Flowrate MGD \geq 1.0), Class 2 (Effluent Flowrate $<$ 1.0 and \geq 0.10 MGD), and Class 3 (Effluent Flowrate $<$ 0.10 MGD) NPDES regulated point sources can be found in tables 7.4.1.1, 7.4.1.2, and 7.4.1.3 in the TMDL report.

Table 7.4.1.1 Class 1 NPDES Facilities (Effluent Flowrate \geq 1.0 MGF)

NPDES #	Facility	Type	Receiving Waterbody	County	Effluent Flowrate ^a (MGD)	TP Monthly Average (mg/l)
AL0023647	Jefferson County Village Creek WWTP - 11	Municipal	Village Creek	Jefferson	60.0	0.25
AL0023647	Jefferson County Village Creek WWTP - 21	Municipal	Village Creek	Jefferson	60.0	0.25
AL0026913	Jefferson County Fivemile Creek WWTP	Municipal	Fivemile Creek	Jefferson	30.0	0.25
AL0049603	Boaz Slab Creek WWTP	Municipal	Slab Creek UT	Marshall	4.88	0.25
AL0003247	ERP Compliant Coke LLC Inc.	Industrial	Fivemile Creek	Jefferson	4.73	0.25
AL0022926	Jefferson County Turkey Creek WWTP	Municipal	Turkey Creek	Jefferson	5.00	0.25
AL0049549	Oneonta WWTP	Municipal	Mill Creek	Blount	2.20	0.25
AL0001449	Tyson Farms Blountsville	Industrial	Graves Creek	Blount	1.339	0.25

Table 7.4.1.2 Class 2 NPDES Facilities (Effluent Flowrate $<$ 1.0 MGD and Effluent Flowrate \geq 0.10 MGD)

NPDES #	Facility	Type	Receiving Waterbody	County	Effluent Flowrate ^a (MGD)	TP Monthly Average (mg/l)
AL0056120	Jefferson County Prudes Creek WWTP	Municipal	Fivemile Creek	Jefferson	0.90	2
AL0053121	Morris Manor Apartments WWTP	Municipal	Turkey Creek	Jefferson	0.50	2
AL0003417	ABC Coke, Drummond Company Inc.	Industrial	Fivemile Creek	Jefferson	0.404	2
AL0001554	CMC Steel Alabama	Industrial	Village Creek UT	Jefferson	0.380	2
AL0058572	Snead WWTP	Municipal	Locust Fork	Blount	0.15	2
AL0073261	Cleveland WWTP	Municipal	Dry Creek UT	Blount	0.15	2

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AL0050881	Warrior WWTP	Municipal	Cane Creek	Jefferson	0.10	2
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The total phosphorus effluent limitations should be incorporated as monthly averages during the months of March-October.

Assessment: The EPA concludes that the WLAs provided in the Report are reasonable and will result in the attainment of water quality standards. This is because the TMDL accounts for all point sources discharging to impaired segments in the watershed and the WLAs require that total phosphorus loads comply with water quality criteria (TMDL targets).

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality [CWA section 303(d)(1)(C), 40 CFR section 130.7(c)(1)]. The EPA 1991 guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

An implicit MOS was incorporated in the TMDL report because the TMDL was developed using a modeling approach that utilized conservative conditions. The conservative conditions used are as followed:

- For the permit condition run, all continuous NPDES point sources in the watershed were set at their respective effluent limitations and also at their design effluent flowrate.
- Surface water withdrawal sources were set at design/plant capacity water withdrawal rates.
- All the sub-watershed land area modeled in the LSPC model is directly connected to all streams.

Assessment: The EPA concludes that the TMDL incorporates an adequate margin of safety.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described [CWA section 303(d)(1)(C), 40 CFR section 130.7(c)(1)].

Seasonal variation was considered in the development of the TMDL by evaluating the model simulation period. The model evaluated data taken over a multi-year period (1/1/2007 to 12/31/2012) in both winter and summer conditions. The model included hydrologic, meteorological, and loading conditions observed in the watershed during the multi-year period. The TMDL is protective of water quality over a range of conditions that can occur within the impaired segments. Seasonal variability is discussed in Section 7.7 of the TMDL report.

Assessment: The EPA concludes the TMDL allocations ensure protection of water quality standards throughout all seasons.

8. Monitoring Plan to Track TMDL Effectiveness

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The EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such a TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

ADEM has a statewide approach for monitoring waterbodies. Priority waterbodies including section 303(d) listed waterbodies and waterbodies with an active TMDL are monitored to help characterize water quality conditions resulting from the implementation of BMPs and load reductions in the watershed.

Assessment: ADEM will follow its already established monitoring plan to track the effectiveness of the Locust Fork/Village Creek TMDLs. This is not a required element of the TMDL approval; therefore, the EPA is taking no action on the monitoring plan.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (the EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs regions to work in partnership with states/tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that regions assist states/tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by the EPA, they help establish the basis for the EPA's approval of TMDLs.

Implementation of phosphorus reductions will be achieved through issuance of NPDES permits that require phosphorus effluent limits during the months March-October. ADEM's NPDES municipal and industrial permitting programs will be responsible for issuing the permits with the aforementioned total phosphorus reductions. ADEM recognizes that the new phosphorus reduction will vary based on existing processes and already planned upgrades. Future or expanded NPDES permittees requesting to discharge within the Locust Fork/Village Creek watersheds will be evaluated on a case-by-case basis consistent with ADEM's current permitting strategy for impaired waters.

Implementation of the phosphorus reductions in urban areas with designations of MS4 will fall under the regulation of ADEM's Stormwater Management NPDES program. Each MS4 permittee will comply with the TMDL through implementation of stormwater management plans. The stormwater management plans will address nutrient reductions by implementing BMPs, eliminating illicit discharges, conducting instream water quality monitoring, education, and outreach.

In order to implement the nonpoint phosphorus reduction, voluntary, incentive-based mechanisms will be used to implement nonpoint source management measures. Participation and cooperation from the general public, various industry, business, and environmental groups are vital to the successful implantation of this TMDL. TMDL implementation for nonpoint sources will be coordinated through interaction with local entities in conjunction with ADEM's 319 Nonpoint Source Program.

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Assessment: Although not a required element of the TMDL approval, Alabama discussed how information derived from the TMDL analysis process can be used to support implementation of the TMDLs. The EPA is taking no action on the implementation portion of the Submission.

10. Reasonable Assurances

The EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for the EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water body impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, states/tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in state/tribe's implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

Point source impairments are addressed using a load reduction at the 33 NPDES point source municipal and industrial facilities that discharge within the Locust Fork watershed. The implementation of phosphorus reductions will be achieved through the issuance of NPDES permits that require effluent total phosphorus limits. Each MS4 permittee must comply with the TMDL through implementation of stormwater management plans (SWMPs). The SWMPs will address nutrient reductions through BMP implementation, eliminating illicit discharges, instream water quality monitoring, education, and outreach.

Based on the TMDL model, in order for the total phosphorus effluent limits to be protective of the watershed, ADEM must enforce a Ch_{1a} target of 18 µg/L in the watershed. Reducing nutrient loading from point sources on other major tributaries to Locust Fork is expected to improve the water quality on the impaired segments of Locust Fork and Village Creek.

Assessment: The EPA considered the reasonable assurances contained in the Report. Point sources are required to comply with their NPDES permits, which must include the requirements and assumptions of the TMDL. The point sources must meet the criteria at the point of discharge in order to meet the regulatory definition of "not causing or contributing to a water quality violation." Reductions for nonpoint sources are expected to occur as a result of the incentive and voluntary programs already in place.

11. Public Participation

The EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each state/tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 CFR section 130.7(c)(1)(ii)). In guidance, the EPA has explained that final TMDLs submitted to the EPA for review and approval must describe the state/tribe's public participation process, including a summary of significant comments and the state/tribe's responses to those comments. When the EPA establishes a TMDL, the EPA regulations require the EPA to publish a notice seeking public comment (40 CFR section 130.7(d)(2)).

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Inadequate public participation could be a basis for disapproving a TMDL; however, where the EPA determines that a state/tribe has not provided adequate public participation, the EPA may defer its approval action until adequate public participation has been provided for, either by the state/tribe or by the EPA.

The draft TMDL was on public notice for 121 days (May 10, 2017 – September 8, 2017) to allow the opportunity for stakeholders to review the draft TMDL and provide comments. During that time, the public was notified by publication in both statewide and local newspapers in Montgomery, Mobile, Birmingham, Tuscaloosa, and Huntsville. The public was given the opportunity to review the TMDL and submit comments.

ADEM received comments on the draft TMDL from the Black Warrior Riverkeeper, Richard R. Horner, Tyson Farms, Inc., and Jefferson County Environmental Services Department. The comments and ADEM responses can be found on pages 1 through 43 of the TMDL submittal package.

Assessment: The EPA has reviewed all comments and ADEM’s responses to comments. The EPA concludes that the State involved the public during the development of the TMDL, provided adequate opportunities for the public to comment on the Report, and provided reasonable responses to the comments received.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to the EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under section 303(d) of the Clean Water Act for the EPA review and approval. This clearly establishes the state/tribe’s intent to submit, and the EPA’s duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the water body, and the pollutant(s) of concern.

Assessment: An electronic letter with the appropriate information was included with the final submission from ADEM, dated December 21, 2017, and signed by Kimberly Minton, Chief of the Modeling and Analysis Section in the Water Quality Branch.

13. Conclusion

After a full and complete review, the EPA finds that the *Nutrient Total Maximum Daily Loads for Locust Fork and Village Creek* satisfy all of the elements of approvable TMDLs. This **APPROVAL** is for one TMDL addressing the nutrient impairments in Locust Fork and Village Creek.

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