



South Carolina Department of Transportation
On Behalf of the Federal Highway Administration - South Carolina Division Office



PROCESSING FORM FOR PROGRAMMATIC CATEGORICAL EXCLUSIONS
NON MAJOR FEDERAL ACTIONS

State ID P038301

Fed Project # P038301

Route S-34

County Laurens

Part 1 - Project Description

Include the Project Name/Description

S-34 (Golden Acres Road) over Millers Fork Creek Bridge Replacement

The purpose of this project is to replace the bridge to eliminate the load restriction placed on it. The existing bridge is posted for load restrictions due to being substandard. It has a sufficiency rating of 39.9. The proposed repair involves replacing the current 45' long bridge with a new bridge on the same alignment.

NEPA studies revealed no significant impacts or effects to resources within the project study area.

It is not anticipated that new right of way will be required for the replacement of these structures. Should additional right of way be needed, it will be minor temporary or permanent strips. Existing right of way for most locations is 33'. Given the rural locations and field studies conducted, new acquisitions are not anticipated to have negative effects to resources or landowners and will be located within the existing project study area.

Part 2 - PCE Type

Select the appropriate Categorical Exclusion from 23 CFR Part 771.117 that best fits the entire project from the drop-down menu. **Reference Appendix A of the PCE Agreement for a more detailed description of each CE contained in 23 CFR 771.117.**

23 CFR 771.117(c) Bridge rehabilitation, reconstruction, or replacement or railroad crossing improvements

23 CFR 771.117(d)

Part 3 - Thresholds

To be processed as a Programmatic Categorical Exclusion (PCE) the following conditions must be met in addition to the General Criteria (as outlined in the PCE Agreement between FHWA-SC and SCDOT). Place a "X" in the appropriate box below. If the answer is "Yes" to any of the below criteria, SCDOT will consult with FHWA-SC to determine the appropriate level of NEPA documentation required and forward to FHWA-SC for approval. ***Reference Part 4 of the Processing form or Section IV of the PCE Agreement for more details and definitions regarding each threshold.**

1.	Involves any unusual circumstances as described in <u>*23 CFR Part 771.117(b)</u>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
2.	The acquisition of more than <u>*minor amounts</u> of temporary or permanent strips of right-of-way	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Part 3 - Thresholds Continued

3.	Involves acquisitions that result in residential or non-residential displacements	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
4.	Results in capacity expansion of a roadway by adding through lanes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
5.	Involves construction that would result in <u>*major traffic disruptions</u>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
6.	Involves <u>*changes in access control</u> requiring FHWA approval	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
7.	An adverse effect determination under Section 106 of the National Historic Preservation Act.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
8.	Use of Section 4(f) property that cannot be documented with a FHWA <i>de minimis</i> determination or a programmatic Section 4(f) other than the programmatic evaluation for the use of historic bridges	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
9.	Any use of a Section 6(f) property	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
10.	Requires an Individual USACE 404 Permit	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
11.	Requires an Individual U.S. Coast Guard Permit.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
12.	Work encroaching in a regulatory floodway, adversely affecting the base floodplain (100 yr.) pursuant to E.O. 11988 and 23 CFR Part 650 Subpart A	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
13.	Construction in, across, or adjacent to a river designated as a National Wild and Scenic River	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
14.	Involves an increase of 15 dBA or greater on any noise receptor or abatement measures are found to be feasible and reasonable due to noise impacts	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
15.	May affect and is likely to adversely affect a Federally listed species or designated critical habitat or projects with impacts subject to the BGEPA	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
16.	Involves acquisition of land for hardship, protective purposes, or early acquisition	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
17.	Does not meet the latest Conformity Determination for air quality non-attainment areas (if applicable).	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
18.	Any known or potential <u>major</u> hazardous waste sites within the right-of-way.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
19.	Is not included in or is inconsistent with the STIP and/or TIP	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Part 3 Continued - Additional criteria to be completed for disposal of excess right-of-way PCE

1. Is the parcel part of a SCDOT environmental mitigation effort or could it be used for environmental mitigation?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Is there a formal plan to use this parcel for a future transportation project (is it part of an approved LRTP)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Part 4 - Threshold Definitions

Unusual Circumstances (23 CFR Part 771.117) - Unusual circumstances are defined as:

- a. Significant environmental impacts;
- b. Substantial controversy on environmental grounds;
- c. Significant impact on properties protected by Section 4(f) of the DOT ACT or Section 106 of the National Historic Preservation Act; or
- d. Inconsistencies with any Federal, State, or local law, requirement, or administrative determination relating to the environmental aspects of the action.

Minor Amount of Right-of-Way (ROW):

A minor amount of ROW is defined as less than 3 acres per linear mile for linear projects or less than 10 acres of impacts for non-linear projects (eg: intersections, bridges), and no removal of major property improvements. Examples of major improvements include residential and business structures, or the removal of other features which would change the functional utility of the property. Removal of minor improvements, such as fencing, landscaping, sprinkler systems, and mailboxes would be allowed.

Major Traffic Disruptions:

A major traffic disruption is defined as an action that would result in: a) adverse effects to through-traffic businesses or schools, b) substantial change in environmental impacts, or c) public controversy associated with the use of the temporary road, detour, or ramp closure.

Changes in Access Control:

Requires approval from FHWA for changes in access control on the Interstate system (eg: Interchange Modification Reports or Interchange Justification Reports).

Additional Comments if Needed:

Part of CLRB 2020-1 Design Build Package of 16 bridges.

Relevant field studies and environmental reviews have been completed to determine that the project meets the criteria set forth in the Programmatic Categorical Exclusion Agreement signed by FHWA-SC and SCDOT. It is understood that any additions/deletions to the project may void environmentally processing the project as presently classified; consequently, any engineering changes must be brought to the attention of SCDOT Environmental Services Office immediately. A copy of this form is included in the project file and one (1) copy has been provided to FHWA.

Prepared By:

WILL MCGOLDRICK

Date

May 17, 2019



Will McGoldrick
c=Will McGoldrick, o=SCDOT, ou=Environmental Services Office,
email=mcgoldr@scdot.org, c=US
2019.05.17 11:40:22 -0400

Primavera:

☐ Yes☐ No

P2S Date:

Does the project contain

commitments?: (if Yes attach to form) ☒ Yes☐ No

Date: 05/17/2019

SCDOT
NEPA ENVIRONMENTAL COMMITMENTS FORM



Project ID : P038301 County : Laurens District : District 2 Doc Type: PCE Total # of Commitments: 6

Project Name: S-34 (Golden Acres Road) over Millers Fork Creek Bridge Replacement

The Environmental Commitment **Contractor Responsible** measures listed below **are to be included in the contract and must be implemented**. It is the responsibility of the Program Manager to make sure the Environmental Commitment **SCDOT Responsible** measures are adhered to. If there are questions regarding the commitments listed please contact:

CONTACT NAME: WILL MCGOLDRICK

PHONE #: 803-737-1326

ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Water Quality

NEPA Doc Ref:

Responsibility:

CONTRACTOR

The contractor will be required to minimize possible water quality impacts through implementation of BMPs, reflecting policies contained in 23 CFR 650B and the Department's Supplemental Specification on Erosion Control Measures (latest edition) and Supplemental Technical Specifications on Seeding (latest edition). Other measures including seeding, silt fences, sediment basins, etc. as appropriate will be implemented during construction to minimize impacts to water quality.

Non-Standard Commitment

NEPA Doc Ref:

Responsibility:

CONTRACTOR

MIGRATORY BIRDS

The federal Migratory Bird Treaty Act, 16 USC § 703-711, states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. The South Carolina Department of Transportation (SCDOT) will comply with the Migratory Bird Treaty Act of 1918 in regard to the avoidance of taking of individual migratory birds and the destruction of their active nests.

The Contractor will notify the Resident Construction Engineer (RCE) at least four (4) weeks prior to construction/demolition/maintenance of bridges and box culverts. The RCE will coordinate with SCDOT Environmental Services Office (ESO), Compliance Division, to determine if there are any active birds using the structure. SCDOT will be responsible for the removal/management of any active bird nests.


Stormwater

NEPA Doc Ref:

Responsibility:

SCDOT

Stormwater control measures, both during construction and post-construction, are required for SCDOT projects with land disturbance and/or constructed in the vicinity of 303(d), TMDL, ORW, tidal, and other sensitive waters in accordance with the SCDOT's MS4 Permit. The selected contractor would be required to minimize potential stormwater impacts through implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and SCDOT's Supplemental Specifications on Seed and Erosion Control Measures (latest edition).

Project ID : <input type="text" value="P038301"/>	SCDOT NEPA ENVIRONMENTAL COMMITMENTS FORM	
ENVIRONMENTAL COMMITMENTS FOR THE PROJECT		

Non-Standard Commitment	NEPA Doc Ref: <input type="text"/>	Responsibility: <input type="text" value="CONTRACTOR"/>
<div><div>GENERAL PERMIT</div><div><p>From field studies, it appears areas within the project study would be jurisdictional waters of the US. All attempts will be made to avoid these features. If these areas cannot be avoided during bridge replacement, a Department of the Army Section 404 permit must be obtained from the US Army Corps of Engineers (USACE) to impact. Based on preliminary examinations, it is anticipated the project would meet stipulations allowable SCDOT's USACE General Permit (GP). Required mitigation will come from USACE approved mitigation banks for unavoidable impacts.</p></div></div>		

Cultural Resources	NEPA Doc Ref: <input type="text"/>	Responsibility: <input type="text" value="CONTRACTOR"/>
<p>The contractor and subcontractors must notify their workers to watch for the presence of any prehistoric or historic remains, including but not limited to arrowheads, pottery, ceramics, flakes, bones, graves, gravestones, or brick concentrations during the construction phase of the project, if any such remains are encountered, the Resident Construction Engineer (RCE) will be immediately notified and all work in the vicinity of the discovered materials and site work shall cease until the SCDOT Archaeologist directs otherwise.</p>		

Floodplains	NEPA Doc Ref: <input type="text"/>	Responsibility: <input type="text" value="CONTRACTOR"/>
<p>The selected contractor will send a set of final plans and request for floodplain management compliance to the local County Floodplain Administrator.</p>		



Cultural Resources Project Screening Form

File Number: PIN: Route: County:

Project Name:

Type 1: Resurfacing, installation of fencing, signs, pavement markings, traffic signals, passenger shelters, railroad warning devices, installation of rumble strips, and landscaping

Project Type

Type 2: Bridge replacements on alignment, construction of bicycle/pedestrian facilities, and intersection improvements

Type 3: Projects that do not fall into Type 1 and Type 2 categories (e.g. road widening)

Comments

The project replaces the load restricted bridge carrying S-34 over Millers Fork Creek in Laurens County. A small amount of new right-of-way (ROW) may be required. The Project Study Area (PSA) was established as a 100 ft wide corridor along the S-340 for a distance of 700 ft on either side of the bridge, widening to 200 ft at the bridge. Within the PSA, the cultural resources (CR) area of potential effect (APE) was set as a corridor 100 ft wide, 200 ft at the bridge, and extending 400 feet north and 300 ft south from either side of the bridge. The architectural APE was a 300 ft buffer around the archaeological APE. Background review indicated that no previously recorded cultural resources were located within the APE. A cultural resources survey was conducted on May 9, 2019 and consisted of a pedestrian reconnaissance of the APE augmented by shovel test pits (STPs) at 30 meter intervals. A total of ten STPs were excavated. Four potential STP locations were examined but not excavated due to wetlands or slope. All STPs were negative. No additional cultural resources investigations are recommended. No historic properties will be affected.

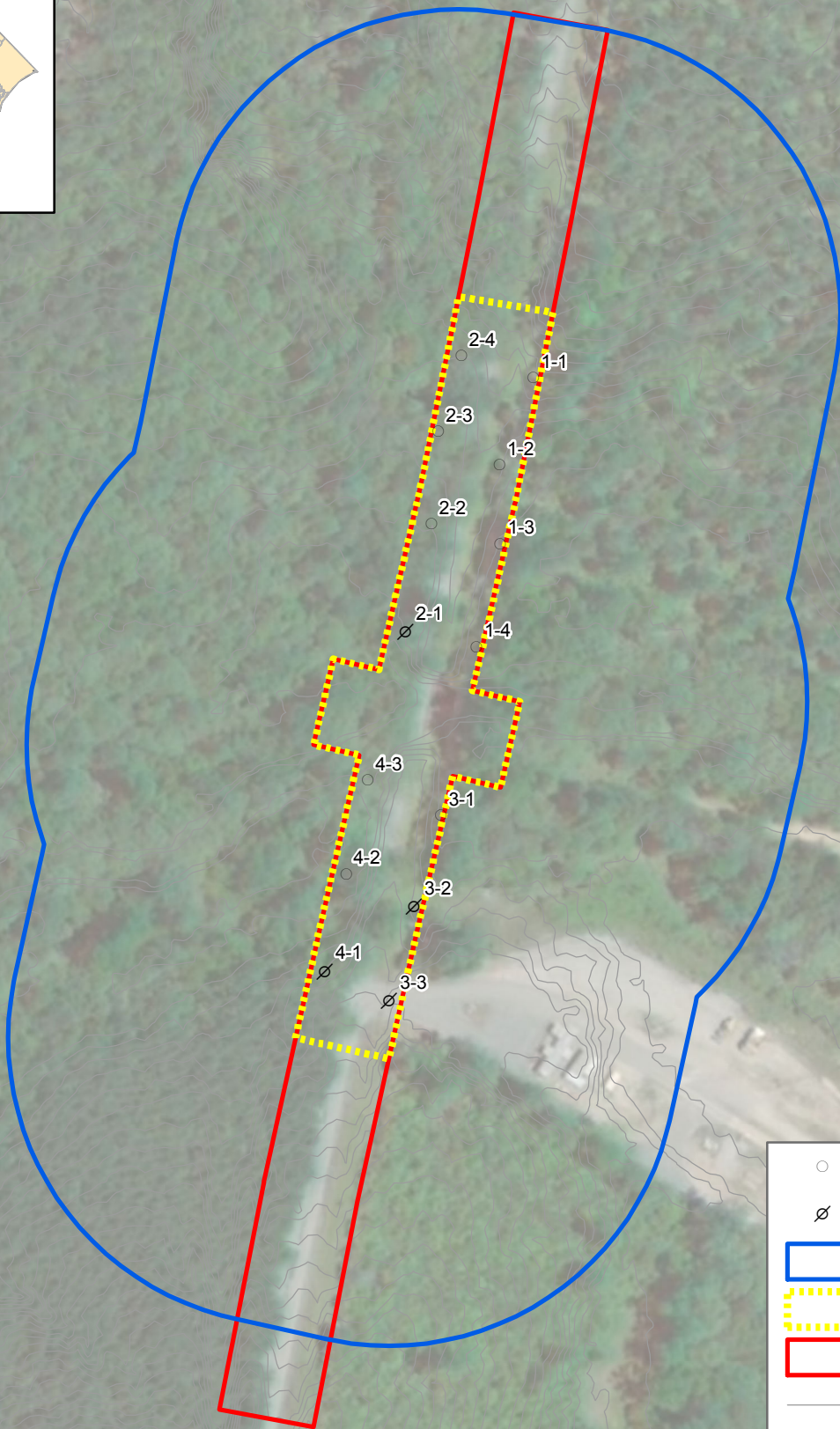
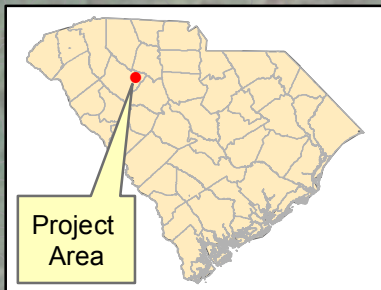
Effect Determination:

*SHPO consultation is required for all Type 3 projects and any project with a No Adverse or Adverse Effect Determination.

This screening form was developed to satisfy documentation requirements for Type I and Type II projects under a Programmatic Agreement between the Federal Highway Administration, the South Carolina State Historic Preservation Office, the US Army Corps of Engineers, and the South Carolina Department of Transportation. For Type I and Type II projects that have no effect on historic properties, the completion of this screening form with supporting documentation (e.g. ArchSite Map) provides evidence of FHWA and SCDOT's compliance with Section 106 of the National Historic Preservation Act.

Prepared by:

Review Date:



- Negative STP
- Ø Unexcavated STP
- Architectural APE
- Archaeological APE
- Project Study Area
- 2 Ft Contour
- 2 Ft Contour

Source: Esri, DigitalGlobe, GeoEye, Earthstar, USDA, USGS, AeroGRID, IGN, and the GIS User Community

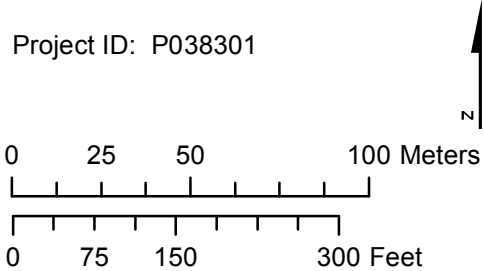
Date:
May 14, 2019



Laurens County
Load Restricted Bridges

S-34 (Golden Acres Road)
over Millers Fork Creek

Project ID: P038301



Biological Survey of S-34 over Millers Fork Creek
Laurens County, S.C.
April 1, 2019
PIN 38301

Pursuant to Section 7 of the Endangered Species Act a field survey was conducted on the proposed new right of way. The following list of threatened (T) and endangered (E) species was obtained from the U.S. Fish and Wildlife Service:

Animals

Red-cockaded woodpecker (*Picoides borealis*) - E
Northern long-eared bat (*Myotis septentrionalis*)- T

Methods

The project area was examined by GIS and Google Earth reconnaissance methods on April 1, 2019. Habitats surveyed were determined by each species' ecological requirements.

Results

The project entails replacing the bridge over North Lick Creek. The project area is mostly rural with a few residences.

According to the Heritage Trust database of endangered, threatened and rare species, the above listed species has not been found in the vicinity of the project. There is no foraging area for the red-cockaded woodpecker. The project area is within the white nose syndrome zone for the Northern long-eared bat but not within 0.25 miles of a known hibernaculum and not near any known maternity roost trees. Based on lack of suitable habitat and/or no observations of the listed species, results of the threatened and endangered species study indicate that the proposed action will have no effect upon any threatened or endangered species or critical habitats currently listed by the USFWS.

Ann-Marie Altman

April 1, 2019

Date: 4-12-19

PERMIT DETERMINATION

FROM WILL MCGOLDRICK COMPANY SCDOT

CONTACT INFO (phone and/or email) 803-737-1326; MCGOLDRIWR@SCDOT.ORG

SCDOT PROJECT ENGINEER BRAD REYNOLDS

TO Will McGoldrick - Design Build Coordinator

Project Description CLOSED AND LOAD RESTRICTED BRIDGE REPLACEMENT

Route or Road No. S-34 County LAURENS

CONST. PIN P038301 OTHER PINS or STRUCTURE # 3070003400100

RESPONSE:

☐ It has been determined that no permits are required because:

☒ The following permit(s) is/are necessary:
(Please check which type(s) of permit the project will need)

USACE Permit ☒ GP ☐ IP ☐ 401 ☐ JD

OCRM Permit ☐ CAP ☐ CZC

Navigable ☐ SCDHEC NAVGP — if checked a USCG and/or USACE navigable permit may also be required, but will be determined during the NEPA and Permitting stages.

Other _____

Water Classification: FW

Print and attach the SCDHEC water quality report

303(d) listed ☒ no ☐ yes, for * _____

TMDL developed ☐ no ☒ yes, for * FECAL

*List all that apply using the SCDHEC abbreviations

Comments: GP may be needed as there are jurisdictional waters in the northwest quadrant.

The determination above was based on the most recently available information at the time. This is a preliminary determination and is subject to change if the design of the project is modified.

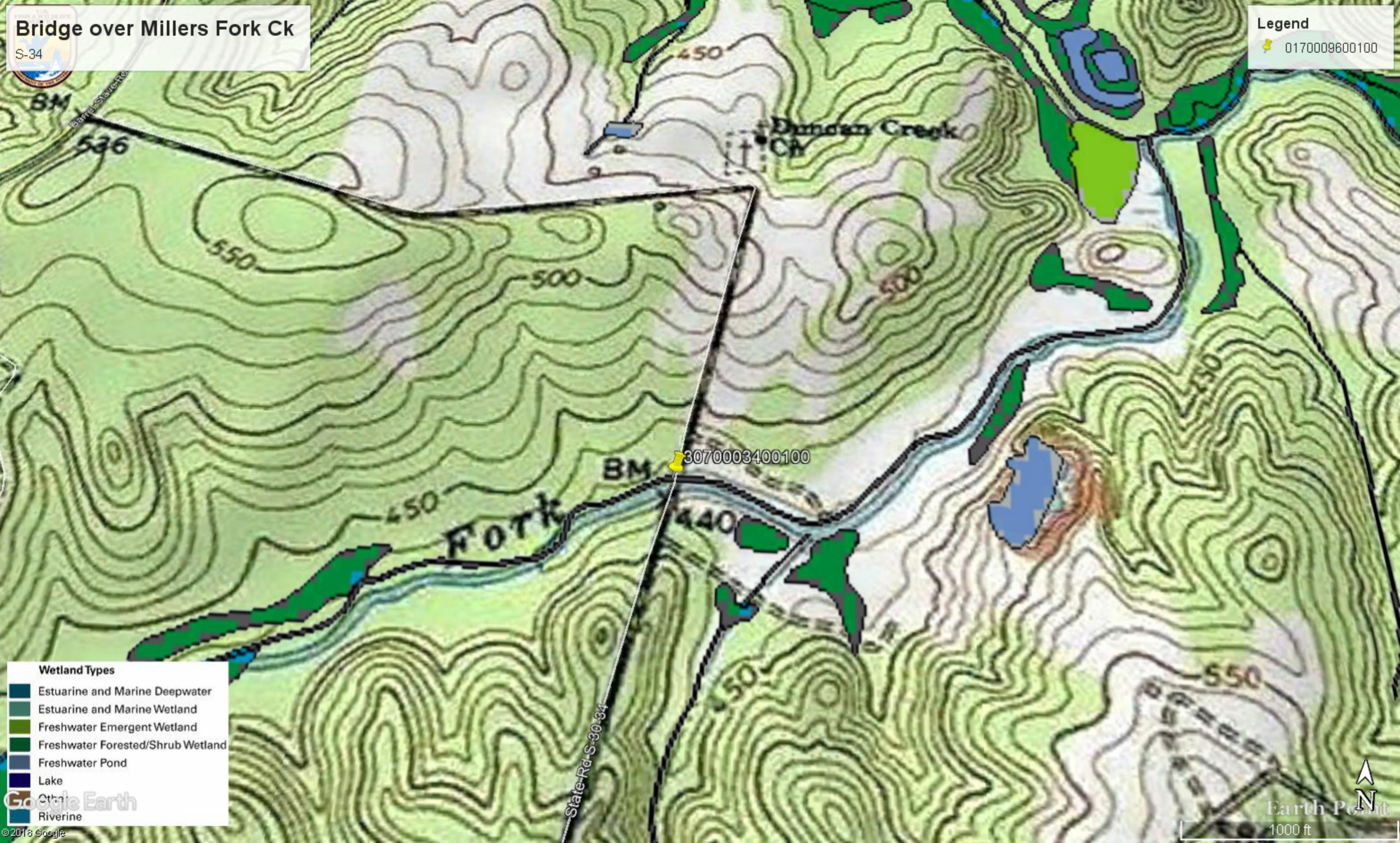
Will McGoldrick

Will McGoldrick
cru=Will McGoldrick, ou=SCDOT, ou=Environmental
Services Office, email=mcgoldrwr@scdot.org,
c=US
2019.04.16 14:30:55 -0400

Biologist, SCDOT/Consultant

4-12-19

Date






















- Wetland Types**
- Estuarine and Marine Deepwater
 - Estuarine and Marine Wetland
 - Freshwater Emergent Wetland
 - Freshwater Forested/Shrub Wetland
 - Freshwater Pond
 - Lake
 - Other
 - Riverine

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



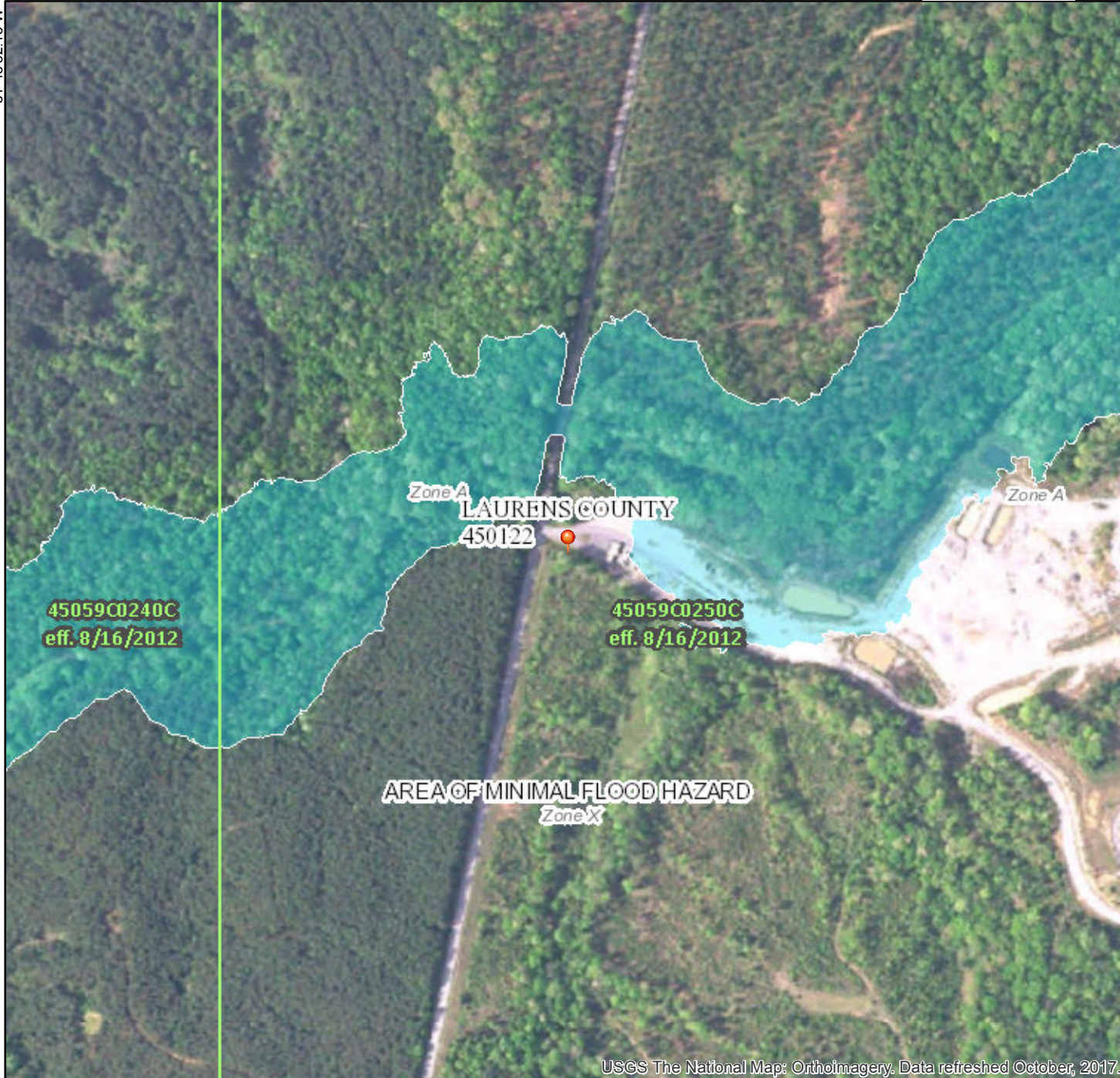
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/3/2019 at 1:32:29 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

34°31'4.99"N



USGS The National Map: Orthoimagery. Data refreshed October, 2017.

0 250 500 1,000 1,500 2,000 Feet 1:6,000

34°30'35.35"N

81°48'14.69"W



2/5/2019

Watershed and Water Quality Information

General Information

Applicant Name: SCDOT

Permit Type: MS4

Latitude: 34.514796

Longitude: -81.809332

MS4 Designation: Not in designated area

Monitoring Station: RS-01057

Within Coastal Critical Area:

Water Classification (Provisional): FW

Waterbody Name: MILLERS FORK

Entered Waterbody Name:

Parameter Descriptions

NH3N	Ammonia	FC	Fecal Coliform
CR	Chromium	FCB	Fecal Coliform (Shellfish)
CU	Copper	BIO	Macroinvertebrates (Bio)
HG	Mercury	TP	(Lakes) Phosphorus
NI	Nickel	TN	(Lakes) Nitrogen
PB	Lead	CHLA	(Lakes) Chlorophyll a
ZN	Zinc	ENTERO	(Beach) Enterococcus
DO	Dissolved Oxygen	HGF	Mercury (Fish)
PH	pH	PCB	PCB (Fish)

Impaired Status (downstream sites)

Station	NH3N	CR	CU	HG	NI	PB	ZN	DO	PH	TURBIDITY	ECOLI	FCB	BIO	TP	TN	CHLA	ENTERO	HGF	PCB
RS-01057	X	X	X	X	X	X	X	X	X	X	T	A	X	X	X	X	X	X	X
RS-14185	F	F	F	F	F	X	F	F	F	F	A	A	X	X	X	X	X	X	X
B-072	A	A	A	A	A	X	A	A	A	A	A	A	X	X	X	X	X	X	X
B-054	A	A	A	A	A	X	A	A	A	A	A	A	X	X	X	X	X	X	X

F = Standards Fully Supported

A = Assessed at Upstream Station

T = Within TMDL Approved Watershed

N = Standards Not Supported

X = Parameter Not Assessed at Station

Parameters to be addressed (those not supporting standards)

ECOLI

Fish Consumption Advisory

TMDL Information - TMDL Parameters to be addressed

In TMDL Watershed: Yes

TMDL Site: RS-01057

TMDL Report No: 016-04

TMDL Parameter: Fecal

TMDL Document Link: http://www.scdhec.gov/sites/default/files/docs/HomeAndEnvironment/Docs/tmdl_enoree_fc.pdf

EPA FINALIZED TMDL

**Enoree River Basin (Hydrological Unit Code: 03050108):
Stations: B-035, B-037, B-038, B-041, B-053, B-054, B-072, B-097,
B-150, B-186, B-192, B-231, B-241, B-246, BE-001, BE-007, BE-
015, BE-017, BE-018, BE-020, BE-024, BE-039, BE-040
Fecal Coliform Bacteria**

September 29, 2004



**South Carolina Department of Health
and Environmental Control**

**Bureau of Water
2600 Bull Street
Columbia, SC 29201**

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et.seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S Environmental Protection Agency is hereby establishing a Total Maximum Daily Load (TMDL) for fecal coliform bacteria in the Enoree Basin. Subsequent actions must be consistent with this TMDL.

James D. Giattina, Director
Water Management Division

Date

Abstract

The Enoree River basin (8-digit HUC 03050108) is located in parts of Union, Spartanburg, Newberry, Laurens, and Greenville counties encompassing 24 14-digit HUCs (Figure 1-1) in the Broad River basin. Twenty-three water quality monitoring stations in the watershed have been placed on the South Carolina §303(d) list of impaired waters for violations of the fecal coliform bacteria standard, as shown in Table 1-1. The 730 square mile basin is composed of mostly forest (70%) with some pastureland (10%) and cropland (10%). The basin has several municipalities that have or may receive Municipal Separate Storm Sewer System (MS4) permits. There are 10 active continuous point sources discharging fecal coliform bacteria in the Enoree River basin of South Carolina.

The load-duration curve methodology was used to establish allowable fecal coliform bacteria loads in the watershed. The existing load was determined by applying a power trend line to measured data in violation of the instantaneous standard. The existing load and allowable total maximum daily load (TMDL) for stations on the 2002-§303(d) list is presented in Table I. To achieve the TMDL target, reductions of fecal coliform bacteria loads will be necessary; this is shown in Table I on the next page.

Table I Total Maximum Daily Loads for Impaired Water Quality Monitoring Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load	TMDL WLA		Existing Load	TMDL LA	MOS	TMDL ³	Percent Reduction ⁴
	Continuous (counts/day)	Continuous ¹ (counts/day)	MS4 ²	(counts/day)	(counts/day)	(counts/day)	(counts/day)	
B-035	NA	NA	66%	1.45E+11	4.68E+10	2.60E+09	4.94E+10	66%
B-037	3.50E+11	3.50E+11	NA	8.05E+12	2.13E+12	1.38E+11	2.61E+12	68%
B-038	NA	NA	NA	3.15E+11	3.53E+10	1.96E+09	3.72E+10	88%
B-041	4.14E+11	4.14E+11	NA	4.34E+12	2.21E+12	1.46E+11	2.77E+12	36%
B-053	4.14E+11	4.14E+11	NA	5.35E+12	3.19E+12	2.00E+11	3.80E+12	29%
B-054	4.29E+11	4.29E+11	NA	1.62E+13	5.76E+12	3.44E+11	6.54E+12	60%
B-072	1.51E+10	1.51E+10	NA	3.29E+12	1.00E+12	5.65E+10	1.07E+12	67%
B-097	NA	NA	67%	3.27E+11	1.03E+11	5.72E+09	1.09E+11	67%
B-150	NA	NA	NA	6.60E+11	2.04E+11	1.13E+10	2.15E+11	67%
B-186	NA	NA	75%	6.23E+11	1.46E+11	8.12E+09	1.54E+11	75%
B-192	NA	NA	60%	2.60E+10	9.97E+09	5.54E+08	1.05E+10	60%
B-231	NA	NA	NA	2.36E+11	1.18E+11	6.55E+09	1.25E+11	47%
B-241	NA	NA	69%	6.93E+11	2.02E+11	1.12E+10	2.13E+11	69%
B-246	NA	NA	NA	2.21E+11	1.44E+11	7.98E+09	1.52E+11	31%
BE-001	NA	NA	72%	2.06E+11	5.36E+10	2.98E+09	5.66E+10	72%
BE-007	NA	NA	81%	9.98E+11	1.78E+11	9.91E+09	1.88E+11	81%
BE-015	1.15E+11	1.15E+11	69%	2.99E+12	7.54E+11	4.83E+10	9.17E+11	69%
BE-017	2.29E+11	2.29E+11	81%	8.76E+12	1.36E+12	8.82E+10	1.68E+12	81%
BE-018	3.50E+11	3.50E+11	72%	8.42E+12	1.92E+12	1.26E+11	2.39E+12	72%
BE-020	3.50E+11	3.50E+11	65%	1.26E+12	7.18E+10	2.34E+10	4.45E+11	65%
BE-024	4.13E+11	4.13E+11	35%	4.95E+12	2.65E+12	1.70E+11	3.24E+12	35%
BE-039	NA	NA	79%	1.18E+11	2.31E+10	1.28E+09	2.44E+10	79%
BE-040	NA	NA	78%	7.12E+11	1.47E+11	8.14E+09	1.55E+11	78%

Table Notes:

1. Total monthly wasteload cannot exceed loads (counts/30-days) listed in Table 3-3.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1 of Appendix B.
4. Percent reduction applies to LA and MS4 components when an MS4 is in the watershed.

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1.0 INTRODUCTION

1.1 Background

Levels of fecal coliform bacteria can be elevated in waterbodies as the result of both point and nonpoint sources of pollution. Section §303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for waterbodies that are not meeting designated uses under technology-based pollution controls. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and instream water quality conditions so that states can establish water quality-based controls to reduce pollution and restore and maintain the quality of water resources (USEPA, 1991).

The State of South Carolina has placed 23 water quality monitoring stations in the Enoree River basin (8-digit HUC 03050108) on South Carolina's 2002 Section §303(d) list for impairment due to fecal coliform bacteria. These stations are identified in Table 1-1.

Table 1-1 Water Quality Monitoring Stations Impaired by Fecal coliform bacteria in the Enoree River Basin (03050108)

Waterbody Name	Waterbody ID	Waterbody Location
Durbin Creek	B-035	DURBIN CREEK ON S-23-160 3 MI E OF SIMPSONVILLE
Enoree River	B-037	ENOREE RIVER AT S-42-118 SW OF WOODRUFF
Lick Creek	B-038	LICK CREEK AT S-42-118 1 1/4 MI SW WOODRUFF
Enoree River	B-041	ENOREE RIVER AT SC 49 SE OF WOODRUFF
Enoree River	B-053	ENOREE RIVER AT SC 72, 121, & US 176, 1 MI NE WHITMIRE
Enoree River	B-054	ENOREE RIVER AT S-36-45 3.5 MI AB JCT WITH BROAD RIVER
Duncan Creek	B-072	DUNCAN CREEK AT US 176 1.5 MI SE OF WHITMIRE
Durbin Creek	B-097	DURBIN CREEK AT SC 418
Warrior Creek	B-150	WARRIOR CREEK AT US 221, 8 MI NNE OF LAURENS
Mountain Creek	B-186	MOUNTAIN CREEK AT S-23-335
Princess Creek	B-192	PRINCESS CREEK AT SUBER MILL RD, SECOND RD S OF US 29 OFF S-23-540
Beards Fork	B-231	BEARDS FORK CREEK AT US 276 (I-385) 3.7 MI NNE OF CLINTON
Gilder Creek	B-241	GILDER CREEK AT S-23-142 2.75 MI ENE OF MAULDIN
Beaverdam Creek	B-246	BEAVERDAM CREEK AT S-30-97, 7 MI NE OF GRAY COURT
Enoree River	BE-001	ENOREE RIVER AT UNNUM RD W US 25 N TRAVELERS REST
Rocky Creek	BE-007	ROCKY CREEK AT BRDG IN BATESVILLE 1 MI AB JCT WITH ENOREE
Enoree River	BE-015	ENOREE RIVER AT CO RD 164
Enoree River	BE-017	ENOREE RIVER AT SC 296, 7.5 MI NE OF MAULDIN
Enoree River	BE-018	ENOREE RIVER AT S-30-75
Gilder Creek	BE-020	GILDER CREEK AT S-23-143 1/4 MI AB JCT WITH ENOREE RIVER
Enoree River	BE-024	ENOREE RIVER AT US 221
Beaverdam Creek	BE-039	BEAVERDAM CREEK AT RD 1967
Gilder Creek	BE-040	GILDER CREEK AT SC 14-AB GILDERS CREEK PT

1.2 Watershed Description

The Enoree River Basin (8-digit HUC 03050108) (Figure 1-1) is located in portions of Union, Spartanburg, Newberry, Laurens, and Greenville counties encompassing 24 14-digit HUCs (Figure 1-1) in the Broad River basin. Enoree River extends nearly 107 miles before discharging into the Broad River. The total drainage area covers 730 square miles in the Piedmont region of South Carolina. Segments in the Enoree River basin discussed in this report are classified as a freshwater stream for recreational use.

Based on 1996 USGS Multi-Resolution Land Characteristic (MRLC) land use data, 71 percent of the watershed is forested. The remaining 30 percent is composed of pastureland (10%), cropland (10%), urban area (6%), and a small mix of water and barren land uses (3%). The majority of urban land is located in the upper portion of the basin between Greenville and Greer, north to Travelers Rest and south to Fountain Inn. Table 1-2 presents the percentage of total watershed area for each aggregated land use. Table A-1 (Appendix A) presents the percentage of land use area in each monitoring station and USGS streamflow station drainage area. The areas are also listed in miles squared in Table A-2. Figure 1-2 illustrates land use for the Enoree River basin.

Table 1-2 MRLC Aggregated Land Use for the Enoree River Basin (03050108)

Aggregated Land Use	Percent of Total Area	Total Area (miles ²)
Urban	6.4%	47
Barren	2.9%	21
Row Crops	9.5%	69
Pasture	9.7%	71
Forest	71.1%	520
Water	0.4%	2.7

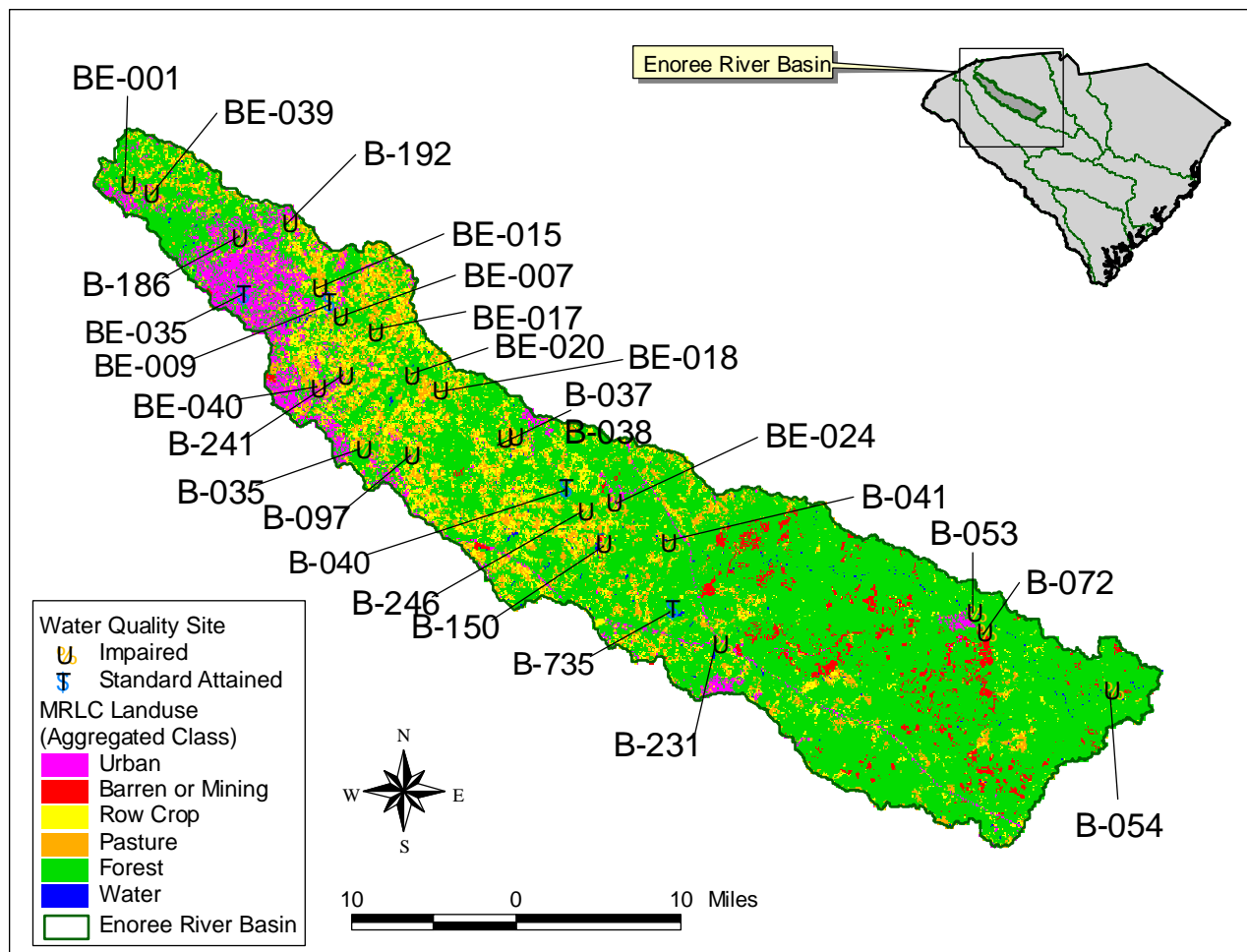


Figure 1-2 Enoree River Basin Land Use

1.3 Water Quality Standard

The impaired stream segments of the Enoree River basin are designated as Class Freshwater. Waters of this class are described as:

“Freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses.” (R.61-68)

South Carolina’s standard for fecal coliform bacteria in freshwater is:

“Not to exceed a geometric mean of 200/100 mL, based on five consecutive samples during any 30 day period; nor shall more than 10 percent of the total samples during any 30 day period exceed 400/100 mL.” (R.61-68).

2.0 WATER QUALITY ASSESSMENT

Fecal coliform bacteria data collected in the Enoree River basin from 1990 through 2001 were assessed to determine impairment of standards for recreational use. The State of South Carolina monitors fecal coliform bacteria at 27 stations in the watershed. Figure 1-1 shows the location of water quality monitoring stations in the watershed.

Twenty-three water quality monitoring stations in the basin have been identified on the State of South Carolina’s Section §303(d) list for 2002 as impaired (Table 1-1). The fecal coliform bacteria data collected at impaired water quality monitoring stations is presented in Appendix A (Table A-3). Waters in which no more than 10 percent of the samples collected over a five year period are greater than 400 fecal coliform counts per 100 mL are considered to comply with the South Carolina water quality standard for fecal coliform bacteria. Waters with more than 10 percent of samples greater than 400 counts per 100 mL are considered impaired and were listed for fecal coliform bacteria on the State of South Carolina’s Section §303(d) list. Statistical information supporting the listing of impaired water quality monitoring sites in the watershed is presented in Table 2-1.

Table 2-1 Statistical Assessment of Observed Fecal Coliform Bacteria Collected from 1996 - 2000

Station	Total Number of Samples	Total Number of Samples >400 #/100 mL	Percent of Samples >400 #/100 mL
B-035	31	23	74%
B-037	30	9	30%
B-038	30	18	60%
B-041	59	12	20%
B-053	10	3	30%
B-054	59	16	27%
B-072	61	35	57%
B-097	60	45	75%
B-150	12	3	25%
B-186	27	11	41%
B-192	59	19	32%
B-231	30	6	20%
B-241	30	21	70%
B-246	12	7	58%
BE-001	59	25	42%
BE-007	31	10	32%
BE-015	30	12	40%
BE-017	58	20	34%
BE-018	28	11	39%
BE-020	30	14	47%
BE-024*	NA	NA	NA
BE-039	28	19	68%
BE-040	30	26	87%

*Note: Water quality monitoring station BE-024 was inactive after 1994.

The timeframe, both annually and seasonally, of water quality monitoring at each station varies greatly. The statistical assessment presented in Table 2-1 was based on data collected over the five-year period from 1996 through 2000. Data collected at BE-024, the Enoree River at US Hwy 221, was collected from 1990 through 1994 and therefore is not included in Table 2-1. Data collected from 1990 through 1994 at BE-024 is in violation of the State's instantaneous standard and therefore remains on the South Carolina §303(d) list of impaired waters.

After determining compliance with water quality standards, observed violations were assessed to determine conditions critical to impairment. Data were compared with estimated streamflows to establish a relationship between instream concentrations and hydrologic conditions. Due to limited streamflow data in the watershed, observed data were plotted with the load-duration curves generated based on area-weighted flows. The development of load-duration curves is discussed further in Section 4.0 of this report. Load-duration curves plotted for each station in Figures B-1 through B-22, and in Figure

2-1 (for B-035) are equal to the TMDL target based on the criteria for instantaneous events. The observed fecal coliform bacteria data were also converted from counts per 100 mL to loads in counts per day to assess hydrologic conditions when the standard is not attained.

The percent of flow exceeded in Figure 2-1 and Figure B-1 through B-22 represent flow conditions at each monitoring station. Hydrologic conditions for very dry events, likely to be exceeded in 99.99 percent of measured events, are represented as 99.99 percent. Extremely wet events that occur rarely are represented as 0.01 percent. Data collected at all impaired stations in the basin have violations during all flow conditions. Violations during various flow events suggest a combination of overland, instream, and continuous sources of fecal coliform bacteria.

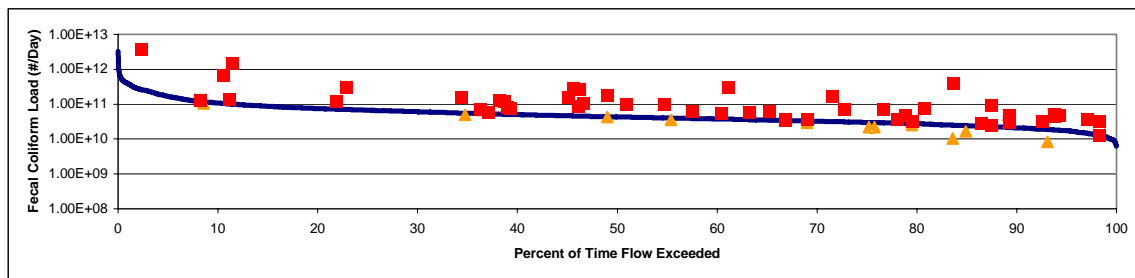


Figure 2-1 Fecal Coliform Bacteria Load-Duration Curve for Station B-035 Illustrating Observed Fecal Coliform Bacteria Loads Over Various Hydrologic Conditions

Given that all impaired stations in the basin have violations during all flow conditions, some stations may have more violations during dry periods than during wet periods. As in Figure 2-1, fecal coliform bacteria data is in violation at all flow regimes but there are more violations during low and average flows periods. Figure B-12 (Appendix B) represents conditions at BE-024 where few violating samples have been collected. The violations that do occur at the station were measured during average to high flow conditions. Looking to all the samples collected at BE-024 it can be observed that concentrations of fecal coliform bacteria remain consistently high, following the TMDL target line, though not in violation of the standard.

3.0 SOURCE ASSESSMENT AND LOAD ALLOCATION

Fecal coliform bacteria enter surface waters of the Enoree River basin from both point and nonpoint sources. Point sources are facilities that discharge at a specific location through pipes, outfalls, and/or conveyance channels. All point sources must have a National Pollutant Discharge Elimination System (NPDES) permit and are often municipal wastewater treatment plants or industrial waste treatment facilities. Nonpoint sources are diffuse sources that have multiple routes of entry into surface waters. Some nonpoint sources are related to land use activities that accumulate fecal coliform bacteria on the land surface (i.e. pastureland) and runoff during storm events.

3.1 Point Sources

There are 10 active continuous point sources discharging fecal coliform bacteria in the Enoree River basin and Municipal Separate Storm Sewer (MS4) permits for unincorporated Greenville, Laurens, and Spartanburg counties and the Cities of Fountain Inn, Greenville, Greer, Mauldin, Simpsonville, and Travelers Rest.

3.1.1 Continuous Point Sources

Facilities with continuous discharges of fecal coliform bacteria are listed in Table 3-1 and illustrated in Figure 3-1. In South Carolina, NPDES permittees that discharge sanitary wastewater must meet the State criteria for fecal coliform bacteria at the point of discharge (i.e. a daily maximum concentration of 400 counts per 100 mL, and a 30-day geometric mean of 200 counts per 100 mL).

Table 3-1 Permitted Facilities Discharging Fecal Coliform Bacteria into Waterbodies of the Enoree River Basin

Facility Name	NPDES No.	Flow * (MGD)	Receiving Stream
INMAN MILLS/RAMEY PLANT	SC0002496	0.113**	ENOREE RIVER
TOWN OF WHITMIRE	SC0022390	1.000	DUNCAN CREEK
WCRSA/TAYLORS AREA PLANT	SC0024309	7.500	ENOREE RIVER
BUCK-A-ROO RANCH INC	SC0026662	0.010	TRIBUTARY TO ENOREE RIVER
WCRSA/PELHAM WWTF	SC0033804	7.500	ENOREE RIVER
ALTAMONT FOREST SD	SC0034398	0.124	ENOREE RIVER
RIVERDALE MILLS W & S DISTRICT	SC0035734	0.090	ENOREE RIVER
WCRSA/DURBIN CREEK	SC0040002	3.300	DURBIN CREEK
WCRSA/GILDER CREEK	SC0040525	8.000	GILDER CREEK
WOODRUFF/ENOREE RIVER	SC0045802	0.700	ENOREE RIVER

* Note: Flow limits are either permit limits or design limits.

**Long Term Averaged Flow

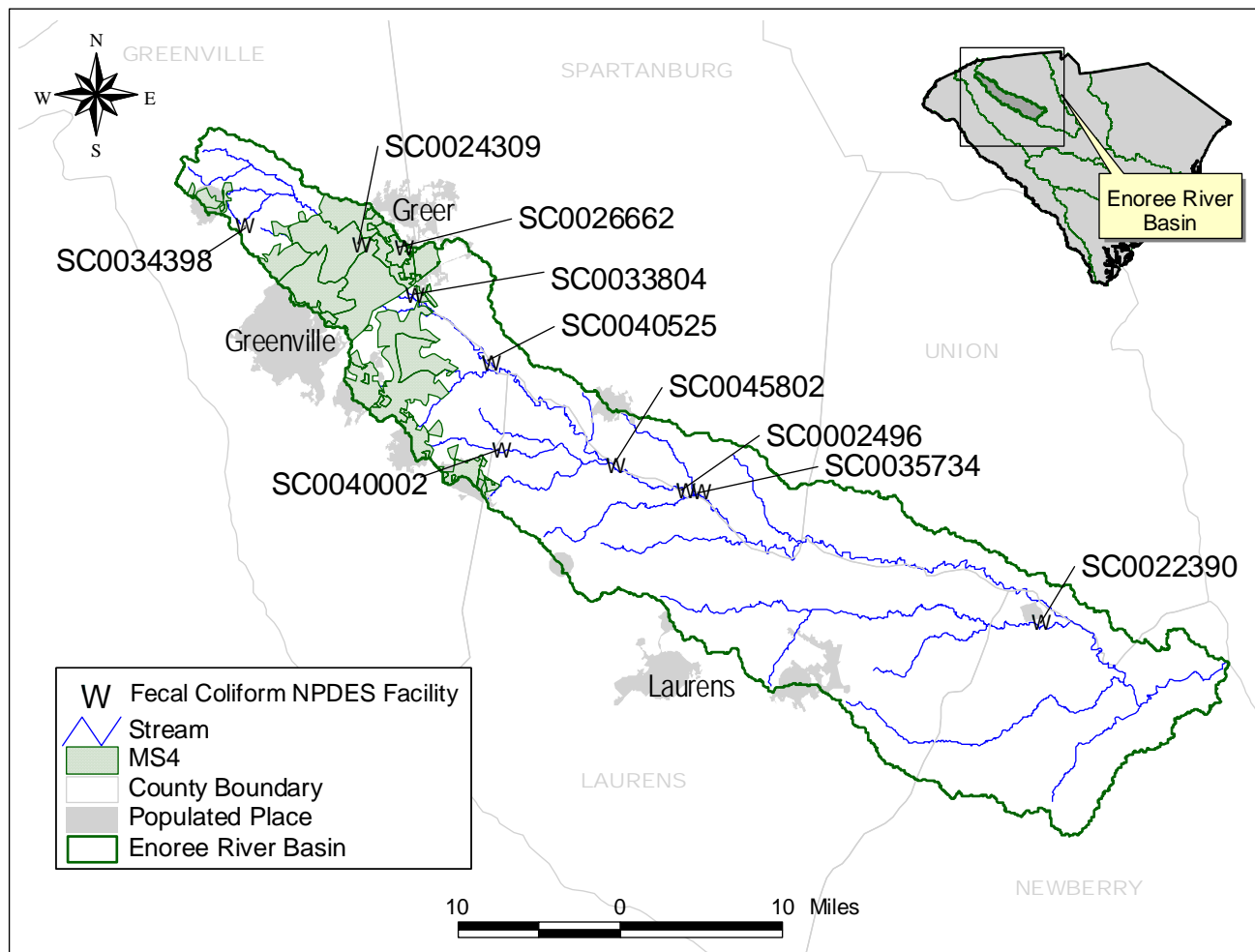


Figure 3-1 Active Fecal Coliform Bacteria Discharging NPDES Facilities

Table 3-2 Impaired Water Quality Monitoring Stations Draining NPDES Facilities in the Enoree River Basin

B-054	B-053	B-041	BE-024	BE-020	BE-018	B-037	BE-017	BE-015	B-072
SC0002496	SC0002496	SC0002496	SC0002496						
SC0022390									SC0022390
SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	SC0024309	
SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662	SC0026662		
SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804	SC0033804		
SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	SC0034398	
SC0035734	SC0035734	SC0035734							
SC0040002	SC0040002	SC0040002	SC0040002						
SC0040525	SC0040525	SC0040525	SC0040525	SC0040525	SC0040525	SC0040525			
SC0045802	SC0045802	SC0045802	SC0045802						

The TMDLs presented in this report were developed using permitted flows, or design flows when there is no permitted flow, and permitted concentrations for fecal coliform bacteria. Limited information was available to determine the survival rate of fecal coliform bacteria discharging from permitted facilities to establish the impact downstream. Therefore, for the purpose of fecal coliform bacteria TMDL development in the Enoree River basin, wasteloads for continuous discharges are cumulative for a given drainage area. Table 3-3 lists estimated existing loads and the permitted geometric mean concentration of 200 counts per 100 mL and instantaneous concentration of 400 counts per 100 mL.

Table 3-3 Estimated Existing Fecal Coliform Bacteria Loads for Facilities in the Enoree River Basin

NPDES Facility	Flow (MGD)*	Existing Loading (counts/days)	Existing Loading (counts/30days)
SC0002496	0.113**	1.71E+09	2.57E+10
SC0022390	1.000	1.51E+10	2.27E+11
SC0024309	7.500	1.14E+11	1.70E+12
SC0026662	0.010	1.51E+08	2.27E+09
SC0033804	7.500	1.14E+11	1.70E+12
SC0034398	0.124	1.88E+09	2.82E+10
SC0035734	0.090	1.36E+09	2.04E+10
SC0040002	3.300	5.00E+10	7.50E+11
SC0040525	8.000	1.21E+11	1.82E+12
SC0045802	0.700	1.06E+10	1.59E+11

* Note: Flow limits are either permit limits or design limits.

**Long Term Averaged Flow

The collection systems for these wastewater treatment facilities are also potential sources of fecal coliform bacteria. Sewage collection systems typically are placed adjacent to waterways. At these locations, there is a potential for collection system leaks which could result in elevated instream concentrations of fecal coliform bacteria. Sanitary sewer overflows (SSOs) are also a potential source, particularly after periods of intense rainfall. This source is associated with infrequent events, limited in duration and likely to have an insignificant long-term impact instream. Identified collection system and/or SSO problems are addressed by SCDHEC through compliance and enforcement mechanisms. Sewer lines are adjacent to Gilder and Rocky Creeks and the Enoree River in Greenville.

3.1.2 Municipal Separate Storm System (NPDES)

Greenville, Laurens, and Spartanburg Counties and the cities of Fountain Inn, Greer, Mauldin, Simpsonville, and Travelers Rest have or will have NPDES MS4 (Municipal Separate Storm Sewer System) permits (Figure 1-1). These permitted sewer systems will

be treated as point sources in the TMDL calculations below. However for modeling purposes all urban areas will be evaluated together as urban nonpoint sources.

In 1990, EPA developed rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program, designed to prevent harmful pollutants from being washed by storm water runoff into Municipal Separate Storm Sewer Systems (MS4s) (or from being dumped directly into the MS4) and then discharged into local waterbodies (SCDHEC, 2002). Phase I of the program required operators of medium and large MS4s (those generally serving populations of 100,000 or greater) to implement a storm water management program as a means to control polluted discharges from MS4s.

Phase II of the rule extends coverage of the NPDES storm water program to certain small MS4s. Small MS4s are defined as any MS4 that is not a medium or large MS4 covered by Phase I of the NPDES Storm Water Program. Phase II requires operators of regulated small MS4s to obtain NPDES permits and develop a storm water management program. Programs are to be designed to reduce discharges of pollutants to the “maximum extent practicable”, protect water quality, and satisfy appropriate water quality requirements of the Clean Water Act.

3.2 Nonpoint Sources

The land use distribution of the Enoree River basin provides insight into determining nonpoint sources of fecal coliform bacteria (Figure 1-2). In the watershed, more than 70 percent of the land area is classified forested, nearly 20 percent is cropland or pastureland. Key nonpoint sources identified in the watershed include livestock, manure application, failing septic systems, illicit discharges (including leaking and overflowing sewers), overland contributions from impervious surfaces, and natural sources.

3.2.1 Wildlife

Fecal coliform bacteria are found in forested areas, pastureland, and cropland due to the presence of wild animal sources such as deer, raccoons, wild turkeys and waterfowl. The Department of Natural Resources in South Carolina estimates the deer habitat in the basin at a density from 15 to 45 deer per square mile in the upper portion and more than 45 deer per square mile in the lower basin in Laurens, Union and Newberry counties (SC Deer Density 2000 map). Wildlife waste is transported over land surfaces during rainfall events or may be directly deposited by animals into streams. The high percentage of permeable surfaces in forested areas increases the infiltration rate over the watershed area. This process ultimately reduces the runoff reaching streams by overland flow and reduces the significance of fecal coliform bacteria contributions transported over land.

3.2.2 Agricultural Activities and Grazing Animals

Agricultural land can be a source of fecal coliform bacteria. Runoff from grazing pastures, improper land application of animal wastes, livestock operations, and livestock

with access to waterbodies are all agricultural sources of fecal coliform bacteria. Agricultural best management practices (BMPs) such as buffer strips, alternative watering sources, limiting livestock access to streams, and the proper land application of animal wastes reduce fecal coliform bacteria loading to waterbodies.

The number of animals in the watershed (Table 3-4) was estimated by area-weighting the 1997 USDA census data over the watershed area for Greenville, Spartanburg, Laurens, Union, and Newberry counties. Census data show that grazing cattle are of more relevance in the Enoree River basin than confined animal operations. Livestock, except for dairy cattle, are not usually confined and are typically grazing in the pastures where deposited manure is a source of nonpoint pollution. The time that cattle spend in streams is assumed to be 0.15 percent of their total grazing time. Hogs are anticipated to be generally confined, where as sheep are expected to spend all of their time grazing. Horses and ponies are expected to spend the majority of spring, summer, and fall months grazing in pastureland where manure is a source of nonpoint pollution.

Table 3-4 1997 USDA Agricultural Census Data Animal Estimates

Animal	1997 Census Estimate
Beef Cow	8720
Dairy Cow	1399
Hog	5107
Sheep	38
Horses and Ponies	634

3.2.3 Failing Septic Systems and Illicit Discharges

Failing septic systems and illegal discharges also represent a nonpoint source that can contribute fecal coliform bacteria to receiving waterbodies through surface or subsurface malfunctions, or direct discharges. Based on 1990 census information, population change from 1990 and 2000, and assuming an average of 2.5 people per household (U.S. Census, 2000), greater than 115,000 people in the Enoree River basin use septic systems. Though the precise failure rate is unknown, Schueler (1999) suggests an average septic failure rate of 20 percent. Many of these areas are also on sewer systems that may leak and/or overflow during rain events contributing significant loads of fecal coliform bacteria directly to streams.

3.2.4 Urban Runoff

Runoff from urban areas not permitted under the MS4 program are probably a significant source of fecal coliform bacteria into Gilder and Duncan Creeks and the Enoree River. Water quality data collected from streams draining many of the un-permitted communities show existing loads of fecal coliform bacteria at levels greater than the

State's instantaneous standards. Best management practices (BMPs) such as buffer strips and the proper disposal of domestic animal wastes reduce fecal coliform bacteria loading to water bodies.

4.0 TECHNICAL APPROACH – LOAD-DURATION METHOD

Load-duration curves were developed for water quality monitoring stations in the Enoree River basin to establish allowable fecal coliform bacteria loads under various hydrologic conditions. The load-duration methodology uses the cumulative frequency distribution of streamflow and pollutant concentration (fecal coliform bacteria) data to estimate the allowable loads for a waterbody. Allowable load-duration curves were established in the basin using the instantaneous concentration of fecal coliform bacteria, minus a five percent margin of safety (MOS), and streamflow measured at various USGS stations in the Enoree River basin and surrounding watersheds, as shown in Figure 1-1 and listed in Table 4-1.

Table 4-1 USGS Stations Used to Establish Area-Weighted Flows

Site Number	Site Name	From	To	Drainage Area (mile ²)
02154500	N PACOLET RIVER AT FINGERVILLE	4/1/1930	9/30/2001	116
02160200	ENOREE RIVER AT TAYLORS	3/1/1998	9/30/2001	49.7
02160326	ENOREE RIVER AT PELHAM	3/10/1993	9/30/2001	84.2
02160381	DURBIN CREEK ABOVE FOUNTAIN INN	7/6/1994	9/30/1999	14
02160390	ENOREE RIVER NEAR WOODRUFF	2/9/1993	9/30/2001	249
02160700	ENOREE RIVER AT WHITMIRE	10/1/1973	9/30/2001	444
02164000	REEDY RIVER NEAR GREENVILLE	11/21/1941	9/30/2001	48.6
02165200	S RABON CREEK NEAR GRAY COURT	1967-1981 and 1990-2001		29.3

Streamflow data was not available at each impaired water quality monitoring station to develop load-duration curves. Therefore, flows were determined by area-weighted data collected at USGS stations listed in Table 4-1. Data collected at these stations through 2001 were used in the analysis. For USGS station 02160200, Enoree River at Taylors; USGS station 02160326, Enoree River at Pelham; USGS station 02160381, Durbin Creek above Fountain Inn; and USGS station 02160390, Enoree River near Woodruff, where data were not collected for the period from 1990 through 2001, the program MOVE1 was used to interpolate streamflow by comparing overlapping records with USGS station

02160700, Enoree River at Whitmire. Statistical analysis from matched stations and technical clarification of the MOVE1 methods can be found in Appendix D.

Watershed characteristics (including the distribution of land use activities, ecoregions, and topography) for the USGS stations and impaired water quality monitoring sites were compared to associate stations and develop load-duration curves. Table 4-2 lists the impaired water quality monitoring stations and associated streamflow stations used to develop area-weighted flow relationships. The location of both USGS and water quality monitoring stations are identified in Figure 1-1. Figure 4-1 illustrates the water yield for impaired stations associated with USGS station 02160326.

Table 4-2 USGS Stations and Associated Water Quality Stations

USGS Gage	Waterbody ID	Waterbody Name
02154500	B-038	Lick Creek
02160200	B-231	Beards Fork
	BE-039	Beaverdam Creek
02160326	B-035	Durbin Creek
	B-037	Enoree River
	B-186	Mountain Creek
	B-241	Gilder Creek
	BE-001	Enoree River
	BE-007	Rocky Creek
	BE-015	Enoree River
	BE-017	Enoree River
	BE-018	Enoree River
	BE-020	Gilder Creek
	BE-040	Gilder Creek
02160381	B-097	Durbin Creek
02160390	BE-024	Enoree River
02160700	B-041	Enoree River
	B-053	Enoree River
	B-054	Enoree River
	B-072	Duncan Creek
02164000	B-192	Princess Creek
02165200	B-150	Warrior Creek
	B-246	Beaverdam Creek

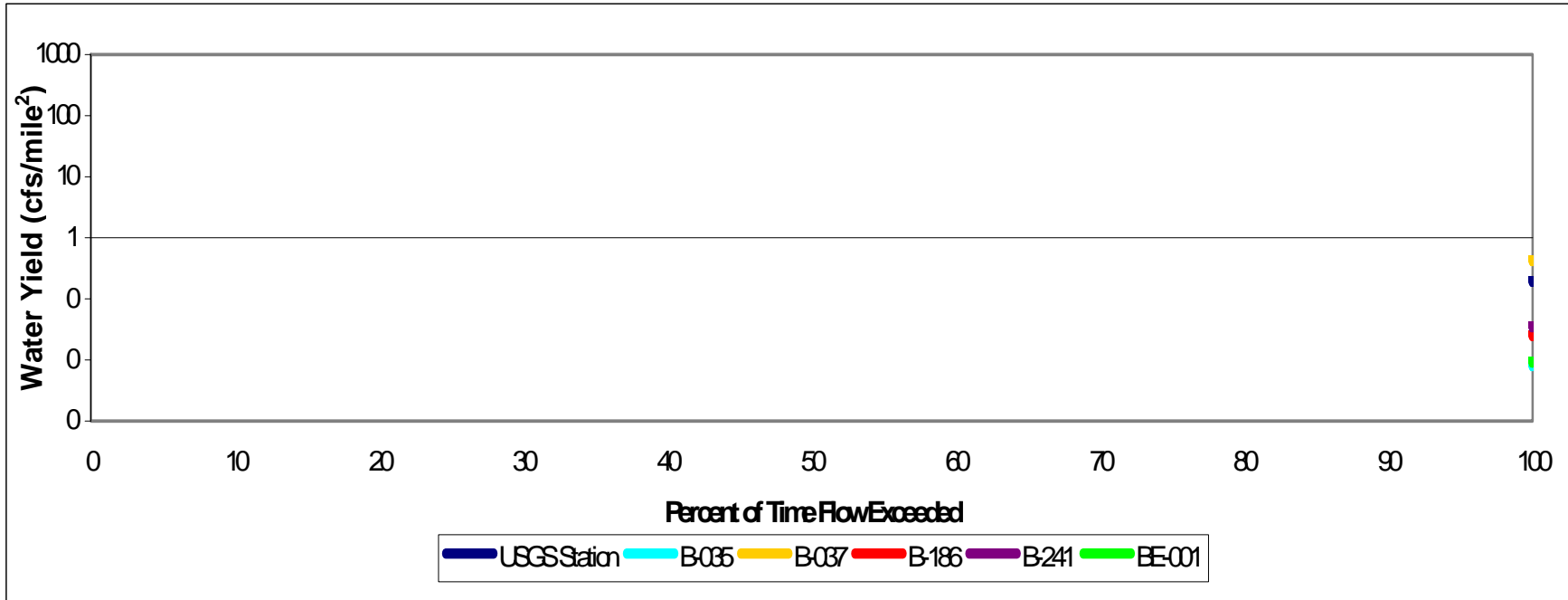


Figure 4-1 Water Yield (cubic feet per second per square mile) Based on Measured Daily Streamflow from USGS station 02160326

After calculating streamflow for each impaired monitoring station the data were ranked to determine the percent of time streamflow was exceeded. The streamflow was then multiplied by a concentration of 380 counts/100 mL (based on the instantaneous concentration and a five percent MOS) to generate a load-duration curve for each impaired station (Appendix B, Figures B-23 through B-29). The result of the load-duration curve is the TMDL target.

To define the TMDL for each station, an average of the load-duration curve was calculated. The average was calculated using loads at five percent intervals from the 10th percentile of flow exceeded to the 90th percentile of flow exceeded. Loads occurring at less than the 10th percentile of flow exceeded are extreme high flow events and the data collected at greater than the 90th percentile of flow exceeded are extreme low flow events and therefore were not considered in developing these TMDLs. Loads established at intervals and the mean load for each station can be found in Appendix B, Table B-1.

5.0 DEVELOPMENT OF TOTAL MAXIMUM DAILY LOAD

A total maximum daily load (TMDL) for a given pollutant and waterbody is comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is represented by the equation:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

The TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis to establish water quality-based controls. For some pollutants, TMDLs are expressed on a mass-loading basis (e.g., pounds per day). For bacteria, however, TMDLs can be expressed in terms of organism counts (or resulting concentration), in accordance with 40 CFR 130.2(l).

5.1 Critical Conditions

Critical conditions for fecal coliform bacteria in the Enoree River basin occur at various flow regimes. The load-duration curve methodology used to establish TMDLs in the basin considers various hydrologic conditions critical in maintaining water quality standards.

5.2 Existing Load

The existing load for each impaired station was established using observed fecal coliform bacteria data and area-weighted streamflow. The measured data occurring at less than the

10th percentile of flow exceeded is an extreme high flow event and the data collected at greater than the 90th percentile of flow exceeded is an extreme low flow event and therefore not considered as critical conditions for these TMDLs.

The data violating the instantaneous concentration were isolated and a best-fit trendline was fit to violating data. The power trendline was determined using a best-fit relationship that was most representative of the violating data. The equation representing the trendline was then used to calculate the average violating load that occurred between the 10th and 90th percentiles, at every fifth percentile. This average load is equal to the existing instream fecal coliform bacteria load at the associated station. The existing load from nonpoint sources is then equal to the existing instream load minus the existing wasteload from point sources.

Figure 5-1 presents the power best-fit trendline for station B-035, the impaired station on Durbin Creek near Simpsonville. Interval loads calculated for existing conditions are presented in Table B-2. Power trendlines at other stations in the basin are presented in Appendix (Figures B-1 through B-22). Existing loads calculated for each station are listed in Table 5-1.

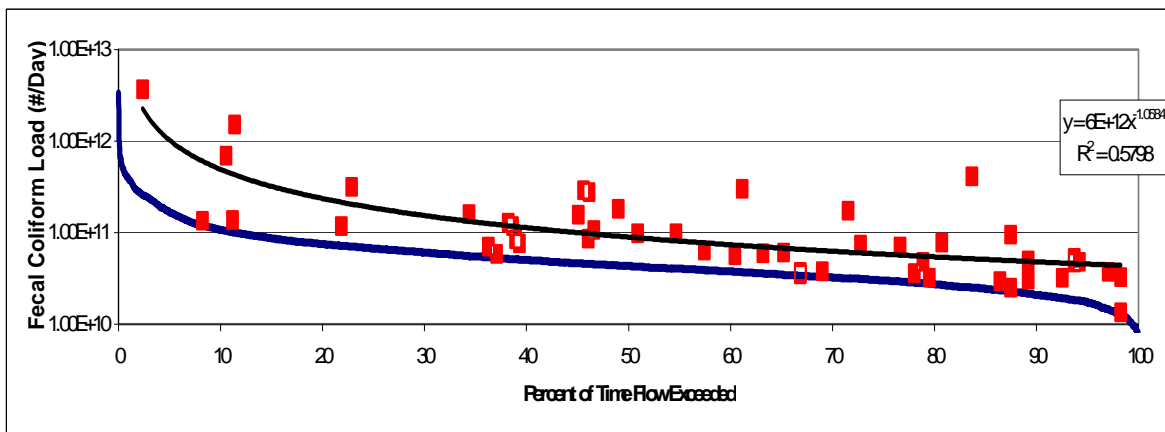


Figure 5-1 Power Trendline Generated from Violating Fecal Coliform Bacteria Measured at B-035

Table 5-1 Existing Loads for Impaired Water Quality Stations in the Enoree River Basin (03050108)

Station ID	Existing Load (counts/day)
B-035	1.45E+11
B-037	8.05E+12
B-038	3.15E+11
B-041	4.34E+12
B-053	5.35E+12
B-054	1.62E+13
B-072	3.29E+12
B-097	3.27E+11
B-150	6.60E+11
B-186	6.23E+11
B-192	2.60E+10
B-231	2.36E+11
B-241	6.93E+11
B-246	2.21E+11
BE-001	2.06E+11
BE-007	9.98E+11
BE-015	2.99E+12
BE-017	8.76E+12
BE-018	8.42E+12
BE-020	1.26E+12
BE-024	4.95E+12
BE-039	1.18E+11
BE-040	7.12E+11

5.3 Existing Wasteload

The existing wasteload was calculated for each NPDES permitted continuous discharge. The facilities were assumed to discharge at permitted flows, or design flows when a flow limit was not designated in the permit, and permitted limits of fecal coliform bacteria equal to the State criteria for both instantaneous and geometric mean loads. In South Carolina, NPDES permittees that discharge sanitary wastewater must meet the State's criteria for fecal coliform bacteria at the point of discharge (i.e. a daily maximum concentration of 400 counts per 100 mL, and a 30-day geometric mean of 200 counts per 100 mL). Under these permitted concentrations facilities should not be in exceedance of the fecal coliform bacteria water quality criteria, and therefore, not considered to be a major contributing source. If facilities are discharging at greater than permitted concentrations this is an illicit discharge and regulated through the NPDES program. Allowable TMDL wasteloads for impaired stations, as shown in Table 5-2, are equal to loads calculated for facilities in the basin.

Table 5-2 Wasteloads from NPDES Continuous Discharges to Impaired Water Quality Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load Continuous (counts/day)
B-035	NA
B-037	3.50E+11
B-038	NA
B-041	4.14E+11
B-053	4.14E+11
B-054	4.29E+11
B-072	1.51E+10
B-097	NA
B-150	NA
B-186	NA
B-192	NA
B-231	NA
B-241	NA
B-246	NA
BE-001	NA
BE-007	NA
BE-015	1.15E+11
BE-017	2.29E+11
BE-018	3.50E+11
BE-020	3.50E+11
BE-024	4.13E+11
BE-039	NA
BE-040	NA

5.4 Margin of Safety

There are two methods for incorporating a margin of safety (MOS) in the analysis: a) by implicitly incorporating the MOS using conservative assumptions to develop allocations; or b) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations. For the Enoree River basin TMDLs, both methods were applied to incorporate a MOS. An implicit MOS was incorporated through the use of conservative assumptions in developing the TMDL, such as the use of the design or permitted flow for NPDES facilities and averaging the exponential trend of measured violations. A five percent explicit MOS was also reserved from the water quality criteria in developing the load-duration curves. Specifically, the water quality target was set at 190 counts per 100 mL for the geometric mean 30-day period and 380 counts per 100 mL for the instantaneous criterion, which is five percent lower than the water quality criteria of 200 and 400 counts per 100 mL, respectively.

5.5 Total Maximum Daily Load

The TMDL represents the maximum fecal coliform bacteria load the stream may carry and still meet water quality standards. The TMDL is presented in fecal coliform counts to be protective of both the instantaneous, per day, and geometric mean, per 30-day, criteria. Table 5-3 defines the fecal coliform bacteria total maximum daily load for protection of water quality standards for impaired stations in the Enoree River basin.

There are several municipalities in the watershed that have or will have NPDES MS4 permits. Greenville County became covered under NPDES Phase I in August of 2000. The other counties, towns, and cities will eventually be covered under one or more

Table 5-3 Total Maximum Daily Loads for Impaired Water Quality Monitoring Stations in the Enoree River Basin (03050108)

Station ID	Existing Waste Load	TMDL WLA		Existing Load	TMDL LA	MOS	TMDL ³	Percent Re-duction ⁴
	Continuous (counts/day)	Continuous ¹ (counts/day)	MS4 ²	(counts/day)	(counts/day)	(counts/day)	(counts/day)	
B-035	NA	NA	66%	1.45E+11	4.68E+10	2.60E+09	4.94E+10	66%
B-037	3.50E+11	3.50E+11	NA	8.05E+12	2.13E+12	1.38E+11	2.61E+12	68%
B-038	NA	NA	NA	3.15E+11	3.53E+10	1.96E+09	3.72E+10	88%
B-041	4.14E+11	4.14E+11	NA	4.34E+12	2.21E+12	1.46E+11	2.77E+12	36%
B-053	4.14E+11	4.14E+11	NA	5.35E+12	3.19E+12	2.00E+11	3.80E+12	29%
B-054	4.29E+11	4.29E+11	NA	1.62E+13	5.76E+12	3.44E+11	6.54E+12	60%
B-072	1.51E+10	1.51E+10	NA	3.29E+12	1.00E+12	5.65E+10	1.07E+12	67%
B-097	NA	NA	67%	3.27E+11	1.03E+11	5.72E+09	1.09E+11	67%
B-150	NA	NA	NA	6.60E+11	2.04E+11	1.13E+10	2.15E+11	67%
B-186	NA	NA	75%	6.23E+11	1.46E+11	8.12E+09	1.54E+11	75%
B-192	NA	NA	60%	2.60E+10	9.97E+09	5.54E+08	1.05E+10	60%
B-231	NA	NA	NA	2.36E+11	1.18E+11	6.55E+09	1.25E+11	47%
B-241	NA	NA	69%	6.93E+11	2.02E+11	1.12E+10	2.13E+11	69%
B-246	NA	NA	NA	2.21E+11	1.44E+11	7.98E+09	1.52E+11	31%
BE-001	NA	NA	72%	2.06E+11	5.36E+10	2.98E+09	5.66E+10	72%
BE-007	NA	NA	81%	9.98E+11	1.78E+11	9.91E+09	1.88E+11	81%
BE-015	1.15E+11	1.15E+11	69%	2.99E+12	7.54E+11	4.83E+10	9.17E+11	69%
BE-017	2.29E+11	2.29E+11	81%	8.76E+12	1.36E+12	8.82E+10	1.68E+12	81%
BE-018	3.50E+11	3.50E+11	72%	8.42E+12	1.92E+12	1.26E+11	2.39E+12	72%
BE-020	3.50E+11	3.50E+11	65%	1.26E+12	7.18E+10	2.34E+10	4.45E+11	65%
BE-024	4.13E+11	4.13E+11	35%	4.95E+12	2.65E+12	1.70E+11	3.24E+12	35%
BE-039	NA	NA	79%	1.18E+11	2.31E+10	1.28E+09	2.44E+10	79%
BE-040	NA	NA	78%	7.12E+11	1.47E+11	8.14E+09	1.55E+11	78%

Table Notes:

1. Total monthly wasteload cannot exceed loads (counts/30-days) listed in Table 3-3.
2. MS4 expressed as percent reduction equal to LA reduction.
3. TMDLs expressed as monthly load by station are listed in Table B-1 of Appendix B.
4. Percent reduction applies to LA and MS4 components when an MS4 is in the watershed.

NPDES phase II stormwater permits. The reduction percentages in this TMDL apply also to the fecal coliform waste load attributable to those areas of the watershed which are covered or will be covered under NPDES MS4 (Municipal Separate Storm Sewer System) permits. Compliance by these municipalities with the terms of their individual MS4 permits will fulfill any obligations they have towards implementing this TMDL.

6.0 IMPLEMENTATION

As discussed in the *Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources for the State of South Carolina* (SCDHEC,1998), South Carolina has several tools available for implementing this nonpoint source TMDL. Specifically, SCDHEC's animal agriculture permitting program addresses animal operations and land application of animal wastes. In addition, SCDHEC will work with the existing agencies in the area to provide nonpoint source education in the Enoree River watershed. Local sources of nonpoint source education and assistance include Clemson Extension Service, the Natural Resource Conservation Service (NRCS), the Laurens, Greenville, Spartanburg, Newberry, and Union Counties Soil and Water Conservation Services, and the South Carolina Department of Natural Resources. Clemson Extension Service offers a 'Farm-A-Syst' package to farmers. Farm-A-Syst allows the farmer to evaluate practices on their property and determine the nonpoint source impact they may be having. It recommends best management practices (BMPs) to correct nonpoint source problems on the farm. NRCS can provide cost share money to land owners installing BMPs.

SCDHEC is empowered under the State Pollution Control Act to perform investigations of and pursue enforcement for activities and conditions which threaten the quality of waters of the state.

The iterative BMP approach as defined in the general storm water NPDES MS4 permit is expected to provide significant implementation of this TMDL. Discovery and removal of illicit storm drain cross connection is one important element of the storm water NPDES permit. Public nonpoint source pollution education is another.

In addition, other interested parties (universities, local watershed groups, etc.) may apply for section 319 grants to install BMPs that will reduce fecal coliform loading to the Enoree Rivers and its tributaries. TMDL implementation projects are given highest priority for 319 funding.

In addition to the resources cited above for the implementation of this TMDL in the Enoree River watershed, Clemson Extension has developed a Home-A-Syst handbook that can help urban or rural homeowners reduce sources of NPS pollution on their property. This document guides homeowners through a self-assessment, including information on proper maintenance practices for septic tanks. SCDHEC also employs a nonpoint source educator who can assist with distribution of these tools as well as provide additional BMP information.

Using existing authorities and mechanisms, these measures will be implemented in the Enoree River watershed in order to bring about the necessary reductions in fecal coliform bacteria loading to the impaired streams. DHEC will continue to monitor, according to the basin monitoring schedule, the effectiveness of implementation measures and evaluate stream water quality as the implementation strategy progresses.

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