City of Charlotte
and
Mecklenburg County
NPDES MS4 Permit Program

TMDL Watershed Plan

Permit Numbers NCS000240 and NCS000395

February 2015

Table of Contents

Section 1: Purpose

The purpose of this Total Maximum Daily Load (TMDL) Watershed Plan is to address the assigned municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) regulated waste load allocations (WLAs) of applicable TMDLs approved for water bodies located within the City of Charlotte, the City's Extra Territorial Jurisdiction (ETJ) area, and applicable watersheds in Mecklenburg County, including Long Creek, Sugar Creek, Little Sugar Creek, and McAlpine Creek. Specifically, the goal of the plan is to facilitate the implementation of activities within the NPDES MS4 permit program six minimum measures that are designed to reduce the TMDL assigned MS4 NPDES regulated WLAs for the pollutant of concern to the maximum extent practicable (MEP). This TMDL Watershed Plan is intended to meet the requirements of the City's NPDES Phase I MS4 permit, and also the requirements of Mecklenburg County's NPDES Phase II MS4 permit for TMDL watershed areas located both within the City and County.

In addition, Part II, Sec J.3 of the City's NPDES MS4 permit requires that the City address any approved TMDLs that do not assign an MS4 NPDES regulated WLA for the pollutant of concern. This is to be done by evaluating strategies and tailoring best management practices (BMPs) within the scope of the six minimum permit measures to address the pollutant of concern to the MEP. All BMP measures included in this TMDL Watershed Plan are designed to address a pollutant of concern in the same manner regardless of whether or not a MS4 NPDES regulated WLA has been assigned. As such, the City has included all approved TMDLs within this plan.

Section 2: Background

Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting water quality standards or that have impaired uses. This list, referred to as the 303(d) list, is submitted biennially to the U.S. Environmental Protection Agency (EPA) for review. The 303(d) process requires that a TMDL be developed for waters shown on Part I of the 303(d) list. The objective of a TMDL is to allocate allowable pollutant loads to known sources so that actions may be taken to restore the water to its intended uses (EPA 1991). Currently, there are seven approved TMDLs applicable to multiple streams in the City of Charlotte and Mecklenburg County. **Table 2-1** provides information on these TMDLs and affected stream watersheds. The following sub-sections elaborate on these TMDLs.

Table 2-1: City of Charlotte Streams with Approved TMDLs

Receiving Stream Name	WQ Classification	TMDL Approved	TMDL Pollutant of Concern
Irwin Creek	C	February 1996	Dissolved Oxygen
Little Sugar Creek	C	February 1996	Dissolved Oxygen
McAlpine Creek	C	February 1996	Dissolved Oxygen
Lake Wylie	WS-IV, B, CA	February 1996	Chlorophyll-a
Irwin Creek	C	March 2002	Fecal Coliform
Little Sugar Creek	C	March 2002	Fecal Coliform
McAlpine Creek	C	March 2002	Fecal Coliform
Sugar Creek	C	March 2002	Fecal Coliform

McKee Creek	C	August 2003	Fecal Coliform
Irwin Creek	C	February 2005	Turbidity
Little Sugar Creek	C	February 2005	Turbidity
Long Creek	C	February 2005	Turbidity
McAlpine Creek	C	February 2005	Turbidity
Sugar Creek	C	February 2005	Turbidity
Steele Creek	C	May 2007	Fecal Coliform
Statewide	All	October 2012	Mercury

Source: 2014 NCDENR-Division of Water Resources website:
http://portal.ncdenr.org/web/wq/ps/mtu/tmdl/tmdls#Catawba

2.1 Fecal Coliform TMDLs

Fecal coliform in urban streams can originate from many sources including both point and non-point sources. Some sources of fecal coliform in urban watersheds include wildlife, pet waste, failing septic systems, cross connections resulting in dry weather flow in stormwater outfalls; sanitary sewer overflows (SSOs), sewer exfiltration, and permitted discharges such as wastewater treatment plants (WWTPs). The North Carolina (NC) in-stream standard for fecal coliform is a 30-day geometric mean of 200 cfu/100 mL or a daily maximum value of 400 cfu/100 mL (15A NCAC 2B .0211 (3)(e)). In 2002, a fecal coliform TMDL was written for Irwin, McAlpine, Little Sugar and Sugar Creek watersheds because these watersheds demonstrated a greater than 10% exceedance of the 400 cfu/100 mL standard. This TMDL set WLAs for NPDES permitted WWTPs and SSOs; and load allocations (LAs) for wildlife, failing septic systems, dry weather flows from the MS4, and sewer exfiltration. No MS4 NPDES WLA was assigned under this TMDL. Nevertheless, fecal coliform will be addressed under this plan as discussed in Section 1.

In 2003, a fecal coliform TMDL was written for the McKee Creek watershed by EPA in cooperation with the NC Department of Environment and Natural Resources (NCDENR). Unlike the fecal coliform TMDL written in 2002, this TMDL included a wet weather WLA for the stormwater outfalls. Aside from the wet weather WLA, a WLA was assigned to continuous discharge facilities, which were privately operated smaller "package" WWTPs. Agricultural runoff, septic systems, urban runoff, and wildlife were identified as nonpoint sources of fecal coliform for the purpose of determining the LA for the TMDL. The MS4 NPDES WLA assigned for this TMDL is 8.16E+09 cfu/day**.**

In 2007, a fecal coliform TMDL was developed for Steele Creek by the South Carolina Department of Health and Environmental Control (SCDHEC). The majority of the Steele Creek watershed is located in South Carolina (SC); however, the creek originates in Charlotte-Mecklenburg. The TMDL compliance points for this water body/pollutant combination are all located in SC. According to SC fecal coliform standards, fecal coliform must not exceed 200 cfu/100 mL based on a geometric mean of five consecutive samples during a 30-day period, or no more than 10% of samples in a five year period may exceed 400 cfu/100 mL (SCDHEC, 2004c). WLAs were developed for continuous flow sources and NPDES permitted stormwater discharges, which were called "intermittent sources". This TMDL states that the City of Charlotte

will need to reduce its combined WLA for stormwater discharges by 87% in order to meet the TMDL at compliance point CW-009 just downstream of the North Carolina-South Carolina border.

2.2 Turbidity TMDL

In 2005, NCDENR developed a turbidity TMDL for Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, and Irwin Creek within the City and County. This TMDL was written because the State's turbidity data for these watersheds demonstrated a greater than 10% exceedance of the 50 Nephelometric Turbidity Unit (NTU) turbidity standard. While the impairment and subsequent TMDL were based on exceedance of the turbidity standard, total suspended solids (TSS) was used as a surrogate for the purpose of calculating WLAs for this TMDL. Point sources of turbidity/TSS identified in this TMDL included permitted construction sites and nonpoint sources of sediment identified including the following:

- Natural erosion occurring from the weathering of soils, rocks, and uncultivated land; geological abrasion; and other natural phenomena[1].
- Erosion from agricultural activities. This erosion can be due to the large land area involved and the land-disturbing effects of cultivation. Grazing livestock can leave areas of ground with little vegetative cover. Unconfined animals with direct access to streams can cause stream bank damage and erosion[1].
- Erosion from unpaved roadways can be a significant source of sediment to rivers and streams. Exposed soils, high runoff velocities and volumes and poor road compaction all increase the potential for erosion[1].
- Runoff from active or abandoned mines may be a significant source of solids loading. Mining activities typically involve removal of vegetation, displacement of soils and other significant land disturbing activities[1].
- Soil erosion from forested land that occurs during timber harvesting and reforestation activities. Timber harvesting includes the layout of access roads, log decks, and skid trails; the construction and stabilization of these areas; and the cutting of trees. Established forest areas produce very little erosion[1].
- Stream bank and streambed erosion processes often contribute a significant portion of the overall sediment budget. The consequence of increased stream bank erosion is both water quality degradation as well as increased stream channel instability and accelerated sediment yields. Stream bank erosion can be traced to two major factors: stream bank characteristics (erodibility potential) and hydraulic/gravitational forces (Rosgen, online)[1]. The predominant processes of stream bank erosion include: surface erosion, mass failure (planar and rotational), fluvial entrainment (particle detachment by flowing water, generally at the bank toe), freeze-thaw, dry ravel, ice scour, liquifaction/collapse, positive pore water pressure, both saturated and unsaturated failures and soil piping (NCDENR 2005).[1]

This TMDL indicated that, of all the stream watersheds included in this TMDL, all but Long Creek demonstrated a less than 10% exceedance of the 50 NTU standard based on the 1997-2004 data. Consequently, a WLA in this TMDL was developed only for Long Creek. A natural background TSS WLA for the MS4 area was set at 324.6 lbs/day at 15.3 cfs flow, and an

additional allocation of 675.4 lbs/day at 15.3 cfs flow, for a total WLA of 1000 lbs/day at 15.3 cfs.

2.3 Dissolved Oxygen TMDL

In 1996, NCDENR developed a dissolved oxygen TMDL for Irwin Creek, McAlpine Creek, and Little Sugar Creek. In this TMDL, summer and winter WLAs for flow, BOD5, and NH3-N were assigned for the Irwin Creek WWTP, McAlpine Creek WWTP, and Sugar Creek WWTP. This TMDL acknowledged that Little Sugar Creek was also impacted by urban stormwater, but stated that the City of Charlotte is covered by the NPDES stormwater requirements. No MS4 NPDES WLA for BOD5 or NH3-N was assigned for this TMDL.

2.4 Chlorophyll a

In 1995, a TMDL for chlorophyll a was developed by NCDENR for Lake Wylie. This TMDL set total nitrogen (TN) and total phosphorus (TP) limits for WWTPs discharging to Lake Wylie. Mecklenburg County conducts an annual assessment in response to this TMDL that is then submitted to NCDENR in compliance with their Phase II NPDES MS4 permit.

2.5 Mercury TMDL

In 2012, NCDENR developed a statewide mercury TMDL to determine how wastewater discharges, in-state air sources, and out-of-state air sources contribute to the surface water mercury load. This TMDL acknowledged that most mercury in stormwater comes from atmospheric deposition and that concentrations in stormwater are typically within the same range as mercury concentrations in rainwater, between zero and 10 ng/L. No MS4 NPDES WLA for mercury was assigned for this TMDL.

Section 3: Watershed Characteristics

3.1 Long Creek Watershed

The Long Creek watershed includes portions of the City of Charlotte and drains north central Mecklenburg County between Charlotte and Huntersville in the Southern Outer Piedmont Ecoregion. The watershed is located within hydrologic unit 03050101 and includes Vances Twin Lakes, Dixon Branch, Swaringer Lake and McIntyre Creek (NCDENR 2005).[1]

According to the 2000 US Census Urbanized Area, the Long Creek watershed includes portions of the Charlotte "urbanized area." The total Phase I & II area included as part of the Charlotte urbanized area within the Long Creek watershed is approximately 13,817 acres (21.5 mi^2), or approximately 59.5% of the total Long Creek watershed (NCDENR 2005).[1] The Long Creek drainage area is approximately 36.3 square miles with about 5.3% impervious cover.

Figures 3-1 through 3-3 below show the location of Long Creek watershed within the Charlotte-Mecklenburg area, the Long Creek watershed impaired reach and tributary streams, and the Long Creek watershed land uses, respectively.

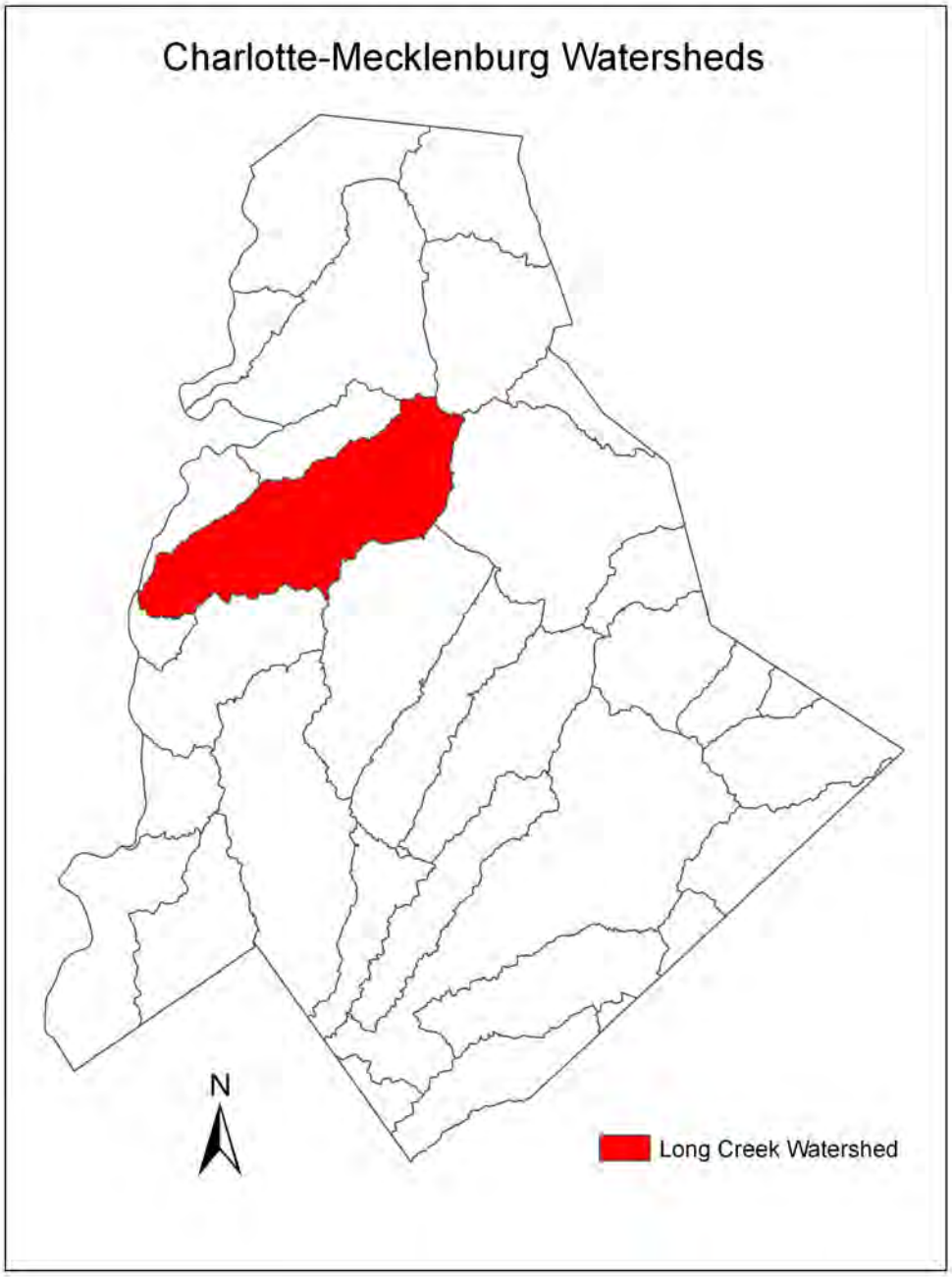

Figure 3-1: Charlotte-Mecklenburg Watersheds

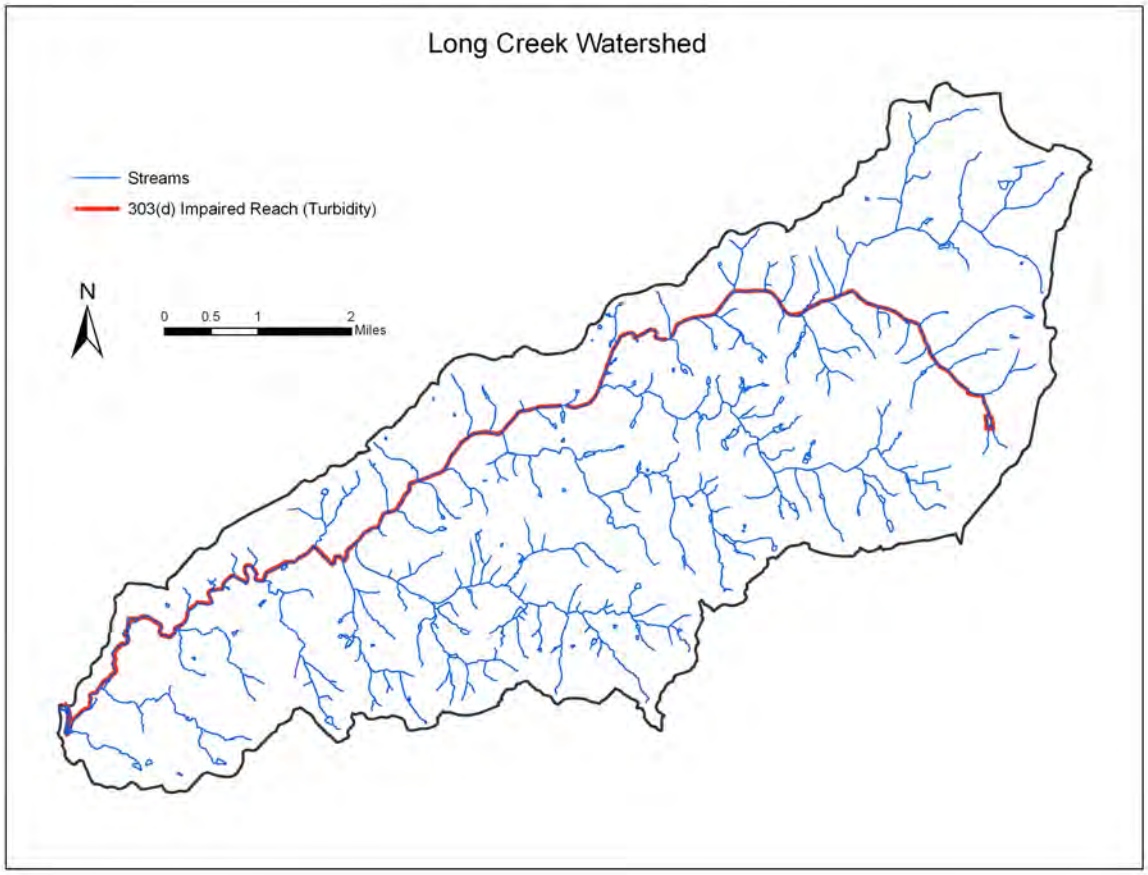

Figure 3-2: Long Creek Watershed

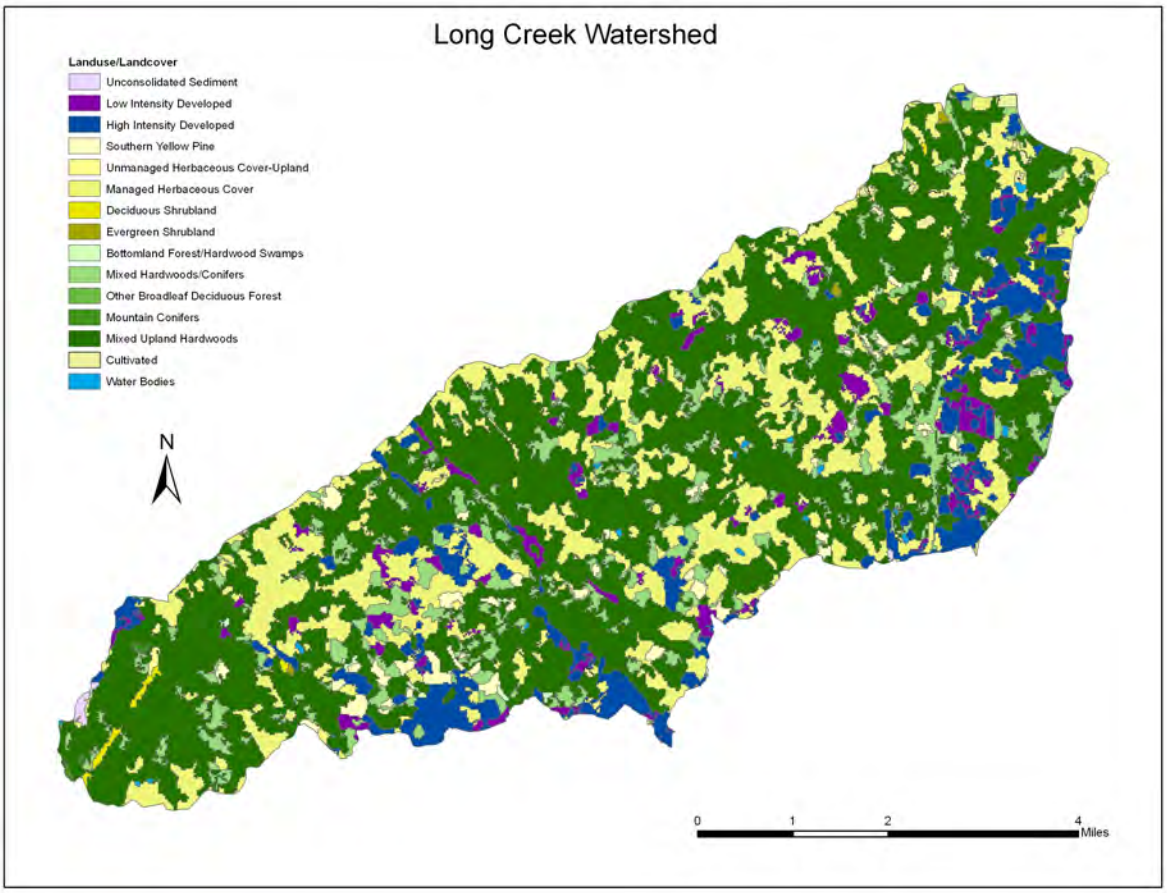

Figure 3-3: Long Creek Watershed Land Uses

3.2 McKee Creek Watershed

The McKee Creek watershed is located within Mecklenburg and Cabarrus Counties, in the eastern part of the Greater Charlotte Metropolitan Area, North Carolina and the Yadkin River Basin. Of the total 5,516 acres in the McKee watershed, 4,008 acres (73%) of the watershed lie within Mecklenburg County and the remaining 1,508 acres (27%) lie within Cabarrus County. The watershed is within the Hydrologic Unit Code 03040105, as designated by the U.S. Geological Survey (USGS) (DWR sub basin 03-07-11). McKee Creek originates in Mecklenburg County and flows north-northeast to its confluence with Reedy Creek in Cabarrus County. Reedy Creek discharges to the Rocky River, which in turn discharges to the Yadkin River[2]. The McKee Creek drainage area is approximately 5.9 square miles with about 1.4% impervious cover. **Figures 3-4 through 3-6** below show the location of McKee Creek watershed within the Charlotte-Mecklenburg area, the McKee Creek watershed impaired reach and tributary streams, and the McKee Creek watershed land uses, respectively.

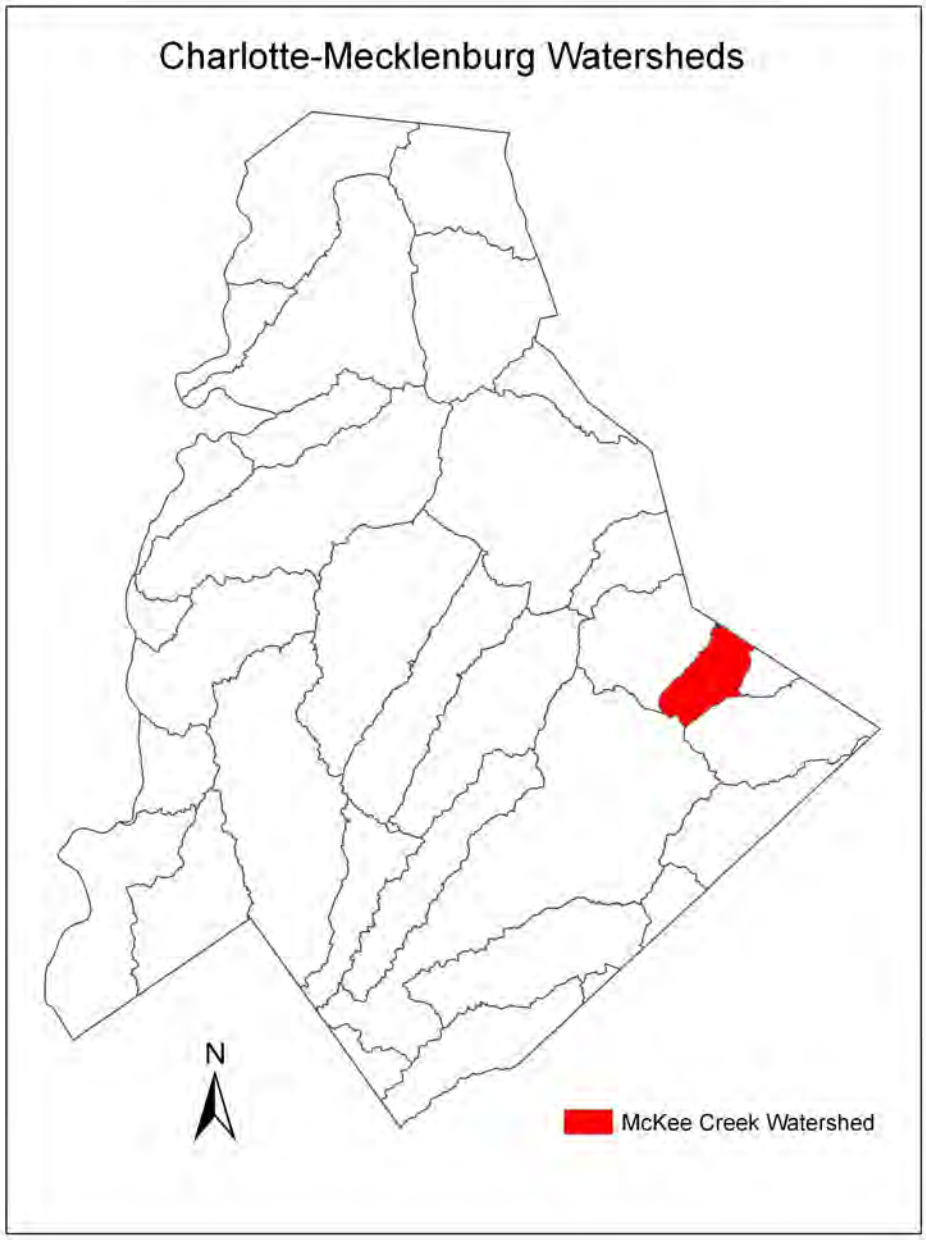

Figure 3-4: Charlotte-Mecklenburg Watersheds

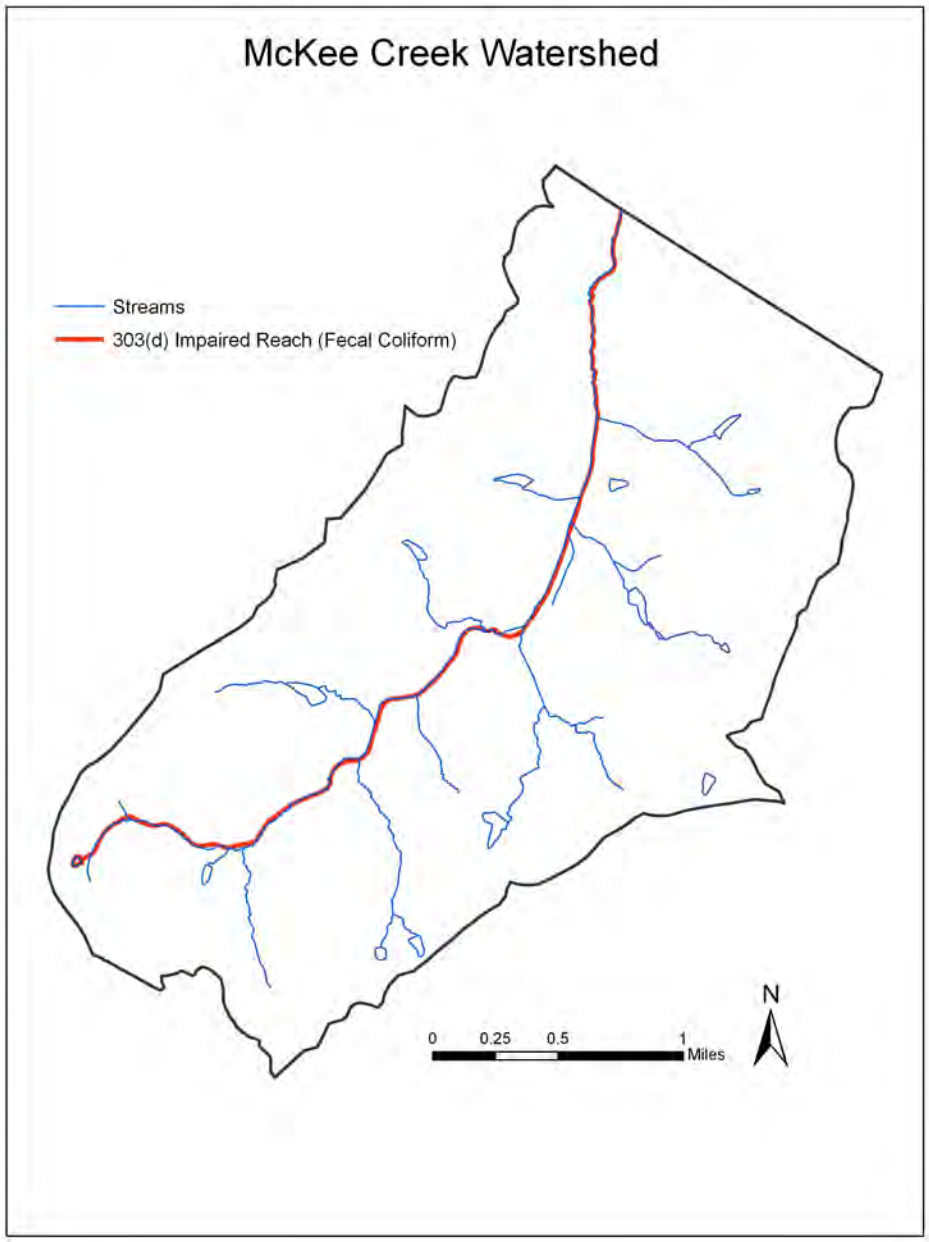

Figure 3-5: McKee Creek Watershed

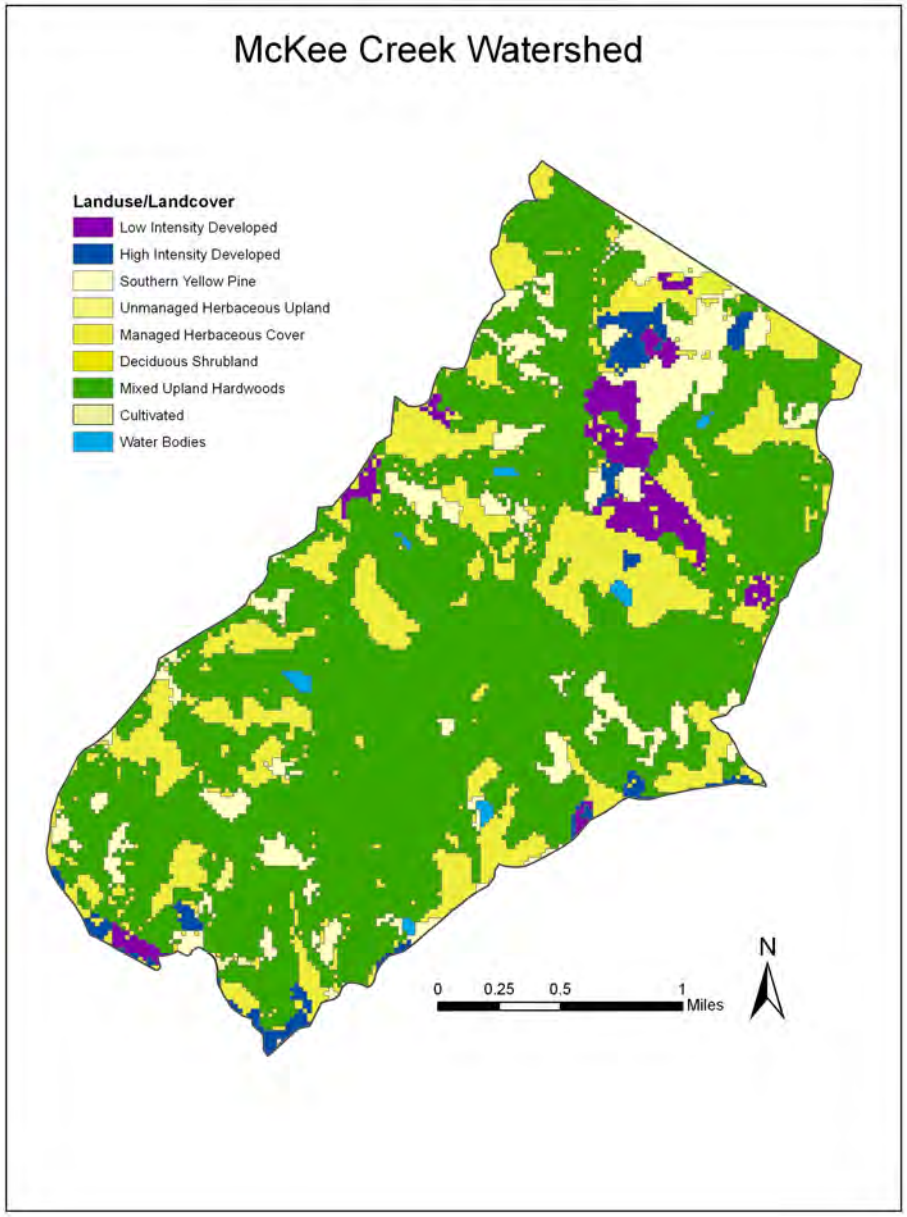

Figure 3-6: McKee Creek Watershed Land Uses

3.3 Steele Creek Watershed

The Steele Creek watershed originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. The upper portion of the watershed within NC is 9,954 acres with about 11% impervious cover and is located in the southwestern part of the City of Charlotte and Mecklenburg County, while the lower portion is located within York County and the City of Fort Mill. **Figures 3-7 through 3-9** below show the location of Steele Creek watershed within

the Charlotte-Mecklenburg area, the Steele Creek watershed stream reach and tributary streams, and the Steele Creek watershed land uses, respectively.

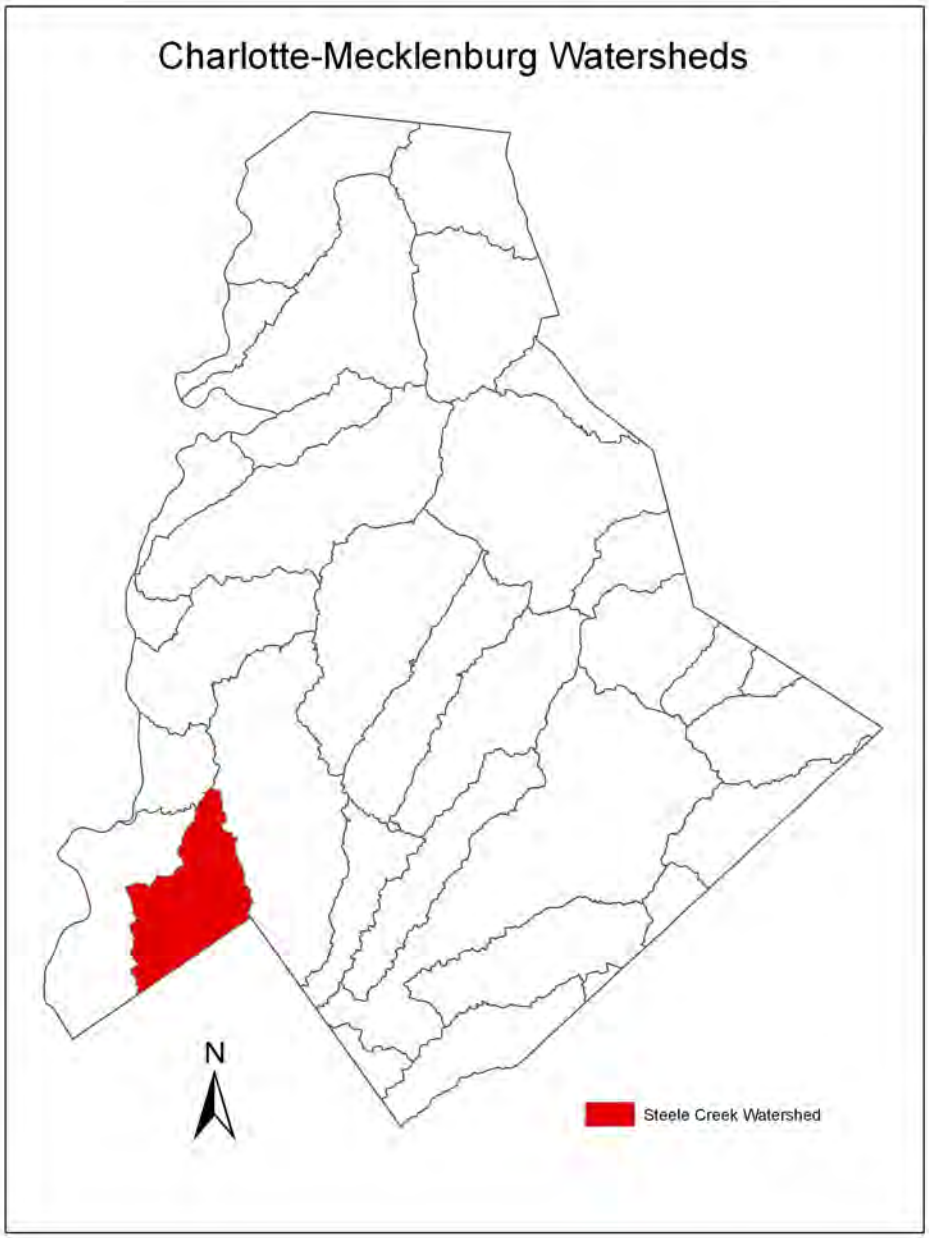

Figure 3-7: Charlotte-Mecklenburg Watersheds

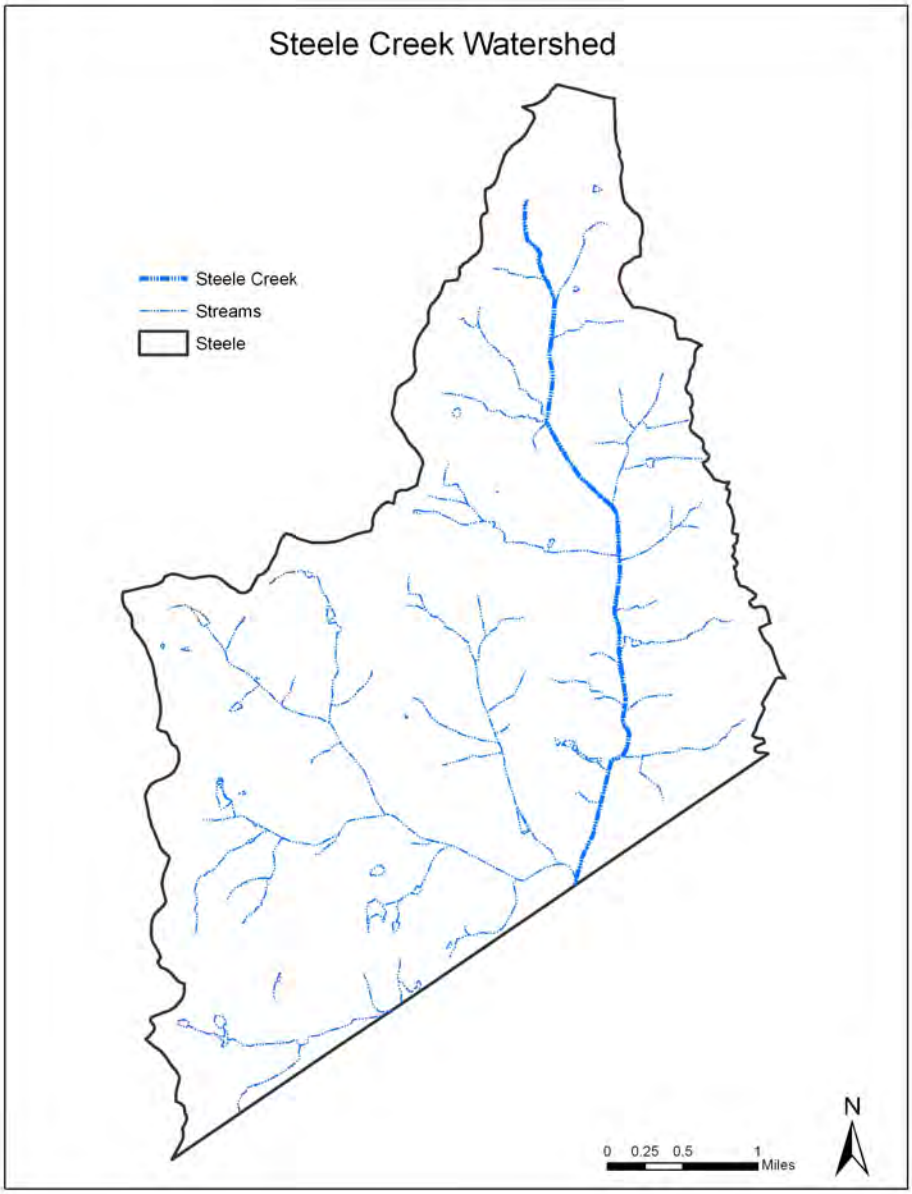

Figure 3-8: Steele Creek Watershed

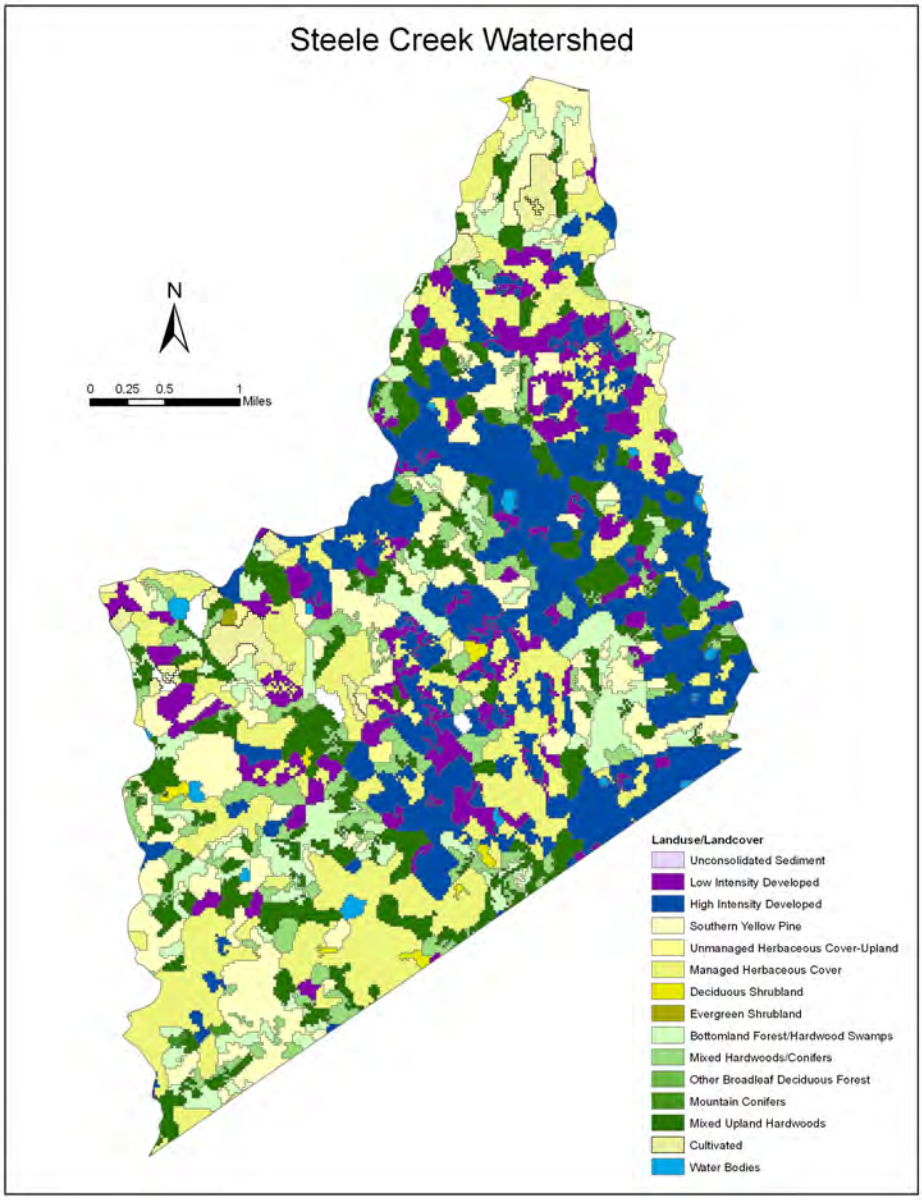

Figure 3-9: Steele Creek Watershed Land Uses

3.4 Sugar/Irwin Creek Watershed

Sugar Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 3-10 through 3-12** below show the location of Sugar Creek watershed within the Charlotte-Mecklenburg area, the Sugar Creek watershed stream reach and tributary streams, and the Sugar Creek watershed land uses, respectively. The upper portion of the watershed in **Figure 3-11** is Irwin Creek which drains to Sugar Creek. Irwin and Sugar Creeks are located in the DWR 12-digit sub watershed 030501030103. The Irwin Creek

drainage area is approximately 30 square miles and is about 16% impervious while the Sugar Creek drainage area is about 37.5 square miles with about 18% impervious cover.

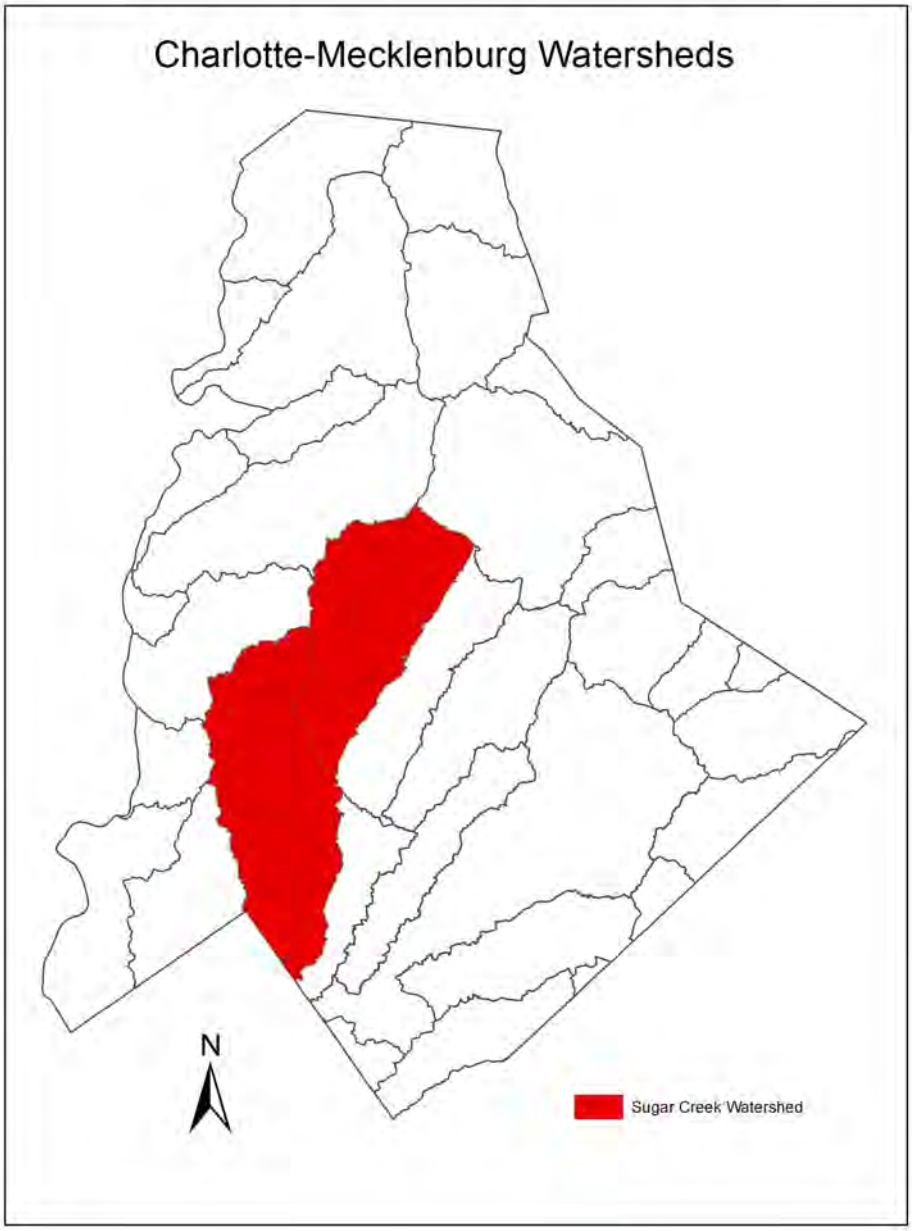

Figure 3-10: Charlotte-Mecklenburg Watersheds

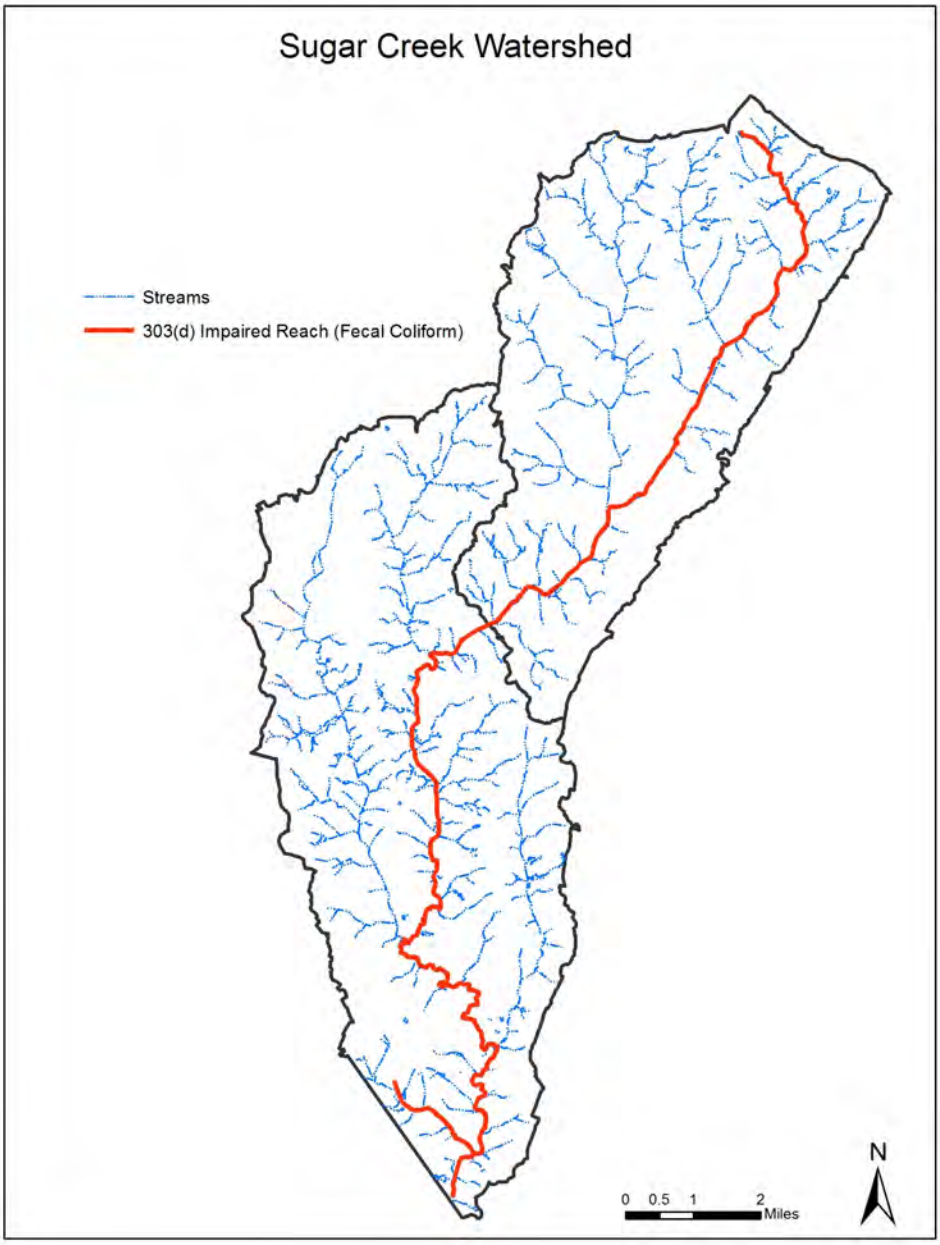

Figure 3-11: Sugar Creek Watershed

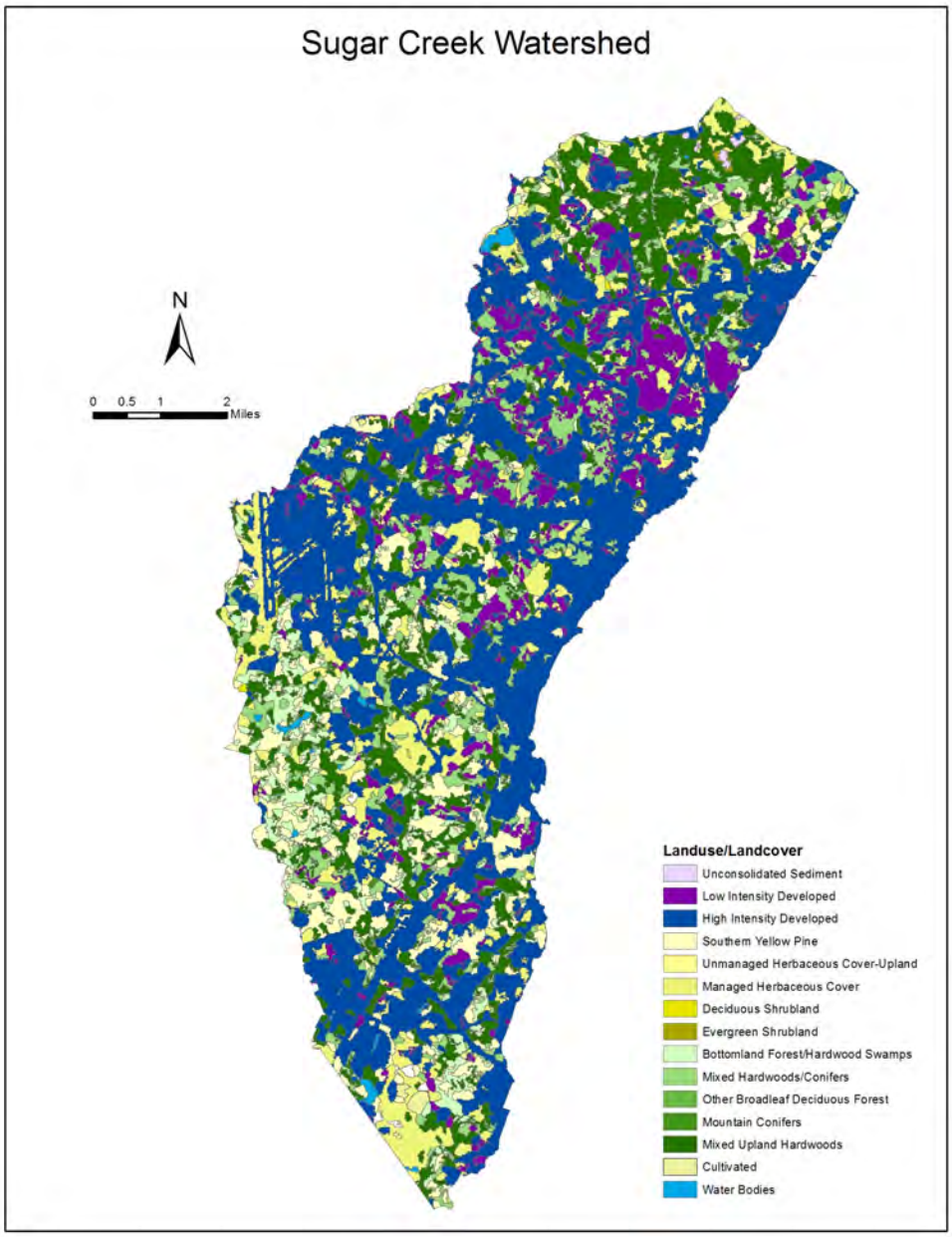

Figure 3-12: Sugar Creek Watershed Land Uses

3.5 Little Sugar Creek Watershed

Little Sugar Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 3-13 through 3-15** below show the location of the Little Sugar Creek watershed within the Charlotte-Mecklenburg area, the Little Sugar Creek watershed stream reach and tributary streams, and the Little Sugar Creek watershed land uses, respectively. The two upper sub-watersheds depicted in **Figure 3-14** represent Upper Little Sugar Creek to the left and Briar Creek to the right, both of which drain to Lower Little Sugar Creek. The Upper

Little Sugar Creek drainage area is approximately 19.3 square miles and 21.5% impervious, Briar Creek is about 21.6 square miles and 13.6% impervious, and Lower Little Sugar Creek is about 10.1 square miles and 20% impervious. Little Sugar Creek is located in the DWR 12-digit sub watershed 030501030102.

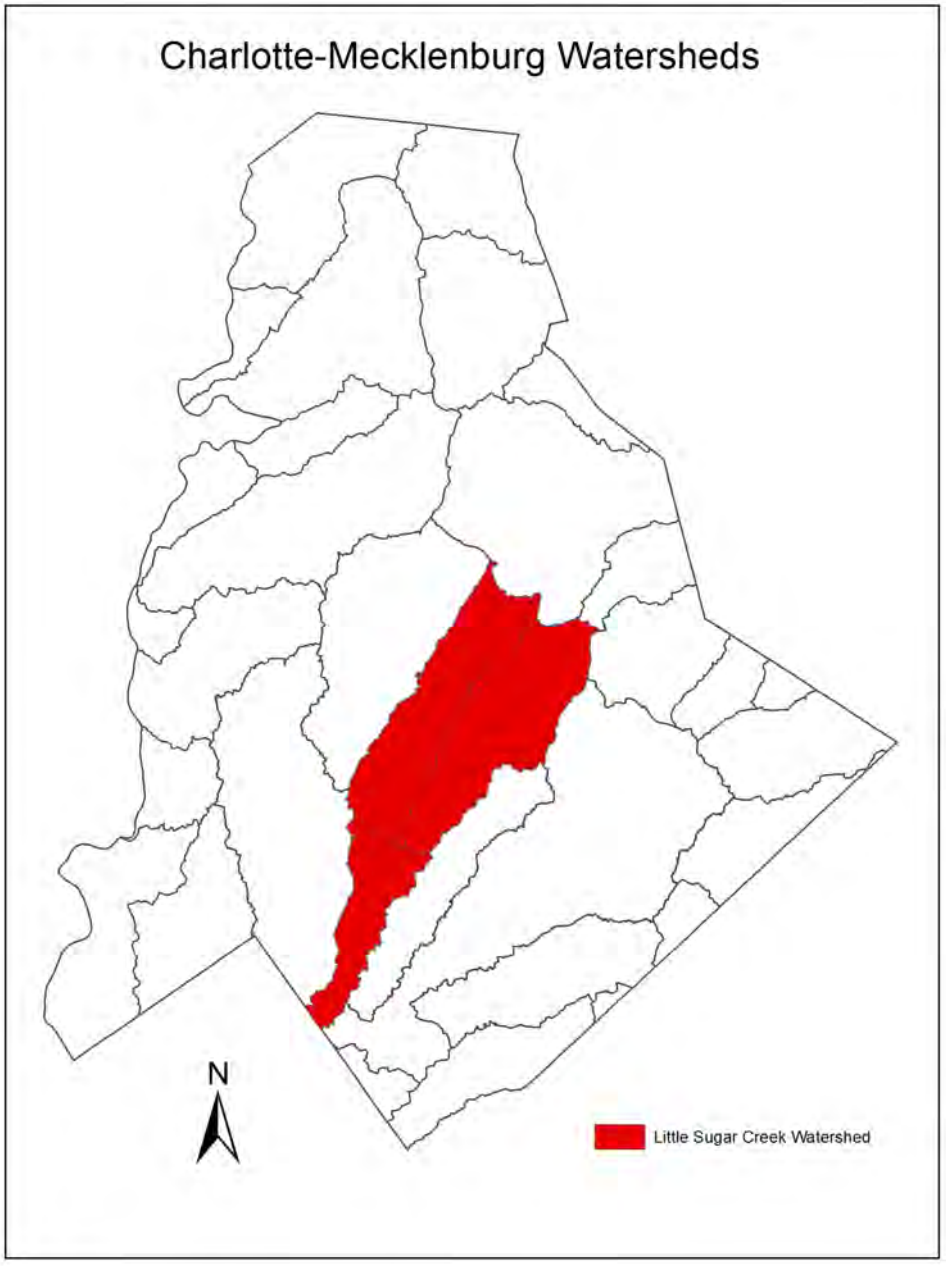

Figure 3-13: Charlotte-Mecklenburg Watersheds

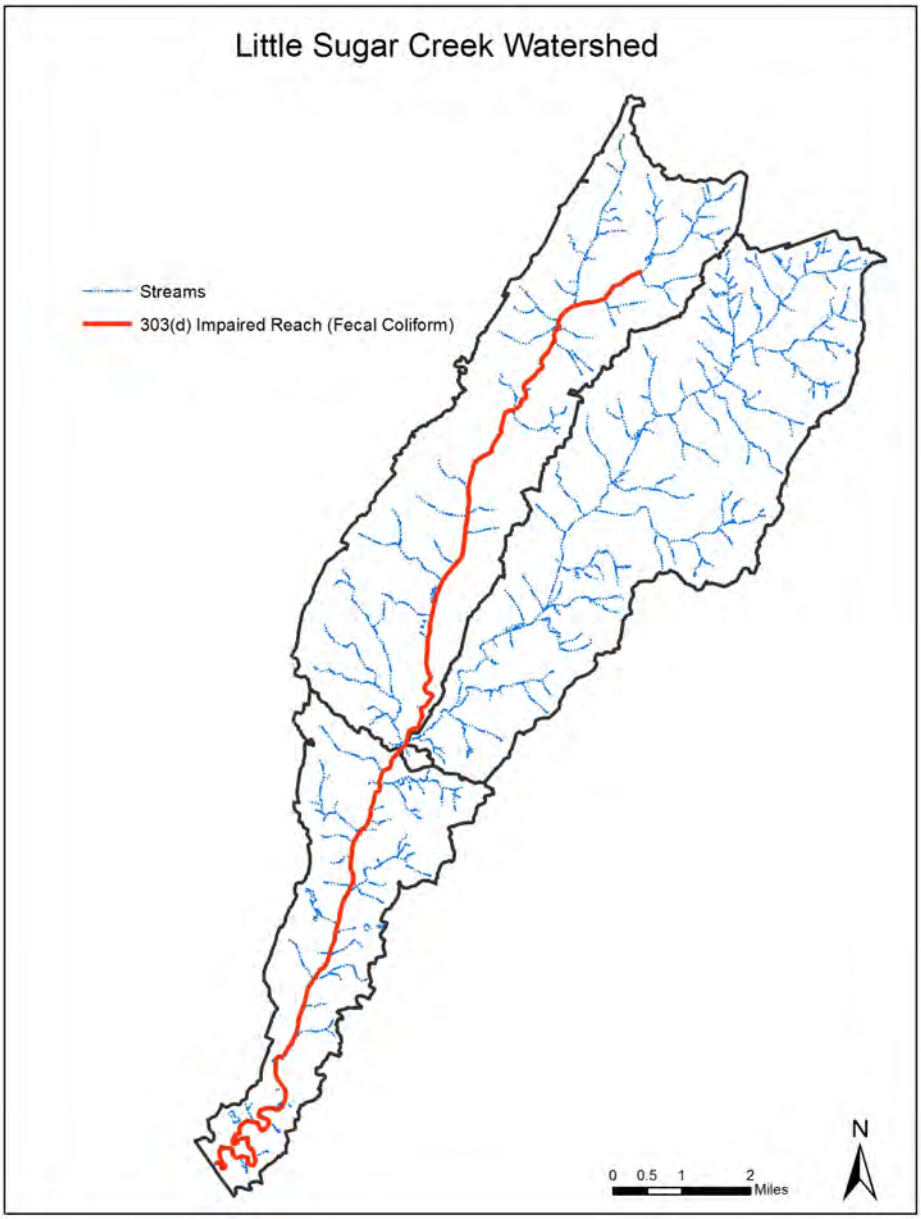

Figure 3-14: Little Sugar Creek Watershed

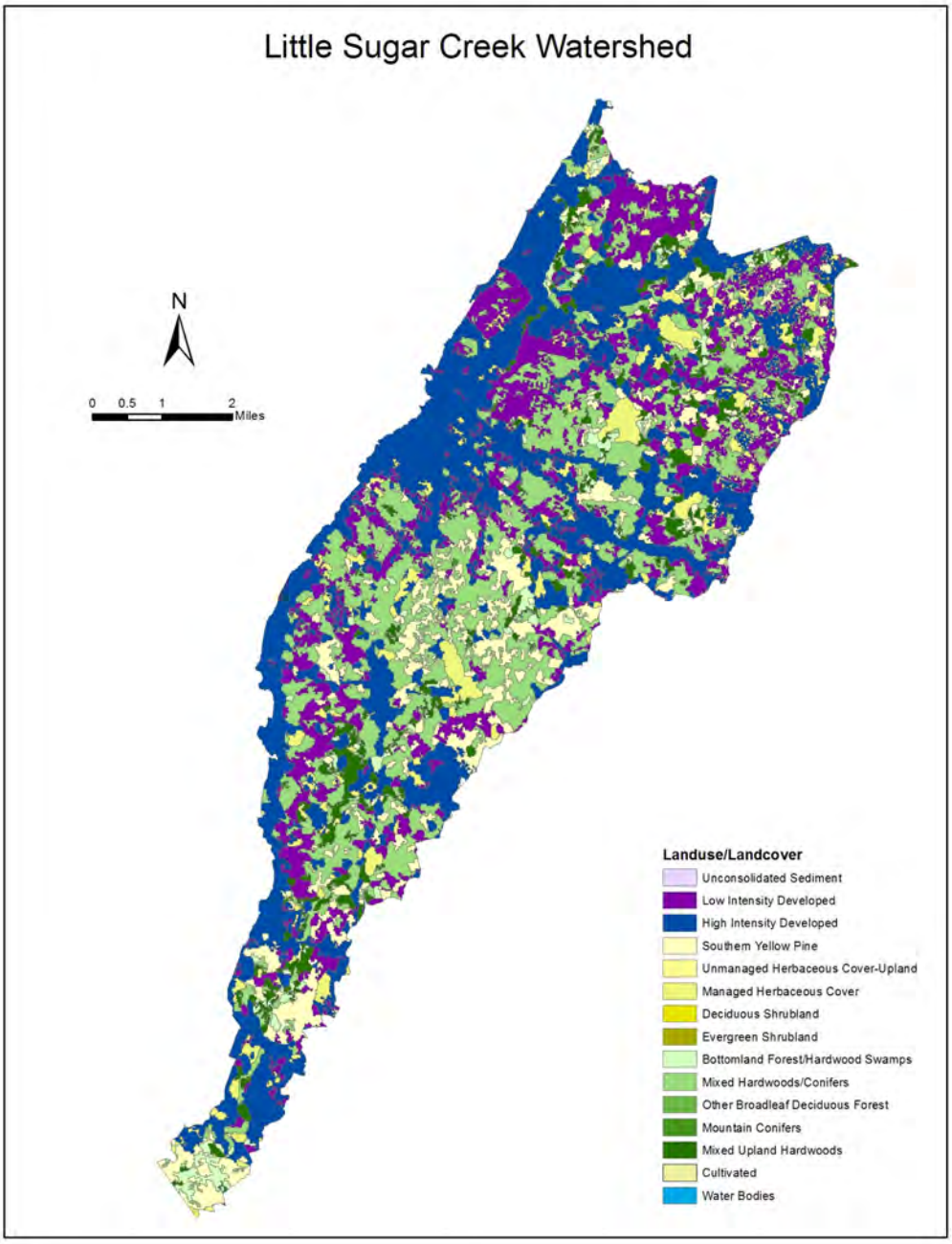

Figure 3-15: Little Sugar Creek Watershed Land Uses

3.6 McAlpine Creek Watershed

McAlpine Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 3-16 through 3-18** below show the location of McAlpine Creek watershed within the Charlotte-Mecklenburg area, the McAlpine Creek watershed stream reach and tributary streams, and the McAlpine Creek watershed land uses, respectively. In **Figure 3-**

17, McAlpine Creek is depicted in red due to its 303(d) impairment. McMullen Creek and Four Mile Creek drain to McAlpine Creek. The McAlpine Creek drainage area is about 59.2 square miles and 9.2% impervious, McMullen Creek is about 15.2 square miles and 13% impervious, and Four Mile Creek is about 18.6 square miles and 5.5% impervious. McAlpine Creek is located in the DWR 12-digit sub watershed 030501030104.

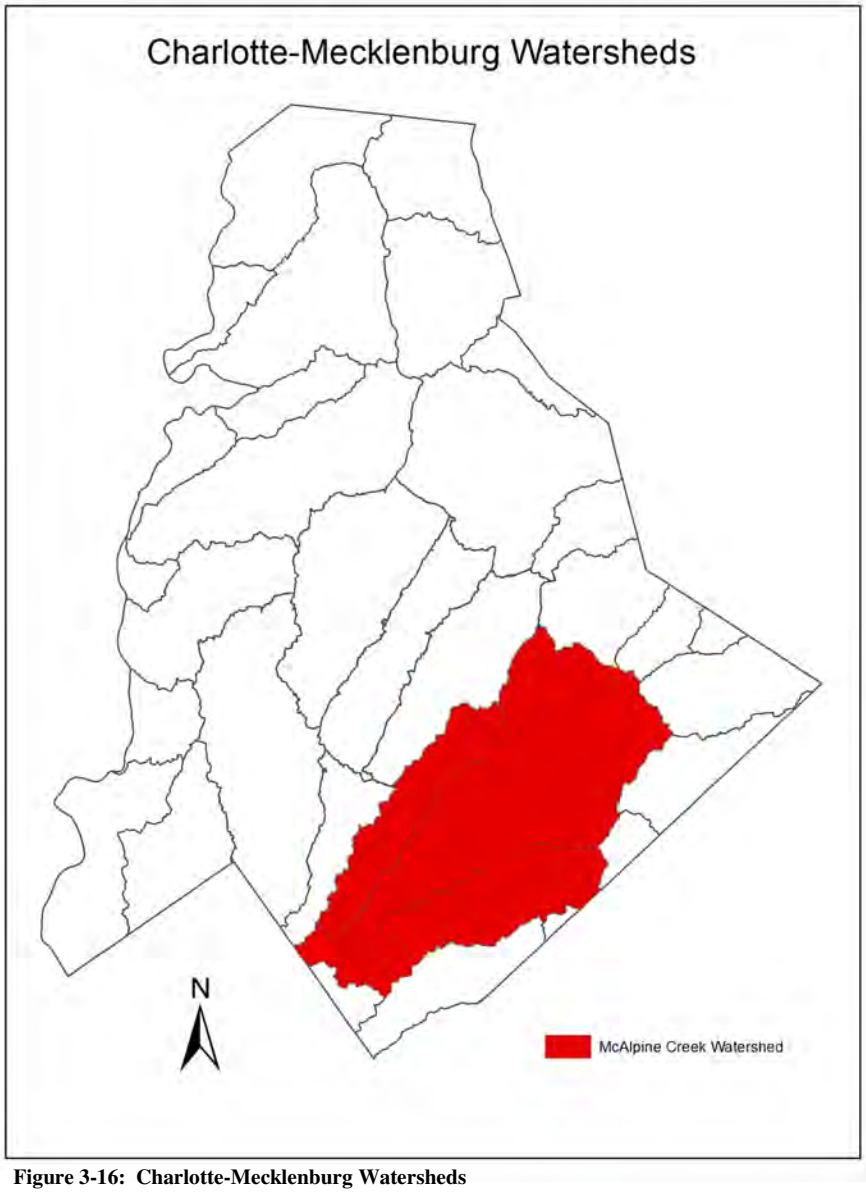

Figure 3-16: Charlotte-Mecklenburg Watersheds

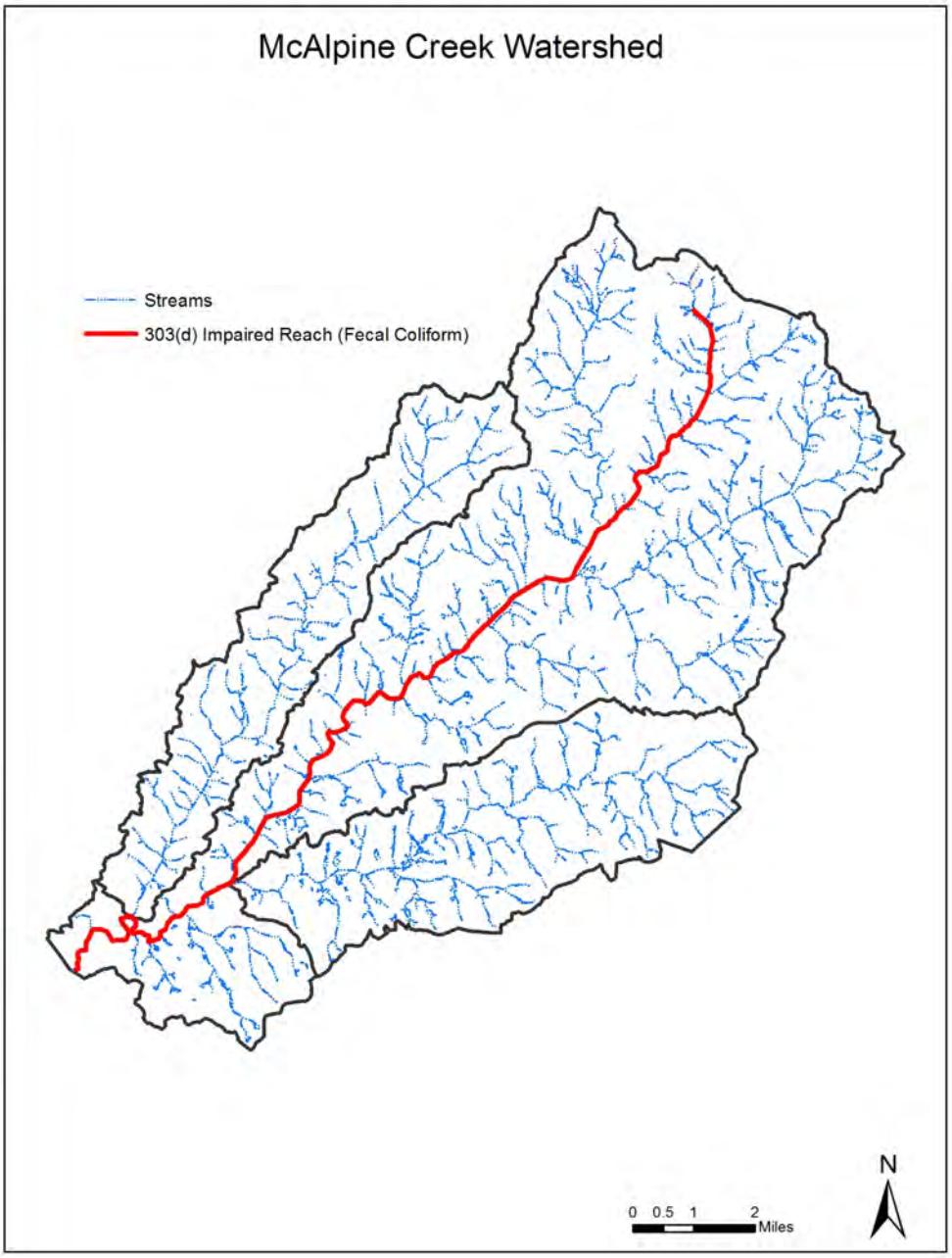

Figure 3-17: McAlpine Creek Watershed

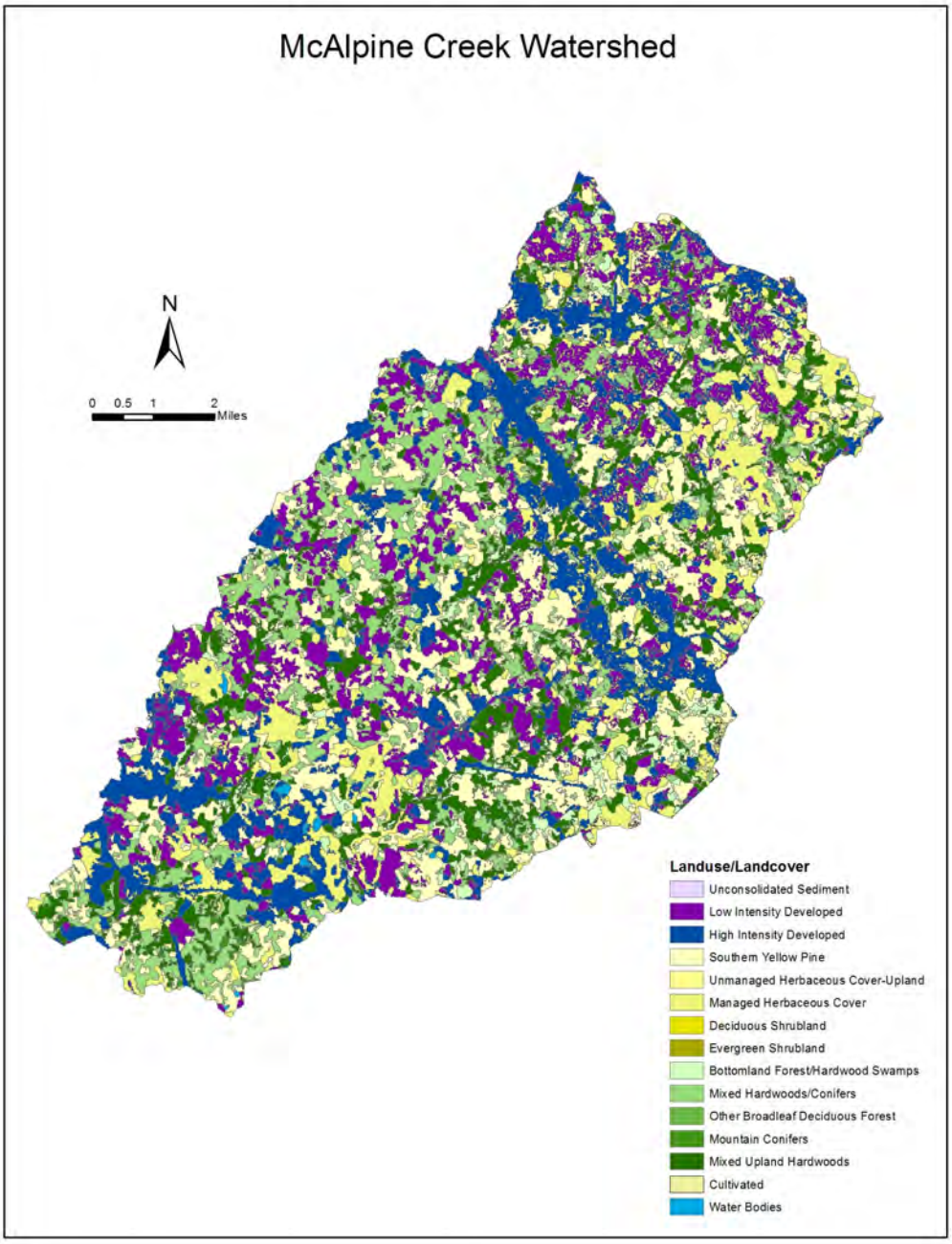

Figure 3-18: McAlpine Creek Watershed Land Uses

Section 4: Public Information and Notification

The Public Information and Notification component of the TMDL watershed plan is designed to provide citizens and businesses with access to information about TMDLs that affect the City of Charlotte and Mecklenburg County and the methods that will be used to reduce the TMDL pollutants. The public will be notified about the TMDLs and the TMDL watershed plan as follows:

- The Charlotte-Mecklenburg Storm Water Services (CMSWS) website will contain information about the city and county's TMDLs, the TMDL pollutants of concern, the TMDL watershed plan, and how the public can report water pollution problems and become engaged in volunteer opportunities.

- The City's NPDES MS4 annual report will also be posted on the CMSWS website and will provide a summary of the activities conducted under the TMDL watershed plan.

Section 5: Implementation Team

A team of staff representatives from the City and County will serve as the primary implementation team for the TMDL Watershed Plan. Other staff members from affected municipal agencies that conduct activities within the TMDL watershed will also be included as necessary. The following City of Charlotte and Mecklenburg County staff positions were identified as key members of the TMDL Watershed Plan Implementation Team:

- City Water Quality Program Manager
- City Water Quality NPDES Supervisor
- City Water Quality NPDES Administrator
- City Land Development Erosion Control Administrator
- City Water Quality Public Information Specialist
- City Water Quality Modeler
- City Water Quality Planner
- City Water Quality Senior Specialist
- City Water Quality Post-Construction Administrator
- City Storm Water MS4 Inventory Supervisor
- City Utility Department Sanitary Sewer System Administrator
- County Water Quality Program Manager
- County Water Quality Supervisor
- County Water Quality Project Manager
- County Water Quality Public Information Specialist

The City's Engineering & Property Management Department-Storm Water Division will have primary responsibility for coordinating the efforts and activities of the TMDL Watershed Plan Implementation Team. This will include interpreting data, evaluating BMP effectiveness, reporting to NCDENR-Division of Energy, Mining, and Land Resources (DEMLR), and

coordinating other activities and reviews with the overall Implementation Team to meet the components and goals of the TMDL Watershed Plan.

Section 6: MS4 Major Outfall Identification

The major stormwater outfalls in Long Creek, McKee Creek, Steele Creek, Sugar Creek, Little Sugar, and McAlpine Creek have been identified through MS4 inventory collection activities and are illustrated in **Figures 6-1 through 6-6**, respectively. The number of outfalls in each watershed is shown in **Table 6-1**. The schedule to discover additional major outfalls for this plan will be the same schedule as noted in the City's stormwater management plan for outfall inventory collection.

Table 6-1: Number of outfalls in each TMDL watershed

Watershed	Number of outfalls
Little Sugar Creek	4,886
Long Creek	1,635
McAlpine Creek	6,664
McKee Creek	120
Steele Creek	756
Sugar Creek	3,538

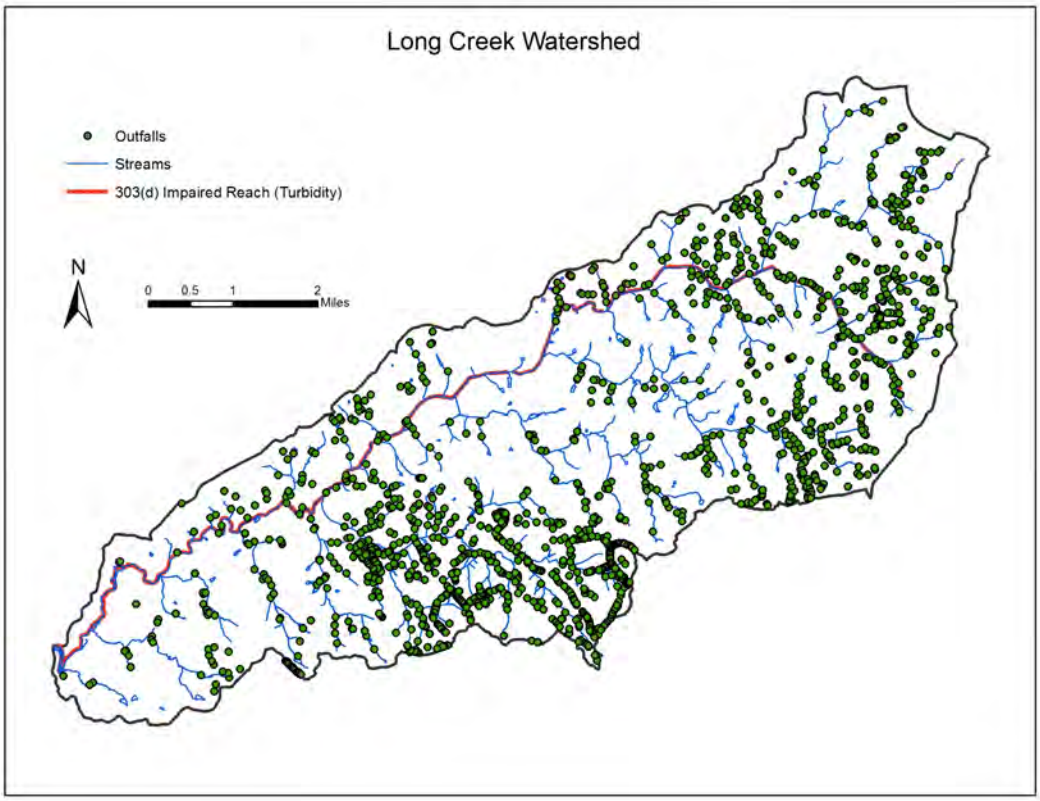

Figure 6-1: Long Creek Watershed Major Outfalls

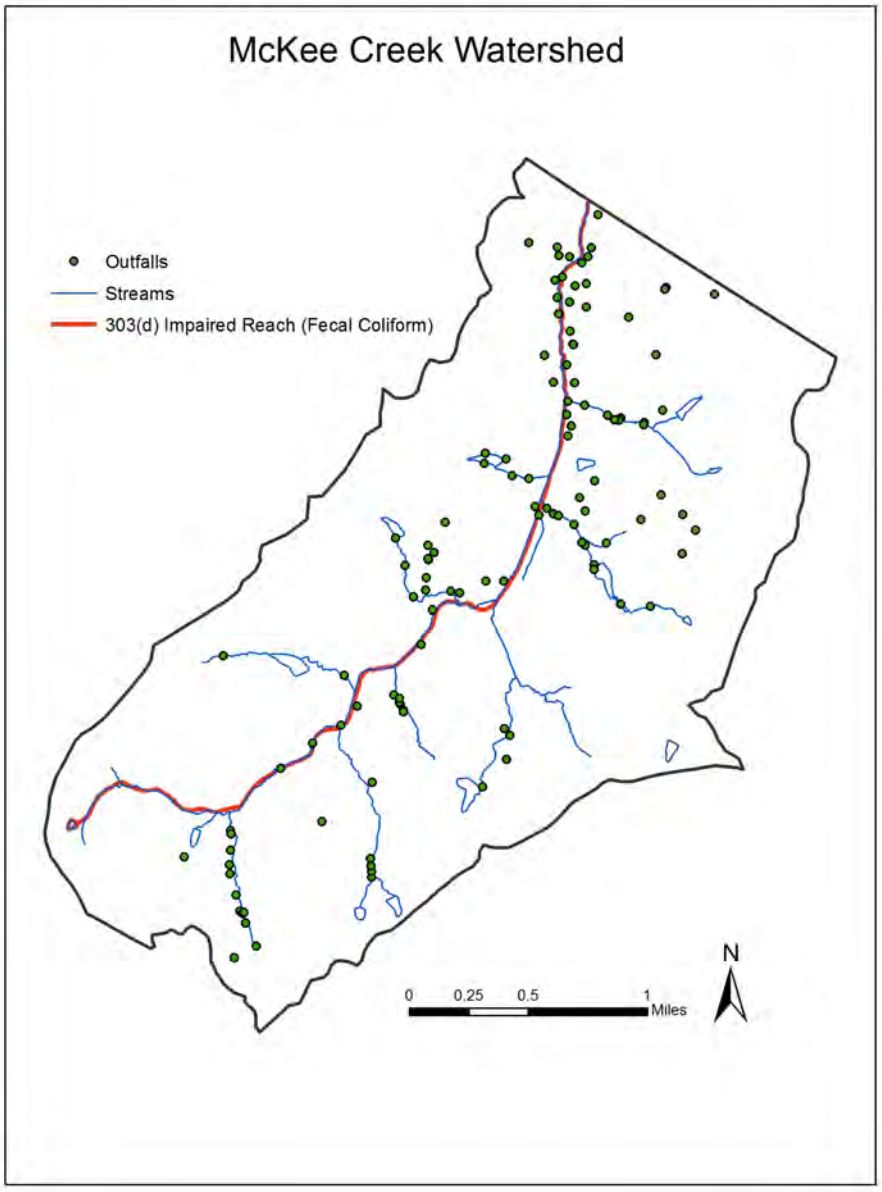

Figure 6-2: McKee Creek Watershed Major Outfalls

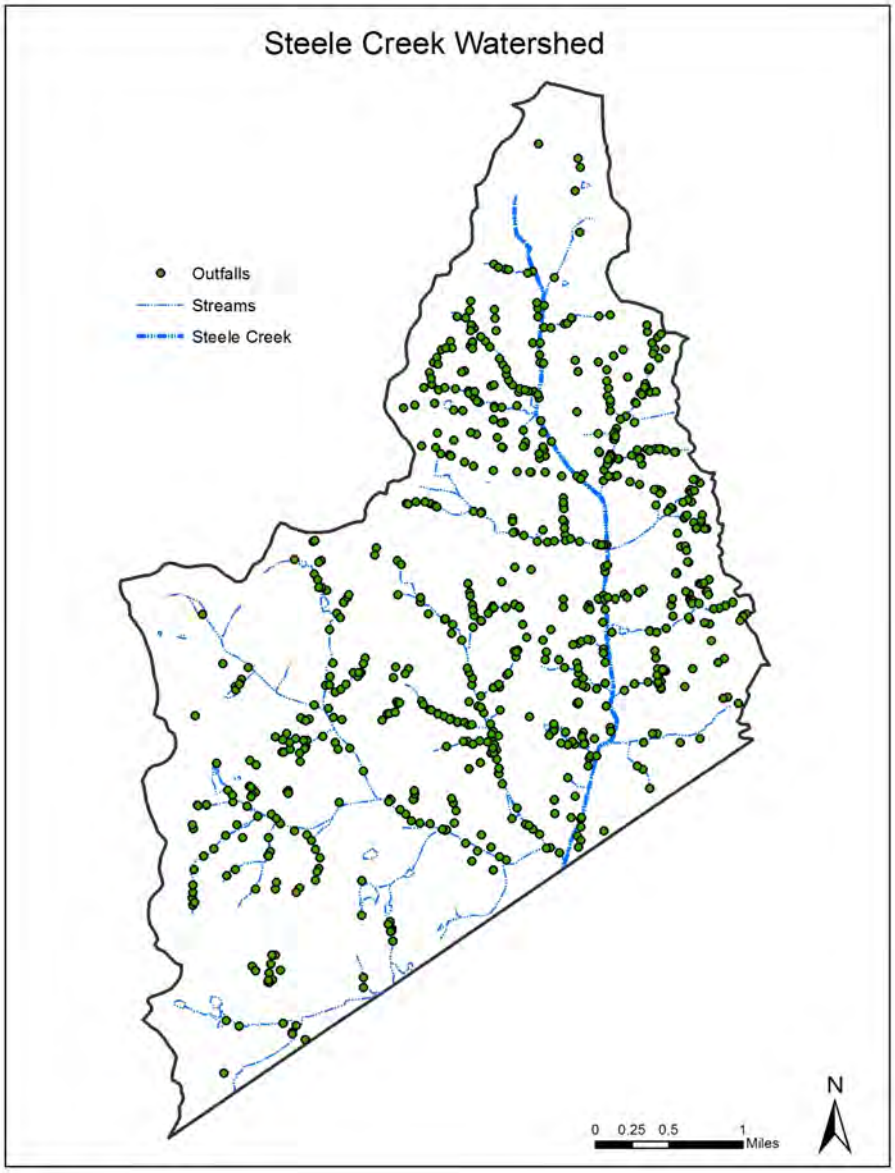

Figure 6-3: Steele Creek Watershed Major Outfalls

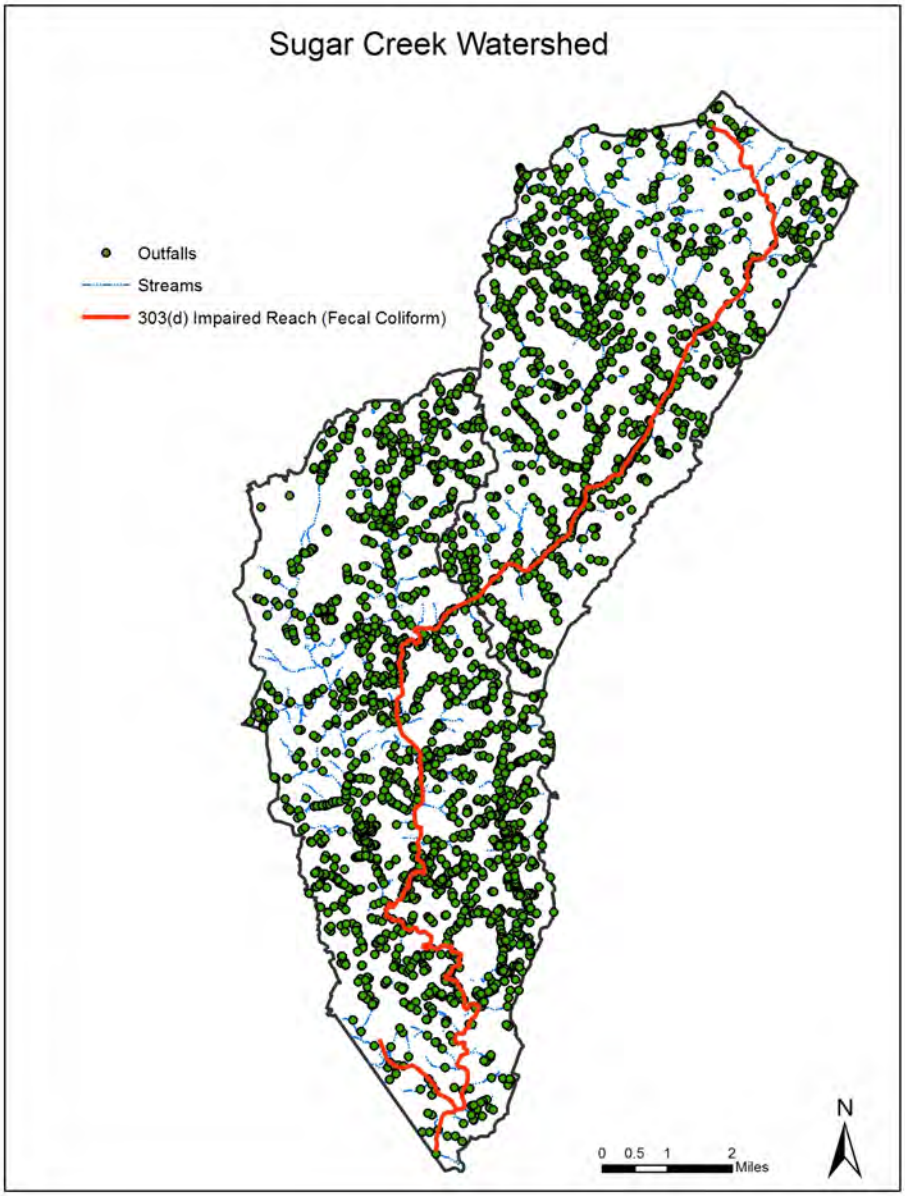

Figure 6-4: Sugar Creek Watershed Major Outfalls

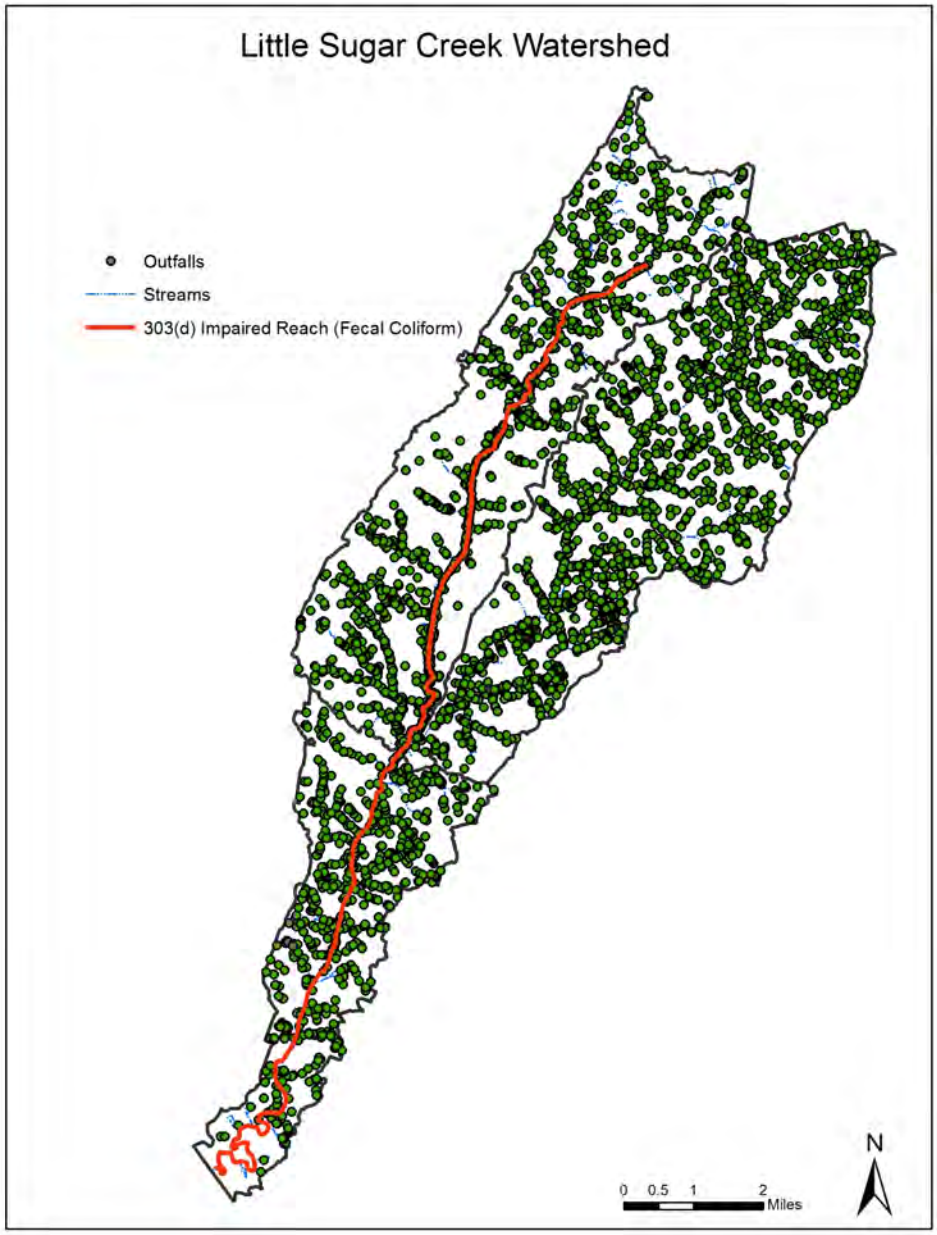

Figure 6-5: Little Sugar Creek Watershed Major Outfalls

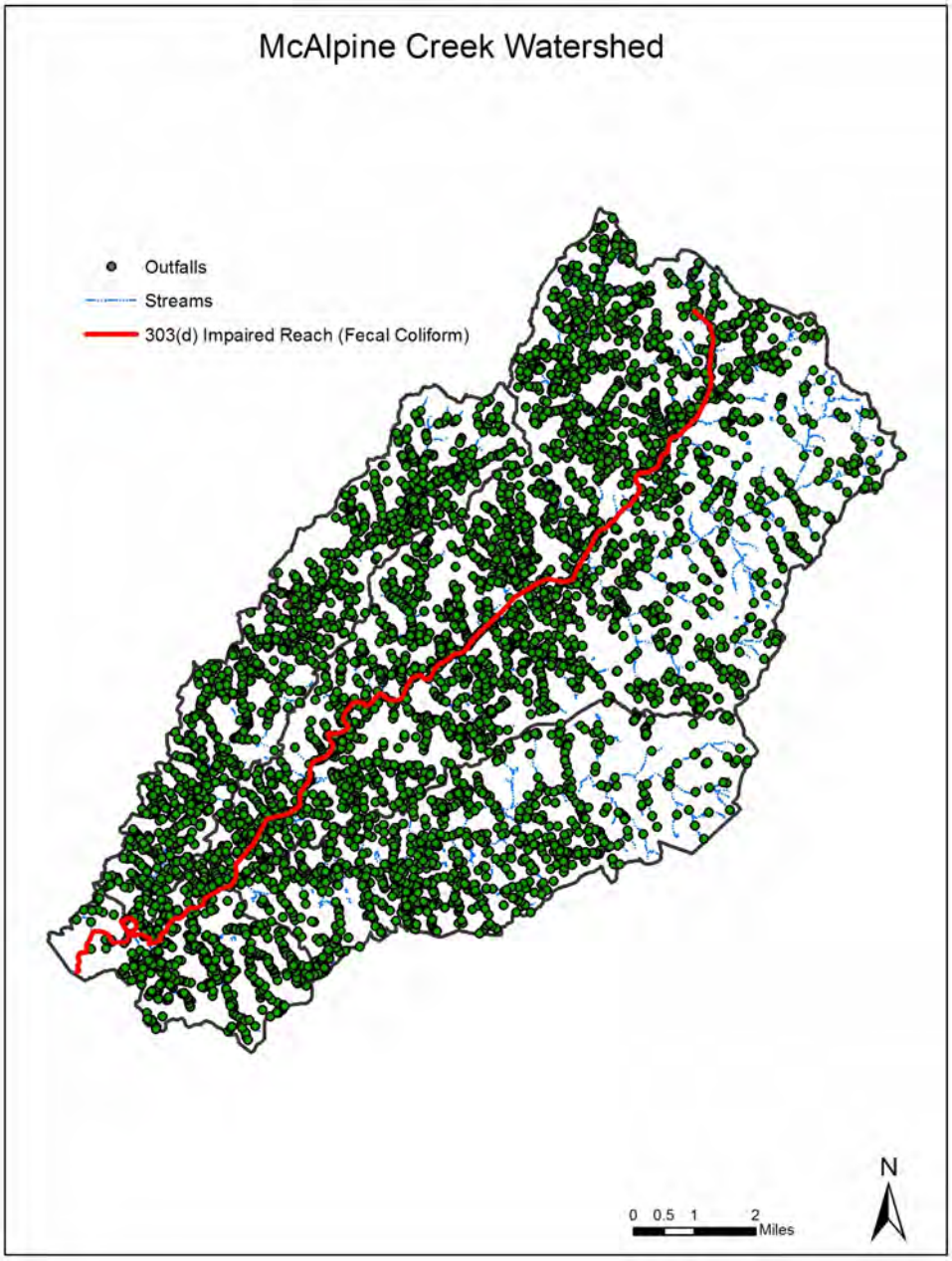

Figure 6-6: McAlpine Creek Watershed Major Outfalls

Section 7: Existing BMP Measures

As discussed in Section 2, the primary TMDL pollutants of concern within Charlotte-Mecklenburg watersheds are fecal coliform, sediment, mercury, and nutrients (nitrogen and phosphorus). These primary pollutants have likely contributed to various water quality standards excursions over time for fecal coliform, turbidity, mercury, dissolved oxygen, and chlorophyll-a,

which have resulted in section 303(d) stream impairment listings and subsequent TMDL development for these parameters.

As part of developing this TMDL Watershed Plan, existing measures currently implemented within the City and County NPDES permit programs were reviewed to determine which would best address the TMDL pollutants of concern. It was determined the following existing measures, discussed below, are designed to achieve the MS4 NPDES WLA to reduce the TMDL pollutants of concern to the maximum extent practicable (MEP). For more detailed information on these measures, please see the City and County NPDES MS4 Stormwater Management Plans.

7.1 Public Education & Outreach

7.1.1 Utility Bill Inserts, Environmental Notices, and Brochures

Print materials are distributed to the public through a variety of events and programs and help educate them about water quality issues, the TMDL pollutants of concern, and the ways they can help reduce these pollution sources.

7.1.2 Media Campaign

The CMSWS media campaign uses television, radio, and print media to communicate water quality and pollution prevention messages, including those related to the TMDL pollutants of concern.

7.1.3 Pet Waste Education

Information about the importance of cleaning up pet waste is a standard part of the CMSWS education campaign. The slogan, “Scoop the Poop” has been used for several years to encourage pet owners to clean up their pet waste to help reduce fecal coliform pollution in stormwater runoff. Pet waste bag dispensers and waste receptacles are provided within several parks and along greenway trails.

7.1.4 Informational Website

The CMSWS website provides information on a variety of stormwater and water quality issues and programs, including pollution prevention, public reporting of problems, and volunteer opportunities.

7.1.5 Social Media

CMSWS currently maintains Twitter and Facebook accounts to promote water quality messages and encourage the public to report pollution problems.

7.1.6 Public Hotline/Helpline

The City of Charlotte and Mecklenburg County operate a joint customer service hotline to receive information from citizens about a variety of concerns. Citizens can dial 311 any time of the day to report pollution, erosion issues, flooding, and blockages to the drainage system as well as request other City/County services. Problems and pollution issues reported through this system are addressed by appropriate City or County personnel.

7.1.7 CMCSI Program

The City and County maintain the *Charlotte-Mecklenburg Certified Site Inspector* (CMCSI) training program which has provided training to over five thousand (5,000) attendees since its inception in 2003. CMCSI is a full day training course that provides attendees with an understanding of the importance of water resources to our community, the local and state requirements for controlling construction site runoff, principles of erosion control, common site problems, recommendations for conducting effective inspections, and a certification exam. Site inspectors are required to be recertified under the CMCSI program every two years.

7.1.8 Public Events and Presentations

CMSWS participates in several public events and provides a wide variety of presentations to promote and communicate water quality and pollution prevention messages to the public each year.

7.1.9 Fats, Oils, and Grease Program

The City's utility department maintains a public education program focused on keeping food related fats, oils, and grease from being discharged to the sanitary sewer system. This effort helps to reduce clogging and blockages in the system and prevent SSOs, which can introduce fecal coliform and other pollutants to water bodies.

7.2 Public Involvement and Participation

7.2.1 Storm Drain Marking

The Storm Drain Marking program provides citizens with a volunteer opportunity to assist in protecting water quality. Volunteers affix a vinyl marker to storm drains providing the message "Do not dump, drains to creek". This message is intended to educate citizens about the "street to stream" path of stormwater and prevent illegal dumping.

7.2.2 Adopt-A-Stream and Big Sweep

The Adopt-A-Stream program provides citizens with the resources needed to adopt a section of stream. Volunteers remove trash from the stream and stream banks and visually inspect the stream for signs of pollution once or twice per year and they are provided garbage bags, gloves

and trash grabbers and signs with the name of their group. Volunteers can also participate in Big Sweep which is a once-a-year event where CMSWS organizes volunteers across the county to clean streams on a coordinated day.

7.2.3 Volunteer Monitoring

The Volunteer Monitoring program provides interested citizens with the opportunity to help monitor water quality. Volunteers are provided test kits for collecting physical water quality data and the means to report this information back to CMSWS. Potential problems detected by this program are referred to City/County staff for follow-up.

7.2.4 Creek ReLeaf

The Creek ReLeaf volunteer program is a Mecklenburg County initiative that provides citizens with the opportunity to help plant trees in watershed buffer areas to help stabilize soils and prevent erosion.

7.2.5 Adopt-A-Street

The City maintains an Adopt-A-Street program where citizens can volunteer to adopt a section of roadway to remove trash and litter. This effort helps to keep trash from entering the storm drain system and streams.

7.3 Illicit Discharge Detection and Elimination (IDDE)

7.3.1 Stream-walk Program/Outfall Inspection/Dry Weather Flow Monitoring

County staff walks each segment of stream on a five year rotational basis to look for pollution problems, illegal dumping, illicit discharges, and SSOs. Watersheds with historically higher incidences of the above-mentioned issues are walked every other year. As part of this effort, MS4 outfalls are inspected for dry weather flows, as well.

7.3.2 Multi-Family Residential Complex Initiative

This effort focuses on multi-family residential complexes and their sanitary sewer lateral connections. City/County staff coordinate with management firms for these complexes to ensure that private sewer lateral systems are inspected and maintained properly and their residents are educated about proper grease disposal, thus reducing the potential for SSOs from these private systems.

7.3.3 Pollution Control Ordinance

Implementation and enforcement of City and County Pollution Control ordinances provides the legal mechanism to ensure correction of pollution problems and illegal practices. In addition, the ordinance serves as a deterrent to such practices, thus preventing pollution problems.

7.3.4 Septic System Program

The County maintains a septic system approval and inspection program to ensure proper design, installation, operation, and maintenance of these systems. The program is coordinated with the City and County NPDES MS4 programs to ensure that failing septic systems are addressed and that discharges from these systems are not reaching the MS4 or surface waters.

7.3.5 Municipal Employee Education on IDDE

As part of the City and County NPDES MS4 programs, municipal employees receive education on water quality and IDDE issues. This program provides the information necessary for employees to be trained to recognize and report IDDE and other water quality issues that may be discovered while performing their regular job duties in the field.

7.3.6 Targeted Stream Investigation & Survey (TSIS)

This program is implemented as a means to quickly assess field conditions and identify illicit discharges in priority stream basins. Priority basins are selected based on numerous factors, and personnel inspect outfalls, business corridors and multi-family private sewer systems within those basins. Personnel drive to select locations during base flow conditions and use visual observation, sensory cues, and quick field tests to determine if abnormal conditions exist. This method allows for numerous quick assessments that can be conducted more frequently throughout the year.

7.3.7 Sewer Use Ordinance

Implementation and enforcement of the City's Sewer Use ordinance provides the legal mechanism to ensure proper use and connection to the sanitary sewer system and correction of problems and illegal practices. Ensuring that the system is used properly will help prevent leaks and overflows as well as up-sets at wastewater treatment plants.

7.3.8 Sanitary Sewer System Inspections and Maintenance

The City's utility department conducts inspections and maintenance of various components of the sanitary sewer system to ensure proper operating function and prevent leaks and overflows. These include food service grease trap inspections, commercial oil/water separator inspections, sanitary sewer line root control and cleaning, sewer line right-of-way clearing and maintenance, and lift station inspection and maintenance.

7.3.9 SSO Rapid Response

The City's utility department maintains a rapid response program designed to quickly and efficiently respond to SSOs, thus reducing the discharge of pollutants to the MEP.

7.4 Construction Site Stormwater Runoff Control

7.4.1 Erosion Control Ordinance

Implementation and enforcement of City and County Soil Erosion and Sediment Control ordinances provides the legal mechanism to ensure proper design and construction of development sites by requiring the use of proper soil erosion and sediment control methods.

7.4.2 Structural SCM requirements

City and County soil erosion and sediment control ordinances and programs require the use of structural stormwater control measures (SCMs), at a minimum, on development sites greater than or equal to one acre to prevent sediment from reaching the MS4 or surface waters.

7.4.3 Site Inspections

City and County erosion control programs conduct routine inspections of development sites to ensure that structural BMPs are in place and operating properly.

7.5 Post-Construction Stormwater Management

7.5.1 PCSO Ordinance

Implementation and enforcement of City and County Post-Construction Stormwater ordinances provides the legal mechanism to ensure proper design, construction, operation, and maintenance of SCMs at development sites.

7.5.2 Require Structural SCMs

City and County post-construction stormwater ordinances and programs require the use of structural SCMs on development sites greater than one acre to treat the stormwater runoff generated from the first one-inch of rainfall. In addition, structural SCMs must provide detention of the channel protection volume for Charlotte-Mecklenburg.

7.5.3 Buffer Requirements (PCSO, WSWS, SWIM)

City and County post-construction stormwater ordinances and programs require the use and protection of vegetated buffers on development sites. The buffers assist with diffusing stormwater flows and stabilizing stream side zones.

7.5.4 SCM Inspection Program

City and County post-construction stormwater programs require annual inspections of SCMs to ensure that the SCMs are operating and maintained properly.

7.6 Pollution Prevention/Good Housekeeping

7.6.1 Facility Inspections

The City and County conduct annual inspections of certain municipal facilities to ensure that they are implementing good housekeeping and stormwater pollution prevention practices. The process provides for the correction of any detected pollution problems and serves to reduce the discharge of stormwater pollutants to surface waters.

7.6.2 Implementation of Site SWPPPs and SPRPs

The City and County have identified certain municipal facilities as having the potential to discharge stormwater pollutants. Stormwater Pollution Prevention Plans (SWPPPs) and Spill Prevention Response Procedures (SPRPs) have been developed for these facilities in order to assist in reducing stormwater pollutant discharges and spills to the MS4 and surface waters.

7.6.3 Catch basin cleaning

The City conducts routine cleaning of catch basins and stormwater pipes in order to maintain the MS4, thus reducing blockages, street flooding, and discharges of pollutants to surface waters.

7.6.4 Street sweeping

The City conducts routine street sweeping of selected streets to remove sediments, debris, and litter from roadways and curb lines. This effort reduces that amount of material that ultimately would be washed to the MS4 during storm events, thus reducing the discharge of pollutants to the MS4 and surface waters.

7.7 Industrial Facilities Evaluation and Monitoring

7.7.1 Facility Inspections and Monitoring

The City conducts inspections and monitoring of selected industrial facilities to ensure that they are implementing good housekeeping and stormwater pollution prevention practices. The process provides for the correction of any detected pollution problems and serves to reduce the discharge of stormwater pollutants to surface waters.

7.8 Water Quality Assessment and Monitoring

7.8.1 Fixed Interval Monitoring

The City and County conduct fixed interval stream monitoring at identified stream sites on a quarterly basis, at a minimum. This monitoring is primarily used to determine water quality trends, but also is used as a tool to detect pollution problems in surface waters. Monitoring results that exceed threshold values are referred for follow-up under the IDDE program.

7.8.2 CMANN Monitoring

The City and County maintain a continuous automated monitoring network (CMANN) that monitors surface waters at select sites for turbidity, dissolved oxygen, temperature, conductivity, and pH. Monitoring results that exceed threshold values are referred for follow-up under the IDDE program.

Section 8: WQ Data Assessment

Fixed interval surface water quality data collected from 2006 through 2014 has been analyzed for all applicable TMDL watersheds and pollutants of concern in the City and County. This data helps to illustrate surface water quality trends in relation to the NC surface water quality standards. The City's current NPDES MS4 permit, effective March 1, 2013, states that the "MS4 Permittee is not responsible for attaining water quality standards (WQS) and the Division expects that attaining WQS will only be achieved through reduction of the TMDL pollutant of concern from the MS4, along with reductions from all other point and nonpoint source contributors." It is infeasible to monitor every MS4 stormwater outfall in order to determine how progress is being made toward achieving MS4 NPDES WLAs; therefore, the City will utilize fixed interval surface water data to determine water quality trends. The data presented below, while illustrating how in-stream water quality has changed over time, unfortunately is not able to distinguish MS4 contributions from other point and nonpoint sources that are not under the control of the MS4. Consequently, increases in surface water contaminants observed in the data do not necessarily indicate that MS4 contributions are also increasing.

8.1 Fecal Coliform

Of the six watersheds listed in **Table 2-1** that are subject to a fecal coliform TMDL, a MS4 NPDES WLA was only developed for McKee and Steele Creeks. According to Part II, Section J.3 of the City's NPDES MS4 permit, for approved TMDLs where a MS4 NPDES WLA for the pollutant of concern is not assigned to the municipal stormwater system, the Permittee is still required to "evaluate strategies and tailor BMPs within the scope of the six minimum permit measures to address the pollutant of concern in the watershed(s) to which the TMDL applies." For this reason, data from all six watersheds listed as being subject to fecal coliform TMDLs in **Table 2-1** will be discussed in this sub-section.

8.1.1 McKee Creek

Fixed interval stream data for fecal coliform was collected at the Charlotte-Mecklenburg monitoring site MY7B on McKee Creek. A summary of the data collected from July 2007 through December 2014 is provided in **Figures 8-1 through 8-3**. Ninety nine (99) samples were collected during this period and 48 samples (48% of the total) exceeded the 400 cfu/100mL State standard (**Figure 8-1**). Of these 99 samples, 39 were collected during ambient conditions (meaning a 72-hour or greater period with no precipitation prior to sampling event) and 60 were collected during wet weather influenced conditions. The majority (72%) of the State standard exceedances occurred during wet weather conditions, but with 33% of ambient samples

exceeding State standards, fecal coliform exceedances continue to occur in McKee Creek during wet weather influenced and ambient conditions (**Figures 8-2 to 8-3**).

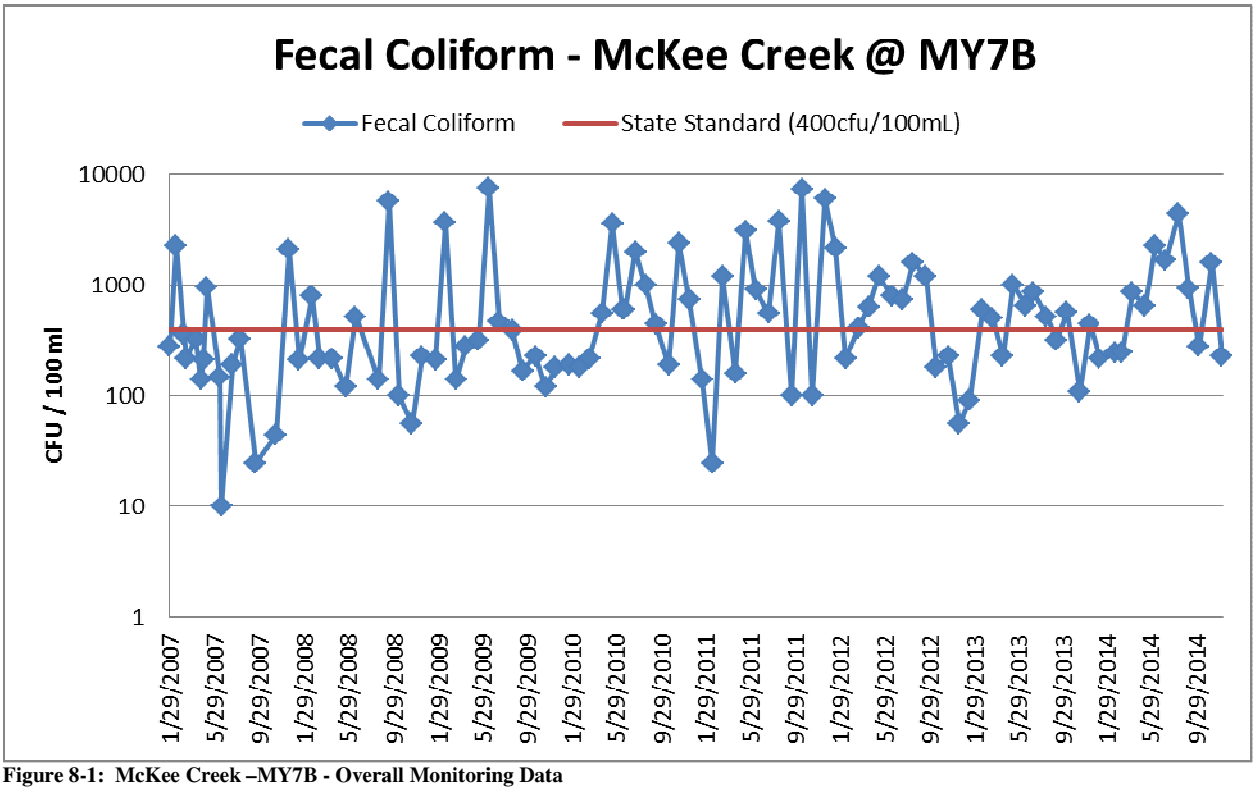

Figure 8-1: McKee Creek –MY7B - Overall Monitoring Data

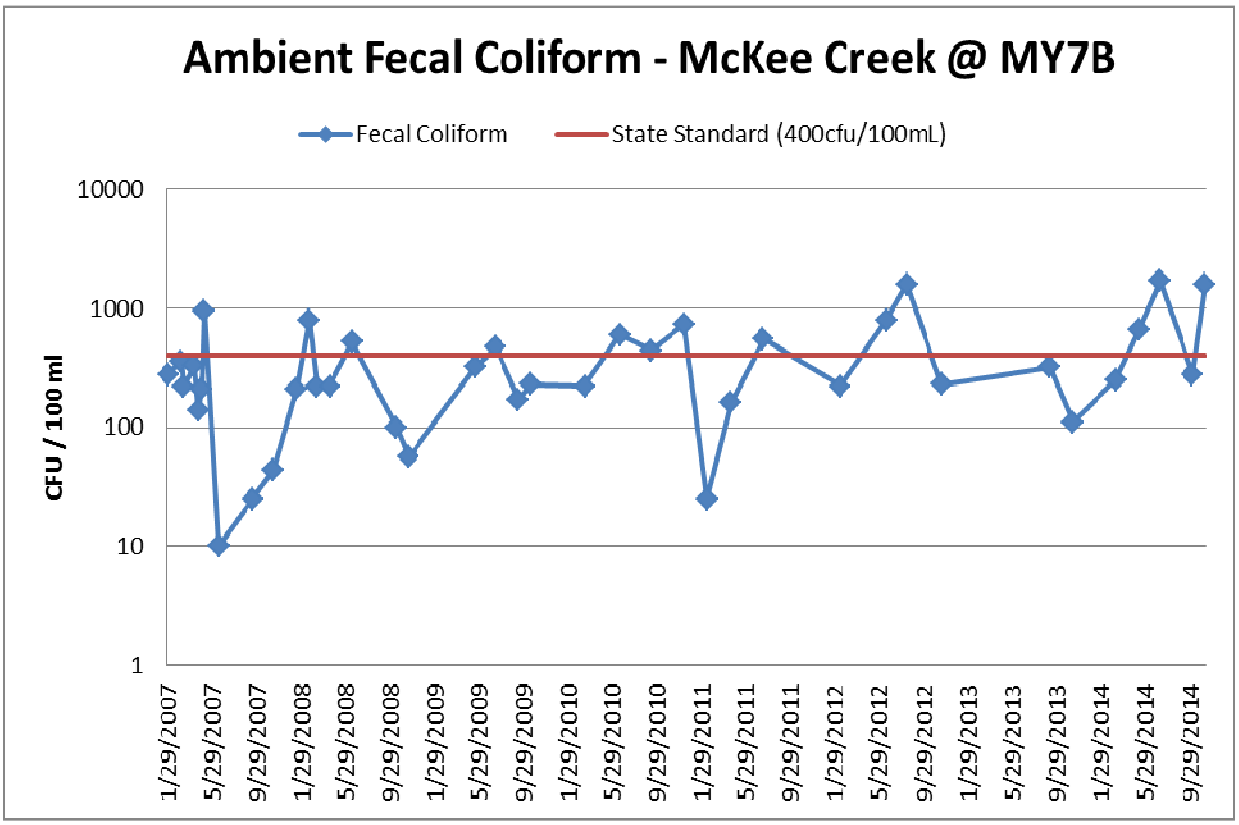

Figure 8-2: McKee Creek –MY7B - Ambient Monitoring Data

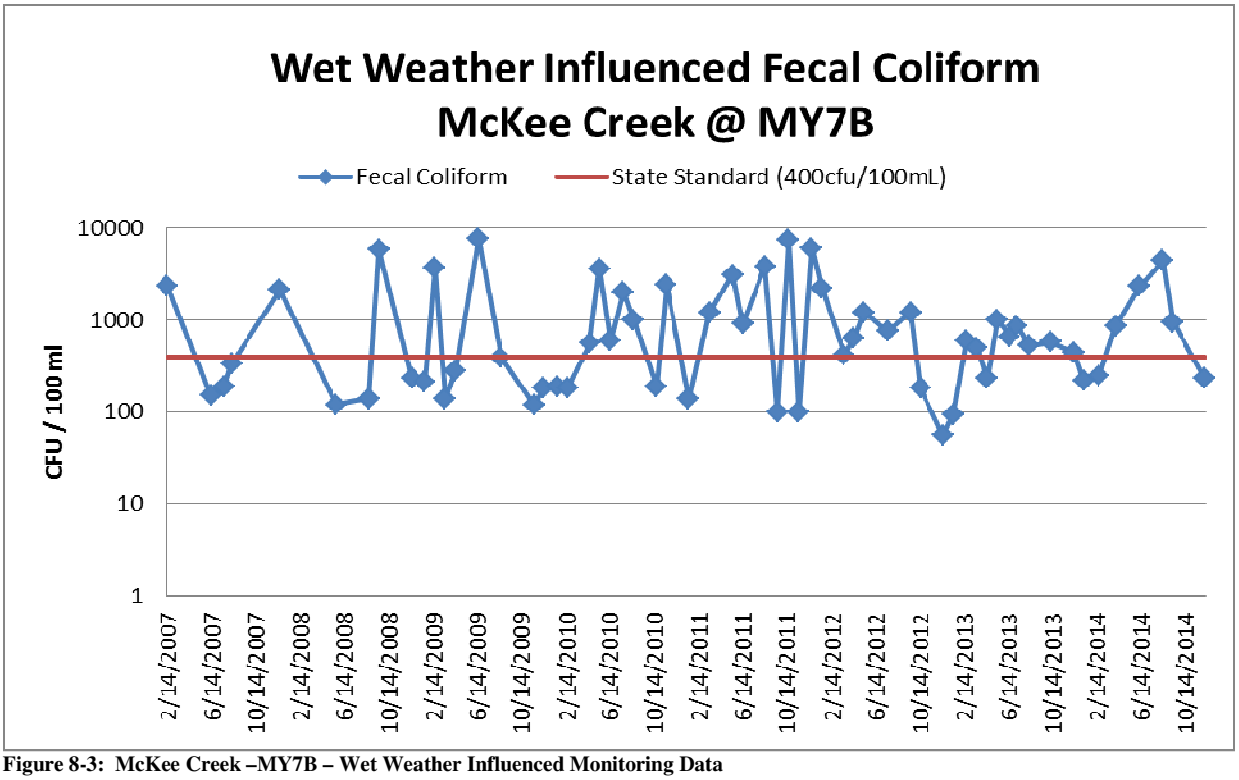

Figure 8-3: McKee Creek –MY7B – Wet Weather Influenced Monitoring Data

8.1.2 Steele Creek Watershed

Fixed interval stream data for fecal coliform was collected at the Charlotte-Mecklenburg monitoring site MC47A on Steele Creek. A summary of the data collected from July 2007 through December 2014 is provided in **Figures 8-4 through 8-6**. One hundred and fourteen (114) samples were collected during this period and 48% of the samples exceeded the 400 cfu/100mL State standard (**Figure 8-4**). Of these 114 samples, 52 were collected during ambient conditions and 62 were collected during wet weather influenced conditions. For the samples collected during ambient conditions, there were only three exceedances of the State standard since July 15, 20019 (**Figure 8-5**). However, for samples collected during wet weather influenced conditions, fecal coliform results were consistently elevated above the standard (**Figure 8-6**).

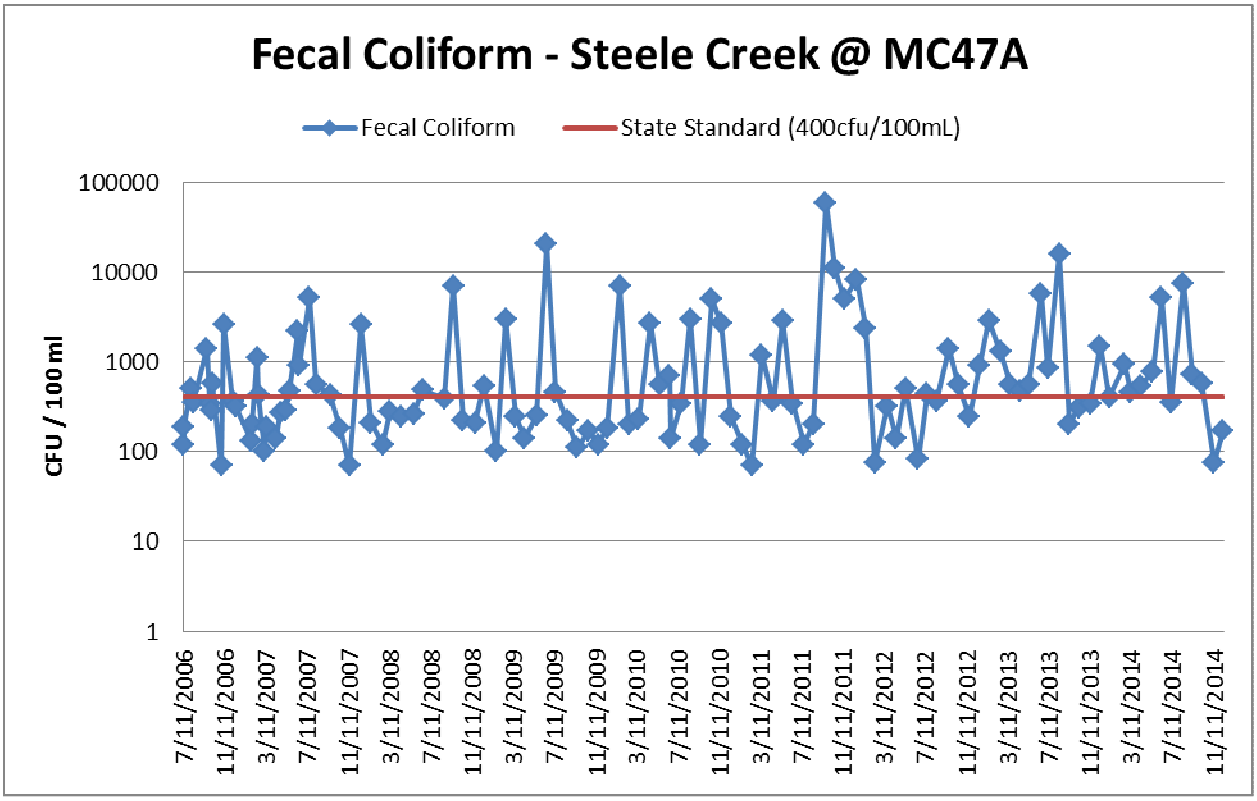

Figure 8-4: Steele Creek –MC47A - Overall Monitoring Data

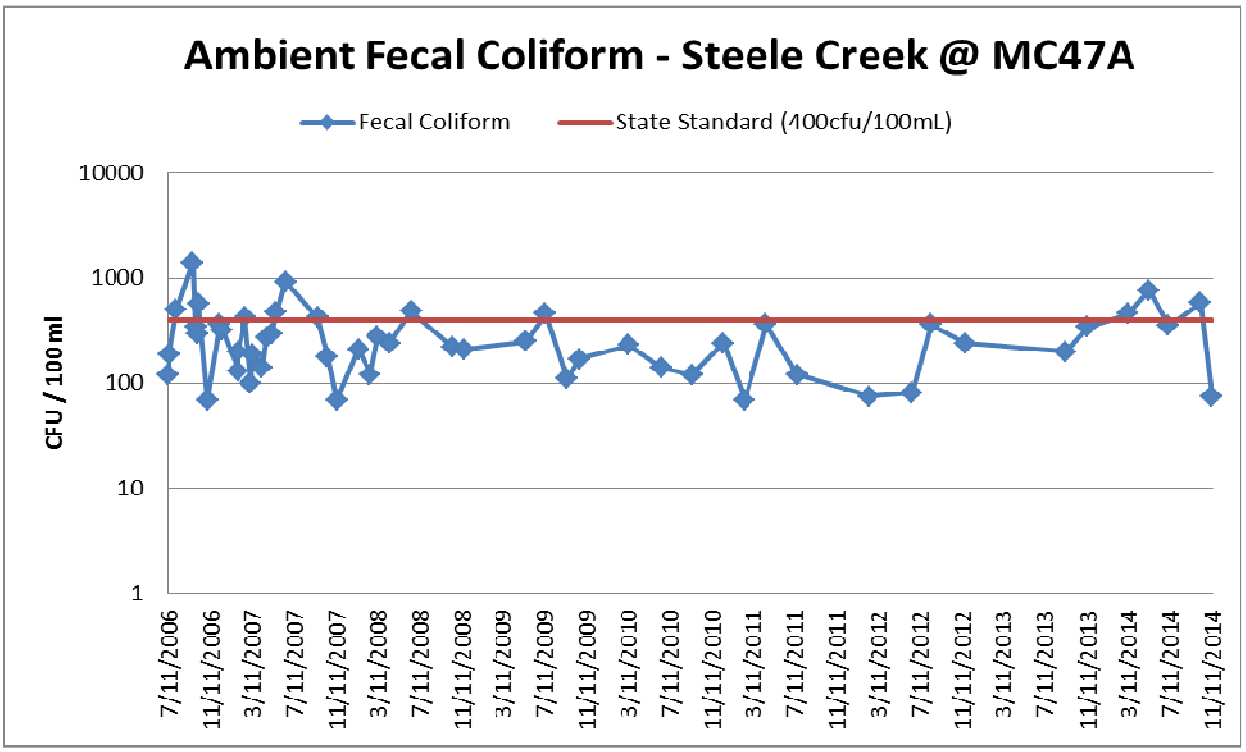

Figure 8-5: Steele Creek –MC47A - Ambient Monitoring Data

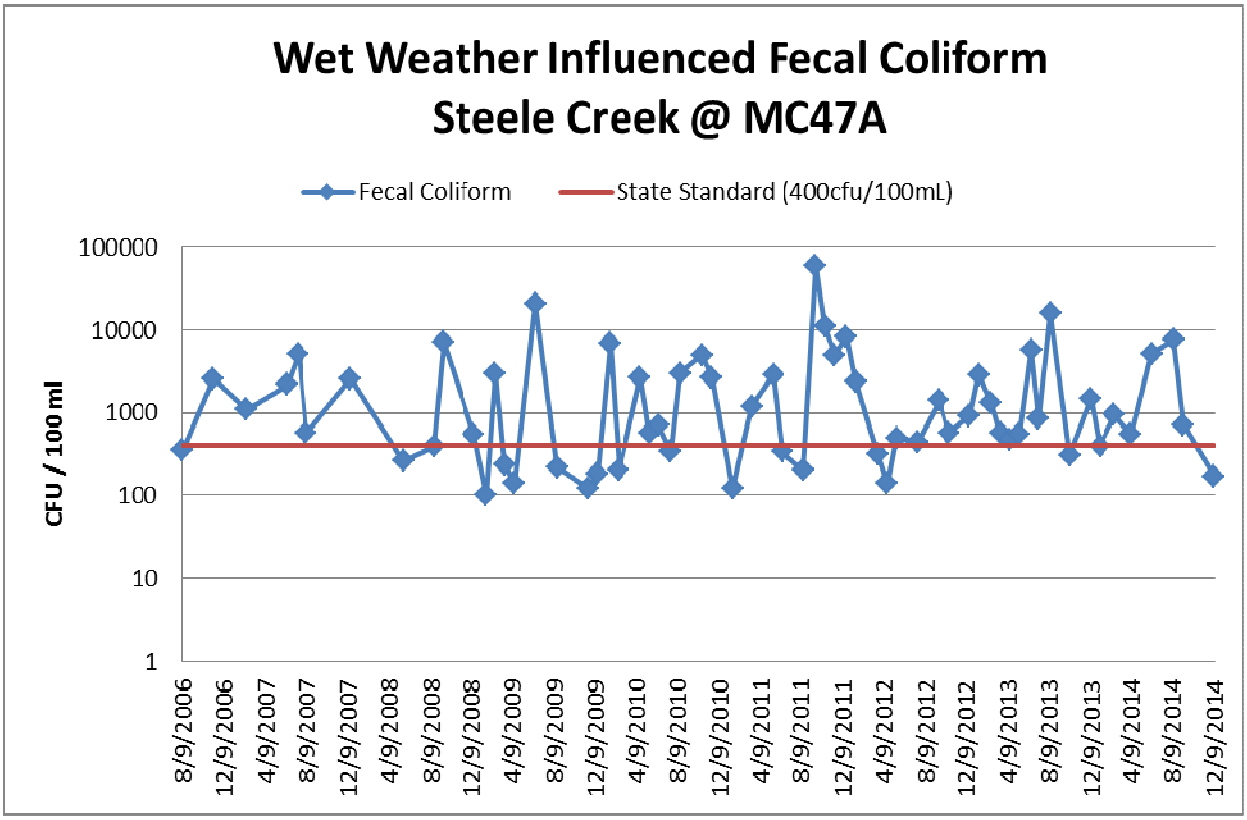

Figure 8-6: Steele Creek –MC47A – Wet Weather Influenced Monitoring Data

8.1.3 Sugar/Irwin Creek Watershed

There are two fixed interval monitoring locations in the Sugar Creek watershed, MC27 in southern Mecklenburg County, and MC22A on Irwin Creek just before its confluence with Sugar Creek. An assessment of available watershed and water quality data was conducted utilizing fixed interval stream data for fecal coliform collected at these two monitoring locations. A summary of the data collected from July 2007 through December 2014 is provided in **Figures 8-7 through 8-12**. One hundred and thirteen (113) samples were collected during this period from Sugar Creek and 43% of the samples exceeded the 400 cfu/100mL State standard (**Figure 8-7**). Of these 113 samples, 51 were collected during ambient conditions and 62 were collected during wet weather influenced conditions. The majority (86%) of State standard exceedances occurred during wet weather influenced conditions with only 14% of the exceedances occurring during ambient conditions. Since August 15, 2012, there has been only one exceedance of the State standard during ambient conditions (**Figure 8-8**). However, during wet weather influenced sampling, fecal coliform data is consistently elevated above the State standard (**Figure 8-9**).

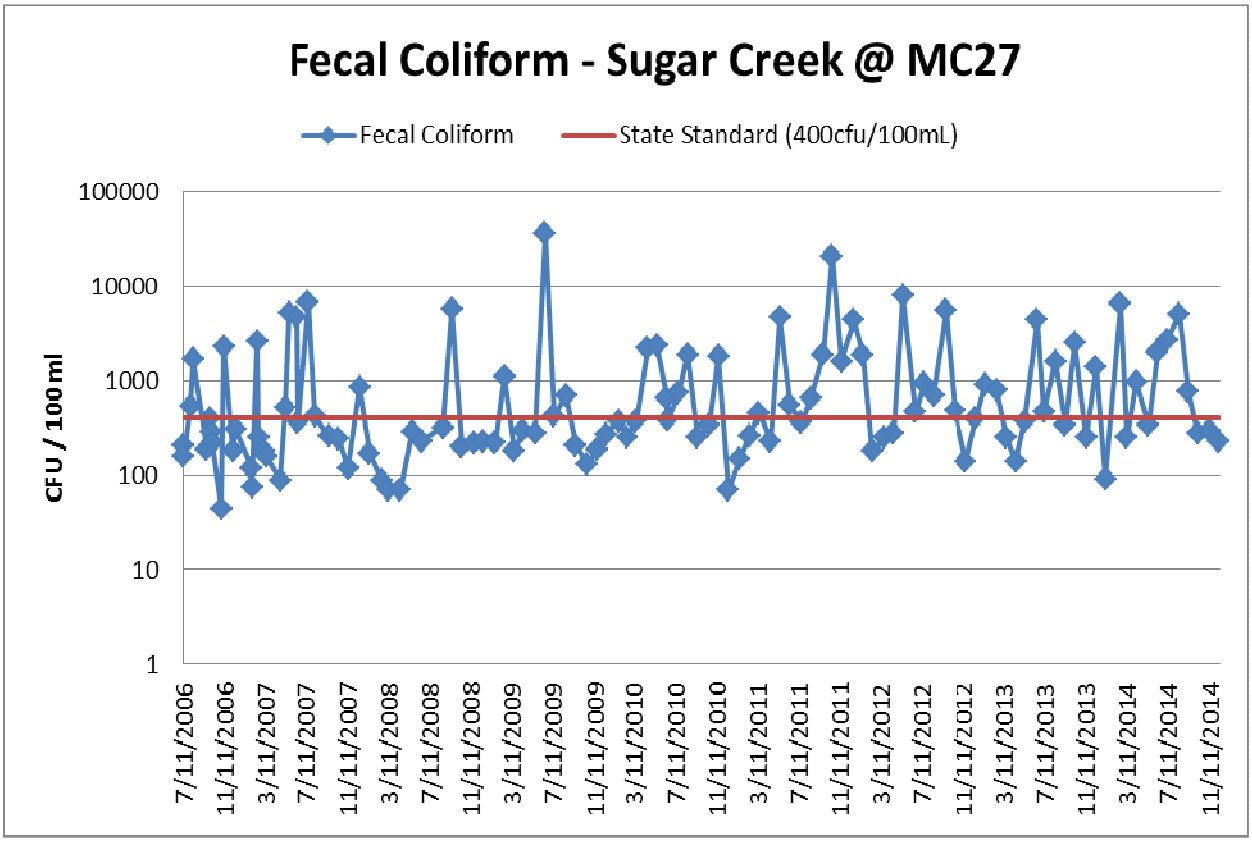

Figure 8-7: Sugar Creek –MC27 - Overall Monitoring Data

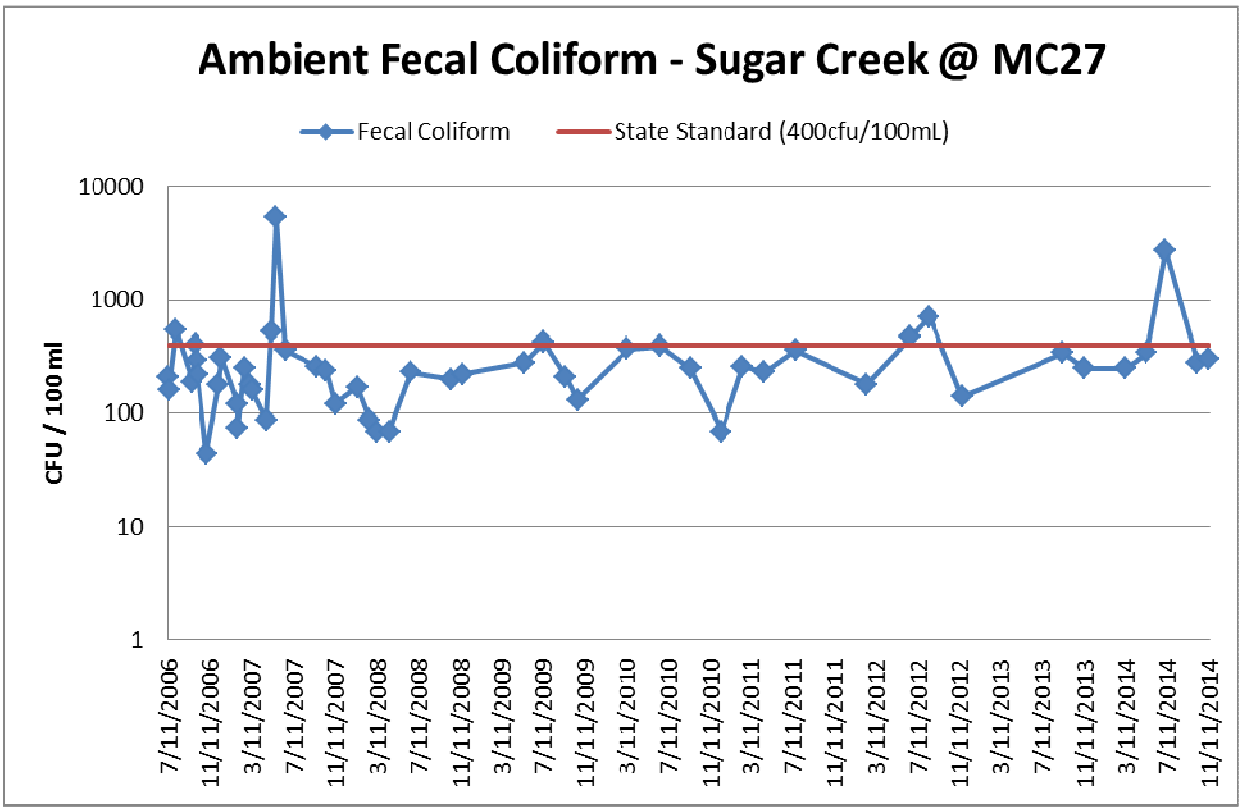

Figure 8-8: Sugar Creek –MC27 - Ambient Monitoring Data

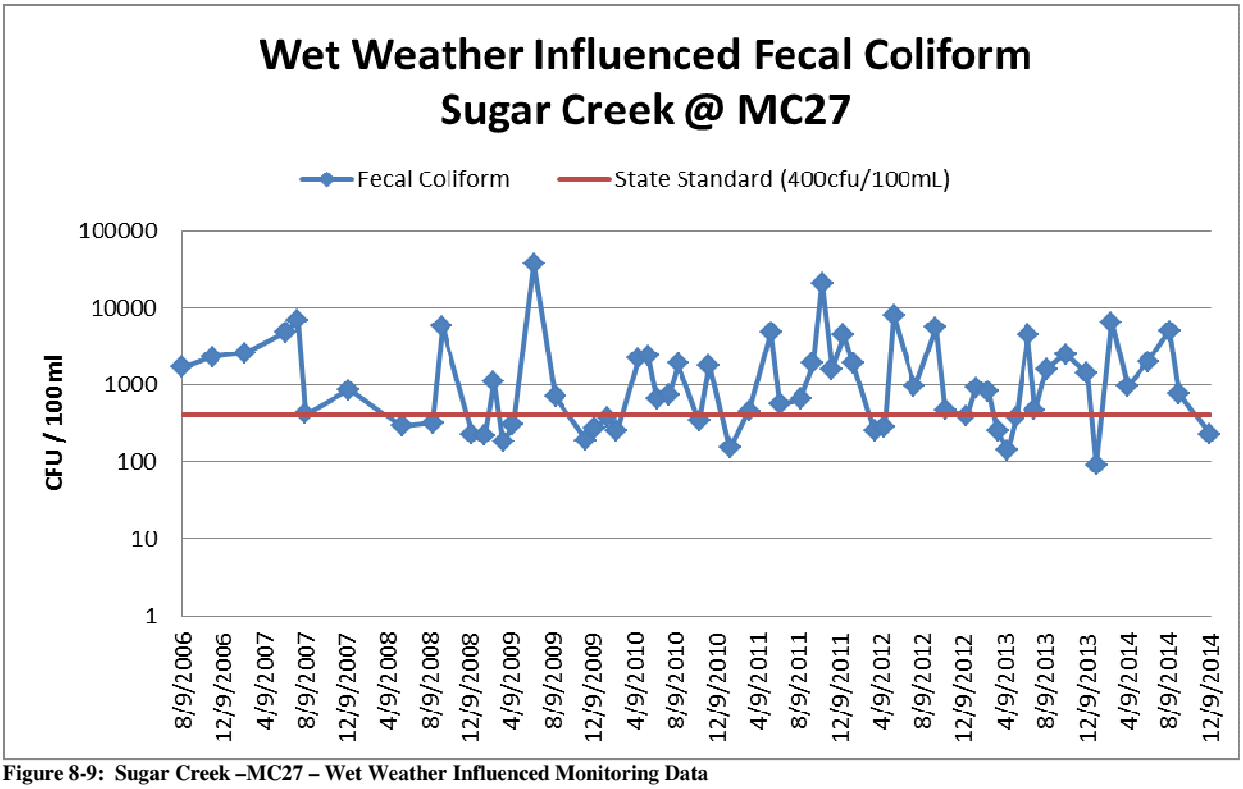

Figure 8-9: Sugar Creek –MC27 – Wet Weather Influenced Monitoring Data

During the period, 114 fixed interval samples were collected from the Irwin Creek site with 51% of these samples exceeding the 400 cfu/100mL fecal coliform State standard (**Figure 8-10**). Of these 114 samples, 52 were collected during ambient conditions and 62 were collected during wet weather influenced conditions. Of these, 35% of the samples collected in ambient conditions and 65% of the samples collected in wet weather influenced conditions exceeded the State standard. Fecal coliform exceedances continue to occur during both sampling conditions; however, since 2008 there has been a decrease in the frequency of exceedances during ambient conditions compared to 2006-2007 (**Figures 8-11 and 8-12**).

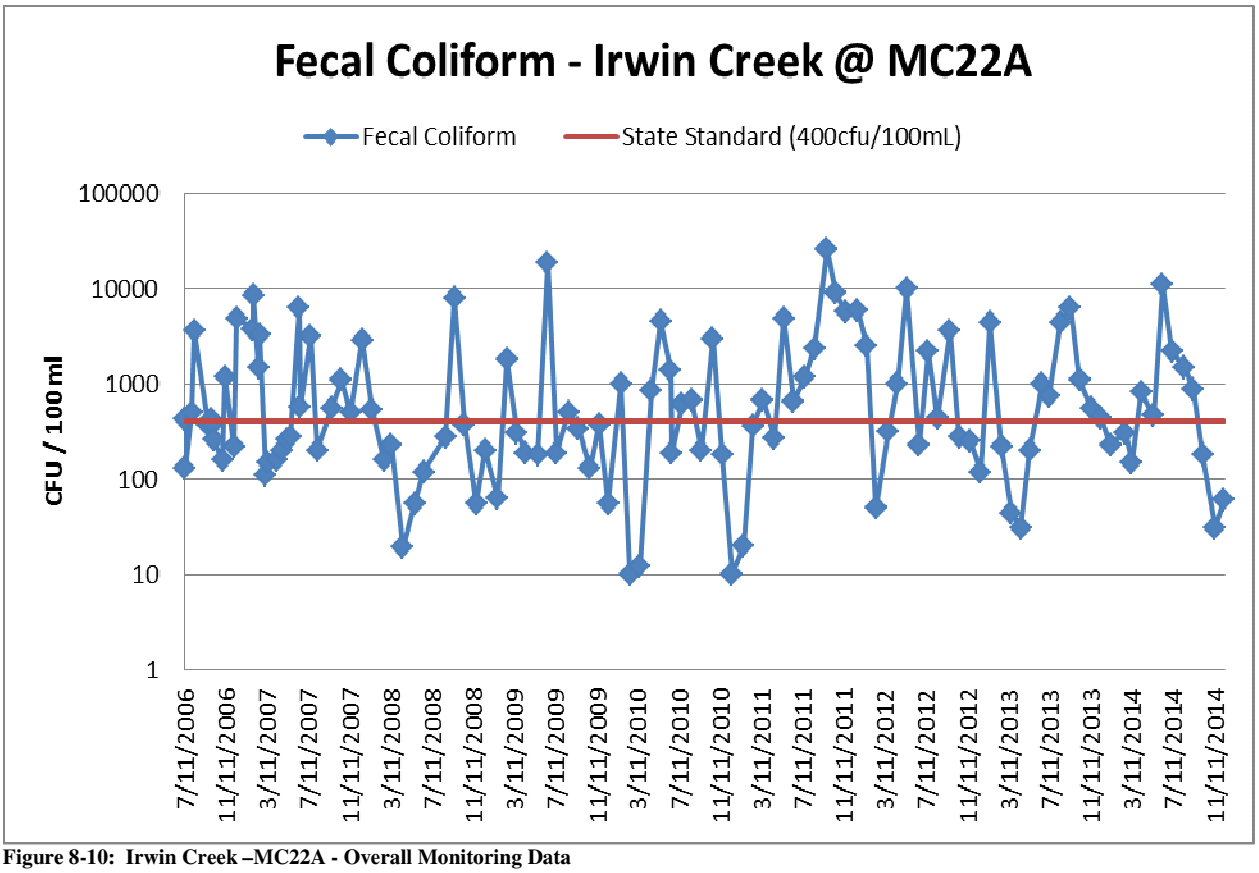

Figure 8-10: Irwin Creek –MC22A - Overall Monitoring Data

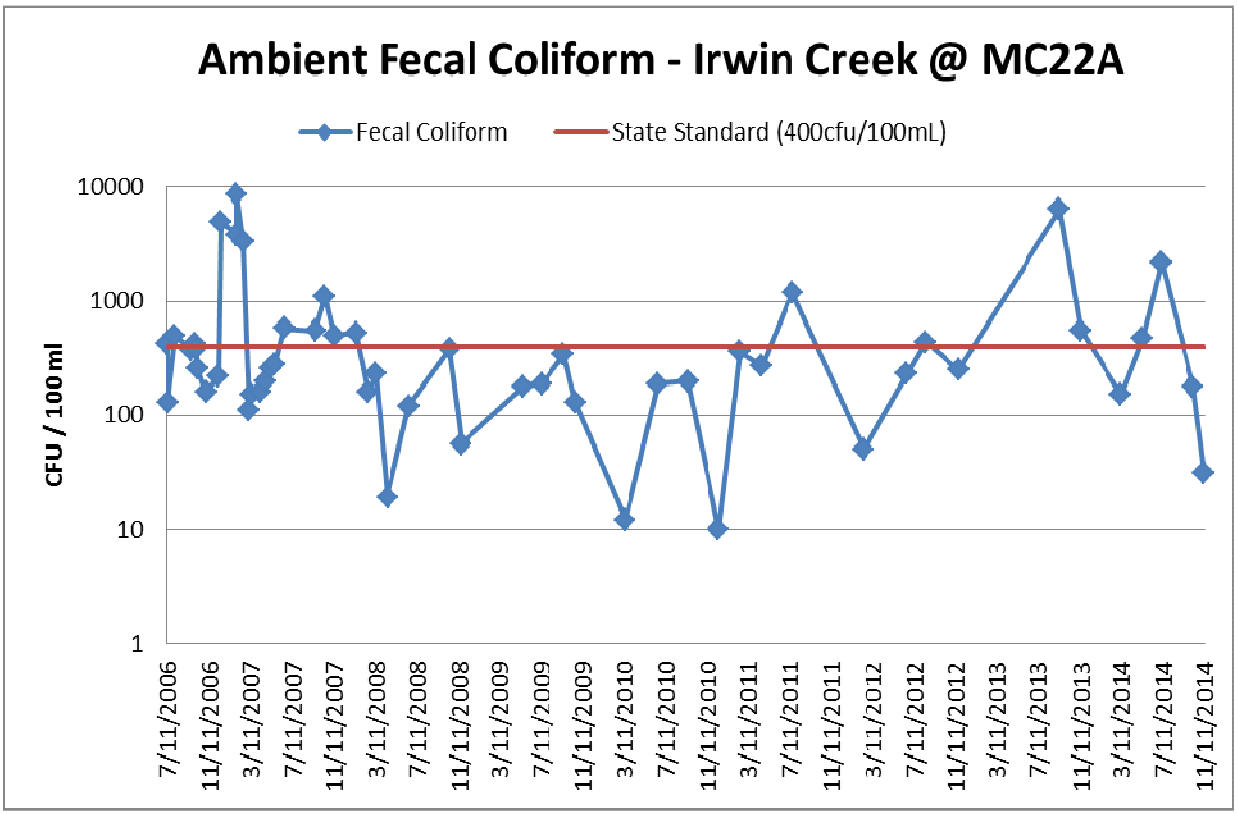

Figure 8-11: Irwin Creek –MC22A - Ambient Monitoring Data

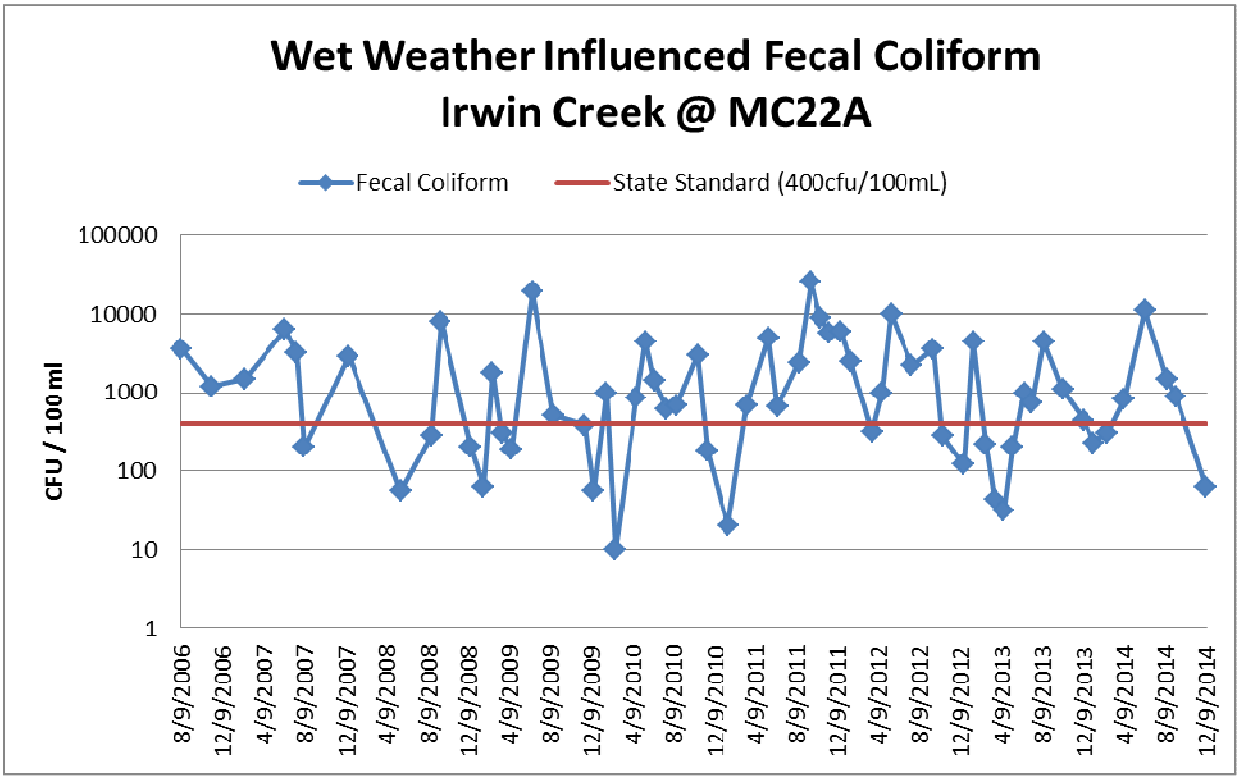

Figure 8-12: Irwin Creek –MC22A – Wet Weather Influenced Monitoring Data

8.1.4 Little Sugar Creek Watershed

There are two monitoring locations on Little Sugar Creek, MC49A in southern Mecklenburg County, and MC29A-1 just downstream of downtown Charlotte. An initial assessment of available watershed and water quality data was conducted utilizing fixed interval stream data for fecal coliform collected at these two monitoring locations. A summary of the data collected from July 2007 through December 2014 is provided in **Figures 8-13 through 8-18**. For monitoring site MC49A, 113 samples were collected during this period with 50% of the samples exceeding the 400 cfu/100mL State standard for fecal coliform (**Figure 8-13**). Of these 113 samples, 51 were collected during ambient conditions and 62 were collected during wet weather influenced conditions. Laboratory analysis data from samples collected during ambient conditions showed that the fecal coliform standard was exceeded 20% of the time while 74% of wet weather influenced samples exceeded the standard (**Figures 8-14 and 8-15**).

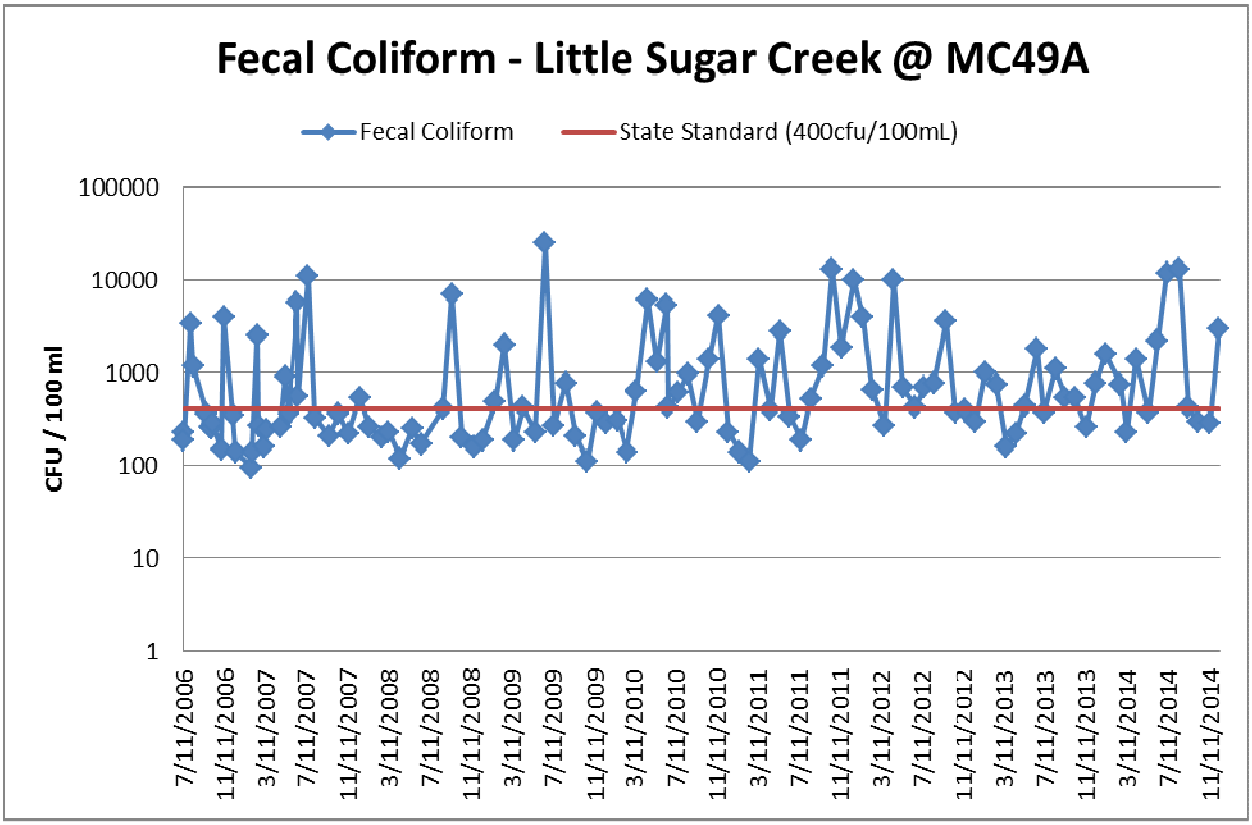

Figure 8-13: Little Sugar Creek –MC49A - Overall Monitoring Data

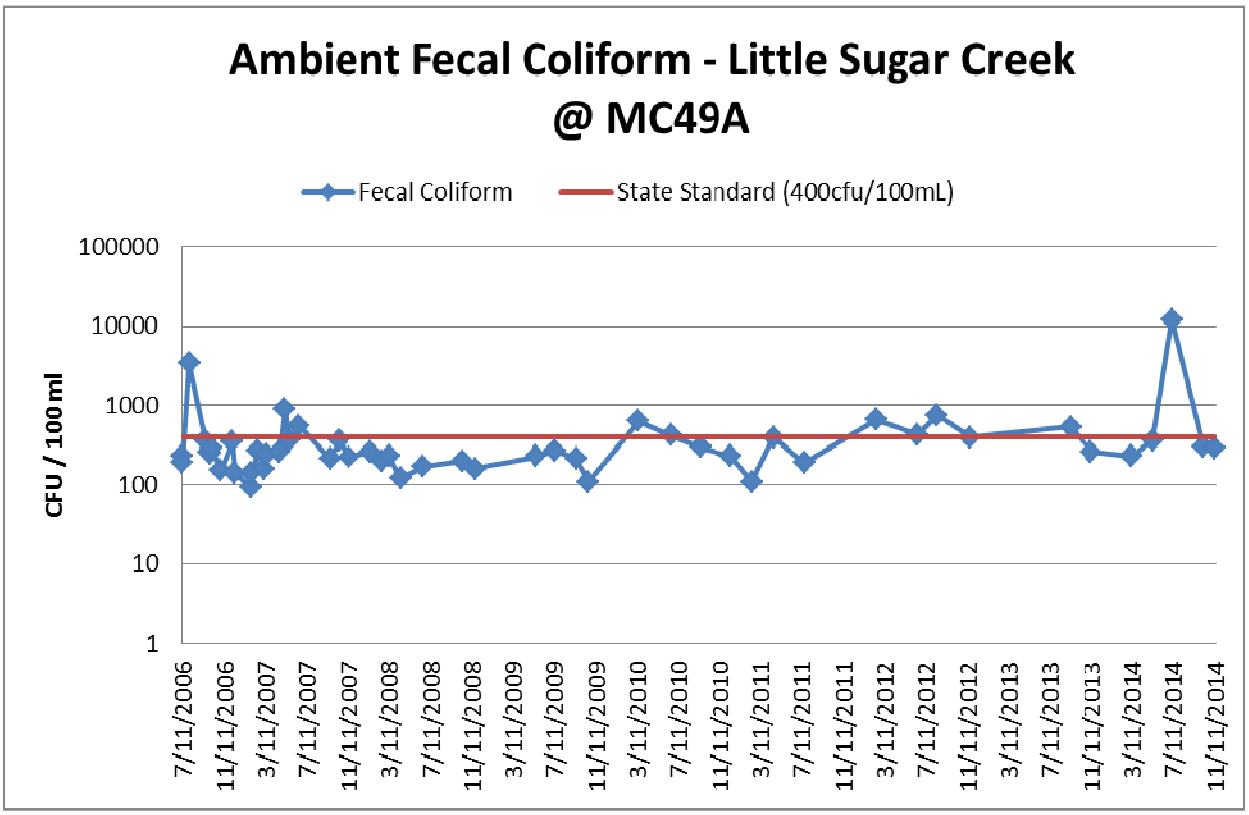

Figure 8-14: Little Sugar Creek –MC49A - Ambient Monitoring Data

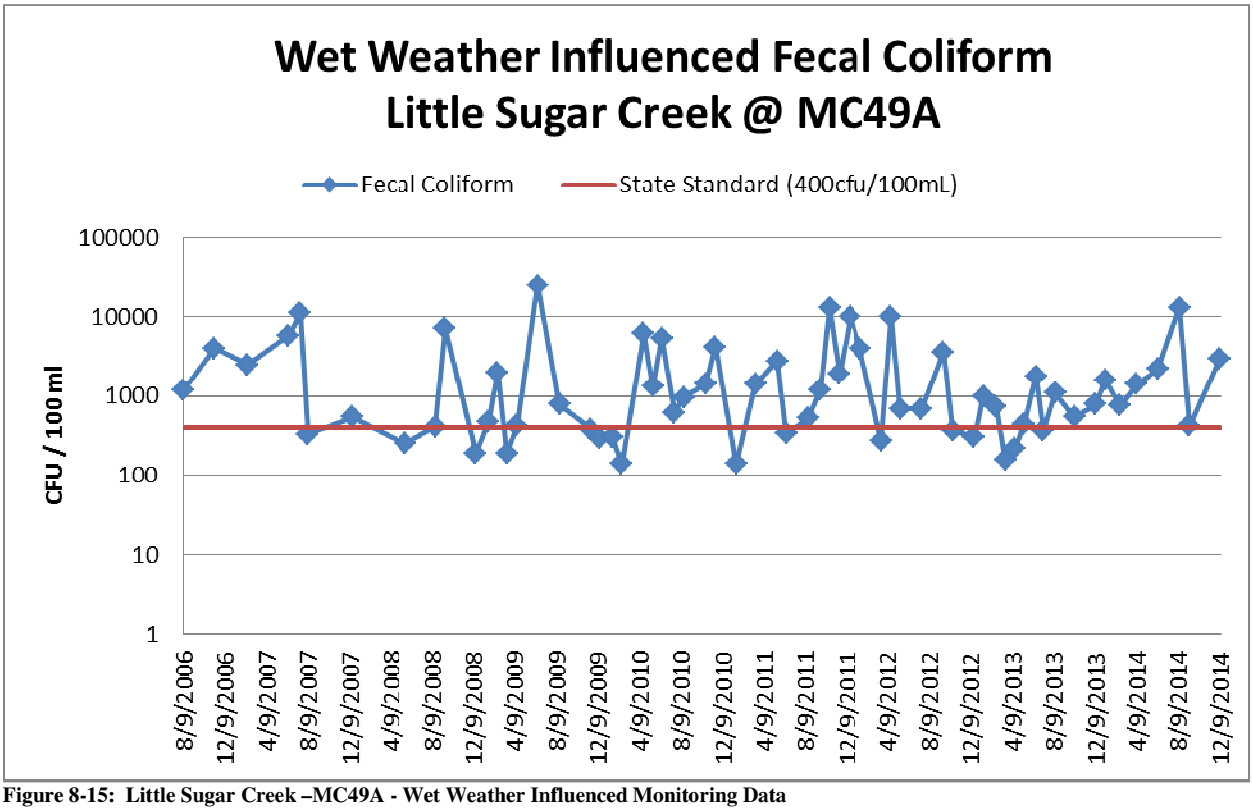

Figure 8-15: Little Sugar Creek –MC49A - Wet Weather Influenced Monitoring Data

For monitoring site MC29A-1, 117 samples were collected during this period with 84% of the samples exceeded the 400 cfu/100mL State standard for fecal coliform (**Figure 8-16**). Of these 117 samples, 54 were collected during ambient conditions and 63 were collected during wet weather influenced conditions (**Figures 8-17 and 8-18**). Of the samples collected during ambient conditions, 76% exceeded the State standard and of the samples collected during wet weather influenced monitoring, 90% exceeded the standard. Exceedances of the fecal coliform standard at MC29A-1 were more prevalent and of greater magnitude than exceedances observed at MC49A.

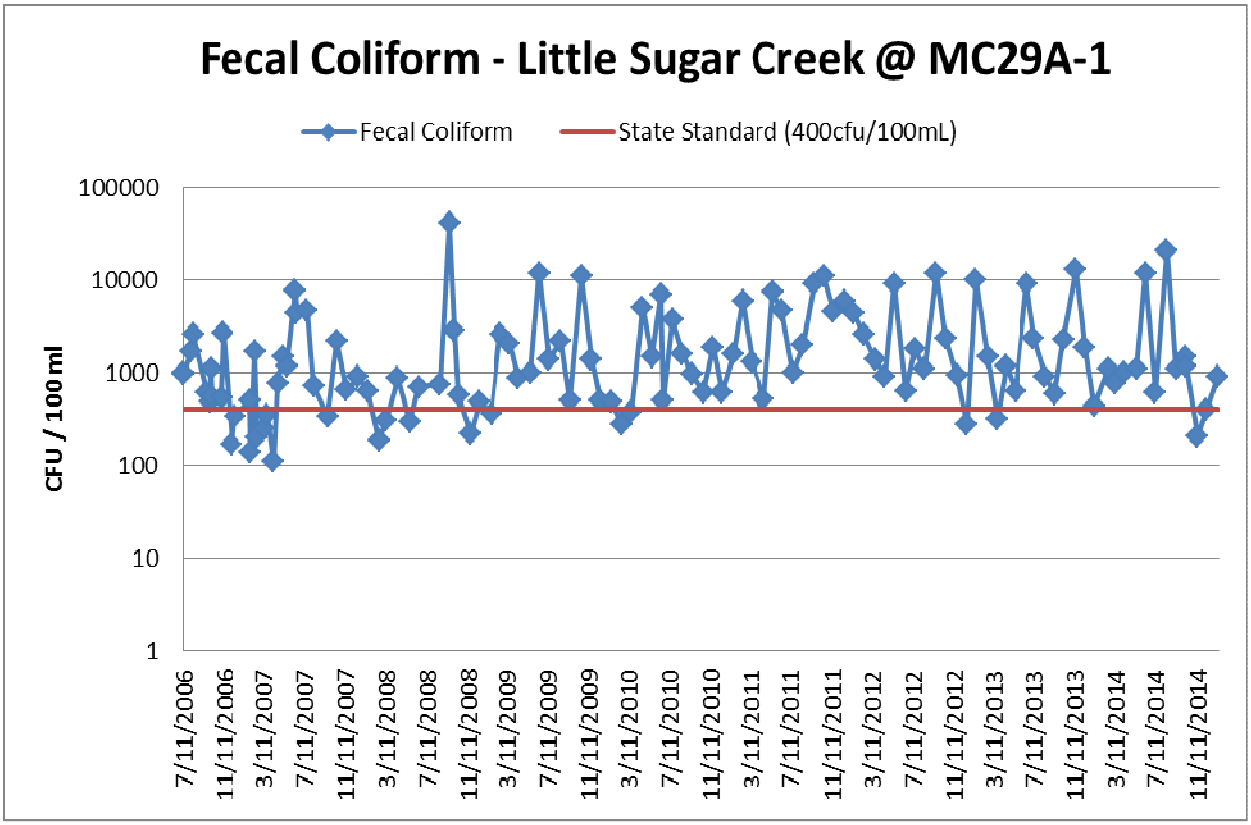

Figure 8-16: Little Sugar Creek –MC29A-1 - Overall Monitoring Data

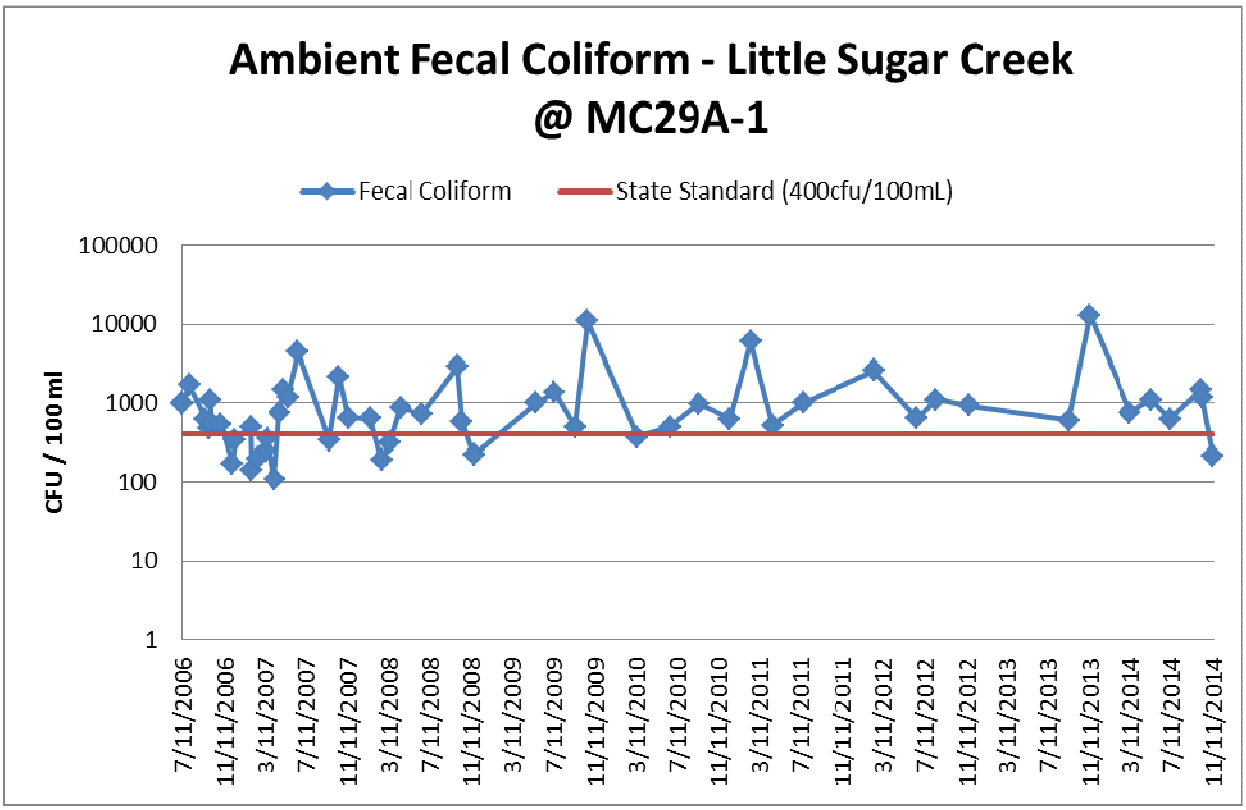

Figure 8-17: Little Sugar Creek –MC29A-1 - Ambient Monitoring Data

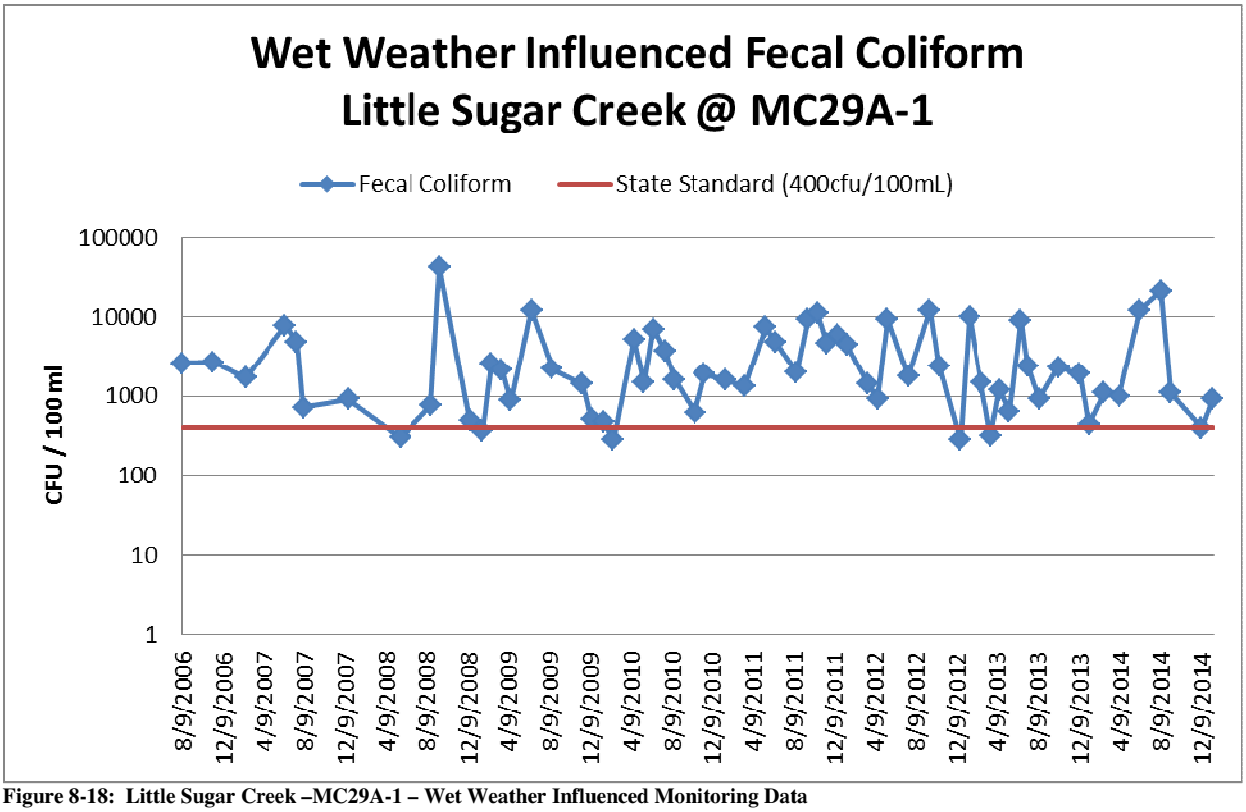

Figure 8-18: Little Sugar Creek –MC29A-1 – Wet Weather Influenced Monitoring Data

8.1.5 McAlpine Creek Watershed

There are two monitoring locations on McAlpine Creek, MC45B just downstream of the NC/SC border, and MC38 downstream of the confluence with Campbell Creek and Irvins Creek. An initial assessment of available watershed and water quality data was conducted utilizing fixed interval stream data for fecal coliform collected at these two monitoring locations. A summary of the data collected from July 2007 through December 2014 is provided in **Figures 8-19 through 8-24**. One hundred and fourteen (114) samples were collected during this period from MC45B and 31% of the samples exceeded the 400 cfu/100mL State standard (**Figure 8-19**). Of these 114 samples, 52 were collected during ambient conditions and 62 were collected during wet weather influenced conditions. Only 8%, or four out of 52, of the ambient samples exceeded the State standard (**Figures 8-20 and 8-21**).

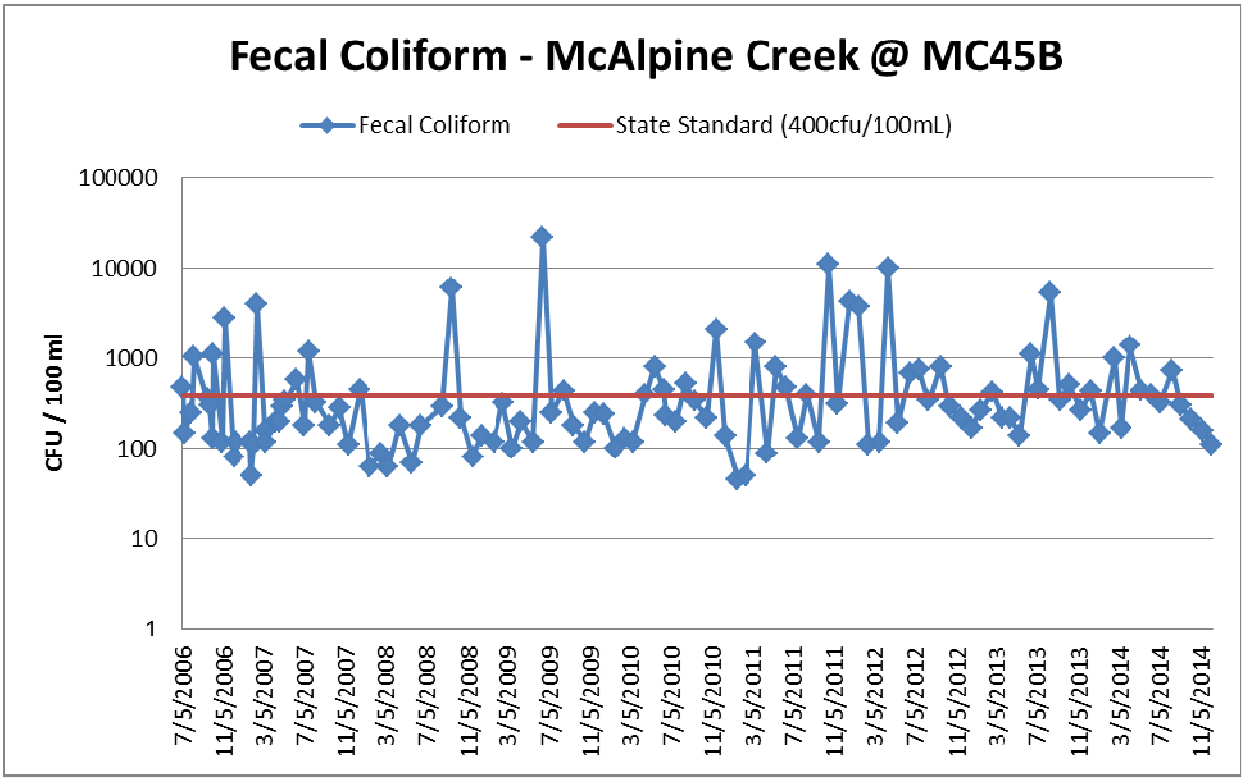

Figure 8-19: McAlpine Creek –MC45B - Overall Monitoring Data

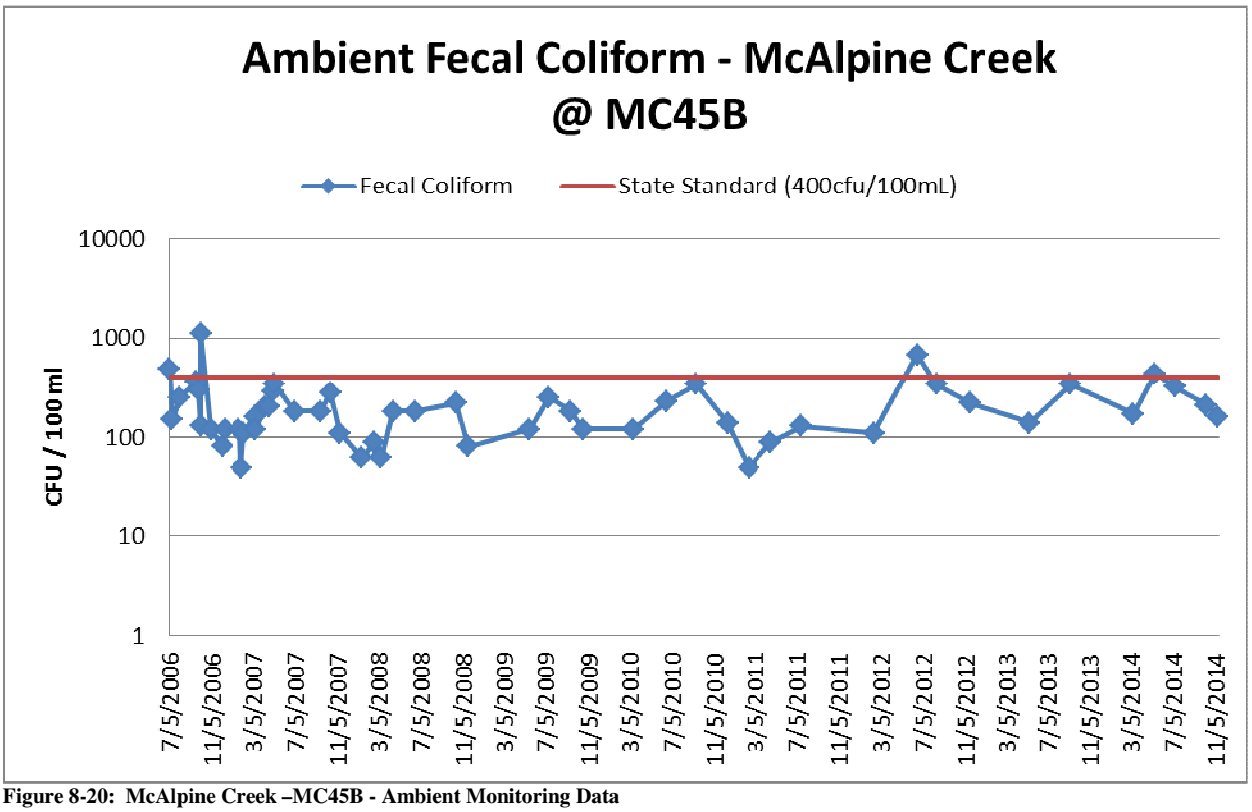

Figure 8-20: McAlpine Creek –MC45B - Ambient Monitoring Data

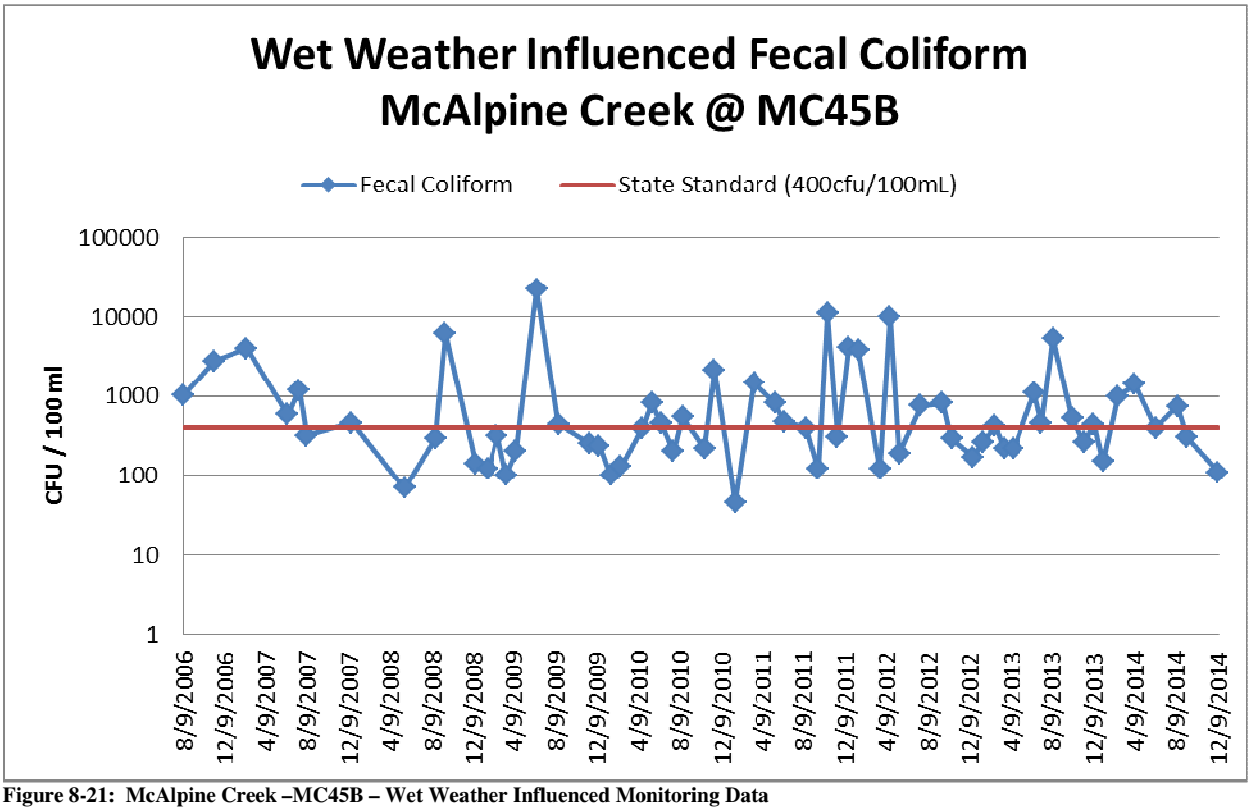

Figure 8-21: McAlpine Creek –MC45B – Wet Weather Influenced Monitoring Data

One hundred and fifteen (115) samples were collected during this period from McAlpine Creek at MC38 and 48% of the samples exceeded the 400 cfu/100mL State standard for fecal coliform (**Figure 8-22**). Of these 115 samples, 52 were collected during ambient conditions and 63 were collected during wet weather influenced conditions (**Figures 8-23 and 8-24**). Of the samples collected during ambient conditions, 17% exceeded the State standard, and of the samples collected during wet weather influenced monitoring, 73% exceeded the standard. During ambient and wet weather influenced monitoring, the samples at MC45B had a lower rate and degree of exceedance compared to the monitoring site upstream (MC38) overall. However, the extent and frequency of exceedance at MC38 has gone down over the years during ambient conditions, with only two out of 20 (10%) exceeding the standard since July 15, 2009.

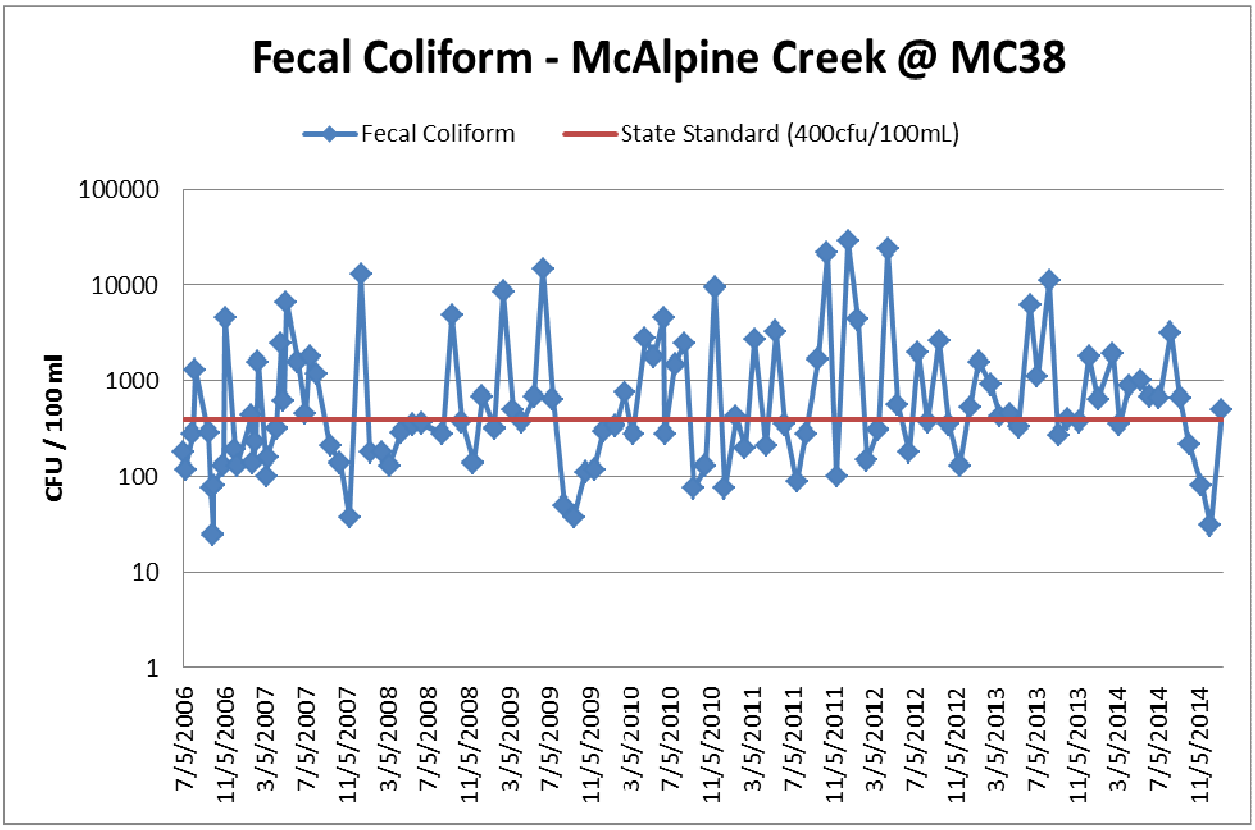

Figure 8-22: McAlpine Creek –MC38 - Overall Monitoring Data

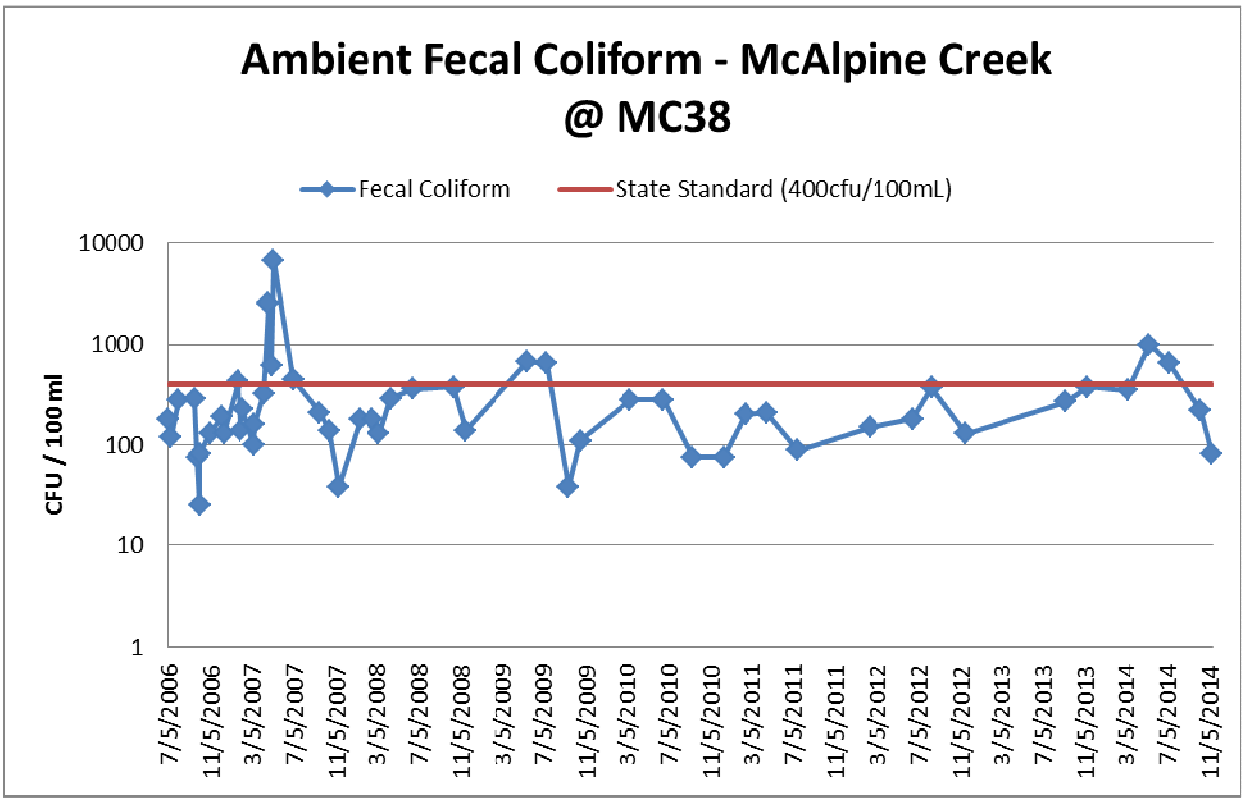

Figure 8-23: McAlpine Creek –MC38 - Ambient Monitoring Data

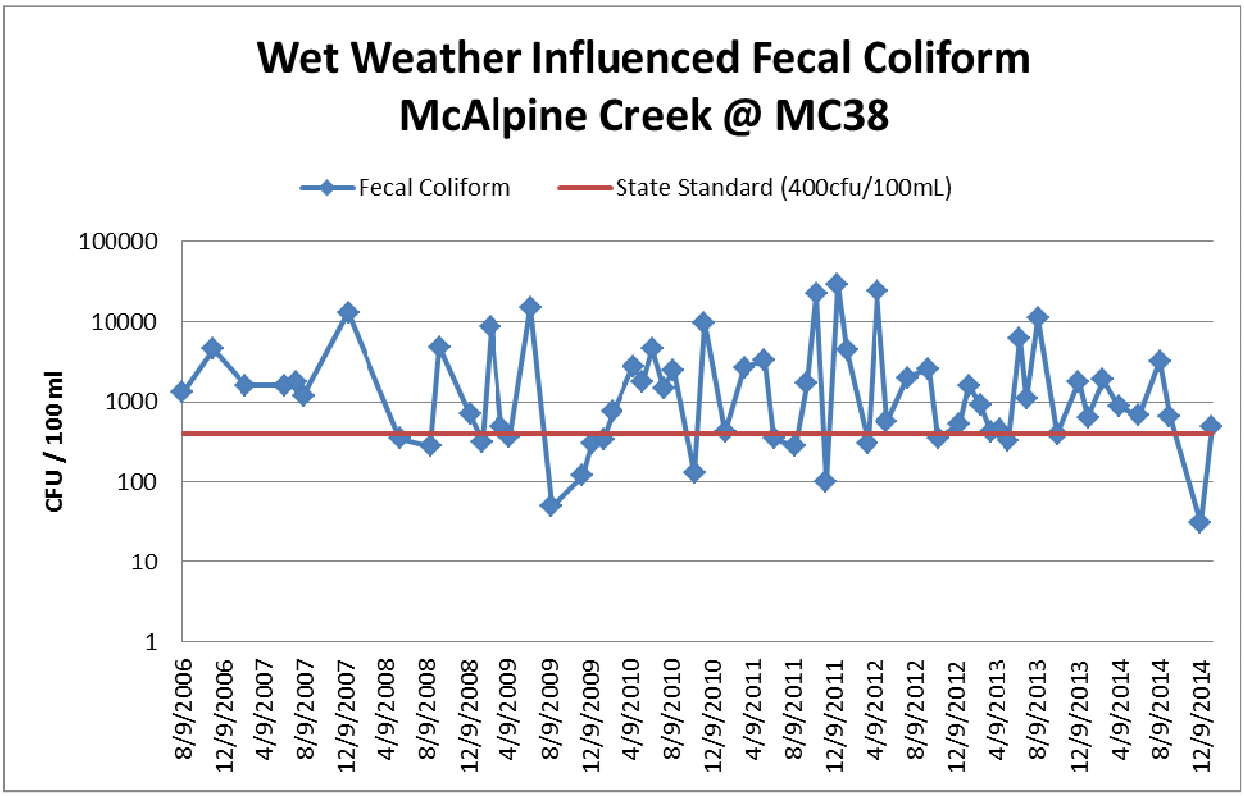

Figure 8-24: McAlpine Creek –MC38 – Wet Weather Influenced Monitoring Data

8.1.6 Fecal Coliform Summary

The State standard for fecal coliform is exceeded by more than 10% for all watersheds with a fecal coliform TMDL identified above, based on fixed interval data collected between 2006 and 2014. These exceedances are most common in wet weather influenced conditions but samples collected during ambient conditions also exceed the standard by more than 10%, with the exception of McAlpine Creek at monitoring point MC45B, where only 8% of samples collected in ambient conditions exceed the standard. That said, some encouraging observations have been noted above for ambient conditions. Since August 15, 2012, there has only been one exceedance of the State standard during ambient conditions at site MC27 on Sugar Creek. Also, in McAlpine Creek, the extent and frequency of exceedances during ambient conditions has decreased over time, with only two out of 20 (10%) samples exceeding the standard since July 15, 2009.

8.2 Turbidity

As discussed in sub-section 2.2, the turbidity TMDL developed in 2005 included five Charlotte-Mecklenburg watersheds but only developed a WLA for turbidity for Long Creek since the water quality data assessment performed for the TMDL demonstrated that the remaining four watersheds had less than a 10% exceedance rate of the 50 NTU State standard. Therefore, this sub-section includes an assessment of turbidity data only for Long Creek.

8.2.1 Long Creek Watershed

An initial assessment of available watershed and water quality data was conducted utilizing stream data for turbidity collected at the Charlotte-Mecklenburg monitoring site MC14A on Long Creek. A summary of the data collected from July 2006 through December 2014, is provided in **Figures 8-25 through 8-27**. One hundred and nine (109) samples were collected during this period and 22 samples exceeded the 50 NTU State standard (**Figure 8-25**). Of these 109 samples, 42 were collected during ambient conditions and 67 were collected during wet weather influenced conditions. There have been no exceedances of the State standard during ambient conditions during this period (**Figure 8-26**). While there have been 22 exceedances of the standard during wet weather influenced conditions, there have been only five exceedances since September 19, 2012, out of 21 data points (**Figure 8-27**). Wet weather influenced samples collected prior to September 20, 2012 demonstrate a much greater magnitude of turbidity standard exceedance than has been observed since that date. Ambient and wet weather influenced sampling over the past two years (September 2012 – September 2014) indicates that turbidity is remaining, for the most part, consistently near or below the State standard of 50 NTU in all conditions.

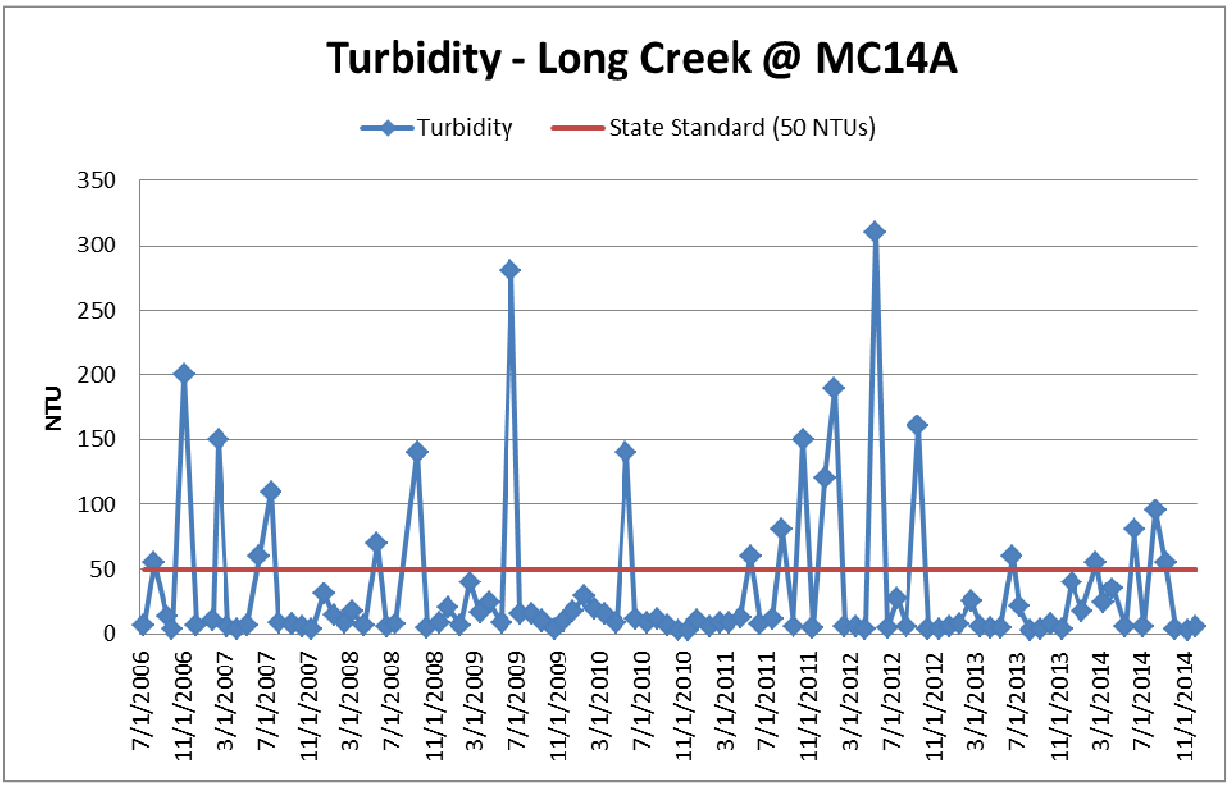

Figure 8-25: Long Creek –MC14A - Overall Monitoring Data

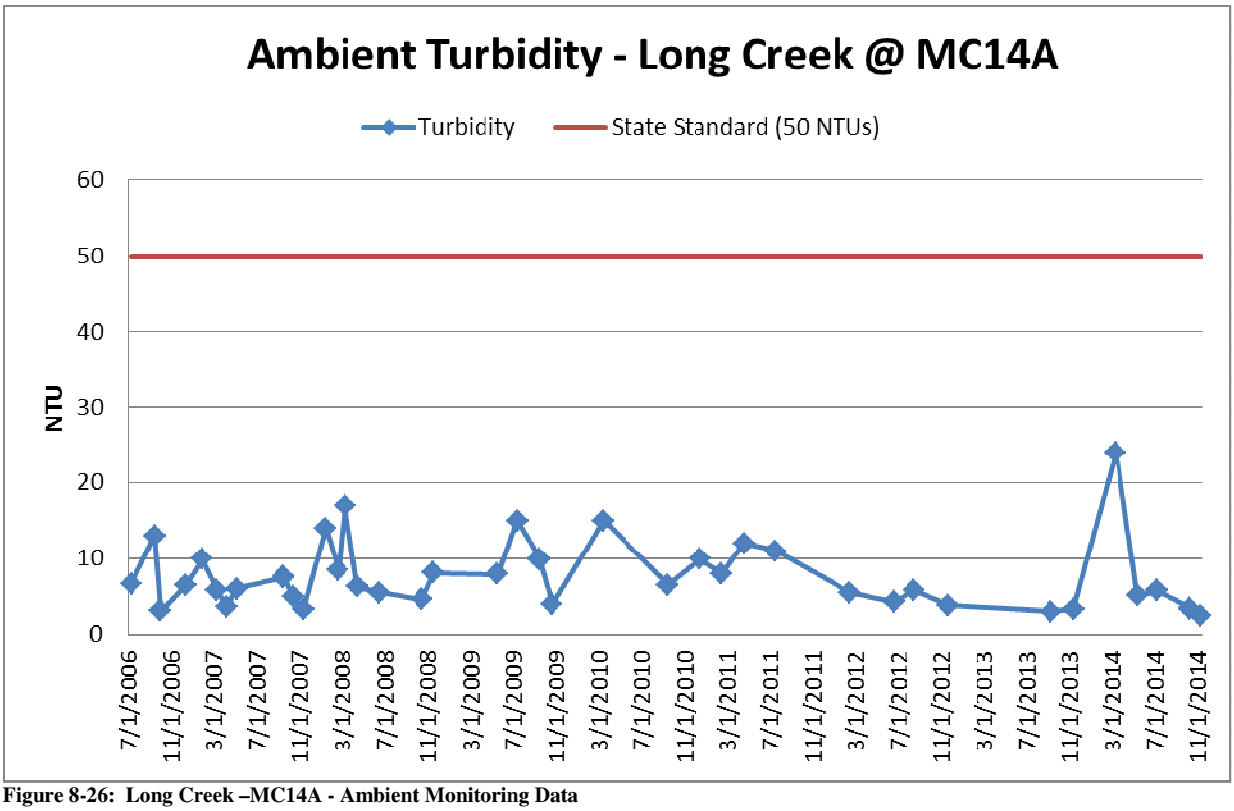

Figure 8-26: Long Creek –MC14A - Ambient Monitoring Data

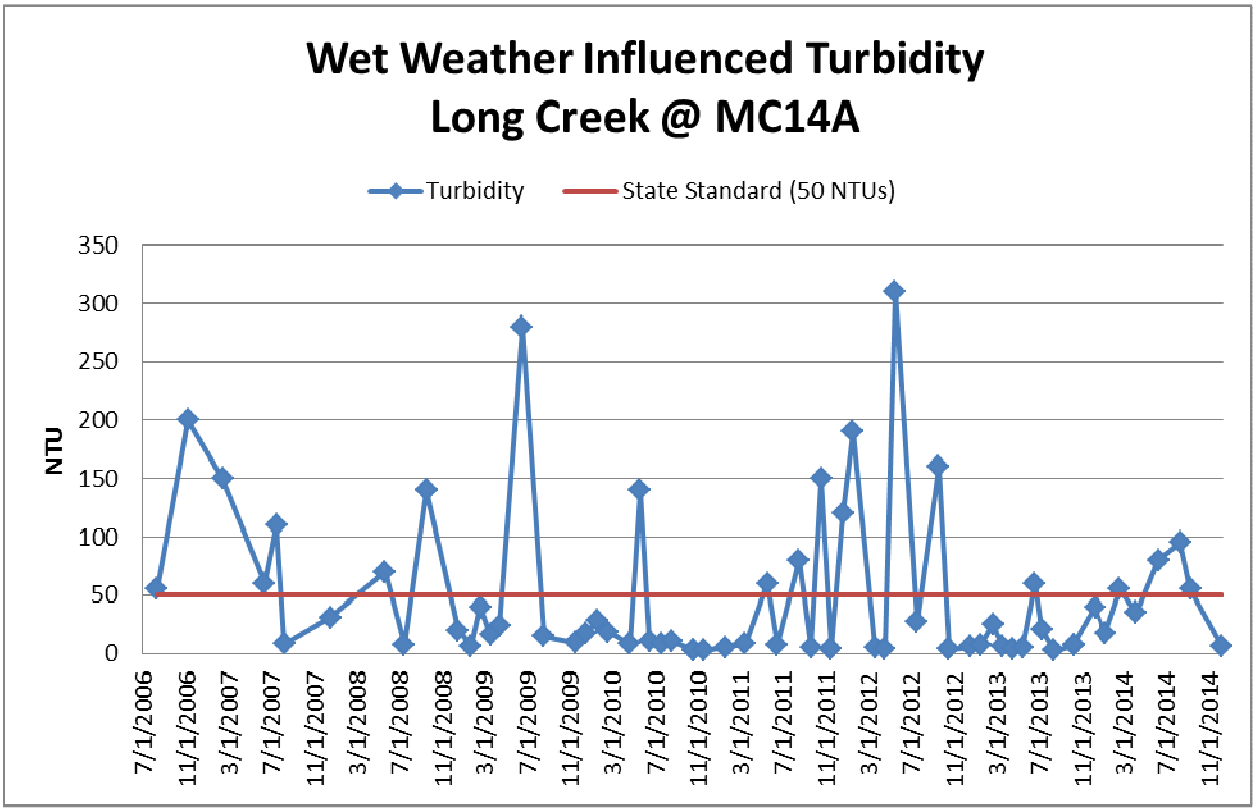

Figure 8-27: Long Creek –MC14A – Wet Weather Influenced Monitoring Data

8.3 Dissolved Oxygen

As stated in sub-section 2.3, the 1996 dissolved oxygen (DO) TMDL for Irwin Creek, McAlpine Creek, and Little Sugar Creek did not include a MS4 NPDES WLA. Nevertheless, since the City's NPDES MS4 permit states in Part II, Section J.3, for approved TMDLs where a MS4 NPDES WLA for the pollutant of concern is not assigned to the MS4, the Permittee is still required to "evaluate strategies and tailor BMPs within the scope of the six minimum permit measures to address the pollutant of concern in the watershed(s) to which the TMDL applies." For this reason, the dissolved oxygen data is provided below in **Figures 8-28 through 8-32**. Unlike the other parameters, for dissolved oxygen the State standard is violated when concentrations go below the standard rather than exceeding the standard. Based on the fixed interval sampling conducted between July 2006 and December 2014, there were no violations of the State standard of four mg/L in any of the DO TMDL watersheds. The 2012 NC Integrated Report categorizes each of these watersheds as 1t for DO, meaning that they have a TMDL but are not impaired and are supporting their designated uses.

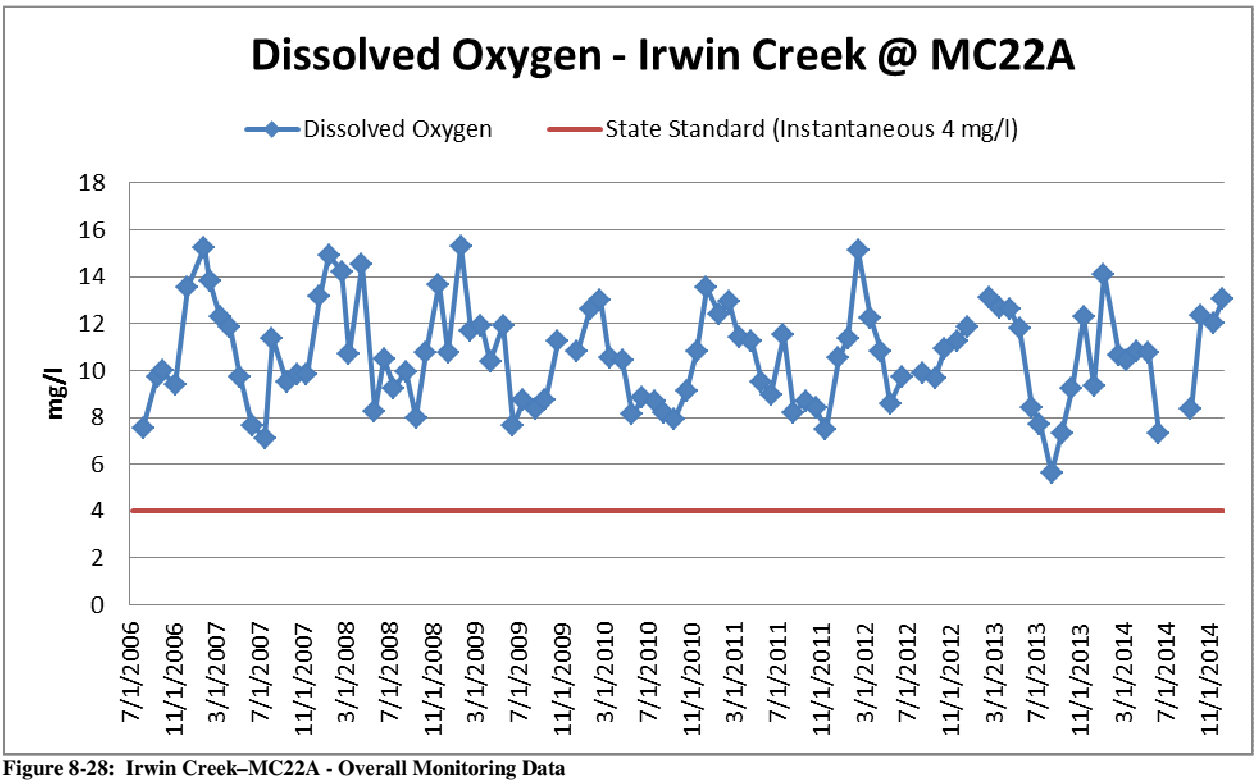

Figure 8-28: Irwin Creek–MC22A - Overall Monitoring Data

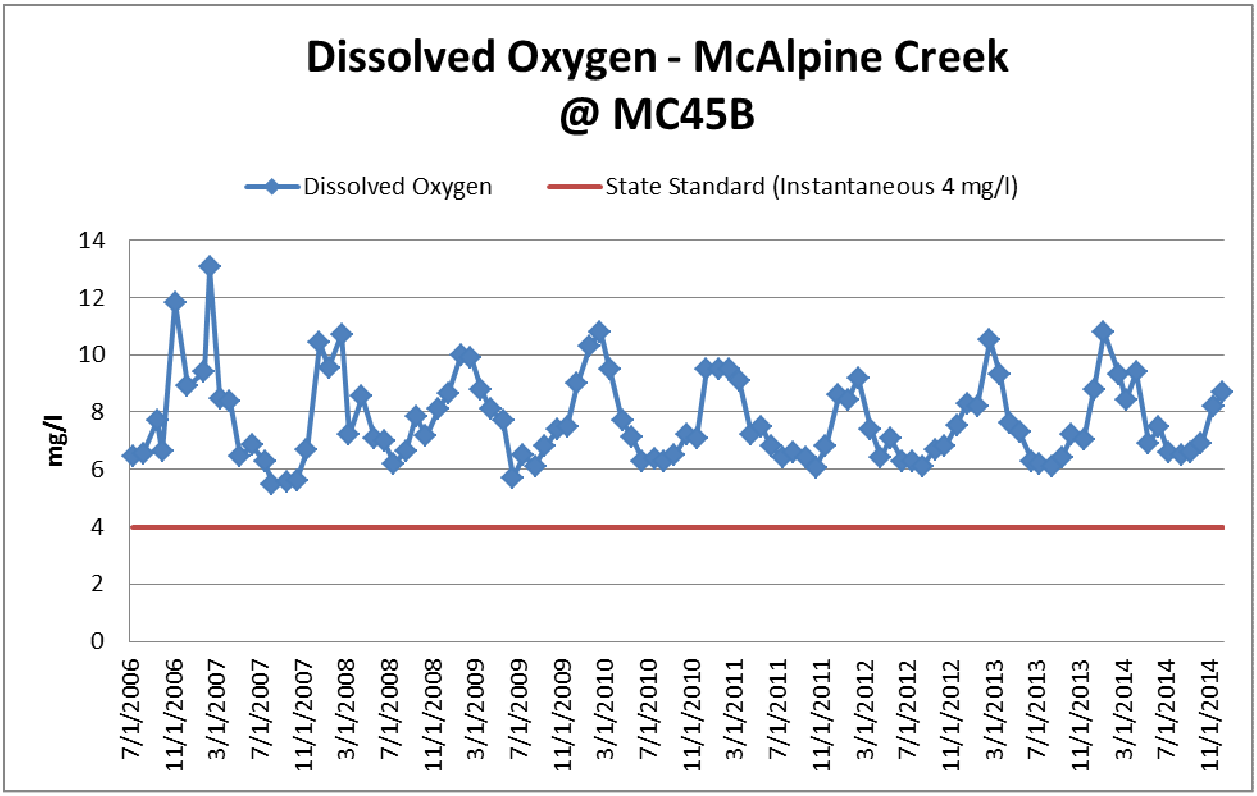

Figure 8-29: McAlpine Creek –MC45B - Overall Monitoring Data

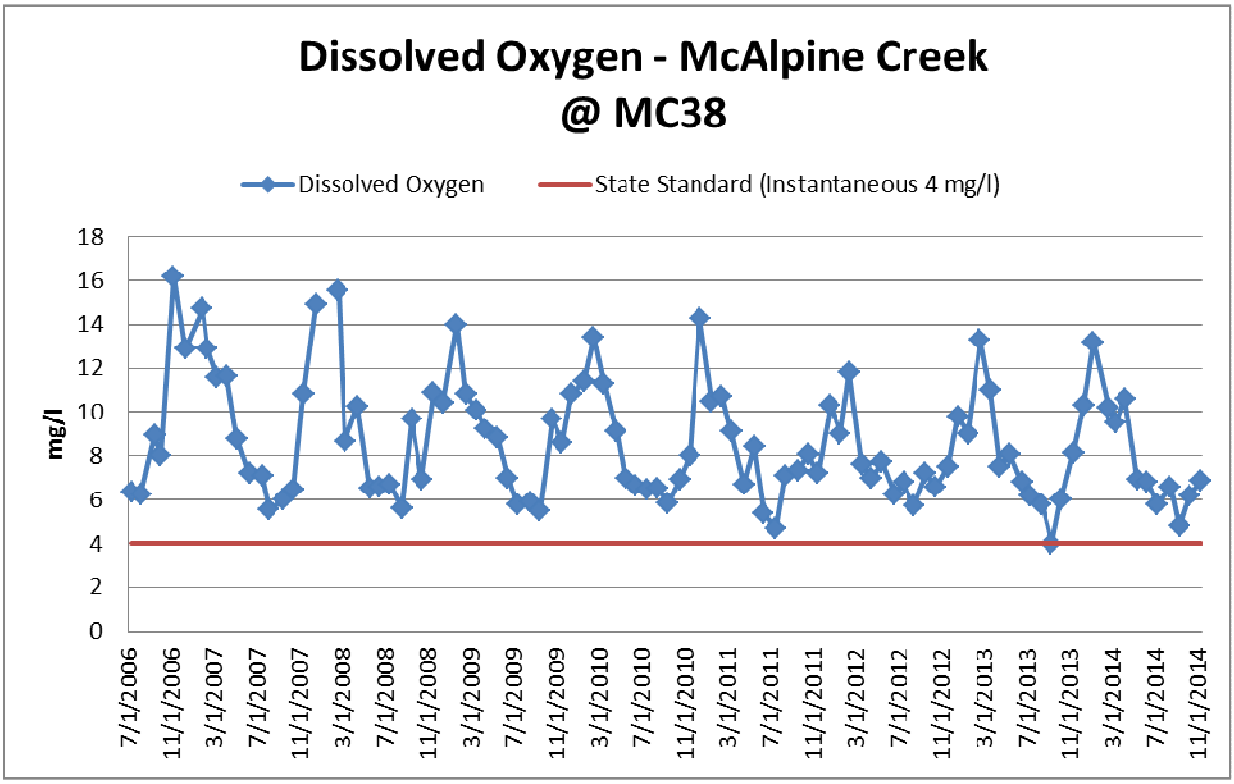

Figure 8-30: McAlpine Creek –MC38 - Overall Monitoring Data

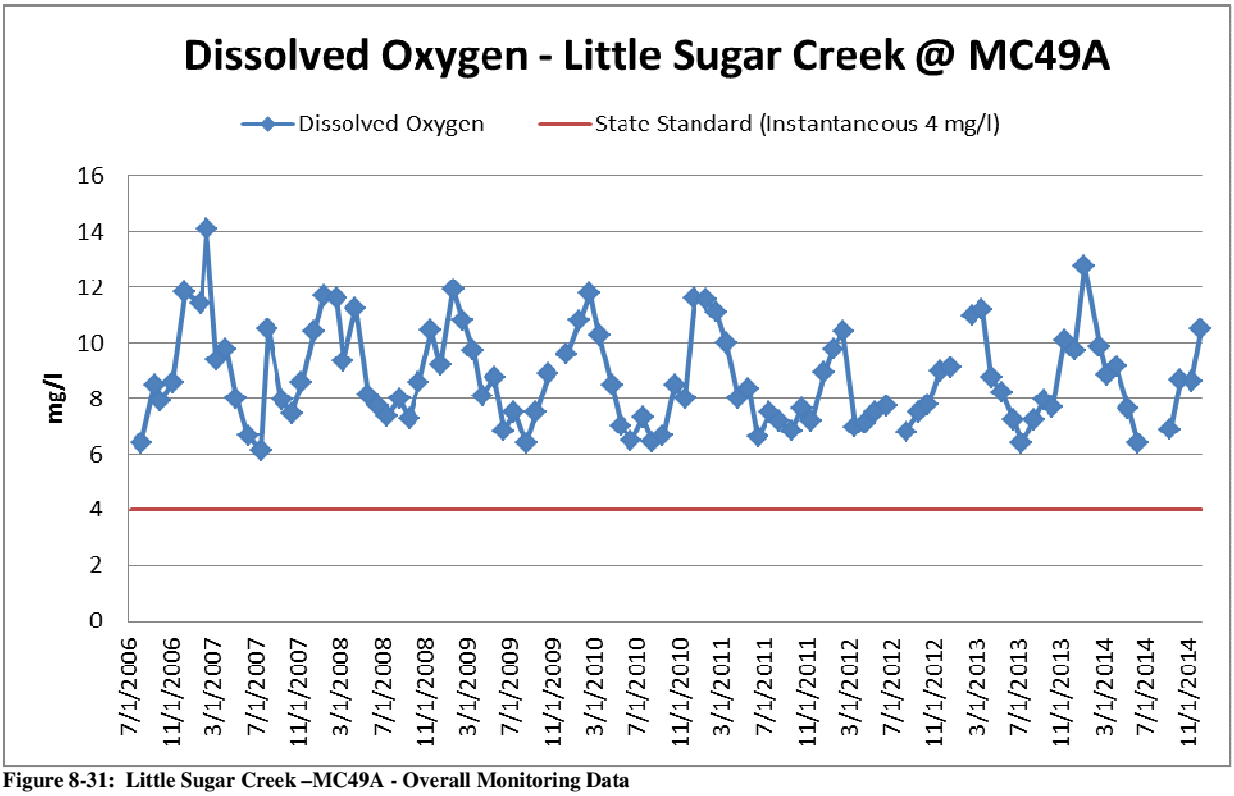

Figure 8-31: Little Sugar Creek –MC49A - Overall Monitoring Data

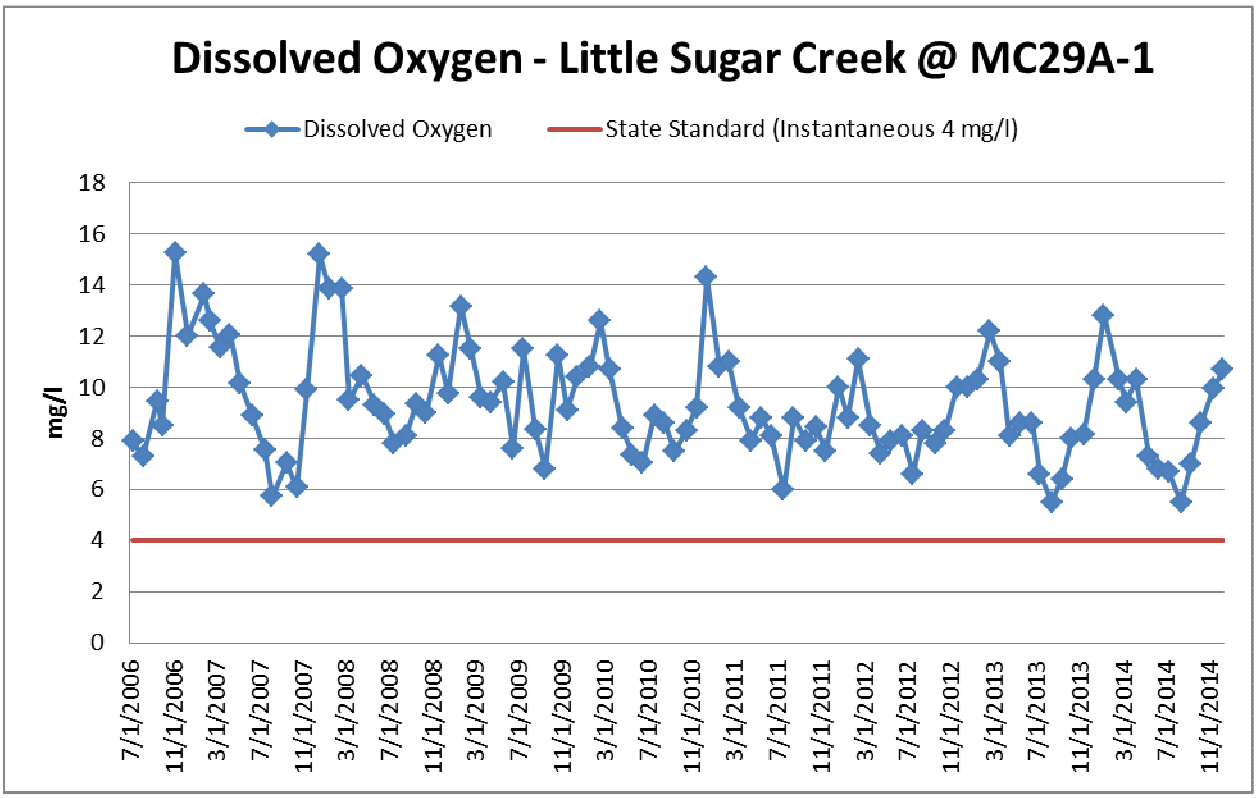

Figure 8-32: Little Sugar Creek –MC29A-1 – Overall Monitoring Data

8.4 Chlorophyll a

As stated in sub-section 2.4, Mecklenburg County is responsible for providing annual assessment reports for the Lake Wylie chlorophyll a TMDL under their Phase II NPDES permit.

8.5 Mercury

As stated in sub-section 2.5, the State did not consider it necessary to include an MS4 NPDES WLA for mercury in their statewide TMDL. For this reason, mercury data is not analyzed in this TMDL Watershed Plan.

Section 9: Monitoring Plan

This section will be addressed in future TMDL plan revisions as required by the NPDES MS4 permit schedule. This activity is scheduled to be completed by February 28, 2016.

Section 10: Additional BMP Measures

This section will be addressed in future TMDL plan revisions as required by the NPDES MS4 permit schedule. This activity is scheduled to be completed by February 28, 2016.

Section 11: Implementation Plan for Additional BMP Measures

This section will be addressed in future TMDL plan revisions as required by the NPDES MS4 permit schedule. This activity is scheduled to be completed by February 28, 2017.

Section 12: Data Tracking and Assessment

The City and County will track relevant water quality monitoring and BMP measure implementation data for the activities conducted under the TMDL Watershed Plan throughout each fiscal year. An assessment of all data will be conducted to document successes and data trends relative to achieving the MS4 NPDES regulated WLA and reducing the TMDL pollutants of concern to the MEP.

Section 13: Reporting

As part of the NPDES MS4 annual report process, data and information concerning the TMDL Watershed Plan will be submitted discussing program activities and successes implemented toward achieving the MS4 NPDES WLA and reducing the TMDL pollutant of concern to the MEP within the applicable TMDL watersheds.

REFERENCES

1. NCDENR - Division of Water Quality, January 2005. Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina

   Rosgen. D.L., A Practical Method of Computing Streambank Erosion Rate. Wildland Hydrology, Inc. Pagosa Springs, Colorado. Online at: http://www.wildlandhydrology.com/assets/Streambank_erosion_paper.pdf

   United States. Environmental Protection Agency (USEPA). October 1999. Protocols for Developing Sediment TMDLs – First Edition. EPA 841-B-99-004. Washington, DC.

   United States Environmental Protection Agency (USEPA). 2000. Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and management Regulation; Final Rule. Fed. Reg. 65:43586-43670 (July 13, 2000).

2. NCDENR - Division of Water Quality, June 2003. Fecal Coliform Total Maximum Daily Load for the McKee and Clear Creek Watersheds, Mecklenburg and Cabarrus Counties, North Carolina.

   NCDENR - Division of Water Quality, January 2005. Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina

   United States. Environmental Protection Agency (USEPA). October 1999. Protocols for Developing Sediment TMDLs – First Edition. EPA 841-B-99-004. Washington, DC.

   United States Environmental Protection Agency (USEPA). 2000. Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and management Regulation; Final Rule. Fed. Reg. 65:43586-43670 (July 13, 2000).

3. NCDENR - Division of Water Quality, June 2003. Fecal Coliform Total Maximum Daily Load for the McKee and Clear Creek Watersheds, Mecklenburg and Cabarrus Counties, North Carolina.

   NCDENR - Division of Water Quality, January 2005. Total Maximum Daily Loads (TMDLs) for Turbidity in Long Creek, McAlpine Creek, Sugar Creek, Little Sugar Creek, Irwin Creek, Henry Fork, and Mud Creek in North Carolina

United States. Environmental Protection Agency (USEPA). October 1999. Protocols for Developing Sediment TMDLs – First Edition. EPA 841-B-99-004. Washington, DC.

United States Environmental Protection Agency (USEPA). 2000. Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revisions to the Water Quality Planning and management Regulation; Final Rule. Fed. Reg. 65:43586-43670 (July 13, 2000).

4. SCDHEC – Bureau of Water, May 2007. Total Maximum Daily Load – Steele Creek (Hydrologic Unit Code 030501030108) Stations CW-009, CW-011, CW-203 - Fecal Coliform Bacteria

APPENDIX A

Reserved for Future Monitoring Plan