3.6 Water Quality

3.6.1 HOW IS WATER QUALITY ASSESSED?

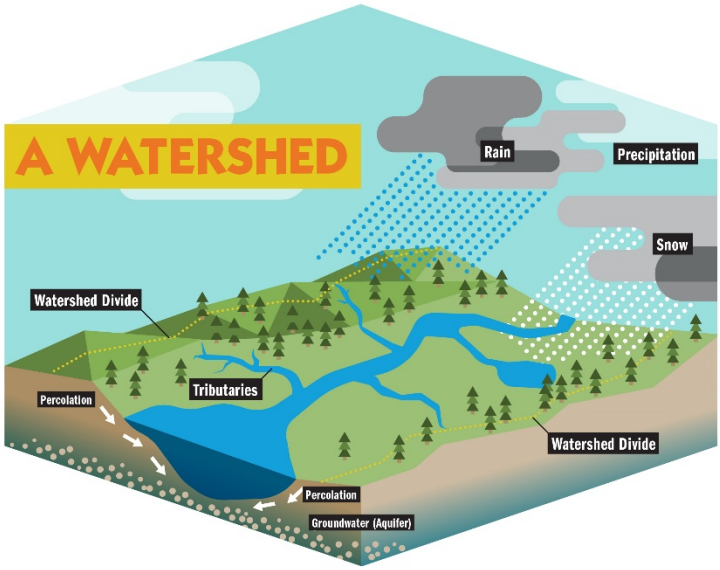
The Clean Water Act (CWA) of 1972 requires that each state set water quality standards for all contaminants in surface waters. These standards are typically based on criteria recommended by the US Environmental Protection Agency (USEPA). The CWA also regulates the discharge of pollutants into our state's waters. In South Carolina, the USEPA has delegated the responsibility of monitoring and regulating water quality to the Department of Health and Environmental Control (SCDHEC).

Many factors can affect water quality, including pesticides, heavy metals, livestock waste, litter, oils and grease, and other chemicals. Water from rain and runoff collect these pollutants and carry them into creeks and rivers. Natural resources and processes can also affect water quality. The amount of tree cover over streams and rivers can affect the temperature of the water, thereby affecting the habitat for other plants, fish, and insects. Additionally, sediment from erosion can wash downstream and impact the depth and important substrate within the stream.

In South Carolina, the SCDHEC is responsible for monitoring and regulating water quality for the USEPA.

In order to assess the quality of our surface waters, water quality monitoring stations (WQMS) are located on specific rivers, streams, or other waterbodies across the state. Each WQMS collects information about the quality of the water to determine if water quality standards are being met and help develop long-term trends. The quality of the water assessed at the WQMS is influenced by all of the factors that enter the water upstream; therefore, the water quality at a WQMS is considered to be representative of the upstream drainage area.

A drainage area is a geographic area in which all water drains to a common point. On a small scale, a pond is an example of a drainage area. Rain water that falls on the surrounding hills flows downhill into the pond. Pollutants carried into the pond would eventually collect near the dam; therefore, a sampling of the water quality near the dam would likely be representative of the entire pond.



Smaller drainage areas can be combined into larger areas, referred to as watersheds. A group of watersheds make up a sub-basin, and sub-basins comprise the larger river basins.

3.6.2 WHAT DRAINAGE BASIN IS THE PROJECT LOCATED WITHIN?

The USGS categorizes drainages areas by specific numbers, or hydrologic unit code (HUC). Large river basins are identified with a four-digit HUC (i.e. 0305). Sub-basins within that basin are given an eight-digit HUC that begins with the same four digits (i.e. 03050108). Ten-digit HUCs are also provided for watershed within 8-digit HUCs (i.e. 03050108-07).

In South Carolina, the SCDHEC divides South Carolina into eight major river basins.[1] The proposed project study area extends across two of the major river basins; the Broad River Basin and the Saluda River Basin, as shown in Figure 3.6-1.

3.6.2.1 Broad River Basin

The Broad River Basin extends across the Piedmont region of North Carolina and South Carolina. In South Carolina, the Broad River Basin encompasses approximately 4,000 square miles, and is roughly bounded by the cities of Greenville to the west, York to the east, and Columbia to the south. Of the 2.5 million acres within the basin, approximately 59 percent is forested land. Agricultural and urban lands comprise the majority of the remaining land within the basin. The Broad River Basin also contains nearly 4,700 miles of streams and 18,500 acres of lake waters.[2]

The basin is subdivided into three sub-basins. Of these, approximately 11.8 percent of the project study area is located within the Broad River Sub-Basin (HUCs 03050105 & 03050106).

The Broad River Sub-Basin (HUCs 03050105 & 03050106) is located in Cherokee, Spartanburg, York, Union, Chester, Fairfield, Newberry, and Richland Counties, and encompasses approximately 2,500 square miles. Of the approximately 1.5 million acres, 60.6 percent is forested land, 23.8 percent is agricultural land, and 9.8 percent is urban land. The urban land percentage is comprised primarily of the cities of Spartanburg, Gaffney, and Chester, and portions of the Cities of York, Union, and Columbia.[3]

Approximately 11.8 percent of the project study area is located within the Broad River Sub-Basin.

Within the Broad River Sub-Basin, there are approximately 14,500 acres of lake waters and 2,800 stream miles, including the Broad River.[4] The Broad River originates in North Carolina and crosses into South Carolina near Gaffney. The river flows generally south and converges with the Saluda River in Columbia.

[1] http://www.scdhec.gov/HomeAndEnvironment/Water/Watersheds/WatershedMap/
[2] South Carolina Department of Health and Environmental Control. 2007. *Watershed Water Quality Assessment: Broad River Basin*. Technical Report No.006-07. Bureau of Water, Columbia, S.C.
[3] Ibid.
[4] Ibid.

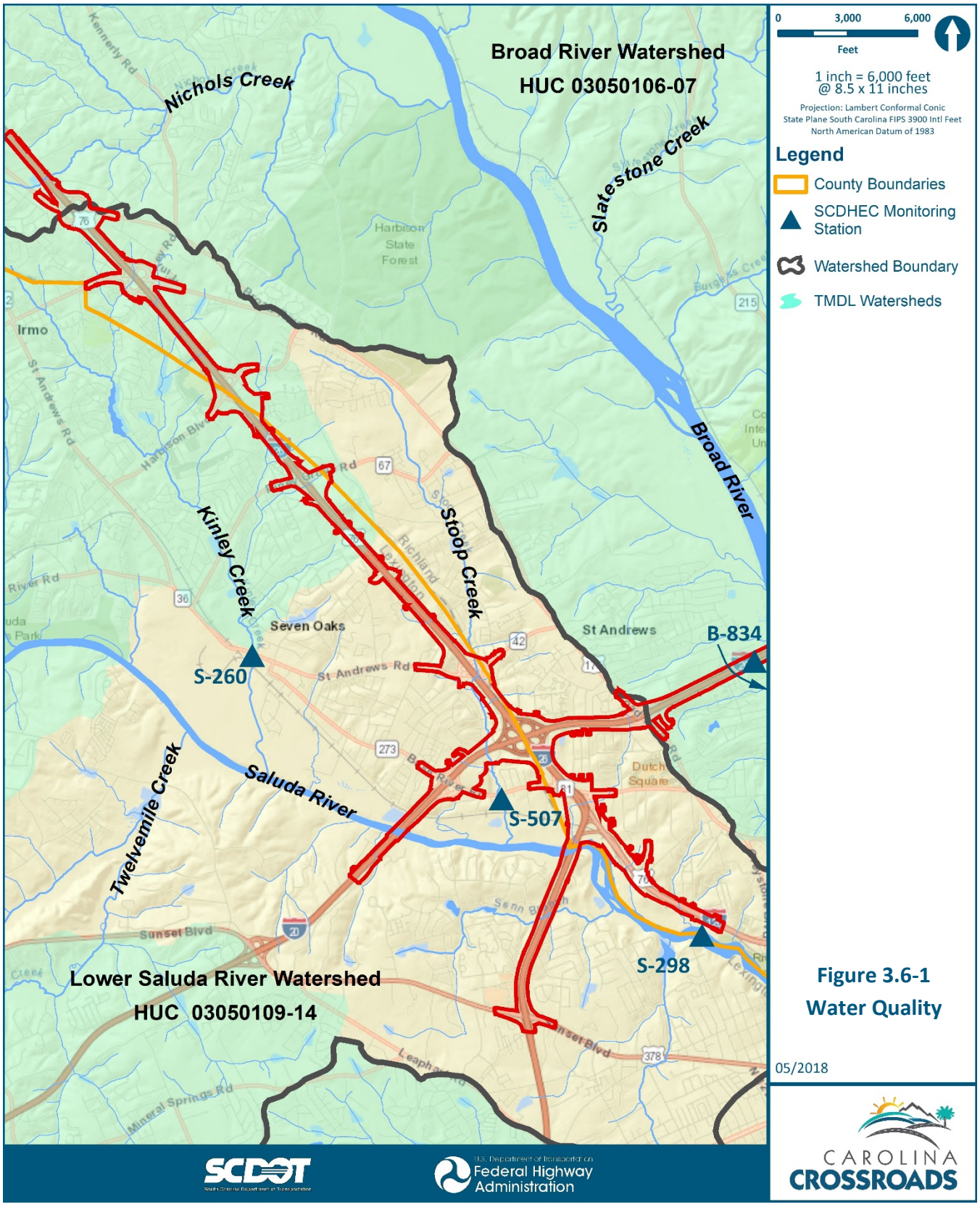


Figure 3.6-1
Water Quality

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The sub-basin is further divided into 17 watersheds. The portion of the project study area within the Broad River Sub-Basin lies within the Broad River Watershed (HUC 03050106-07), as shown in Figure 3.6-1. HUC 03050106-07 is located in Newberry, Fairfield, and Richland Counties and consists primarily of the Broad River and its tributaries from the Parr Shoals dam to its confluence with the Saluda River. Within the project study area, the Broad River Watershed encompasses the northern portion of US 176 (Broad River Road) interchange with I-26, and the portion of I-20 located east of the interchange of US 176 (Broad River Road).

No Outstanding Resource Waters (ORW), Outstanding National Resource Waters (ONRW), or trout streams are documented in HUC 03050106-07. All streams are classified as freshwater (FW).[5]

3.6.2.2 Saluda River Basin

The Saluda River Basin originates at the South Carolina state line and extends from the Blue Ridge Mountains through the Piedmont and into the Sand Hills region. The basin encompasses approximately 2,500 square miles, and is roughly bounded by the cities of Easley to the west, Greenville to the east, and Lake Marion to the south. Of the 1.6 million acres within the basin, approximately 53 percent is forested land. Agricultural and urban lands comprise the majority of the remaining land within the basin. The Saluda River Basin contains over 6,700 miles of streams and 74,500 acres of lake waters.[6]

Approximately 88.2 percent of the project study area is located within the Saluda River Sub-Basin.

The basin is subdivided into two sub-basins. Of these, approximately 88.2 percent of the project study area is located within the Saluda River Sub-Basin (HUC 03050109).

The Saluda River Sub-Basin (HUC 03050109) is located in Greenville, Pickens, Anderson, Abbeville, Laurens, Greenwood, Newberry, Saluda, Lexington, and Richland Counties, and encompasses approximately 2,500 square miles. Of the approximately 1.6 million acres, 53.7 percent is forested land, 26.1 percent is agricultural land, and 12.9 percent is urban land. The urban land percentage is comprised primarily of the cities of Greenville and Columbia, and to a lesser extent the cities of Laurens and Newberry.[7]

Within the Saluda River Sub-Basin, there are approximately 69,000 acres of lake waters and 5,600 miles of streams, including the Saluda River.[8] The Saluda River forms near Greenville and flows southwest, eventually forming the headwaters of Lake Murray. The Saluda River emerges from the Lake Murray dam and joins the Broad River in the City of Columbia to form the Congaree River.

Specifically, the portion of the project study area within the Saluda River Sub-Basin lies within the Lower Saluda River Watershed (HUC 03050109-14), as shown in Figure 3.6-1. HUC 03050109-14 is located in Lexington and Richland Counties and consists primarily of the lowest reach of the Saluda River and its tributaries from the Lake

[5] Ibid.
[6] South Carolina Department of Health and Environmental Control. 2011. *Watershed Water Quality Assessment: Saluda River Basin*. Technical Report No.9C21-11. Bureau of Water, Columbia, S.C.
[7] Ibid.
[8] Ibid.

Murray dam to its confluence with the Broad River. Within the project study area, the Lower Saluda River Watershed encompasses the area south of US 176 (Broad River Road) at I-26, and the area west of US 176 (Broad River Road) at I-20.

No ORW or ONRW are documented in HUC 03050109-14. The mainstem of the Saluda River is classified Trout – Put, Grow, and Take (TGPT), and all other streams are classified freshwater (FW).[9]

3.6.3 WHERE DOES THE PROPOSED PROJECT DRAIN?

Due to the size of the proposed project, hydrology from the project study area drains to multiple streams that are monitored by four different water quality monitoring stations (WQMS), as shown in Figure 3.6-1.

All waters located within the Broad River Basin drain through streams and eventually into the Broad River. These include Tributaries 1, 2, 39, 40, 59, and 60; Wetlands 16 through 19, 39, and 50; as well as Pond 3 (see Figures 3.8.6 and 3.8.7). These waters are monitored by WQMS B-834, which is located on the Broad River at the Columbia Diversion Canal.

Surface water in the upper central portion of the project study area along I-26, from north of US 176 (Broad River Road) to Tram Road, drains to Kinley Creek. These include Tributaries 3 through 17; Wetlands 1 through 7 and 40 through 47; and Ponds 1 and 4 (see Figures 3.8.6 and 3.8.7). WQMS S-260 is located on Kinley Creek at St. Andrews Road, approximately 1.2 miles west of I-26. Kinley Creek eventually discharges into the Saluda River.

Waters within the lower central portion of the project study area along I-26, from Tram Road to the I-20 interchange, drain to Stoop Creek. These include Tributaries 18 through 23, and 32 through 34; and Wetlands 8, 14, and 49 (see Figures 3.8.6 and 3.8.7). WQMS S-507 is located on Stoop Creek at Bush River Road. Stoop Creek eventually discharges into the Saluda River.

The remainder of the project study area drains into the Saluda River. These include Tributaries 24 through 31, 35 through 38, 41 through 58, and 61 through 68; Wetlands 9 through 13, 15, 20 through 38, and 51 through 55; Pond 2, and the NPDES Treatment Basin. WQMS S-298 is located on the Saluda River, approximately one-mile upstream of the Millrace Rapids and the Riverbank Zoo.

3.6.4 ARE ANY STREAMS IN THE PROJECT STUDY AREA IMPAIRED?

The SCDHEC develops a list of waterbodies that do not meet water quality standards and updates the list every two years. This list is a requirement of Section 303(d) of the CWA and is commonly referred to as the 303(d) List.

The 303(d) List includes all WQMS that are impaired and outlines the parameters that do not meet standards. A WQMS can be listed for one or more impairments. Table 3.7-1 lists the WQMS on the 2016 303(d) List.

[9] Ibid.

Table 3.6-1 303(d) List of Impaired Waters within the Project Study Area

Waterbody	Monitoring station	Impaired Use(s)	Impairment cause(s)	TMDL status
Kinley Creek	S-260	Aquatic life uses	Impaired biological integrity	
Kinley Creek	S-260	Recreational uses	E. coli	Approved TMDL
Stoop Creek	S-507	Aquatic life uses	Impaired biological integrity	
Saluda River	S-298	Recreational uses	E. coli	
Broad River	B-834	Recreational uses	E. coli	Approved TMDL

Station S-260 (Kinley Creek) and Station S-507 (Stoop Creek) are both impaired for aquatic life uses based on the assessment of biological data at these stations. Stations S-260 (Kinley Creek), S-298 (Saluda River), and B-834 (Broad River) are all impaired for recreational uses due to the presence of E. coli in the water. In addition, there is a fish consumption advisory for the portion of the Saluda River within the project study area.[10]

Once a WQMS has been added to the 303(d) List, it will remain on the list until the water quality standard set by SCDHEC has been attained or a plan has been developed and approved by the USEPA to attain the standard. This plan is known as a total maximum daily load (TMDL).

3.6.5 HAVE ANY TMDLS BEEN DEVELOPED IN THE PROJECT STUDY AREA?

A TMDL refers to both a calculation of a pollutant entering a waterbody as well as a plan document. The calculation determines the amount of a single pollutant (e.g., bacteria, nutrients, metals) that can enter a waterbody on a daily basis and still meet water quality standards set forth by the state. The TMDL plan document includes this calculation along with source assessments, watershed and land use information, reductions and allocations information, implementation of the program and other relevant information, maps, figures and pictures.

A Total Maximum Daily Load (TMDL) is established for all impaired waters.

The goal of a TMDL is to identify potential pollution sources, calculate and quantify the reduction of those sources, and provide general implementation information needed in order to meet water quality standards and improve water quality. After the approval of the TMDL, an implementation plan can be developed to realize the goals of the written TMDL plan document. Implementation of a TMDL has the potential to reduce sources of pollution within a watershed and the potential to restore the full use of the waterbody.

TMDLs are calculated by adding all the sources for the pollutant causing the impairment. After a TMDL is calculated, the amount of pollutant entering the water is compared to the water quality standards for that waterbody. Then this total loading is reduced to the levels where the water quality standards can be met. This reduced loading is then divided among all contributing sources.

[10] http://www.scdhec.gov/FoodSafety/FishConsumptionAdvisories/saluda/

According to the SCDHEC, two TMDLs have been developed within the vicinity of the proposed project. These TMDLs are implemented for all waters within the impaired drainage area. The extent of the TMDLs is shown in Figure 3.6-1.

A TMDL was approved for fecal coliform bacteria in the Broad River in September 2005. There are eight facilities that have fecal coliform limits in their NPDES permits that discharge into this section of the Broad River. Part of the City of Columbia's Municipal Separate Storm Sewer System (MS4) is in this section of the Broad River watershed. Possible sources of fecal coliform bacteria in the Broad River, identified in the TMDL, include MS4 stormwater runoff, leaking sewers, sanitary sewer overflows (SSOs), failing onsite wastewater disposal systems, stormwater runoff containing manure from agricultural land application, waste from pets and wildlife, and direct contributions resulting from cattle watering in creeks. The TMDL specifies a reduction in the load of fecal coliform bacteria into this section of the Broad River of 62 percent in order for the river to meet the recreational use standard. The northern portion of US 176 (Broad River Road) interchange with I-26, and the area along I-20 east of the interchange of US 176 (Broad River Road), are located within the limits of this TMDL.

TMDLs were also approved for the Lower Saluda River and tributaries Kinley Creek and Twelvemile Creek in September 2004. There is a NPDES facility permitted to discharge fecal coliform bacteria on Twelvemile Creek and one on the Saluda River. Much of this watershed has been incorporated into one or more MS4s. Possible sources of fecal coliform bacteria in the Twelvemile Creek watershed are leaking sewers, SSOs, failing septic systems, improper land application of manure, cattle watering in the creeks, wildlife, and urban runoff. Fecal coliform sources in the Saluda River and Kinley Creek watersheds are the same except for the exclusion of agricultural sources. The TMDLs require reductions of 89 to 92 percent in fecal coliform loading for these streams to meet the recreational use standard. The central portion of the project study area along I-26, from US 176 (Broad River Road) to Tram Road are located within the limits of this TMDL.

3.6.6 ARE ANY POINT SOURCES LOCATED WITHIN THE PROJECT STUDY AREA?

Point sources discharge pollutants directly into waters through a pipe, ditch, vessel, or other conveyance from which waste can be discharged. The National Pollutant Discharge Elimination System (NPDES) Permit Program was created by Section 402 of the CWA to regulate and permit point source discharges.

Persons/facilities with point source discharges to surface waters are required to have NPDES permits. Typical regulated point source discharges are:

- discharges from wastewater treatment systems owned by municipalities, industries, private utilities, State and Federal government, etc.;
- discharges such as cooling water, boiler blow down, etc.;
- stormwater discharges from municipal separate storm sewer systems (MS4s);
- stormwater discharges associated with industrial activity; and
- stormwater discharges from construction sites.

Two NPDES permitted facilities are operating within the project study area. Both facilities are located in the vicinity of the I-20 crossing of the Saluda River. NPDES Permit SC0029475 authorizes minor domestic discharge, including non-potable water, to the Saluda River from Woodland Utilities. NPDES Permit SC0035564 authorizes minor domestic discharge, including non-potable water, to the Saluda River from Carolina Water Services Regional Sewer System. SCDHEC has recently issued a Notice of Intent to deny reissuance of NPDES Permit SC0035564 and currently supports a requirement that Carolina Water Services tie into the regional system and eliminate discharge into the Saluda River.

3.6.7 HOW WOULD THE NO-BUILD ALTERNATIVE IMPACT WATER QUALITY?

The No-build Alternative would have no effect on water quality since existing conditions would remain unchanged.

3.6.8 HOW WOULD THE REASONABLE ALTERNATIVES IMPACT WATER QUALITY?

The project study area is serviced by public water utilities, rather than private wells. Therefore, impacts to ground water resources are not anticipated. Currently, the Lake Murray Water Treatment Plant and the Columbia Water Treatment Plant are responsible for providing drinking water to the project study area. Neither of these facilities will be impacted by the project; therefore, no impacts to drinking water are anticipated.

Both of the Reasonable Alternatives would result in similar impacts to water quality. These impacts could occur during construction as well as during normal operations following construction.

The Reasonable Alternatives each propose to increase traffic capacity throughout the project study area by adding more travel lanes, collector-distributer roadways, and other improvements. These activities require land that is currently vegetated (i.e. grassed or forested) to be paved with asphalt or concrete. Pavement is not pervious, meaning it does not allow precipitation to soak into the soil beneath. Precipitation that is not absorbed into the soil becomes stormwater runoff; therefore, an increase in impervious surface will result in additional stormwater flowing into streams.

As shown in Table 3.6-2, the Reasonable Alternatives would each increase the amount of impervious surface in the project study area. Each Reasonable Alternative would also remove some existing pavement, converting it back to a pervious surface.

Table 3.6-2 Increase of Impervious Surface by Reasonable Alternative

Alternative	Existing (ac.)	Impervious to pervious (ac.)	Pervious to impervious (ac.)	Total impervious surface (ac.)
No-Build	330.64	0	0	0
RA 1 (Preferred)	330.64	-35.3	+164.4	459.7
RA 5 Modified	330.64	-37.0	+164.3	457.9

Higher traffic volumes could also result in an increase of pollutants being discharged into the receiving waters. Potential water quality impacts could occur from petroleum products (gasoline, diesel, and engine oil), brake dust, tire rubber and exhaust particulates that accumulate on roadways and get washed into adjacent waters.

The contractor would avoid and minimize impacts resulting from stormwater runoff through the implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and S.C. Code of Regulations 72-400. The SCDOT has also issued an Engineering Directive Memorandum (Number 23), dated April 10, 2015, regarding Department procedures to be followed in order to ensure compliance with S.C. Code of 72-400, Standards for Stormwater Management and Sediment Reduction. Exposed areas may be stabilized by following the Department's Supplemental Technical Specification for Seeding (SCDOT Designation SC-M-810 (11-08)).

Neither of the Reasonable Alternatives is anticipated to have a significant effect on the existing impairments or on the approved TMDLs in the project study area. SCDHEC recognizes that biological integrity impairments are, in part, due to sediment-related deposits into streams.[11] The implementation of construction best management practices would be included into either Reasonable Alternative. These practices would eliminate or reduce sedimentation; thereby, minimizing the potential effects sedimentation would have on the biological integrity impairments in the project study area.

The project would not release sources of fecal coliform into adjacent streams. Additionally, the contractor would identify and avoid all point sources of fecal coliform during construction. Therefore, neither of the Reasonable Alternatives is anticipated to have any effect on the existing E. coli impairments or TMDLs in the project study area.

3.6.9 HOW WOULD IMPACTS TO WATER QUALITY BE MITIGATED?

Stormwater modeling would be completed for the final design of the recommended preferred alternative. SCDOT would mitigate stormwater runoff by discharging stormwater into detention basins and/or vegetated swales before it is released into receiving waters. This practice would reduce impacts to streams by reducing peak-flow discharge and by allowing particulates and sediment in stormwater to settle in the basin to reduce the amount of pollutants discharged to the receiving water. In addition, other SCDOT best management practices guidelines[12] would be followed during design and construction to minimize the amount of runoff pollution from streams.

Due to the existing water quality impairments and approved TMDLs within the project watershed, SCDHEC may require additional water quality protection and stormwater treatment measures during and after construction. Specific mitigation requirements for impacts to water quality would be established during the Section 404/401 permitting process.

[11] SCDOT. NPDES General Permit for Stormwater Discharges from Construction Activities
[12] South Carolina Highway Department Standard Specifications for Highway Construction

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