Alabama Department of Environmental Management

DRAFT
Total Maximum Daily Load (TMDL)
for

Abbie Creek
Assessment Unit ID # AL03130004-0405-100

Peterman Creek
Assessment Unit ID # AL03130004-0403-110

Henry and Barbour Counties

Pathogens (*E. coli*)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
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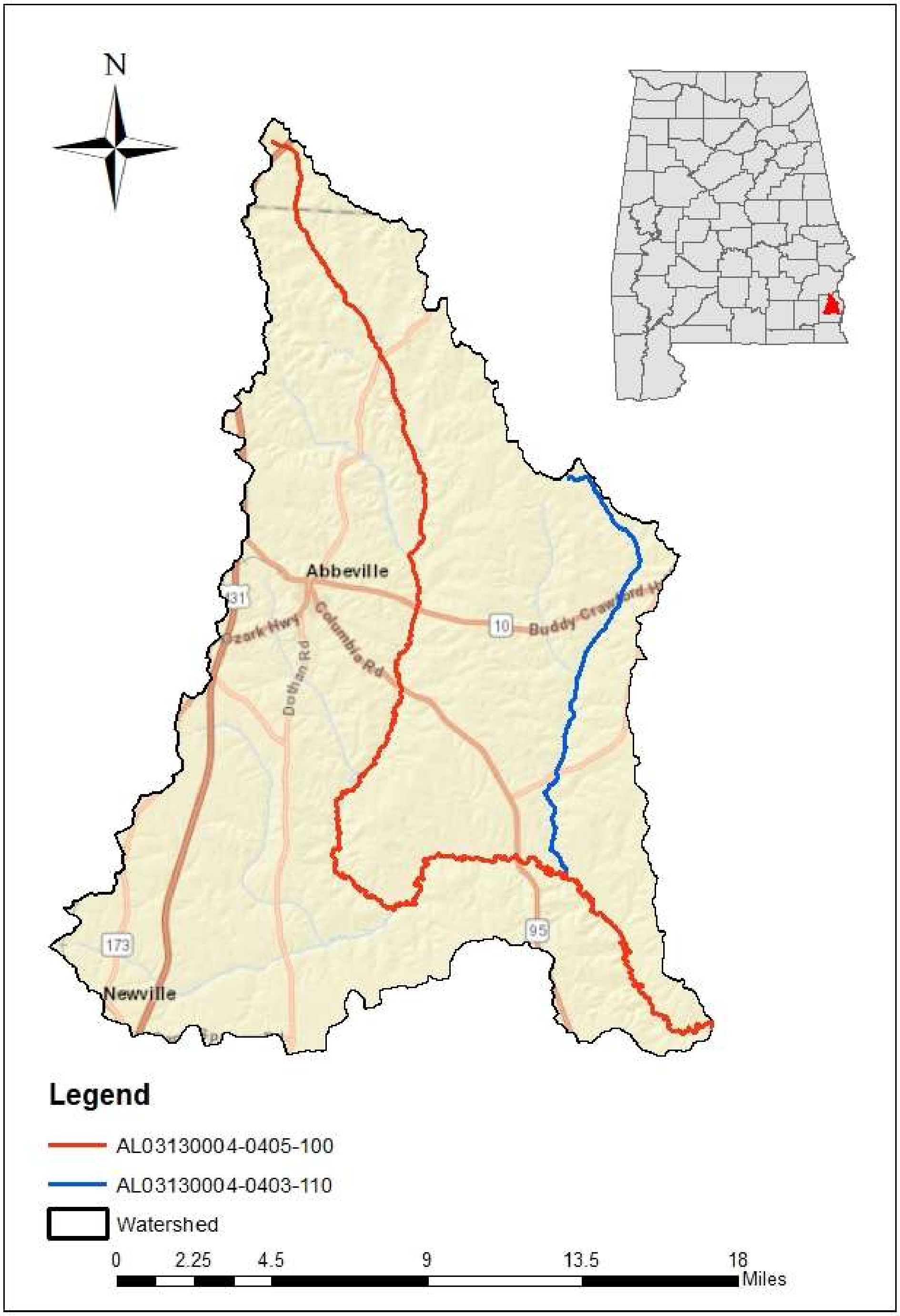
Table of Contents

List of Tables

List of Figures

Figure 1: The Abbie Creek watershed



1.0 Executive Summary

Section 303(d) of the Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify waterbodies which are not meeting their designated uses and to determine the total maximum daily load (TMDL) for pollutants causing the use impairment. A TMDL is the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS).

Abbie Creek, located in Henry and Barbour Counties, is a tributary to the Chattahoochee River. Abbie Creek is currently included on Alabama's §303(d) list as impaired for pathogens (*E. coli*) from the Chattahoochee River to its source. The listed portion of Abbie Creek has a designated use classification of Fish & Wildlife (F&W). Abbie Creek begins north of Abbeville and flows southeast for a total length of 42.53 miles, ending at the confluence with the Chattahoochee River. The total drainage area for the Abbie Creek watershed is approximately 197.72 square miles.

Peterman Creek, located in Henry County, is a tributary to Abbie Creek. Peterman Creek is currently included on Alabama's §303(d) list as impaired for pathogens (*E. coli*) from Abbie Creek to its source. The listed portion of Peterman Creek has a designated use classification of F&W. Peterman Creek begins northwest of Shorterville and flows south for a total length of 12.43 miles, ending at the confluence with Abbie Creek. The total drainage area for the Peterman Creek watershed is approximately 32.26 square miles.

Abbie Creek (AL03130004-0405-100) was placed on the 2016 §303(d) list as impaired for pathogens based on data collected by the Alabama Department of Environmental Management (ADEM) at station ABIH-2 during 2014. Peterman Creek (AL03130004-0403-110) was placed on the 2016 §303(d) list as impaired for pathogens based on data collected by ADEM at station PTRH-1 during 2014.

In 2021 and 2024, additional sampling studies were performed by ADEM to further assess the water quality of the impaired streams. A review of the general water quality and intensive *E. coli* studies revealed that the listed segments of Abbie Creek and Peterman Creek were still not meeting the pathogen criteria applicable to their use classifications (F&W).

A mass balance approach was used for calculating the pathogen TMDLs for Abbie Creek and Peterman Creek. The mass balance approach utilizes the conservation of mass principle. Existing loads were calculated by multiplying the *E. coli* concentrations times the respective in-stream flows and a conversion factor. In the same manner as existing loads were calculated, allowable loads were calculated for the single sample *E. coli* target of 268.2 colonies/100 ml (298 colonies/100 ml – 10% Margin of Safety) and geometric mean *E. coli* target of 113.4 colonies/100 ml (126 colonies/100 ml – 10% Margin of Safety). The TMDL was calculated using the single sample or geometric mean sample exceedance event which resulted in the highest percent reduction.

Table 1.1 is a summary of the estimated existing load, allowable load, and percent reduction for the single sample criterion and the geometric mean criterion for Abbie Creek. Table 1.2 lists the TMDL, defined as the maximum allowable *E. coli* loading under critical conditions for Abbie Creek.

Table 1.1: Abbie Creek - *E. coli* loads and required reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	2.79E+12	3.09E+11	2.48E+12	89%
Geometric Mean Load	1.78E+12	4.51E+11	1.33E+12	75%
Abbeville South Lagoon (AL0059358)	1.15E+8	8.48E+9	0	0%

Table 1.2: *E. coli* TMDL for Abbie Creek (AL03130004-0405-100)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
3.44E+11	3.44E+10	8.48E+9	N/A	0	3.01E+11	89%

N/A – Not Applicable
a. Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.
b. Current and future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation of BMPs on a case-by-case basis.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
e. TMDL was established using the single sample maximum criterion of 298 colonies/100 ml.

Table 1.3 is a summary of the estimated existing load, allowable load, and percent reduction for the single sample criterion and the geometric mean criterion for Peterman Creek. Table 1.4 lists the TMDL, defined as the maximum allowable *E. coli* loading under critical conditions for Peterman Creek.

Table 1.3: Peterman Creek - *E. coli* loads and required reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	2.65E+11	4.58E+10	2.19E+11	83%
Geometric Mean Load	7.71E+11	9.74E+10	6.73E+11	87%

Table 1.4: *E. coli* TMDL for Peterman Creek (AL03130004-0403-110)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
1.08E+11	1.08E+10	N/A	N/A	0	9.74E+10	87%

N/A – Not Applicable
a Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.
b. Future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation of BMPs on a case-by-case basis.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
e. TMDL was established using the geometric mean criterion of 126 colonies/100 ml.

Compliance with the terms and conditions of existing and future National Pollutant Discharge Elimination System (NPDES) permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL. Required load reductions in the LA portion of this TMDL can be implemented through voluntary measures and may be eligible for CWA §319 grants.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the Abbie Creek and Peterman Creek watersheds. As additional data and/or information become available, it may become necessary to revise and/or modify the TMDL accordingly.

2.0 Basis for §303(d) Listing

2.1 Introduction

Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify waterbodies which are not meeting their designated uses and to determine the TMDL for pollutants causing use impairment. The TMDL process establishes the allowable loading of pollutants for a waterbody based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution and restore and maintain the quality of their water resources (USEPA, 1991).

2.2 Problem Definition

Waterbody Impaired:	Abbie Creek – from the Chattahoochee River to its source
Assessment Unit ID:	AL03130004-0405-100
Impaired Reach Length:	42.53 miles
Impaired Drainage Area:	197.72 square miles
Water Quality Standard Violation:	Pathogens (Single Sample, Geometric Mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	Fish and Wildlife

Waterbody Impaired:	Peterman Creek – from Abbie Creek to its source
Assessment Unit ID:	AL03130004-0403-110
Impaired Reach Length:	12.43 miles
Impaired Drainage Area:	32.26 square miles
Water Quality Standard Violation:	Pathogens (Single Sample, Geometric Mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	Fish and Wildlife

Usage Related to Classification:
The impaired stream segments are classified as Fish and Wildlife (F&W). Usage of waters in this classification is described in ADEM Admin. Code R. 335-6-10-.09(5)(a), (b), (c), and (d).

(a) Best usage of waters: fishing, propagation of fish, aquatic life, and wildlife.

(b) Conditions related to best usage: the waters will be suitable for fish, aquatic life and wildlife propagation. The quality of salt and estuarine waters to which this classification is assigned will also be suitable for the propagation of shrimp and crabs.

(c) Other usage of waters: it is recognized that the waters may be used for incidental water contact year-round and whole body water-contact recreation during the months of May through October, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming areas and will be considered satisfactory for swimming and other whole body water-contact sports.

E. coli Criteria:
Criteria for acceptable bacteria levels for the F&W use classification are described in ADEM Admin. Code R. 335-6-10-.09(5)(e)7(i) and (ii) as follows:

7. Bacteria:

(i) In non-coastal waters, bacteria of the E. coli group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(ii) For incidental water contact and whole body water-contact recreation during the months of May through October, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean E. coli organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 298 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 158 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water contact sports.

Abbie Creek - Criteria Exceeded

Abbie Creek (AL03130004-0405-100) was placed on the Department's 2016 §303(d) list for pathogens based on data collected during 2014 at station ABIH-2. *S*ampling at station ABIH-2 in 2014 showed that the *E. coli* criterion was exceeded in two out of eight samples. (At the time of the original 2016 listing, the geometric mean criterion was 126 col/100 ml, and the single sample criterion was 487 col/100 ml during the months of June – September. During the months of October – May, the geometric mean criterion was 548 col/100 ml, and the single sample criterion was 2507 col/100 ml.) The table below illustrates the *E. coli* data that was the basis for the listing.

Table 2.2.1: Abbie Creek Data at ABIH-2 for §303(d) listing

ABIH-2		
Activity Date	***E. coli* (col/100 mL)**	**Qualifier Code**
3/19/2014	344.8	H
4/9/2014	496.2	H
5/7/2014	178.9	H
6/18/2014	270	H
7/9/2014	186	H
8/11/2014	727	H
9/17/2014	344.8	H
10/15/2014	4839.2	H

*H = The analytical holding times for analysis are exceeded.

Peterman Creek - Criteria Exceeded:

Peterman Creek (AL03130004-0403-110) was placed on the Department's 2016 §303(d) list for pathogens based on data collected during 2014 at station PTRH-1. *S*ampling at station PTRH-1 from 2014 showed that the *E. coli* criterion was exceeded in four out of eight samples. (At the time of the original 2016 listing, the geometric mean criterion was 126 col/100 ml, and the single sample criterion was 487 col/100 ml during the months of June – September. During the months of October – May, the geometric mean criterion was 548 col/100 ml, and the single sample criterion was 2507 col/100 ml.) The table below illustrates the *E. coli* data that was the basis for the listing.

Table 2.2.2: Peterman Creek Data for §303(d) listing at PTRH-1

PTRH-1			
Activity Date	**Flow (cfs)**	***E. coli* (col/100 mL)**	**Qualifier Code**
3/19/2014	56.70	517.2	H
4/9/2014		689.6	H
5/7/2014	81.61	365.4	H
6/18/2014	28.17	727	H
7/9/2014		579.4	H
8/11/2014	28.71	1553.1	H
9/17/2014	16.30	1413.6	H
10/15/2014	53.71	2092.4	H

*H = The analytical holding times for analysis are exceeded.

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

For the purpose of this TMDL, a single sample maximum *E. coli* target of 268.2 colonies/100 ml will be used. This target was derived by using a 10% explicit margin of safety from the single sample maximum criterion of 298 colonies/100 ml. This target is considered protective of water quality standards and should not allow the single sample maximum criterion to be exceeded. In addition, a geometric mean target of 113.4 colonies/100 ml will be used for a series of at least five samples taken no less than 24 hours apart over the course of 30 days. This target was also derived by using a 10% explicit margin of safety from the geometric mean criterion of 126 colonies/100 ml. This target is considered protective of water quality standards and should not allow the geometric mean criterion to be exceeded.

3.2 Source Assessment

A point source can be defined as a discernible, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source contributions can typically be attributed to municipal wastewater facilities, illicit discharges, and leaking sewer systems in urban areas. Municipal wastewater treatment facilities are permitted through the NPDES process administered by ADEM. In urban settings, sewer lines typically run parallel to streams in the floodplain. If a leaking sewer line is present, high concentrations of bacteria can flow into the stream or leach into the groundwater. Illicit discharges are found at facilities that are discharging bacteria when not permitted, or when the pathogens criterion established in the issued NPDES permit is not being upheld.

3.2.1 Continuous Point Sources

Currently, there is one NPDES-regulated continuous point source discharge located within the Abbie Creek watershed. The Abbeville South Lagoon has daily maximum and monthly average *E. coli* limits. The permit limits are the applicable pathogen criteria for the Fish and Wildlife use classification and are as follows:

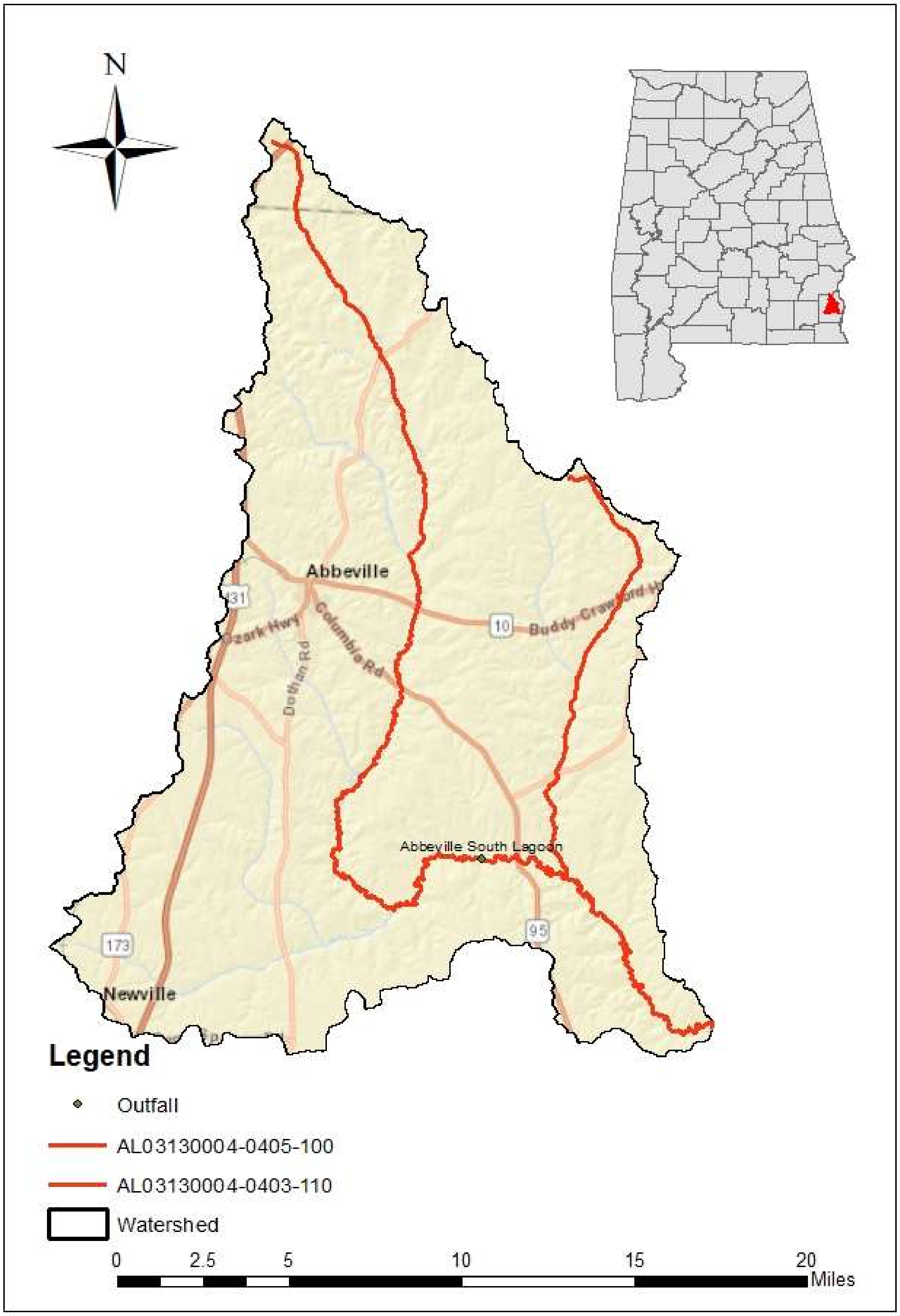
Monthly average (May-October): 126 colonies/100ml
Monthly average (November-April): 548 colonies/100ml
Daily maximum (May-October): 298 colonies/100ml
Daily maximum (November-April): 2507 colonies/100ml

Permit and location information for this facility can be seen in the table and map below.

Table 3.2.1.1: NPDES-regulated continuous point source within the Abbie Creek watershed

Type	Permit Number	Facility Name	Receiving Stream	Design Flow (MGD)
Municipal	AL0059358	Abbeville South Lagoon	Abbie Creek	0.75

Figure 3.2.1.1: Continuous point source in the Abbie Creek watershed



Any future NPDES-regulated continuous discharges that are considered by the Department to be a pathogen source will be required to meet the in-stream water quality criteria for pathogens at the point of discharge.

3.2.2 Non-Continuous Point Sources

There are numerous facilities with mining, construction, and industrial (individual and general) NPDES permits located within the Abbie Creek watershed. These facilities are not required to monitor for *E. coli* and are not considered to be a source of pathogens due to the nature of their operations. As such, no *E. coli* loading will be attributed to these facilities, nor will they receive an allocation in this TMDL.

There are currently no urban areas designated as part of the Municipal Separate Storm Sewer System (MS4) program located within the Abbie Creek watershed.

Any future MS4 stormwater or other NPDES-permitted discharges that are considered by the Department to be a pathogen source will be required to demonstrate consistency with the assumptions and requirements of this TMDL through the implementation of best management practices (BMPs) on a case-by-case basis.

Currently, there are sixteen Animal Feeding Operations/Concentrated Animal Feeding Operations (AFOs/CAFOs) located within the Abbie Creek watershed. AFOs/CAFOs are required to implement and maintain effective BMPs that meet or exceed Natural Resources Conservation Service (NRCS) technical standards and guidelines, and the ADEM AFO/CAFO rules currently prohibit discharges of pollutants from these facilities and their associated land application activities. As a result, current and future AFOs/CAFOs will receive a waste load allocation of zero.

There are currently no registered sites in the Abbie Creek watershed where land application of by-products for beneficial use is present. Beneficial use sites are regulated by ADEM's Land Division and are required to implement appropriate BMPs and agronomic application rates to protect the environment.

Sanitary sewer overflows (SSOs) have the potential to severely impact water quality and can often result in the violation of water quality standards. It is the responsibility of the NPDES wastewater discharger or collection system operator for non-permitted "collection only" systems to ensure that releases do not occur. Unfortunately, releases to surface waters from SSOs are not always preventable or reported. From review of ADEM files, it was found that one facility reported a few SSOs within the Abbie Creek watershed during 2019 to 2024. The reported SSOs are listed in Appendix 7.2.

3.2.3 Nonpoint Sources

Nonpoint sources of bacteria do not have a defined discharge point but rather occur over the entire length of a stream or waterbody. On the land surface, bacteria can accumulate over time and be washed into streams or waterbodies during rain events. Therefore, there is some net loading of bacteria into streams as dictated by the watershed hydrology.

Agricultural land can be a source of *E. coli* bacteria. Runoff from pastures, animal feeding areas, improper land application of animal waste, and animals with direct access to streams are all mechanisms that can contribute bacteria to waterbodies. To account for the potential influence from animals with direct access to stream reaches in the watershed, *E. coli* loads can be calculated as a direct source into the stream.

E. coli bacteria can also originate from forested areas due to the presence of wild animals such as deer, raccoons, turkey, waterfowl, etc. Wildlife will deposit feces onto land surfaces, where it can be transported during rainfall events to nearby streams. Control of these sources is usually limited to land management BMPs and may be impracticable in most cases. As a result, forested areas are not specifically targeted in this TMDL.

E. coli loading from developed areas is potentially attributable to multiple sources including stormwater runoff, unpermitted discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, and domestic animals. On-site septic systems may be direct or indirect sources of bacterial pollution via ground and surface waters due to system failures and malfunctions.

The nature and extent of bacteria sources in the watershed will be identified more specifically during the implementation phase of the TMDL.

3.3 Land Use Assessment

Land use percentages for the Abbie Creek watershed were determined from the 2021 National Land Cover Dataset (NLCD). The total drainage area of the Abbie Creek watershed is approximately 197.72 square miles. Table 3.3.1 lists the various land uses and their associated percentages for the Abbie Creek watershed. A pie chart illustrating the major cumulative land use types for the Abbie Creek watershed is shown in Figure 3.3.1.

Table 3.3.1: Abbie Creek watershed land use (2021 NLCD)

Land Use	Miles^2	Acres	Percent
Open Water	0.81	521.05	0.41%
Developed, Open Space	5.79	3708.52	2.93%
Developed, Low Intensity	3.44	2199.85	1.74%
Developed, Medium Intensity	0.86	550.41	0.43%
Developed, High Intensity	0.18	113.19	0.09%
Barren Land	0.41	463.97	0.21%
Deciduous Forest	5.92	3787.92	2.99%
Evergreen Forest	64.34	41174.50	32.54%
Mixed Forest	34.79	22262.49	17.59%
Shrub/Scrub	16.04	10266.05	8.11%
Herbaceous	9.83	6289.10	4.97%
Hay/Pasture	13.27	8493.40	6.71%
Cultivated Crops	29.82	19086.58	15.08%
Woody Wetlands	12.09	7739.07	6.12%
Emergent Herbaceous Wetlands	0.15	95.18	0.08%
Totals→	**197.72**	**126551.30**	**100.00%**
Class Description	**Miles^2**	**Acres**	**Percent**
Open Water	0.81	521.05	0.41%
Agricultural Lands	43.09	27579.99	21.79%
Forested/Natural	143.15	91614.31	72.40%
Developed Land (Grouped)	10.68	6835.95	5.40%
Totals→	**197.72**	**126551.30**	**100.00%**

Figure 3.3.1: Abbie Creek watershed cumulative land use distribution

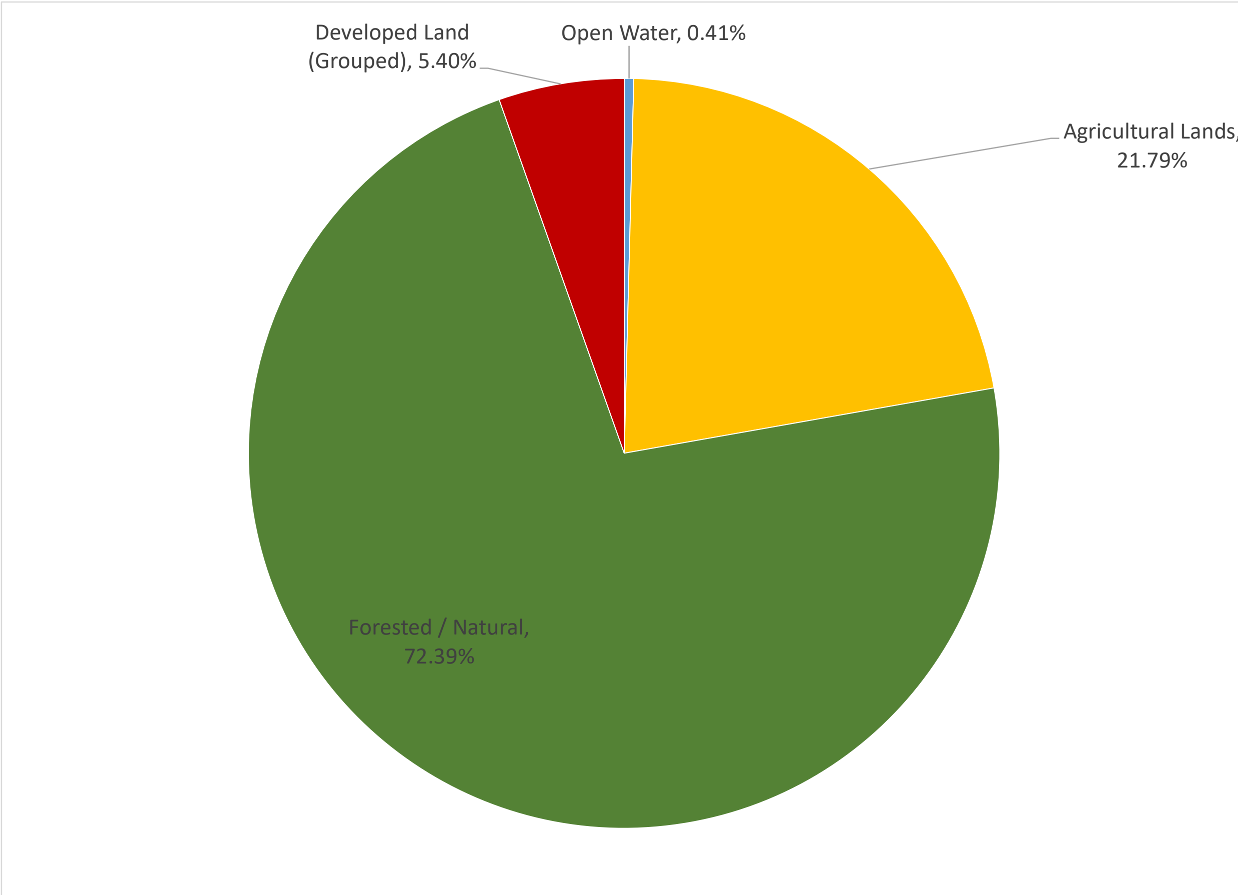
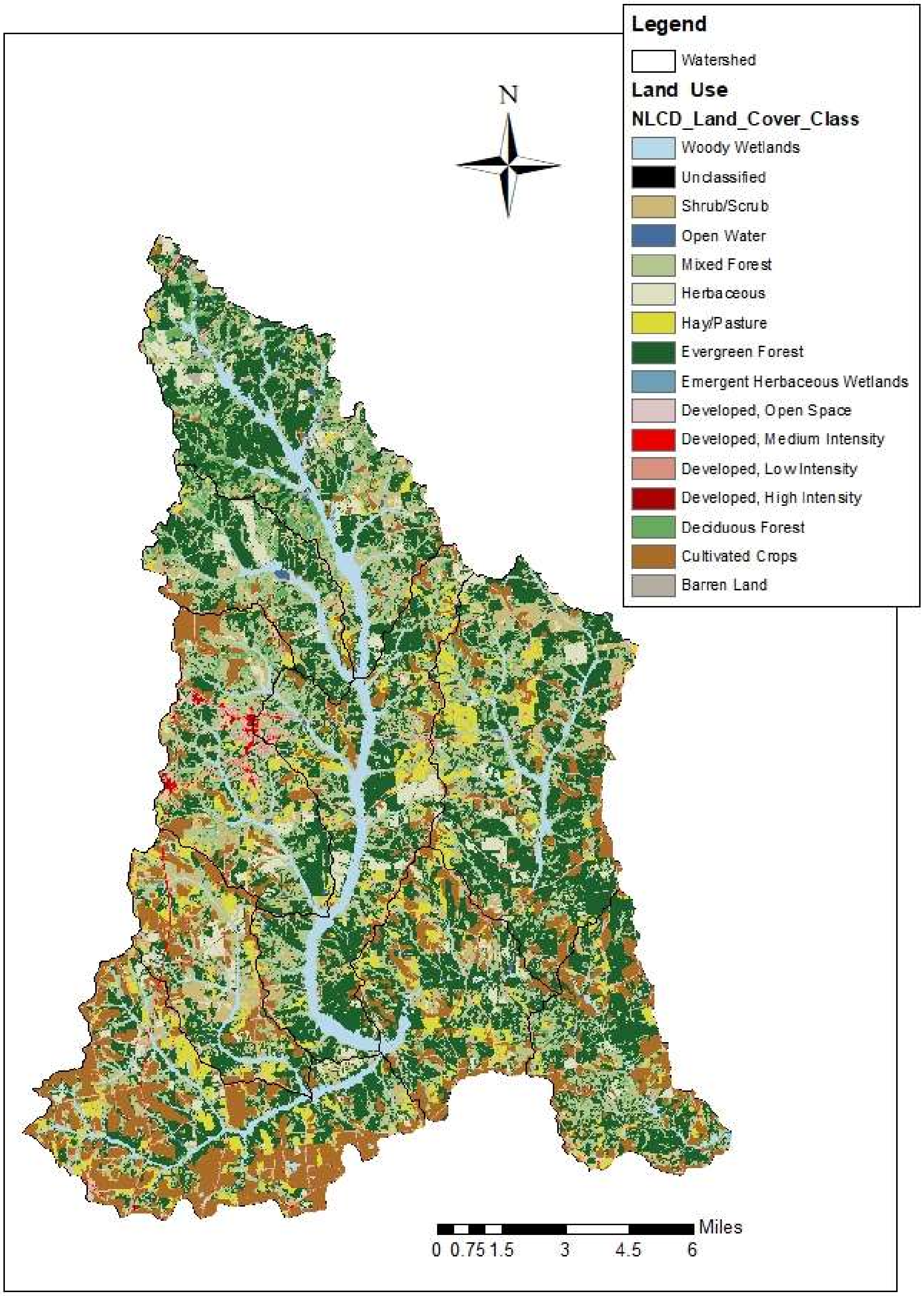


Figure 3.3.2: 2021 NLCD map of the Abbie Creek watershed



Land use percentages for the Peterman Creek subwatershed (within the Abbie Creek watershed) were determined from the 2021 NLCD. The total drainage area of the Peterman Creek watershed is approximately 32.26 square miles. Table 3.3.2 lists the various land uses and their associated percentages for the Peterman Creek watershed. A pie chart illustrating the major cumulative land use types for the Peterman Creek watershed is shown in Figure 3.3.3.

Table 3.3.2: Peterman Creek watershed land use (2021 NLCD)

Land Use	Miles^2	Acres	Percent
Open Water	0.09	58.49	0.28%
Developed, Open Space	0.76	488.36	2.37%
Developed, Low Intensity	0.37	239.51	1.16%
Developed, Medium Intensity	0.05	30.47	0.15%
Developed, High Intensity	0.01	5.78	0.03%
Barren Land	0.04	26.69	0.13%
Deciduous Forest	0.61	388.95	1.88%
Evergreen Forest	12.92	8271.68	40.06%
Mixed Forest	5.92	3790.36	18.36%
Shrub/Scrub	3.18	2035.73	9.86%
Herbaceous	1.54	984.73	4.77%
Hay/Pasture	2.30	1471.53	7.13%
Cultivated Crops	3.22	2059.08	9.97%
Woody Wetlands	1.22	781.69	3.79%
Emergent Herbaceous Wetlands	0.02	13.57	0.07%
Totals→	**32.26**	**20646.63**	**100.00%**
Class Description	**Miles^2**	**Acres**	**Percent**
Open Water	0.09	58.49	0.28%
Agricultural Lands	5.52	3530.62	17.10%
Forested/Natural	25.42	16266.72	78.79%
Developed Land (Grouped)	1.24	790.81	3.84%
Totals→	**32.26**	**20646.63**	**100.00%**

Figure 3.3.3: Peterman Creek watershed cumulative land use distribution

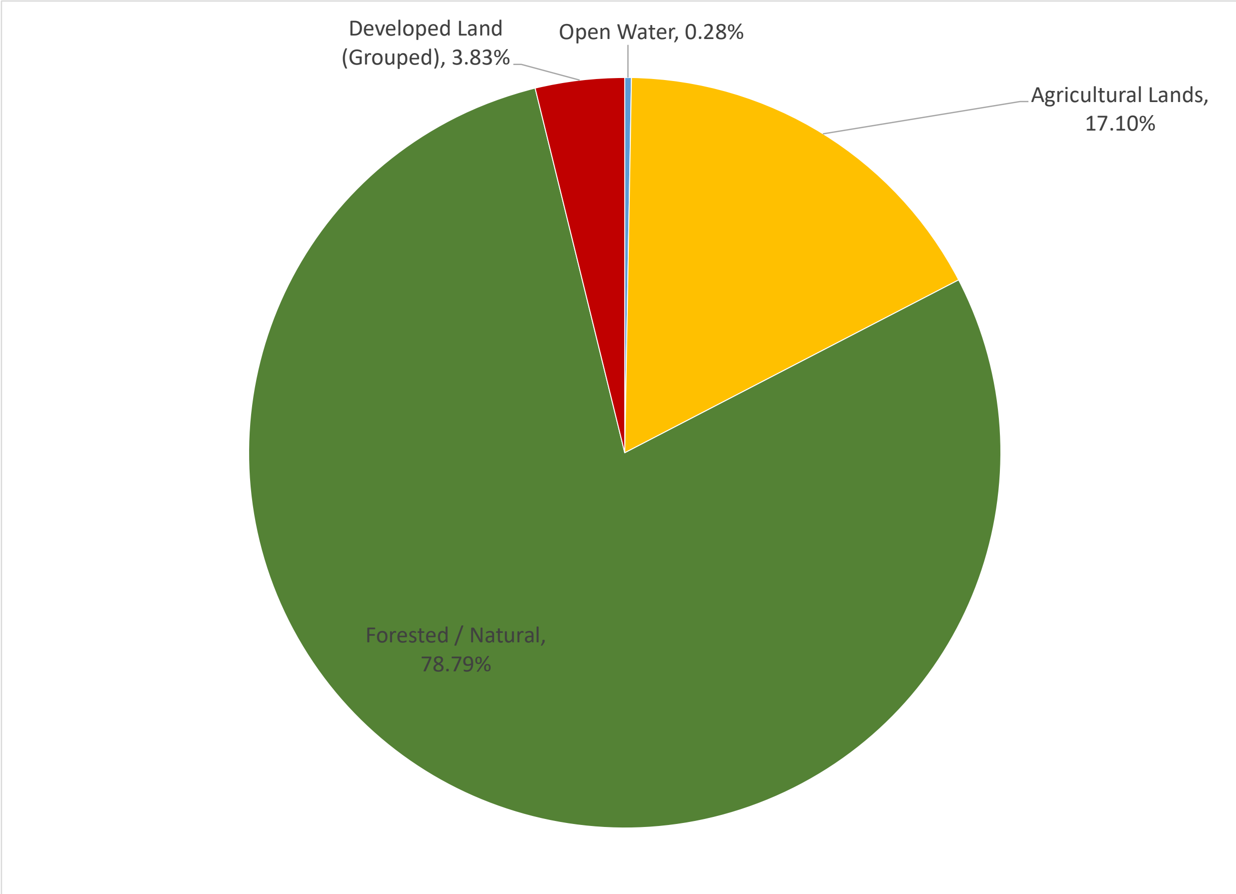
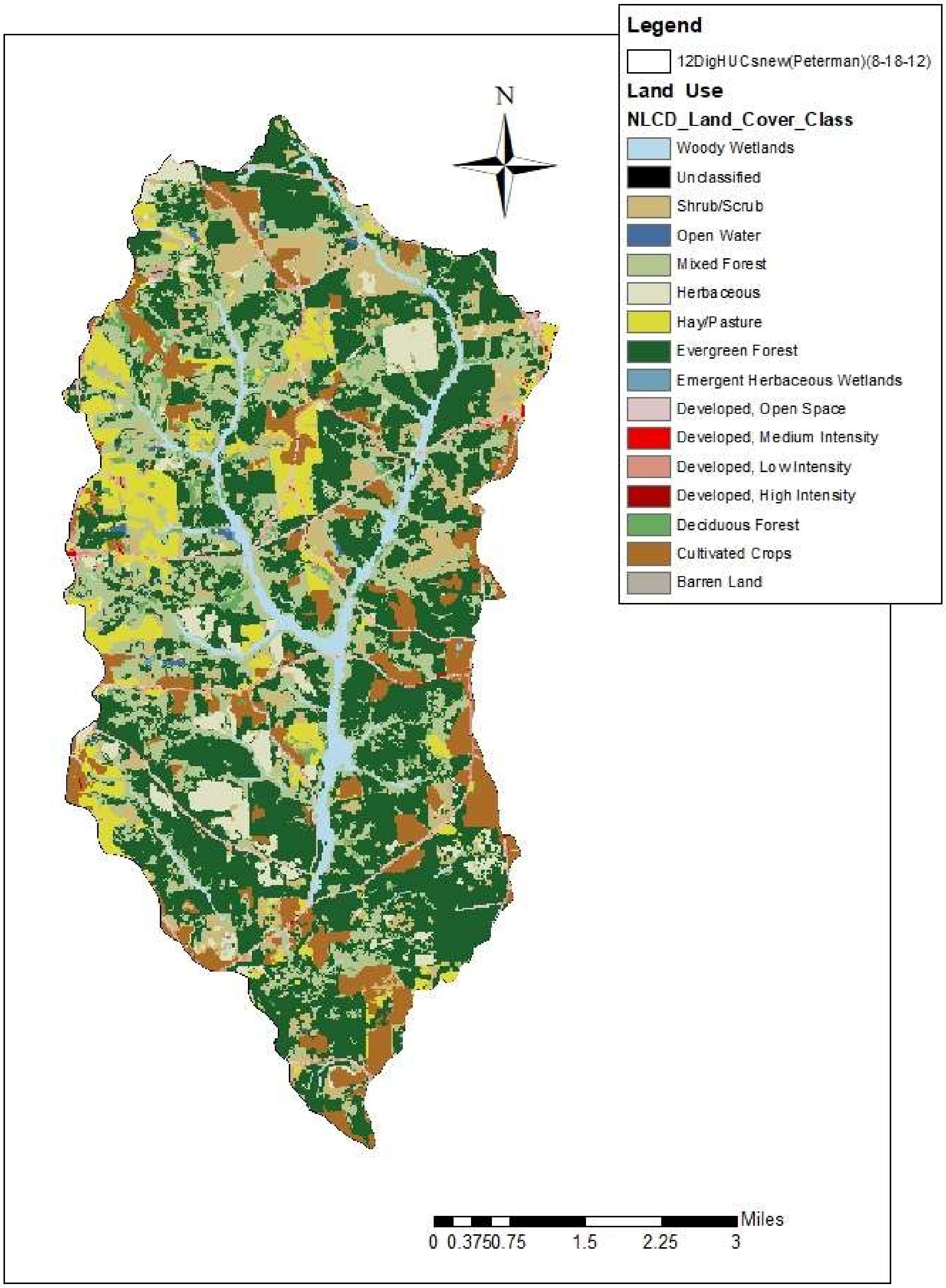


Figure 3.3.4: 2021 NLCD map of the Peterman Creek watershed



3.4 Linkage between Numeric Targets and Sources

The predominant land use coverage in the Abbie Creek watershed (and the Peterman Creek subwatershed) is forested/natural, followed by agriculture and developed land. Pollutant loadings from forested areas tend to be low due to their filtering capabilities and will be considered as background conditions. The most likely sources of pathogen loadings are from agricultural land uses and sewer/septic system failures. It is not considered a logical approach to calculate individual components for nonpoint source loadings. Hence, there will not be individual loads or reductions calculated for the various nonpoint sources. The loadings and reductions will only be calculated as a single total nonpoint source load and reduction.

3.5 Data Availability and Analysis

ADEM collected monthly (March – October) *E. coli* samples in Abbie Creek at station ABIH-2 during 2024. Two intensive bacteria studies (May and October) were also conducted at station ABIH-2 during the 2024 sampling season. Each intensive bacteria study consisted of collecting at least five *E. coli* bacteria samples over a 30-day time window, with a minimum of 24 hours between each sample collection. A geometric mean was calculated from each intensive bacteria study. ADEM also collected monthly (June – September) *E. coli* samples in Abbie Creek at station CHTH-3 in 2021 and 2024.

A total of 15 *E. coli* samples were collected at station ABIH-2 in 2024. Of the 15 *E. coli* samples, nine exceeded the single sample summer maximum criterion of 298 colonies/100 ml. Intensive bacteria studies were performed during the months of May and October in 2024. The calculated geometric means for both May and October were above the geometric mean criterion of 126 colonies/100 ml.

A total of eight *E. coli* samples were collected at station CHTH-3 in 2021 and 2024. Of the eight *E. coli* samples, five exceeded the single sample summer maximum criterion of 298 colonies/100 ml.

A summary of the Abbie Creek *E. coli* results is provided below in Table 3.5.1. All *E. coli* criteria exceedances are highlighted in red.

Table 3.5.1: *E. coli* Data for Abbie Creek (2021 and 2024)

Station	Activity Date	Flow (cfs)	*E. coli* (col/100 ml)	Qualifier Code	*E. coli* Criterion (col/100 ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
ABIH-2	3/13/2024		613.1	H	2507		
ABIH-2	4/2/2024		435.2	H	2507		
ABIH-2	5/8/2024	68.07	160.2		298	444.2	126
ABIH-2	5/20/2024		1785		298		
ABIH-2	5/23/2024		275		298		
ABIH-2	5/24/2024		613		298		
ABIH-2	6/5/2024		358.6		298		
ABIH-2	7/17/2024		2419.6	G	298		
ABIH-2	8/14/2024		461.1		298		
ABIH-2	9/4/2024		248.9		298		
ABIH-2	10/7/2024		770.1		298	447.2	126
ABIH-2	10/9/2024		579.4		298		
ABIH-2	10/10/2024		224.7		298		
ABIH-2	10/11/2024		365.4		298		
ABIH-2	10/23/2024		488.4		298		
CHTH-3	6/29/2021		235.9	H	298		
CHTH-3	7/27/2021		410.6	H	298		
CHTH-3	8/24/2021		435.2	H	298		
CHTH-3	9/29/2021		344.8	H	298		
CHTH-3	6/24/2024		410.6	H	298		
CHTH-3	7/23/2024		231	H	298		
CHTH-3	8/28/2024		261.3	H	298		
CHTH-3	9/17/2024		517.2	H	298		

*H = The analytical holding times for analysis are exceeded.
*G = The amount of analyte is above an acceptable level for quantitation and is likely higher than the reported value.

ADEM collected monthly (March – October) *E. coli* samples in Peterman Creek at station PTRH-1 during 2024. Two intensive bacteria studies (May and October) were also conducted at station PTRH-1 during the 2024 sampling season. Each intensive bacteria study consisted of collecting at least five *E. coli* bacteria samples over a 30-day time window, with a minimum of 24 hours between each sample collection. A geometric mean was calculated from each intensive bacteria study.

A total of 15 *E. coli* samples were collected at station PTRH-1 during 2024. Of the 15 *E. coli* samples, 14 exceeded the single sample summer maximum criterion of 298 colonies/100 ml. Intensive bacteria studies were performed during the months of May and October in 2024. The calculated geometric means for both May and October were above the geometric mean criterion of 126 colonies/100 ml. A summary of the *E. coli* results is provided below in Table 3.5.2. All *E. coli* criteria exceedances are highlighted in red.

Table 3.5.2: *E. coli* Data for Peterman Creek (2024)

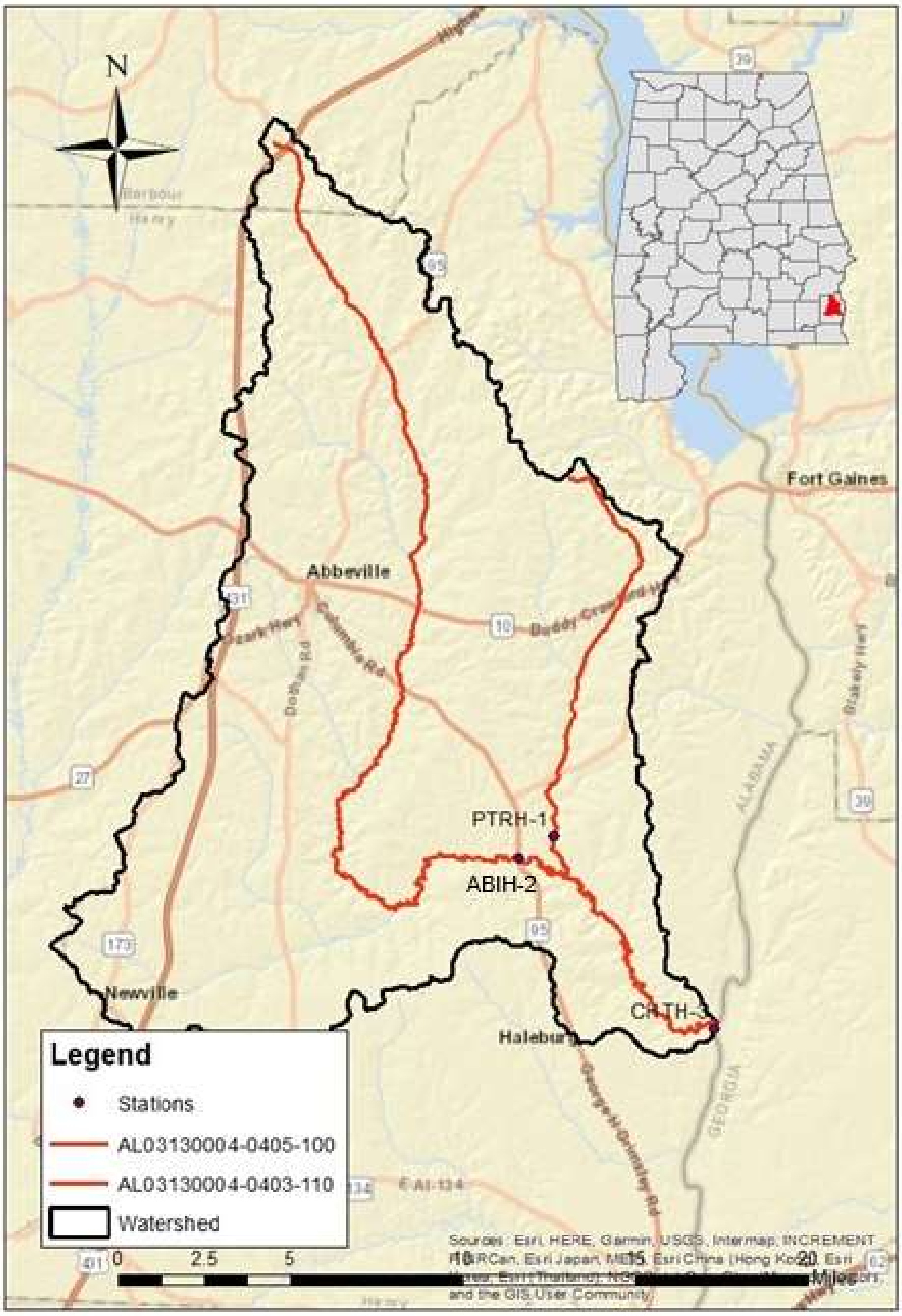
Station	Activity Date	Flow (cfs)	*E. coli* (col/100 ml)	Qualifier Code	*E. coli* Criterion (col/100 ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
PTRH-1	3/13/2024	46.23	1732.9	H	2507		
PTRH-1	4/2/2024	33.87	179.3	H	2507		
PTRH-1	5/8/2024	16.87	922.2		298		
PTRH-1	5/20/2024	40.47	1455		298		
PTRH-1	5/23/2024	31.31	369		298	816.5	126
PTRH-1	5/24/2024	27.23	1126		298		
PTRH-1	6/5/2024	22.12	651		298		
PTRH-1	7/17/2024	10.17	1203.3		298		
PTRH-1	8/14/2024	8.598	1413.6		298		
PTRH-1	9/4/2024	6.973	1553.1		298		
PTRH-1	10/7/2024	48.15	613.1		298		
PTRH-1	10/9/2024	34.82	980.4		298		
PTRH-1	10/10/2024	36.3	907.1		298	897.4	126
PTRH-1	10/11/2024	30.75	1299.7		298		
PTRH-1	10/23/2024	25.48	821.2		298		

*H = The analytical holding times for analysis are exceeded.

Table 3.5.3: ADEM sampling stations in the Abbie Creek watershed

Station	Latitude	Longitude	Description
ABIH-2	31.47246	-85.16238	Abbie Creek at State Highway 95
CHTH-3	31.41156	-85.080463	Deepest point, main creek channel, Abbie Creek Embayment
PTRH-1	31.48045	-85.14764	Peterman Creek at Henry County Road 28

Figure 3.5.1: ADEM sampling stations in the Abbie Creek watershed



3.6 Critical Conditions/Seasonal Variation

Critical conditions typically occur during the summer months (May-October). This can be explained by the nature of storm events in the summer versus the winter. In summer, periods of dry weather interspersed with thunderstorms allow for the accumulation and washing off of bacteria into streams, resulting in spikes of bacteria counts. In winter, frequent low intensity rain events are more typical and do not allow for the build-up of bacteria on the land surface, resulting in a more uniform loading rate.

The watershed for Abbie Creek generally follows the trends described above for the summer months of May through October. The critical conditions were taken to be those with the highest *E. coli* single sample exceedance value and/or geometric mean exceedance value.

Data from ABIH-2 will be used to represent the conditions in Abbie Creek. The single sample collected on July 17, 2024 (2419.6 col/100 ml) and the intensive bacteria study during the month of October 2024 (447.2 col/100 ml) will be used to estimate the TMDL pathogen loadings in Abbie Creek under critical conditions. A stream flow of 47.1 cfs will be used for the single sample maximum and an average streamflow of 162.7 cfs will be used for the geometric mean. (Stream flows were not measured for most sampling events at ABIH-2 due to non-wadeable or hazardous flow conditions. Flows were estimated using the drainage area ratio method with flows measured at PTRH-1.)

Data from PTRH-1 will be used to represent the conditions in Peterman Creek. The single sample collected on September 4, 2024 (1553.1 col/100 ml) and the intensive bacteria study during the month of October (897.4 col/100 ml) will be used to estimate the TMDL pathogen loadings in Peterman Creek under critical conditions. A stream flow of 7 cfs will be used for the single sample maximum and an average streamflow of 35.1 cfs will be used for the geometric mean.

3.7 Margin of Safety

There are two methods for incorporating a Margin of Safety (MOS) in the TMDL analysis: 1) by implicitly incorporating the MOS using conservative model assumptions to develop allocations, or 2) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations.

The MOS accounts for the uncertainty associated with the limited availability of data used in this analysis. An explicit MOS was applied to the TMDL by reducing the appropriate target criterion concentration by ten percent and calculating a mass loading target with measured or calculated flow data. The single sample *E. coli* maximum criterion of 298 colonies/100 ml was reduced by 10% to 268.2 colonies/100 ml, while the geometric mean criterion was reduced in the same fashion to 113.4 colonies/100 ml.

4.0 TMDL Development

4.1 Definition of a TMDL

A TMDL is the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS). The margin of safety can be included either explicitly or implicitly and accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. As discussed earlier, the MOS is explicit in this TMDL. A TMDL can be denoted by the equation:

$$TMDL = \sum WLA + \sum LA + MOS$$

The TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while achieving water quality standards under critical conditions. Pathogen TMDL loads are typically expressed in terms of organism counts per day (colonies/day), in accordance with 40 CFR 130.2(i).

4.2 TMDL Calculations

A mass balance approach was used to calculate the pathogen TMDLs for Abbie Creek and Peterman Creek. The mass balance approach utilizes the conservation of mass principle. Total mass loads can be calculated by multiplying the *E. coli* concentration times the in-stream flow times a conversion factor. Existing loads were calculated for the highest geometric mean sample exceedance and the highest single sample exceedance. In the same manner, allowable loads were calculated for both the single sample criterion of 298 col/100 ml and the geometric mean criterion of 126 col/100 ml. The TMDL was based on the violation that produced the highest percent reduction of *E. coli* loads necessary to achieve applicable water quality criteria, whether it be the single sample or geometric mean.

4.2.1 Abbie Creek - Existing Conditions

The **single sample** mass loading was calculated by multiplying the highest *E. coli* single sample exceedance concentration of 2419.6 colonies/100 ml by the estimated flow on the day of the exceedance. The calculation for the existing condition was based on the measurement at ABIH-2 on July 17, 2024, which can be found above in Table 3.5.1. (As noted previously, the flows at ABIH-2 were estimated using the drainage area ratio method with the flows measured at PTRH-1.) The product of the concentration, estimated flow, and a conversion factor gives the total mass loading (colonies per day) of *E. coli* in Abbie Creek under the single sample exceedance condition.

$$\frac{47.1\ \mathrm{ft^3}}{\mathrm{s}} \times \frac{2419.6\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft^3} * \mathrm{day}} = \frac{2.79 \times 10^{12}\mathrm{colonies}}{\mathrm{day}}$$

The **geometric mean** mass loading was calculated by multiplying the highest geometric mean exceedance concentration of 447.2 colonies/100 ml times the average of the five estimated daily stream flows. This concentration was calculated based on measurements at ABIH-2 between October 7, 2024, and October 23, 2024, and can be found above in Table 3.5.2. The average stream flow was calculated to be 162.7 cfs. The product of these two values and the conversion factor gives the total mass loading (colonies per day) of *E. coli* in Abbie Creek under the geometric mean exceedance condition.

$$\frac{162.7\ \mathrm{ft}^3}{\mathrm{s}} \times \frac{447.2\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft}^3 * \mathrm{day}} = \frac{1.78 \times 10^{12}\mathrm{colonies}}{\mathrm{day}}$$

The **continuous point sources** mass loading was calculated by taking the average discharge flow from the month of July 2024 (since this is when the highest exceedance occurred) and multiplying that by the reported maximum daily *E. coli* value for the same month for the facility in the watershed. These numbers were found in the July 2024 DMR submitted by the facility.

Abbeville South Lagoon (AL0059358):

$$0.112\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{27\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{1.15 \times 10^8 colonies}{day}$$

4.2.2 Abbie Creek - Allowable Conditions

The **allowable load** to the watershed was calculated under the same physical conditions as discussed above for the single sample and geometric mean criteria. This was done by taking the product of the estimated flow for the violation event, the allowable concentration, and the conversion factor.

For the **single sample** *E. coli* target concentration of 268.2 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{47.1\ \mathrm{ft}^3}{\mathrm{s}} \times \frac{268.2\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft}^3 * \mathrm{day}} = \frac{3.09 \times 10^{11}\mathrm{colonies}}{\mathrm{day}}$$

The explicit margin of safety of 29.8 colonies/100 ml equals a daily loading of:

$$\frac{47.1\ \mathrm{ft}^3}{\mathrm{s}} \times \frac{29.8\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft}^3 * \mathrm{day}} = \frac{3.44 \times 10^{10}\mathrm{colonies}}{\mathrm{day}}$$

For the **geometric mean** *E. coli* target concentration of 113.4 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{162.7\ ft^3}{s} \times \frac{113.4\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100mL * s}{ft^3 * day} = \frac{4.51 \times 10^{11} colonies}{day}$$

The explicit margin of safety of 12.6 colonies/100 ml equals a daily loading of:

$$\frac{162.7\ ft^3}{s} \times \frac{12.6\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{5.01 \times 10^{10} colonies}{day}$$

The WLA portion of this TMDL was calculated by multiplying the design flow of the facility by the applicable in-stream single sample *E. coli* criterion. This value was then multiplied by a conversion factor to come up with the appropriate loading.

Abbeville South Lagoon (AL0059358):

$$0.75\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{298\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{8.48 \times 10^9 colonies}{day}$$

The difference between the existing conditions (violation event) and the allowable conditions converted to a percent reduction represents the total load reduction needed to achieve the *E. coli* water quality criteria. The TMDL for Abbie Creek was calculated as the total daily *E. coli* load at station ABIH-2. Table 4.2.2.1 below depicts the existing and allowable *E. coli* loads and required reductions for the Abbie Creek watershed.

Table 4.2.2.1: Abbie Creek - *E. coli* loads and required reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	2.79E+12	3.09E+11	2.48E+12	89%
Geometric Mean Load	1.78E+12	4.51E+11	1.33E+12	75%
Abbeville South Lagoon (AL0059358)	1.15E+8	8.48E+9	0	0%

From Table 4.2.2.1, compliance with the single sample maximum criterion of 298 colonies/100 ml requires a reduction of 89% in the *E. coli* load. The TMDL, WLA, LA and MOS values necessary to achieve the applicable *E. coli* criteria are provided in Table 4.2.2.2 below.

Table 4.2.2.2: *E. coli* TMDL for Abbie Creek (AL03130004-0405-100)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
3.44E+11	3.44E+10	8.48E+9	N/A	0	3.01E+11	89%

a. Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.
b. Current and future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation of BMPs on a case-by-case basis.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
e. TMDL was established using the single sample maximum criterion of 298 colonies/100 ml.

4.2.3 Peterman Creek - Existing Conditions

The **single sample** mass loading was calculated by multiplying the highest *E. coli* single sample exceedance concentration of 1553.1 colonies/100 ml by the measured flow on the day of the exceedance. The calculation for the existing condition was based on the measurement at PTRH-1 on September 4, 2024, which can be found above in Table 3.5.2. The product of the concentration, measured flow, and a conversion factor gives the total mass loading (colonies per day) of *E. coli* in Peterman Creek under the single sample exceedance condition.

$$\frac{7\ \text{ft}^3}{\text{s}} \times \frac{1553.1\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{2.65 \times 10^{11}\ \text{colonies}}{\text{day}}$$

The **geometric mean** mass loading was calculated by multiplying the highest geometric mean concentration of 897.4 colonies/100 ml times the average of the five measured daily stream flows. This concentration was calculated based on measurements at PTRH-1 between October 7, 2024, and October 23, 2024, and can be found above in Table 3.5.2. The average stream flow was calculated to be 35.1 cfs. The product of these two values times the conversion factor gives the total mass loading (colonies per day) of *E. coli* in Peterman Creek under the geometric mean condition.

$$\frac{35.1\ \text{ft}^3}{\text{s}} \times \frac{897.4\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{7.71 \times 10^{11}\text{colonies}}{\text{day}}$$

4.2.4 Peterman Creek - Allowable Conditions

The **allowable load** to the watershed was calculated under the same physical conditions as discussed above for the single sample and geometric mean criteria. This was done by taking the product of the measured flow for the violation event, the allowable concentration, and the conversion factor.

For the **single sample** *E. coli* target concentration of 268.2 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{7\ \mathrm{ft}^3}{\mathrm{s}} \times \frac{268.2\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft}^3 * \mathrm{day}} = \frac{4.58 \times 10^{10}\mathrm{colonies}}{\mathrm{day}}$$

The explicit margin of safety of 29.8 colonies/100 ml equals a daily loading of:

$$\frac{7\ \mathrm{ft}^3}{\mathrm{s}} \times \frac{29.8\ \mathrm{colonies}}{100\ \mathrm{ml}} \times \frac{24{,}465{,}755 * 100\ \mathrm{ml} * \mathrm{s}}{\mathrm{ft}^3 * \mathrm{day}} = \frac{5.08 \times 10^{9}\mathrm{colonies}}{\mathrm{day}}$$

For the **geometric mean** *E. coli* target concentration of 113.4 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{35.1\ ft^3}{s} \times \frac{113.4\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100mL * s}{ft^3 * day} = \frac{9.74 \times 10^{10} colonies}{day}$$

The explicit margin of safety of 12.6 colonies/100 ml equals a daily loading of:

$$\frac{35.1\ ft^3}{s} \times \frac{12.6\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{1.08 \times 10^{10} colonies}{day}$$

The difference between the existing conditions (violation event) and the allowable conditions converted to a percent reduction represents the total load reduction needed to achieve the *E. coli* water quality criteria. The TMDL for Peterman Creek was calculated as the total daily *E. coli* load at station PTRH-1. Table 4.2.4.1 below depicts the existing and allowable *E. coli* loads and required reductions for the Peterman Creek watershed.

Table 4.2.4.1: Peterman Creek – *E. coli* loads and required reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	2.65E+11	4.58E+10	2.19E+11	83%
Geometric Mean Load	7.71E+11	9.74E+10	6.73E+11	87%

From Table 4.2.4.1, compliance with the geometric mean criterion of 126 colonies/100 ml requires a reduction of 87% in the *E. coli* load. The TMDL, WLA, LA and MOS values necessary to achieve the applicable *E. coli* criteria are provided in Table 4.2.4.2 below.

Table 4.2.4.2: *E. coli* TMDL for Peterman Creek (AL03130004-0403-110)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
1.08E+11	1.08E+10	N/A	N/A	0	9.74E+10	87%

a. Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.
b. Future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation of BMPs on a case-by-case basis.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
e. TMDL was established using the geometric mean criterion of 126 colonies/100 ml.

4.3 TMDL Summary

Abbie Creek was placed on Alabama's §303(d) list in 2016 based on data collected during 2014 at station ABIH-2. A mass balance approach was used to calculate the *E. coli* TMDL for Abbie Creek. Based on the TMDL analysis, it was determined that an 89% reduction in *E. coli* loading was necessary to achieve compliance with applicable water quality standards.

Peterman Creek was placed on Alabama's §303(d) list in 2016 based on data collected during 2014 at station PTRH-1. A mass balance approach was used to calculate the *E. coli* TMDL for Peterman Creek. Based on the TMDL analysis, it was determined that an 87% reduction in *E. coli* loading was necessary to achieve compliance with applicable water quality standards.

Compliance with the terms and conditions of existing and future NPDES sanitary and storm water permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL.

Required load reductions in the LA portion of this TMDL will be implemented through voluntary measures/best management practices (BMPs). Cooperation and active participation by the general public and various other groups is critical to successful implementation of TMDLs. Local citizen-led and implemented management measures offer the most efficient and comprehensive avenue for reduction of loading rates from nonpoint sources. Therefore, TMDL implementation activities for nonpoint sources will be coordinated through interaction with local entities and may be eligible for CWA §319 grants through the Department's Nonpoint Source Unit.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the Abbie Creek watershed. As additional data and/or information become available, it may become necessary to revise and/or modify the TMDL accordingly.

5.0 Follow-up monitoring

ADEM has adopted a basin approach to water quality monitoring, an approach that divides Alabama's sixteen major river basins into three groups. Each year, ADEM's water quality resources are concentrated in one of the three basin groups and are divided among multiple priorities including §303(d) listed waterbodies, waterbodies with active TMDLs, and other waterbodies as determined by the Department. Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices and load reductions in the watershed. This monitoring will occur in each basin according to the schedule shown in Table 5.1.

Table 5.1: Follow-up monitoring schedule

River Basin Group	Years to be Monitored
Coosa, Escatawpa, Tennessee (Guntersville), Tombigbee	2025/2028
Alabama, Cahaba, Mobile, Tallapoosa, Tennessee (Pickwick and Wilson)	2026/2029
Black Warrior, Blackwater, Chattahoochee, Chipola, Choctawhatchee, Escambia, Perdido, Tennessee (Wheeler), Yellow	2027/2030

6.0 Public Participation

As part of the public participation process, this TMDL will be placed on public notice and made available for review and comment. The public notice and subject TMDL will be made available on ADEM's website: www.adem.alabama.gov. In addition, the public notice will be submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. The public may also request paper or electronic copies of the TMDL by contacting Ms. Kimberly Minton at 334-271-7826 or kminton@adem.alabama.gov. The public will be given an opportunity to review the TMDL and submit comments to the Department in writing. At the end of the public review period, all written comments received during the public notice period will become part of the administrative record. ADEM will consider all comments received by the public prior to final completion of this TMDL and subsequent submission to EPA Region 4 for final approval.

7.0 Appendices

7.1 References

ADEM Administrative Code, 2021. Water Division - Water Quality Program, Chapter 335-6-10, Water Quality Criteria.

ADEM Administrative Code, 2021. Water Division - Water Quality Program, Chapter 335-6-11, Use Classifications for Interstate and Intrastate Waters.

Alabama Department of Environmental Management (ADEM), *Alabama's Water Quality Assessment and Listing Methodology*, January 2024.

Alabama's §303(d) List and Fact Sheet. 2016, 2018, 2020, 2022, 2024. ADEM.

Alabama Department of Environmental Management (ADEM), Laboratory Data Qualification SOP #4910 Revision 7.2, 2022.

United States Environmental Protection Agency, 1991. Guidance for Water Quality-Based Decisions: The TMDL Process. Office of Water. EPA 440/4-91-001.

United States Environmental Protection Agency, 1986. Quality Criteria for Water. Office of Water. EPA 440/4-91-001.

7.2 Sanitary Sewer Overflows (SSOs)

Table 7.2.1: SSO data

Permit Number	Facility/Site Name	SSO Began Date & Time	SSO Stopped Date & Time	SSO Latitude	SSO Longitude
AL0059358	Abbeville South Lagoon	1/3/2019 9:20	1/3/2019 11:10	31.555360	-85.264500
AL0059358	Abbeville South Lagoon	10/22/2019 11:15	10/22/2019 3:00	31.557077	-85.263621
AL0059358	Abbeville South Lagoon	5/4/2023 7:37	5/4/2023 10:31	31.554193	-85.277812
AL0059358	Abbeville South Lagoon	6/15/2023 18:00	6/16/2023 10:15	31.568373	-85.228972

7.3 Abbie Creek Watershed Photos

Figure 7.3.1: Abbie Creek at Station ABIH-2: Upstream View (3/25/2025)

Figure 7.3.2: Abbie Creek at Station ABIH-2: Downstream View (3/25/2025)

Figure 7.4.1: Peterman Creek at Station PTRH-1: Upstream View (3/25/2025)

Figure 7.4.2: Peterman Creek at Station PTRH-1: Downstream View (3/25/2025)