

Section 3.17 Groundwater Resources

3.17.1 What are the groundwater resources in the project study area?

The project study area in South Carolina is located above the Southeastern Coastal Plain Aquifer System, which is comprised of four regional aquifers, including the Surficial Aquifer, the Floridan Aquifer, Chattahoochee River Aquifer, and the Black Warrior River Aquifer. The regional aquifers in the South Carolina portion of the project study area are the Surficial Aquifer, beneath that is the Chattahoochee River Aquifer, and farther beneath the surface, is the Black Warrior River Aquifer.¹³¹ Five hydrogeologic units compose these three regional aquifers, which are from the surface down, the Surficial Aquifer, Pee Dee Aquifer, Black Creek Aquifer, Middendorf Aquifer, and Cape Fear Aquifer (refer to Figure 3-41, page 3-252). The Surficial Aquifer is an unconfined unit, while the rest are confined units, meaning they are separated by clay, silt, or rock. An aquifer is an underground layer of porous rock or gravel that holds water like a natural storage tank. Confining units are layers of impermeable rock, silt, or clay that separate aquifers, usually horizontally, and prevent mixing of water between aquifers.

The Surficial, Black Creek, and Middendorf Aquifers are the main groundwater sources in the South Carolina portion of the project study area.¹³² The Surficial Aquifer is the saturated zone that underlies the surface of the land and is very shallow (usually 20 to 60 feet deep). It provides groundwater to individuals throughout the project study area who have private wells. The water quality of the Surficial Aquifer varies greatly, and due to this, detailed studies have not been done to determine its overall water quality. Instead, water quality is determined on a site-specific test for wells using this aquifer. The Surficial Aquifer has groundwater discharge/recharge areas throughout the project study area.

The Black Creek Aquifer overlies and covers the Middendorf Aquifer as they extend east toward the coast (refer to Figure 3-41, page 3-252). The Black Creek Aquifer is used as a groundwater source in the portion of the project study area in southern Marlboro and northern Dillon Counties since it is shallower than the Middendorf Aquifer, which makes it more economical to develop. The primary use of groundwater withdrawals from the Black Creek Aquifer is as a drinking water source. The Middendorf Aquifer provides groundwater supplies in the upper coastal plain near the Great Pee Dee River throughout most of Marlboro County.

The Black Creek Aquifer generally has good to excellent water quality; however, the aquifer consistently has high levels of fluoride. This aquifer has high levels of chloride and sodium near

¹³¹ USGS, *Groundwater Atlas of the United States: Alabama, Florida, Georgia, South Carolina*, HA-730G, http://capp.water.usgs.gov/gwa/ch_g/G-text7.html (January 11, 2007).

¹³² SCDHEC, *South Carolina Ambient Groundwater Quality Monitoring Network 2003 Annual Report*, (October 2005).

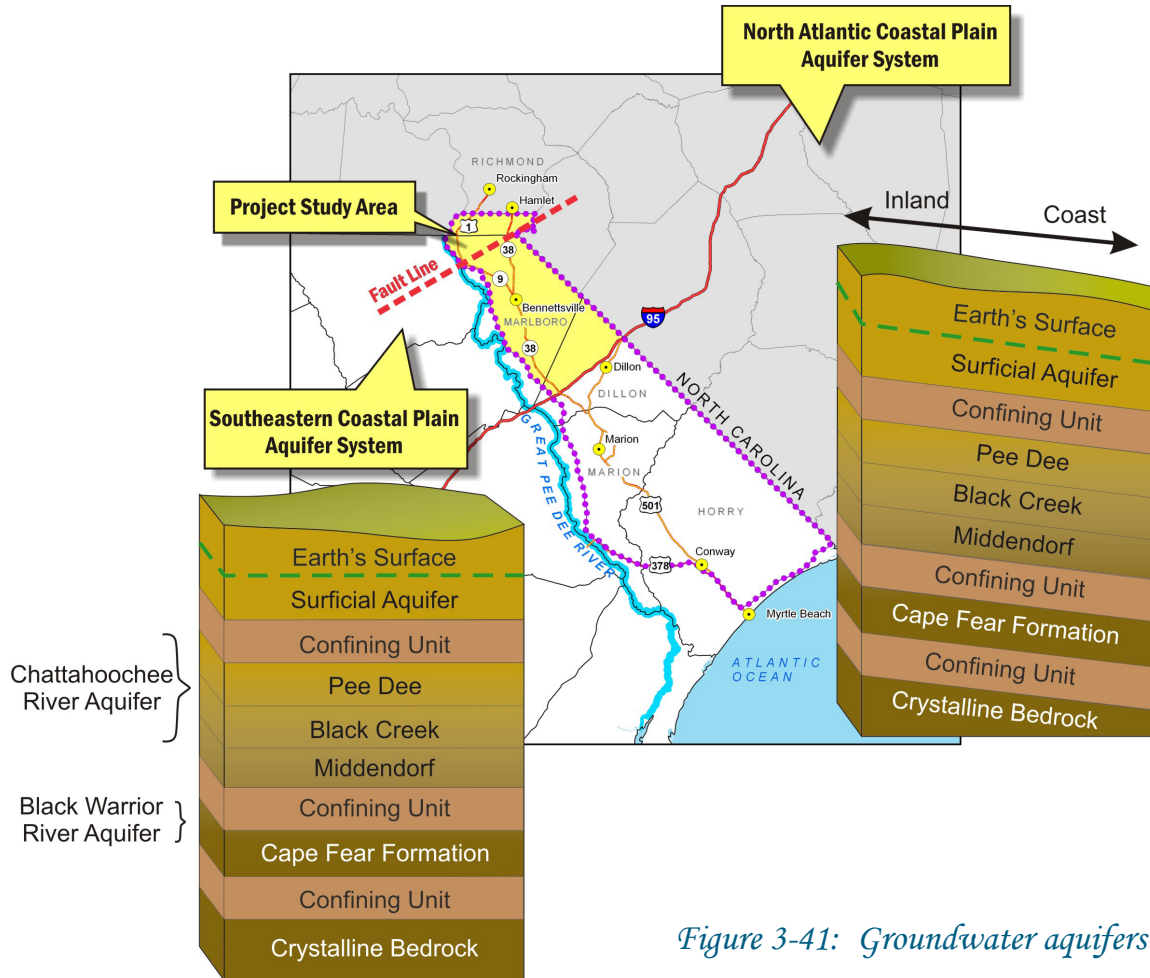


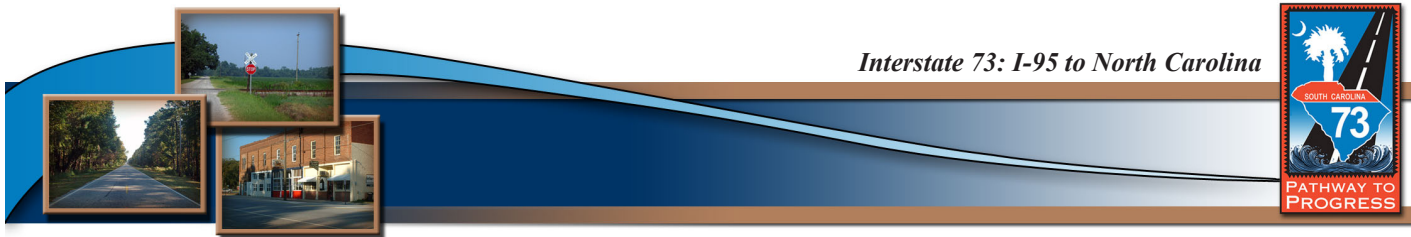
Figure 3-41: Groundwater aquifers

the coast due to the mixing of saltwater with the water in the aquifer. Due to this, the hydrogen ion concentrations (pH) are usually higher throughout the aquifer, especially closer to the coastline. The discharge/recharge area of this aquifer is located between the Great Pee Dee and Little Pee Dee Rivers in South Carolina, a portion of which is located in the project study area.¹³³

There is minimal ion concentration present in the upper coastal plain portion of the Middendorf Aquifer. This is due to the presence of clean quartz sands that have been thoroughly leached over time. Water found in the upper coastal portion is acidic, usually soft, and contains a low amount of dissolved solids. This has been correlated with the proximity of the water to the recharge area. Water in the lower coastal portion is usually highly mineralized, with higher levels of total dissolved solids and pH.¹³⁴ This is because the water in the lower coastal portion has been in the aquifer

¹³³ *Ibid.*

¹³⁴ *Ibid.*



longer and has possibly mixed with more mineralized water from adjacent leaky aquifers. The Middendorf Aquifer has generally good water quality; however, the 2003 results showed high iron contents above United States Environmental Protection Agency (USEPA) standards in most of the wells sampled.¹³⁵ The discharge/recharge area for the Middendorf Aquifer is located between the fault line in Chesterfield County, South Carolina and the Great Pee Dee River, which is in the northern portion of the project study area.¹³⁶

The portion of the project study area in North Carolina is mostly located within the North Atlantic Coastal Plain Aquifer System. The Southeastern Coastal Plain Aquifer System slopes laterally into the North Atlantic Coastal Plain Aquifer System near the North Carolina and South Carolina state line in Scotland County then east towards the coastline (refer to Figure 3-41).¹³⁷ While there may be some geographic overlap, the aquifer systems are separated by thick confining units, which were believed to prevent intermixing of water between the two systems. According to the United States Geological Survey (USGS), a study is currently underway re-examining whether intermixing occurs between the two aquifer systems, and should be completed in the fall of 2007.¹³⁸ Several regional aquifers within the two aquifer systems possess the same name (i.e., the Pee Dee Aquifers and the Black Creek Aquifers). These aquifers are in similar geographical positions within the Southeastern Coastal Plain and the North Atlantic Coastal Plain, and correlate to each other. However, the fact that two similarly named aquifers correlate does not necessarily mean that intermixing occurs or that they are the same aquifer.¹³⁹ The relationship between correlating aquifers is one facet of the USGS study.

The North Atlantic Coastal Plain Aquifer System is comprised of six regional aquifers, two of which are located in the project study area, the Surficial Aquifer and the Pee Dee – Upper Cape Fear Aquifer. The Surficial Aquifer in the North Atlantic Coastal Plain Aquifer System is similar to the one found in the Southeastern Coastal Plain Aquifer System, and consists of unconsolidated sand and gravel of marine and nonmarine origin. The Surficial Aquifer is recognized as a principal aquifer, even though it has a low potential to yield large volumes of water. In North Carolina, withdrawals from this aquifer are mainly for domestic and agricultural supplies. Water quality within the Surficial Aquifer is highly variable, dependent on the chemistry of precipitation and the underlying sediments. In general, precipitation contributions are dependent on proximity to coastal waters. Closer towards the coastline, precipitation contributes more dissolved sodium and chloride concentrations and less dissolved sulfate concentrations to the aquifer. Due to the short residence time, dissolutions of minerals within this aquifer to aquifers below are limited.¹⁴⁰

¹³⁵ *Ibid.*

¹³⁶ *Ibid.*

¹³⁷ USGS, *Ground Water Atlas of the United States: Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, HA 730-L*, http://capp.water.usgs.gov/gwa/ch_1/L-text3.html (January 11, 2007).

¹³⁸ Bruce Campbell, USGS, Personal communication, April 20, 2007.

¹³⁹ *Ibid.*

¹⁴⁰ USGS, *Ground Water Atlas of the United States: Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, HA 730-L*, http://capp.water.usgs.gov/gwa/ch_1/L-text3.html (January 11, 2007).



The Pee Dee – Upper Cape Fear Aquifer is composed of three hydrogeologic units separated by clay and silt confining units: the local Pee Dee Aquifer, the Black Creek Aquifer, and the Upper Cape Fear Aquifer (refer to Figure 3-41, page 3-252). Of the three aquifers, groundwater from the Black Creek Aquifer is most commonly used for public, agricultural, mining, and industrial uses. Water quality within the Pee Dee – Upper Cape Fear Aquifer is highly variable, especially in regards to dissolved solids and sodium chloride. In general, dissolved solids concentration increase towards the coast, with significant saline concentrations being found along the coastline. Dissolved solids found in groundwater withdrawals near the coastline are composed primarily of shell materials, bicarbonate matrixes, and sodium chloride.¹⁴¹ Specific data on the water quality for each hydrogeologic unit of the Pee Dee – Upper Cape Fear Aquifer is not available at this time.

3.17.2 How would groundwater resources be impacted by the proposed project?

It is not likely that this project would impact groundwater. The Middendorf Aquifer, Black Creek Aquifer, and Pee Dee – Upper Cape Fear Aquifer are confined units deep below the surface of the ground (depending on their distance away from the coast), and would not be impacted by construction or reached by pollutants filtering through sediment and rock. The Black Creek Aquifer does have recharge/discharge areas throughout the Little Pee Dee River and its associated swamp systems. However, except during long periods of drought conditions, wetlands mainly serve as groundwater discharge areas.¹⁴² This project would avoid and minimize any intrusion into wetlands if possible. For further information about wetlands, refer to Section 3.12, page 3-176.

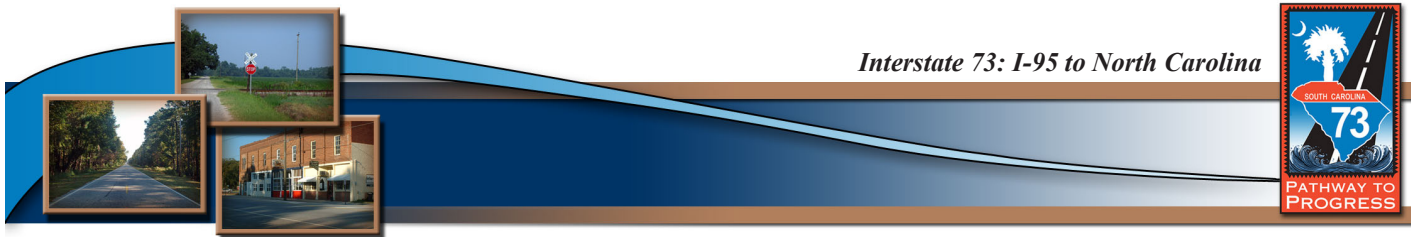
Impacts could occur to the Surficial Aquifers due to its proximity to the surface, variability in depth, and that it contains unconfined units. During construction, the Surficial Aquifers could be exposed, leading to sediment entering the aquifers. Soluble materials such as petroleum products could be leaked or spilled during construction and enter these exposed areas and may cause contamination. However, best management practices would be in place, so if during construction, groundwater was encountered, a spill prevention control and countermeasures plan would be in place to manage spills and leaks of soluble materials.

While the majority of drinking water in the project study area is supplied through surface waters, Dillon, Marlboro, Richmond, and Scotland Counties use a substantial amount of groundwater for water supply, irrigation, and industrial uses.¹⁴³ Induced growth and development could increase the demand for groundwater needed in the project study area. Groundwater levels in aquifers are

¹⁴¹ *Ibid.*

¹⁴² Ralph C. Heath, *Groundwater Recharge in North Carolina*, Prepared for the Groundwater Section of the Division of Environmental Management, North Carolina Department of Environment, Health and Natural Resources, (1994) <http://h2o.enr.state.nc.us/aps/gpu/documents/Heath-gwrechargeinNC.pdf> (January 10, 2007).

¹⁴³ SCDHEC, *South Carolina Water Use Report 2005 Annual Summary*, (January 30, 2007).



monitored by the United States Geological Survey, and the NCDENR or SCDHEC in their respective states. Dillon and Marlboro Counties are currently part of a six-county proposed capacity use area designated by SCDHEC to regulate the amount of groundwater being withdrawn and further protect the Middendorf and Black Creek Aquifers.¹⁴⁴ Any additional groundwater wells would need to be permitted prior to drilling, in accordance with state and local regulations.

3.18 Surface Water Resources

3.18.1 What drainage basin is the proposed project located within?

The proposed project is located within the Pee Dee River Basin, one of the eight drainage basins in South Carolina, and the Yadkin-Pee Dee Basin, one of North Carolina's seventeen drainage basins. The Pee Dee River Basin is composed of four sub-basins, while the Yadkin-Pee Dee River Basin is made up of 17 sub-basins. The project study area is located in the Pee Dee River Sub-basin in South Carolina and the Yadkin-Pee Dee River Sub-basin 03-07-16 in North Carolina. The Pee Dee River Sub-basin consists of approximately 3,472 miles of streams and 27 watershed units, eight of which occur within the project study area.¹⁴⁵ Sub-basin 03-07-16 has approximately 5,862 miles of streams and seventeen watershed units, three of which include the project study area.¹⁴⁶ A list of watershed units and major streams in the project study area is found in Table 3.60, (refer to page 3-256).

3.18.2 What surface waters are located in the project study area?

All of the surface waters located in the South Carolina portion of the project study area are classified by SCDHEC as *freshwaters*. *Freshwaters* are surface waters that are suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of SCDHEC. Systems designated as *freshwaters* are also suitable for fishing and the survival and propagation of a balanced native aquatic community of fauna and flora, along with industrial and agricultural uses.¹⁴⁷

In the North Carolina portion of the project study area, all of the surface waters are designated as Class C, Fishable and Swimmable Waters. Class C waters are protected for secondary recreation,

¹⁴⁴ SCDHEC, *Preliminary Assessment of the Groundwater Conditions in Part of the Pee Dee Region, South Carolina*, (2003) <http://www.scdhec.gov/eqc/water/pubs/pdrprt.pdf> (January 30, 2007).

¹⁴⁵ SCDHEC, Watershed Management, <http://www.scdhec.net/water/shed/peedee.html#basinfacts> (December 19, 2006).

¹⁴⁶ NCDENR, Division of Water Quality, <http://h2o.enr.state.nc.us/basinwide/yadkin/Yadkin%20final%202003%20BP/Yad%20ExecSum.pdf> (December 19, 2006).

¹⁴⁷ *Ibid.*



Table 3.60
Sub-basins, Watershed Units, and Major Streams in Project Study Area

Sub-basin	Watershed Unit (11-digit Hydrological Unit Code)	Major Stream Names	
Pee Dee River (SC) and Yadkin-Pee Dee River 03-07-16 (NC) Sub-basins	Pee Dee River (03040201-010)	Great Pee Dee River Marks Creek*	
	Whites Creek (03040201-040)	Whites Creek* Wallace Pond* Everetts Lake* Great Pee Dee River	
	Pee Dee River (03040201-050)	Beaverdam Creek Tarkiln Creek Naked Creek Crooked Creek* Whites Creek* Husbands Creek Phils Creek	Henegan Lake Three Creeks Rogers Creek Lake Creek Hicks Creek Great Pee Dee River Wolf Creek
	Crooked Creek (03040201-070)	Crooked Creek Usher Pond Beverly Creek Lilly Quick Creek Lake Wallace	Goodwin's Millpond Burnt Factory Pond McCalls Millpond Lightwood Knot Creek
	Three Creeks (03040201-090)	Three Creeks Cottingham Creek Hagins Prong	Muddy Creek Great Pee Dee River
	Pee Dee River (03040201-120)	Brownsville Creek Great Pee Dee River	
	Catfish Creek (03040201-150)	(Tributaries to) Catfish Canal	
	Little Pee Dee River (03040204-010)	Gum Swamp Beaverdam Creek McNairs Millpond Parker Branch Marsnip Branch Leith Creek	Panther Creek Red Bluff Lake Reedy Branch McLaurins Millpond Little Pee Dee River
	Little Pee Dee River (03040204-030)	Little Pee Dee River Sweat Swamp Hayes Swamp Beaverdam Creek	Shoe Heel Creek Martins Branch Carolina Branch
	Buck Swamp (03040204-050)	Reedy Creek Little Reedy Creek	

South Carolina

FW—Freshwaters that are suitable for primary and secondary contact recreation and as a source for drinking water supply, after conventional treatment, in accordance with SCDHEC. These waters are suitable for fishing, and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. This class is also suitable for industrial and agricultural uses.

North Carolina

C— Fishable and Swimmable waters are protected for secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, agriculture and other uses

Those noted with an asterisk are classified as C in addition to being designated as FW.

Source: SCDNR and NCDENR Websites.



fishing, wildlife, fish and aquatic life propagation and survival, agriculture and other uses. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.¹⁴⁸

3.18.3 What are the drinking water sources in the project study area?

Drinking water sources in the project study area come from both groundwater and surface water sources. The USEPA, on its Safe Drinking Water Information System,¹⁴⁹ lists the main water systems in the project study area, along with the number of people served by the water system, and the source (refer to Table 3.61). The Black Creek and Middendorf Aquifers are used for supplying groundwater to users. There are no sole source aquifers located within the project study area.

**Table 3.61
Water Service Providers in the Project Study Area**

Water Service Provider	Primary Water Source	Population (by number) Served	Principal County Served	State
City of Dillon	Groundwater	7,612	Dillon	SC
Town of Lake View	Groundwater	789	Dillon	SC
Town of Latta	Groundwater	2,249	Dillon	SC
Trico Water Co	Groundwater	14,433	Dillon	SC
McCormick Co Water Authority	Surface water	8,500	Marlboro	SC
McCormick CPW	Surface water	2,038	Marlboro	SC
Town of Ellerbe	Surface water	1,497	Richmond	NC
Hamlet Water System	Surface water	11,027	Richmond	NC
Richmond County Water System	Surface water	18,275	Richmond	NC
City of Rockingham	Surface water	10,627	Richmond	NC

Source: USEPA Drinking Water Website, 2007.

¹⁴⁸ NCDENR. Water Classification Standards Website. <http://h2o.enr.state.nc.us/csu/swc.html> Last accessed January 12, 2007.

¹⁴⁹ USEPA, Safe Drinking Water Information System, List of Water Systems in SDWIS Webpage, <http://www.epa.gov/safewater/dwinfo/sc.htm#offices> (November 30, 2006).



3.18.4 How is surface water quality evaluated?

Under the CWA, states are required to record the condition of their surface waters with 305(b) and 303(d) documentation. The 305(b) documentation serves to evaluate the extent to which surface waters are supporting their designated uses for categories such as drinking water supply, aquatic life, recreational use, and fish consumption. SCDHEC descriptions of these categories are provided in Table 3.62, while NCDENR descriptions can be found in Table 3.63 (refer to page 3-260). SCDHEC Bureau of Water produces Watershed Water Quality Assessments (WWQA) to evaluate its streams under 305(b). The SCDHEC 2000 WWQA describes the most currently known watershed conditions and trends that are developing based on data collected from various monitoring stations that are located along water bodies throughout the State of South Carolina. NCDENR's Division of Water Quality produced the *2003 Yadkin-Pee Dee River Basinwide Water Quality Plan* to conform to 305(b) requirements. The 2003 report describes the most currently known watershed conditions and trends that are developing based on data collected from various monitoring stations that are located along water bodies throughout the State of North Carolina.

The 303(d) documentation is a comprehensive list of impaired water bodies that each state must develop under the CWA to identify water bodies that do not support their designated use classifications. The SCDHEC and NCDENR develop a priority list of water bodies pursuant to Section 303(d) of the CWA, 40 CFR §130.7, and in compliance with the requirements of the current regulation. These water bodies are targeted for water quality management action and are listed in the *State of South Carolina Section 303(d) List for 2006*¹⁵⁰ and *State of North Carolina 303(d) List for 2004*.¹⁵¹ These lists identify water bodies that do not meet state water quality standards after the application of required controls for point and nonpoint source pollutants, as well as priority water bodies to which the agencies can direct their attention when developing required controls. Water quality monitoring stations that are on the list and within the project study area are included in Table 3.64 (refer to page 3-261). These sites are listed based on the water quality at the monitoring stations during the time samples were taken. The stream distance of an impaired area around water quality monitoring stations in South Carolina is not identified by SCDHEC. Since the affected areas are not known, crossings within a five-mile distance from an impaired station were considered impaired for purposes of this document.

The 2006 North Carolina 303(d) Draft List has been released but not finalized by NCDENR or USEPA. It lists Station Q994000 as being impaired for biological integrity, but does not include any other water quality monitoring stations that are within the project study area.¹⁵²

¹⁵⁰ SCDHEC, *The State of South Carolina's 2004 Integrated Report, Part I: Listing of Impaired Waters*, (2004) http://www.scdhec.gov/eqc/water/pubs/06_303d.pdf (December 19, 2006).

¹⁵¹ NCDENR, http://h2o.enr.state.nc.us/tmdl/General_303d.htm#Downloads (December 19, 2006).

¹⁵² NCDENR, Department of Water Quality, *2006 303(d) Draft List*, <http://h2o.enr.state.nc.us/tmdl/documents/2006303dListPublicReviewDraft.pdf> (January 22, 2007).



Table 3.62
SCDHEC's Use Support Determination System

Type of Use Support	Description	Evaluation Criteria	Support Ranking System
Aquatic Life Use Support	Evaluation of a water body's ability to provide an environment in which native plant and animal communities can survive and reproduce.	Based on percentage of samples for levels of dissolved oxygen, pH, and toxic substances in the water body. The Standard is at least 4-5mg/l for dissolved oxygen. The pH level ranges from 5 to 8.5. Acute aquatic life standard is used for toxic substances.	10% or less of samples are not within desired levels- Aquatic life uses fully supported. 11-25% of samples are not within desired levels- Aquatic life uses partially supported. More than 25% of samples are not within desired levels- Aquatic life uses not supported. (Individual toxic substances are evaluated separately on the same scale with respect to attainment of the acute aquatic life standard.)
Recreational Use Support	Evaluation of a water body's suitability for whole body contact recreational activities such as swimming.	Based on the percentage of fecal coliform bacteria excursions, defined as greater than 400/100ml for all surface water classes, found in water body.	Less than 10%- recreational uses fully supported. 11-25%- recreational uses partially supported. Greater than 25%- recreational uses not supported.
Drinking Water Use Support	Used to determine the suitability of the water body to be used as a drinking water source.	Criteria developed by SCDHEC under the Safe Drinking Water Act (as amended).	
Fish Consumption Use Support	Evaluation of digestible fish in the water body to determine if safe fish consumption by humans is possible.	Tests done for mercury concentration in fish, evaluated with the average exposure dose to determine the consumption rate that would not be likely to pose a health threat to adult males and non-pregnant females.	No Fish Advisory or Ban- full fish consumption use support in water body. Fish Advisory- fish consumption partially supported; certain limits and restrictions on consumption are advised. Fish Ban- fish consumption is not supported in the water body.

Source: SCDHEC (2000), *Watershed Water Quality Assessment: Pee Dee Basin*, <http://www.scdhec.net/eqc/water/pubs/peedee2k1.pdf> Last accessed December 19, 2006.



Table 3.63
NCDENR's Use Support Determination System for Class C Waters

Type of Use Support	Description	Evaluation Criteria	Support Ranking System
Aquatic Life and Secondary Recreation Use Support	Benthic Bioclassifications	Ephemeroptera, Plecoptera, and Trichoptera (EPT) Biotic Index	Excellent, Good, and Good to Fair Rankings are Supporting Fair to Poor Rankings are Impaired
	Fish Community Bioclassifications	North Carolina Index of Biotic Integrity	Excellent, Good, and Good to Fair Rankings are Supporting Fair to Poor Rankings are Impaired
	Ambient Monitoring Data	Based on a five-year monitoring window that ends on August 31 of the year sampling. Selected parameters are measured against standards for a minimum of ten samples.	Criterion exceeded $\leq 10\%$ - Supporting Criterion exceeded 11-25% - Impaired
Fish Consumption Use Support	Assesses whether humans can safely consume fish from a waterbody	Issuance of Fish Consumption Advisories by the NC Department of Health and Human Services.	No Issuance of Fish Consumption Advisory – Supporting Issuance of Fish Consumption Advisory – Impaired
Primary Recreation Use Support	Evaluates waterbodies for the support of primary recreation activities such as swimming, water-skiing, skin diving, and similar uses usually involving human body contact with water where such activities take place in an organized manner or on a frequent basis	Based on a five year monitoring window for fecal coliform bacteria that ends on August 31 of the year sampling.	For Class C waters: Supporting: standard not exceeded within five-year window Impaired: standard exceeded within five-year window (200 colonies per 100ml geometric mean as calculated for a minimum of five samples collected within 30 days, or greater than 20 percent of these samples exceeded 400 colonies per 100 ml over the five year data window).
Water Supply Use Support	Assesses whether a water can be used for water supply purposes	Has not been developed.	Has not been developed.

Source: NCDENR, 2003 *Yadkin-Pee Dee River Basinwide Water Quality Plan*.
<http://h2o.enr.state.nc.us/basinwide/yadkin/Yadkin%20final%202003%20BP/app3.pdf> Last accessed December 19, 2006.



Table 3.64
303(d) List of Impaired Streams within Project Study Area*

Stream	State	Monitoring Station Location	Impairment
Buck Swamp (blackwater system) Unit 03040204-050	South Carolina	PD-031: At State Route 33 Crossing, just east of Latta.	-Aquatic life use impairment due to low dissolved oxygen.
Pee Dee River Unit 03040201-090	South Carolina	PD-242: Great Pee Dee River at Blue’s Landing	-Fishing Advisory due to high mercury levels.
Everetts Lake – Marks Creek Unit 03040201-010	North Carolina	Q994000: Marks Creek at NC State Road 1812 near Hamlet	- Impaired biological integrity due to agricultural inputs

* Based on 2006 South Carolina 303(d) List and 2004 North Carolina 303(d) List.

The USEPA, USDA, and other federal agencies released the Clean Water Action Plan in February 1998. This plan calls on states to evaluate the eight-digit watersheds within the state boundaries and determine if they “(1) meet clean water and other natural resource goals and support healthy aquatic systems or (2) are in need of restoration because the waters within them do not meet, or face imminent threat of not meeting, clean water and other natural resource goals.” The watershed assessment process is called Unified Watershed Assessment, and the Plan asks that states select Watershed Restoration Priorities for the fiscal years 1999 and 2000. SCDHEC and NRCS were the lead agencies in the assessment process for South Carolina and compiled the *South Carolina Unified Watershed Assessment and FY 1999-2000 Watershed Restoration Priorities*, in September 1998. NCDENR’s Division of Water Quality and the NRCS were the lead agencies for North Carolina and developed the *North Carolina Unified Watershed Assessment Detailed Report* in 1998. Watersheds in South Carolina were assessed based on water quality and macroinvertebrate community sampling data from 1,000 monitoring stations statewide, as well as input from 18 other federal and state agencies, and from private groups. Watersheds in North Carolina were assessed based on the following factors: percentage of monitored waters rated as impaired (305(b) type assessments), 303(d) priority ratings, local interest, geographic distribution, and potential for combining existing or ongoing efforts.

SCDHEC, NCDENR Division of Water Quality, and NRCS established criteria, based on guidance from the USEPA, for classifying watersheds. Eight-digit watersheds within South Carolina and North Carolina were classified into one of the four following categories:



- Category I – Watersheds in Need of Restoration. These watersheds do not meet, or face imminent threat of not meeting, clean water and other natural resource goals;
- Category II – Watersheds Meeting Goals, Including Those Needing Action to Sustain Water Quality. These watersheds meet clean water and other natural resource goals and standards and support healthy aquatic systems;
- Category III – Watersheds with Pristine/Sensitive Aquatic Systems Conditions on Lands Administered by Federal, State, or Tribal governments; or
- Category IV – Watersheds with Insufficient Data to Make an Assessment.

The Pee Dee River Watershed in South Carolina (03040201) was given a Category I rating under the Unified Watershed Assessment due to 31 percent of its assessed waters being impaired.¹⁵³ In addition, this watershed was designated as Priority One in the Watershed Restoration Priorities for fiscal year 1999-2000. The Lower Pee Dee River Watershed (03040201) in North Carolina was given a Category II rating by NCDENR and USDA.¹⁵⁴

Watersheds that do not meet their designated uses are required to develop total maximum daily loads (TMDLs) under the section 303 of the CWA and 40 CFR Part 30. A TMDL is a calculation of the total amount of pollutant a water body can accept from point and nonpoint sources and still meet water quality standards.¹⁵⁵ Existing and future projects or facilities discharging into a watershed that has a TMDL in place must coordinate with state water quality agencies to ensure compliance with the TMDL. Based on information from NCDENR and SCDHEC, no TMDLs have been developed for impaired waters within the project study area.

3.18.5 What are the surface water quality conditions in the Pee Dee River Sub-basin and the Yadkin-Pee Dee River Sub-basin 03-07-06?

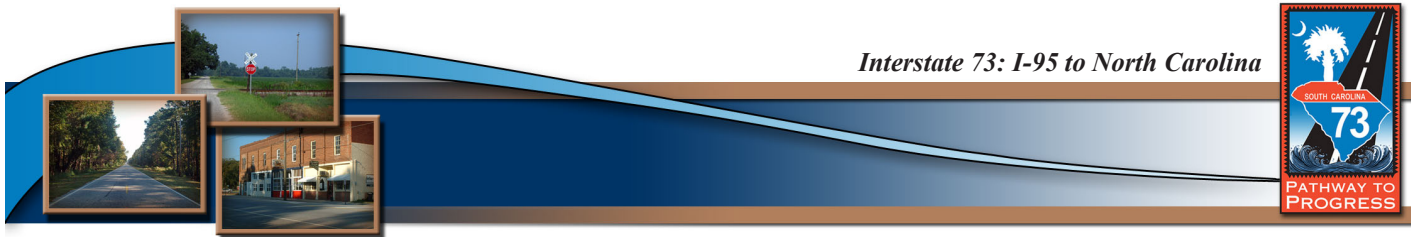
Water quality sampling results reported for the Pee Dee River Sub-basin and the Yadkin-Pee Dee River Sub-basin 03-07-06 were available, to varying extents, from 1998 through 2006. In South Carolina, sources for the information used included the *SCDHEC WWQA for the Pee Dee Basin for 2000* as well as the South Carolina Section 303(d) lists for 1998, 2000, 2002, 2004, and 2006. In North Carolina, sources for the information used included NCDENR's *2003 Yadkin-Pee Dee River Basinwide Water Quality Plan*,¹⁵⁶ as well as the North Carolina Section 303(d) lists for 1998, 2000,

¹⁵³ SCDHEC and USDA-NRCS, *South Carolina Unified Watershed Assessment and FY 1999-2000 Watershed Priorities*, (1998) <http://www.scdhec.net/eqc/water/pubs/uwafull.pdf> (January 12, 2007).

¹⁵⁴ NCDENR and USDA-NRCS, North Carolina's Unified Watershed Assessment Website. <http://h2o.enr.state.nc.us/nps/uwa.htm> (January 12, 2007).

¹⁵⁵ USEPA, Introduction to TMDLs Webpage, <http://www.epa.gov/owow/tmdl/intro.html> (January 22, 2007).

¹⁵⁶ NCDENR, *2003 Yadkin-Pee Dee River Basinwide Water Quality Plan*, Section B: Chapter 16.



2002, 2004, and 2006 (draft). The watershed units in both sub-basins drain to either the Great Pee Dee or Little Pee Dee Rivers, depending on topography and natural drainage systems in the area.

The SCDHEC and the NCDENR submit water quality data to the USEPA Storage and Retrieval (STORET) system on a regular basis. Readily available information was downloaded from the USEPA STORET for the water quality monitoring stations in the project study area and station averages were calculated for each parameter using only those values that were above the corresponding method detection limit. A summary of the information available within the USEPA STORET database from 1999 to 2006 is provided throughout the discussion of the watershed units, with the number of violations being stated for those parameters with set criteria, and sampled averages for those which have no set standard criteria. Detailed information for each water quality monitoring station is found in the *Natural Resources Technical Memorandum*.

3.18.5.1 Watershed units which drain into the Great Pee Dee River

Pee Dee River Watershed Unit 03040201-010

Pee Dee River watershed unit 03040201-010 is located in Marlboro and Chesterfield Counties, South Carolina and Richmond County, North Carolina. Streams in this watershed unit that are also within the project study area include Marks Creek in North Carolina and the Great Pee Dee River and associated tributaries from the state line south to Whites Creek in South Carolina, (refer to Figure 3-42, page 3-265). Station Q9940000, which is monitored by the NCDENR, is located on Marks Creek at N.C. State Road 1812 near the City of Hamlet. Marks Creek from N.C. Route 177 to the North Carolina/South Carolina state line was placed on the North Carolina 303(d) list from 1998 to present due to impaired biological integrity caused by agricultural inputs. This station is approximately one mile upstream of the Hamlet Wastewater Treatment Plant, a NPDES discharge, which was noted to be in significant noncompliance in 2003.¹⁵⁷ Monitoring data averages from this station show that water samples were in excess of the standards set by NCDENR for dissolved oxygen, pH, iron, and fecal coliforms. Samples taken at the station for other parameters met the standard criteria or were not sampled. A fish consumption advisory was also issued by the both SCDHEC and NCDENR due to high mercury levels within this watershed unit.

Pee Dee River Watershed Unit 03040201-050

Pee Dee River watershed unit 03040201-050 is located in Marlboro, Chesterfield, Darlington, and Florence Counties, South Carolina. The stream reach of this watershed unit extends from Whites Creek to Black Creek. This large stream reach accepts drainage from numerous tributaries in the project study area including Whites Creek, Hicks Creek, Husbands Creek, Phils Creek,

¹⁵⁷ *Ibid.*



Beaverdam Creek, Tarkiln Creek, Naked Creek, Crooked Creek, Henegan Lake, Lake Creek, Three Creeks, Rogers Creek, and Wolf Creek (refer to Figure 3-42).

Station RS-02471, monitored by SCDHEC, is located along the Great Pee Dee River at Hunts Bluff Landing and is approximately 4.3 miles from Alternative 1; however, it is located within another 11-digit watershed unit. This station is not directly crossed by any of the Build Alternatives. Sampling data from 2002 (the only year it was sampled between 1999 and 2006) for this station indicated that mercury levels were beyond the set criteria during one sampling event (50 percent of sampling events), but all other parameters either met standard criteria or were not sampled.

Two other stations within the project study area include PD-012, located on the Great Pee Dee River at the S.C. Route 9 crossing, and PD-015, also located on the Great Pee Dee River at the U.S. Route 15 crossing. At Station PD-012 copper levels were in excess of standard criteria, while at Station PD-015, chromium and copper levels were in excess of set standards. A fish consumption advisory has been issued by the SCDHEC for high mercury levels at all three stations, while Station PD-015 is listed for recreational use impairment due to high fecal coliform levels.

Crooked Creek Watershed Unit 03040201-070

Crooked Creek watershed unit 03040201-070 is located in Marlboro County, South Carolina and in Richmond and Scotland Counties, North Carolina. While both watershed units comprise a single hydrologically connected watershed unit, it has been administratively separated at the North Carolina/South Carolina state line. This watershed unit is comprised of Crooked Creek and its tributaries, including Lightwood Knot Creek, Usher Pond, Goodwins Millpond, Burnt Factory Pond, Beverly Creek, Lilly Quick Creek, Lake Paul Wallace, and McCalls Millpond, all of which drain into the Great Pee Dee River (refer to Figure 3-42).

There are six stations monitored by the SCDHEC that are located within the portion of the watershed unit in the project study area and within five miles of a Build Alternative. Station CL-086 is located at the Lake Wallace Dam Recreation Pond while Station RL-02324 is also located on Lake Wallace 0.8 mile south of Beauty Spot Road (Road S-35-47). Station PD-014 is located on Crooked Creek at Road S-35-43, Station PD-063 is located on Crooked Creek at the Bridge crossing along S.C. Route 912, and Station PD-107 is located on Crooked Creek at S.C. Route 9 in Bennettsville, SC. Station PD-612 is located on Crooked Creek approximately 0.25 mile south of the state line and no ambient water quality data was submitted by SCDHEC for this station. Based on sampling data from 1999 to 2006, Stations CL-086, PD-014, PD-063, and PD-107 were in violation of the pH data between 27 (PD-063) and 65 (PD-107) percent of the sampling events. Additionally, Stations PD-063, PD-107, and RL-02324 were in excess of the fecal coliform standard between 10 percent (RL-02324) and 24 percent (PD-063) during