City of Charlotte
and
Mecklenburg County
NPDES MS4 Permit Program

TMDL Watershed Plan

Permit Numbers NCS000240 and NCS000395

Fiscal Year 2021

June 2020

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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 ("City"). This also includes the City's Extra Territorial Jurisdiction (ETJ) area and applicable watersheds in Mecklenburg County ("County"), including Long Creek, Sugar Creek, Little Sugar Creek, and McAlpine Creek. Specifically, the goal of this 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 the requirements of Mecklenburg County's NPDES Phase II MS4 permit for the TMDL watershed areas located both within the City and County.

In addition, Part II, Sec J.4 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: TMDL Information

Section 303(d) of the Clean Water Act (CWA) requires states to develop a list of waters not meeting surface 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 water bodies in the City and County. **Table 2-1** provides information on these TMDLs and affected watersheds (each color denotes a separate TMDL). 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: 2020 NCDEQ-Division of Water Resources website:
https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment/tmdls/draft-and-approved-tmdls#Catawba
https://deq.nc.gov/about/divisions/water-resources/planning/modeling-assessment/tmdls/draft-and-approved-tmdls#Yadkin

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 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 is 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 then NC Department of Environment and Natural Resources (NCDENR), now the North Carolina Department of Environmental Quality (NCDEQ). 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 detailed as "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 surface 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 the 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: Implementation Team

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

- City Surface Water Quality Program Manager
- City Surface Water Quality NPDES Supervisor
- City Surface Water Quality NPDES Administrator
- City Land Development Erosion Control Administrator
- City Surface Water Quality Senior Public Information Specialist

- City Surface Water Quality Modeler
- City Surface Water Quality Planner
- City Surface Water Quality Specialist
- City Surface Water Quality Post-Construction Administrator
- City Storm Water Division - MS4 Inventory Supervisor
- City Utility Department Sanitary Sewer System Administrator
- County Water Quality Program Manager
- County Water Quality Supervisor
- County Water Quality Hydrologist
- County Water Quality Public Information Specialist

The City's General Services Department-Storm Water Division has the primary responsibility for coordinating the efforts and activities of the TMDL Watershed Plan Implementation Team. This includes interpreting data, evaluating BMP effectiveness, reporting to NCDEQ-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 4: Public Information

The Public Information 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 are used to reduce the TMDL pollutants of concern. The public is notified about the TMDLs and the TMDL watershed plan as follows:

- The Charlotte-Mecklenburg Storm Water Services (CMSWS) website contains information about the applicable 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 is also posted on the CMSWS website and provides information on the activities conducted under this TMDL watershed plan.

Section 5: Watershed Characteristics

5.1 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 12% impervious cover.

Figures 5-1 through 5-3 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.

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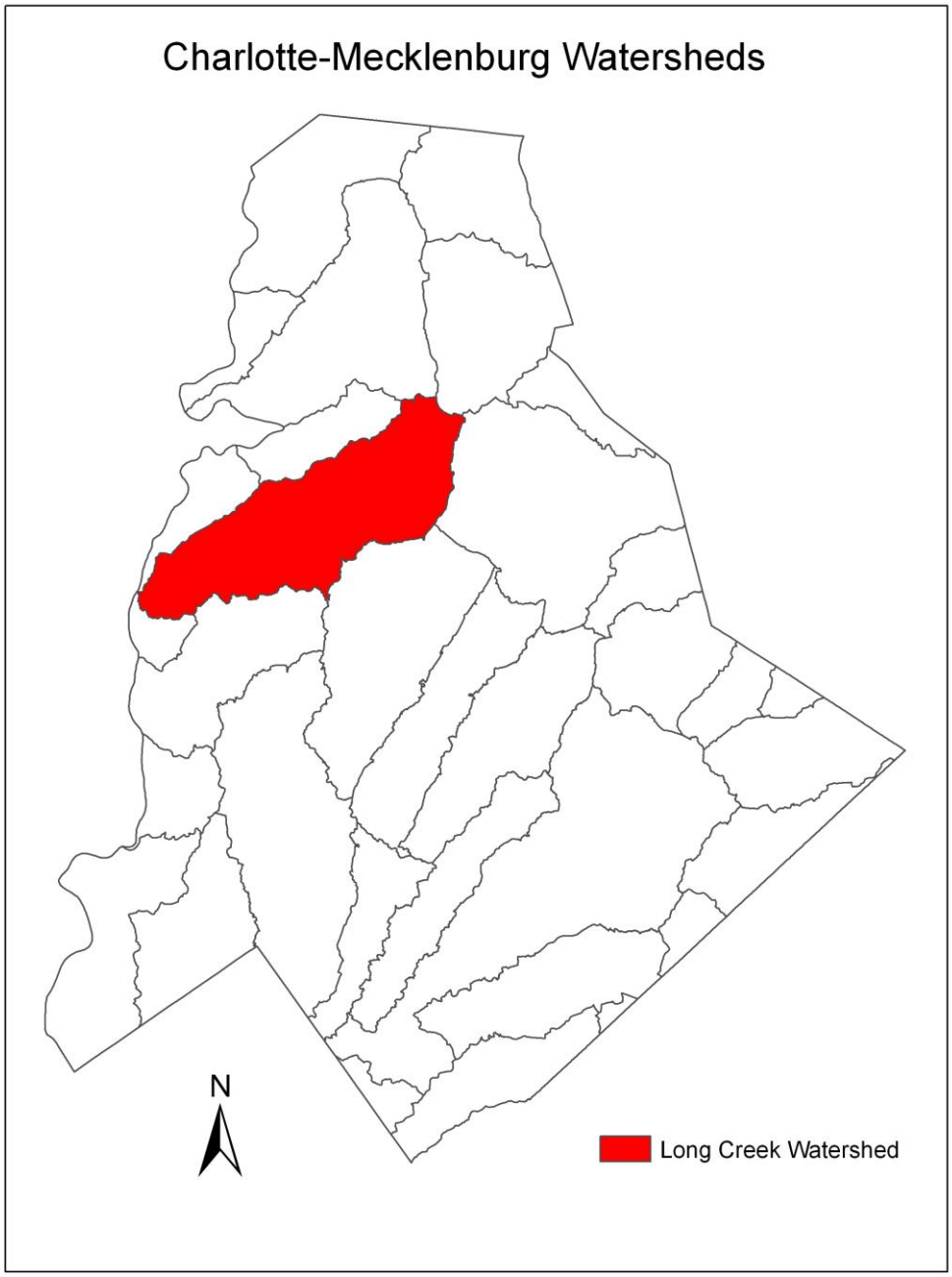

Figure 5-1: Charlotte-Mecklenburg Watersheds

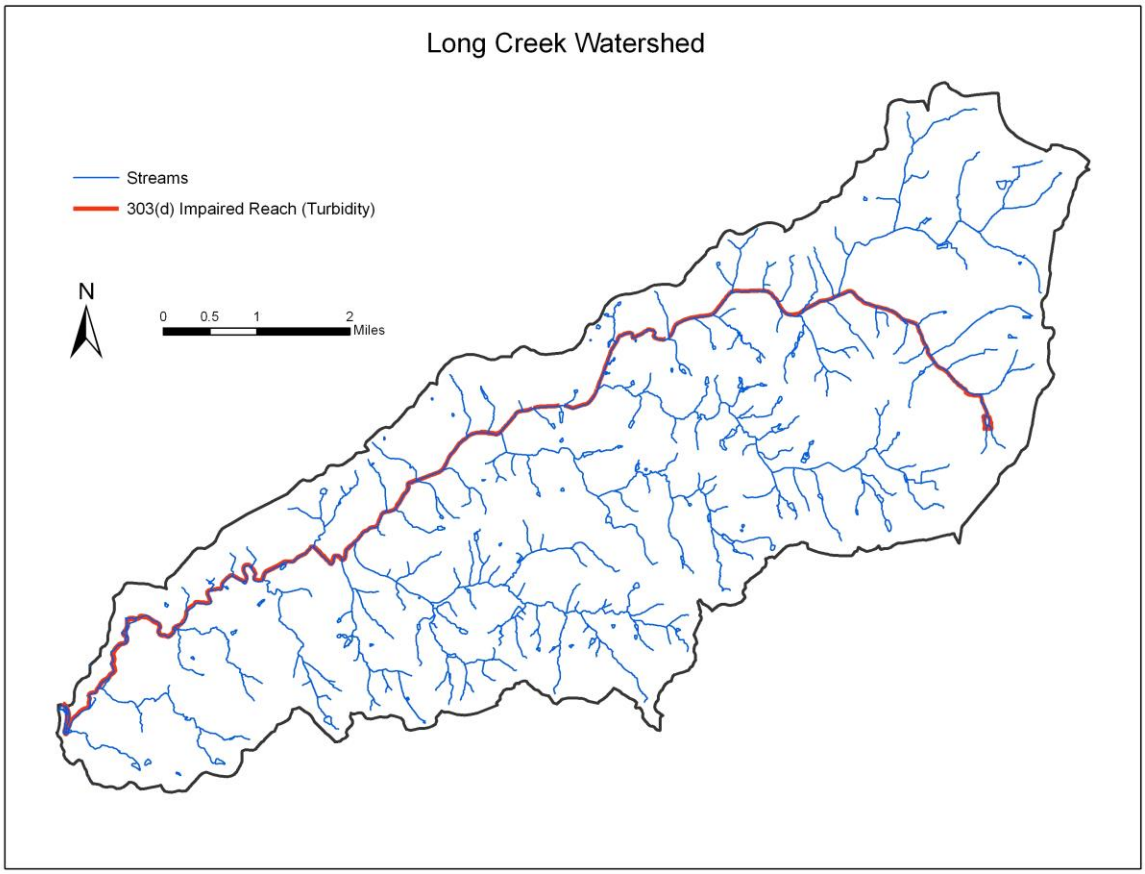

Figure 5-2: Long Creek Watershed

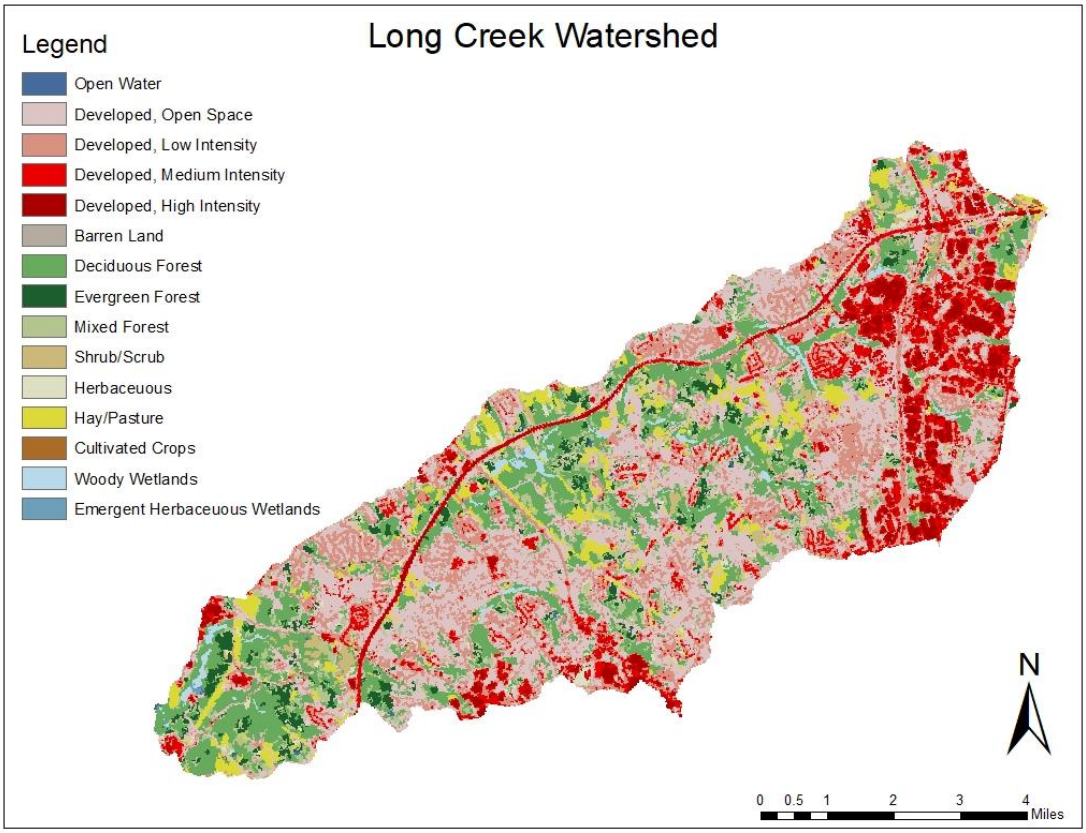

Figure 5-3: Long Creek Watershed Land Uses

5.2 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 10% impervious cover. **Figures 5-4 through 5-6** 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.

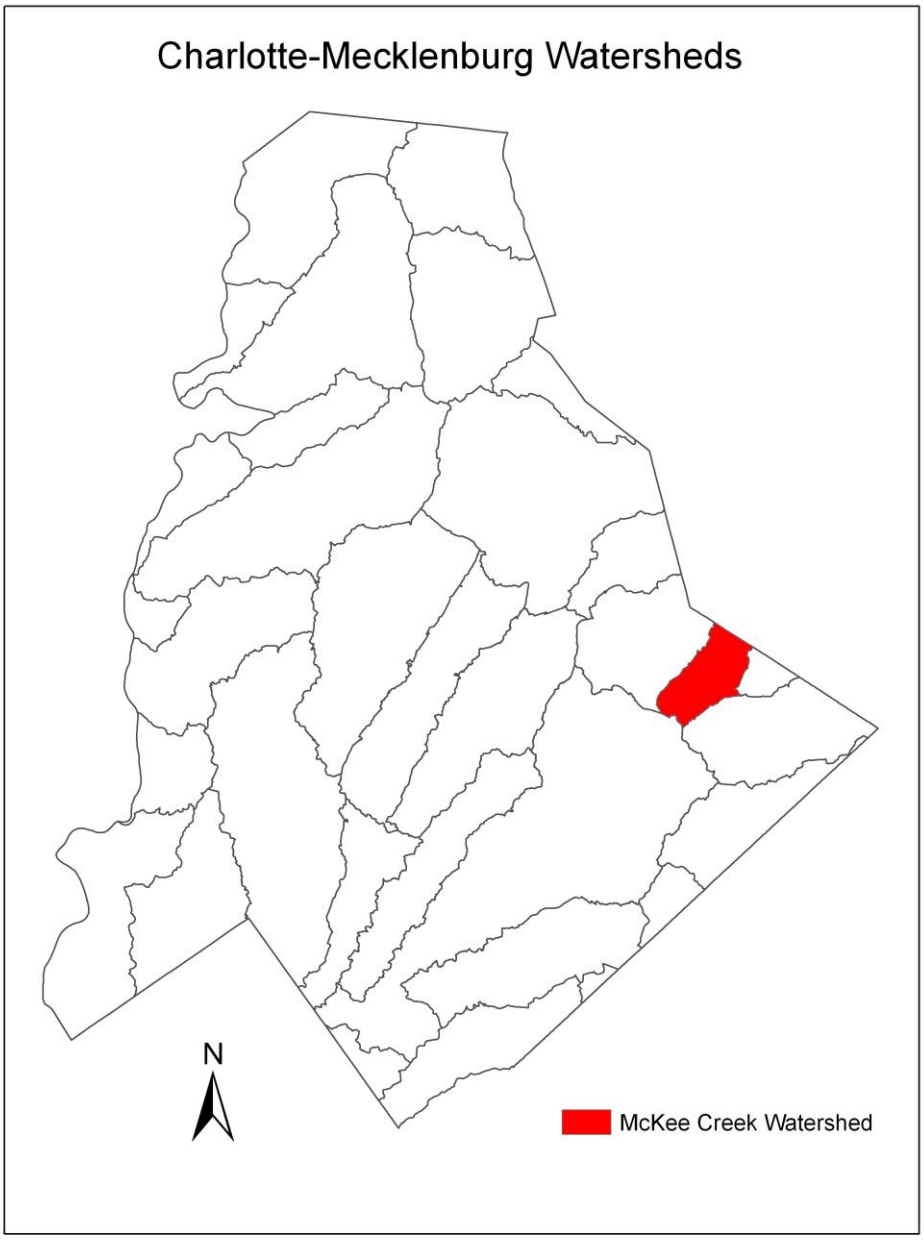

Figure 5-4: Charlotte-Mecklenburg Watersheds

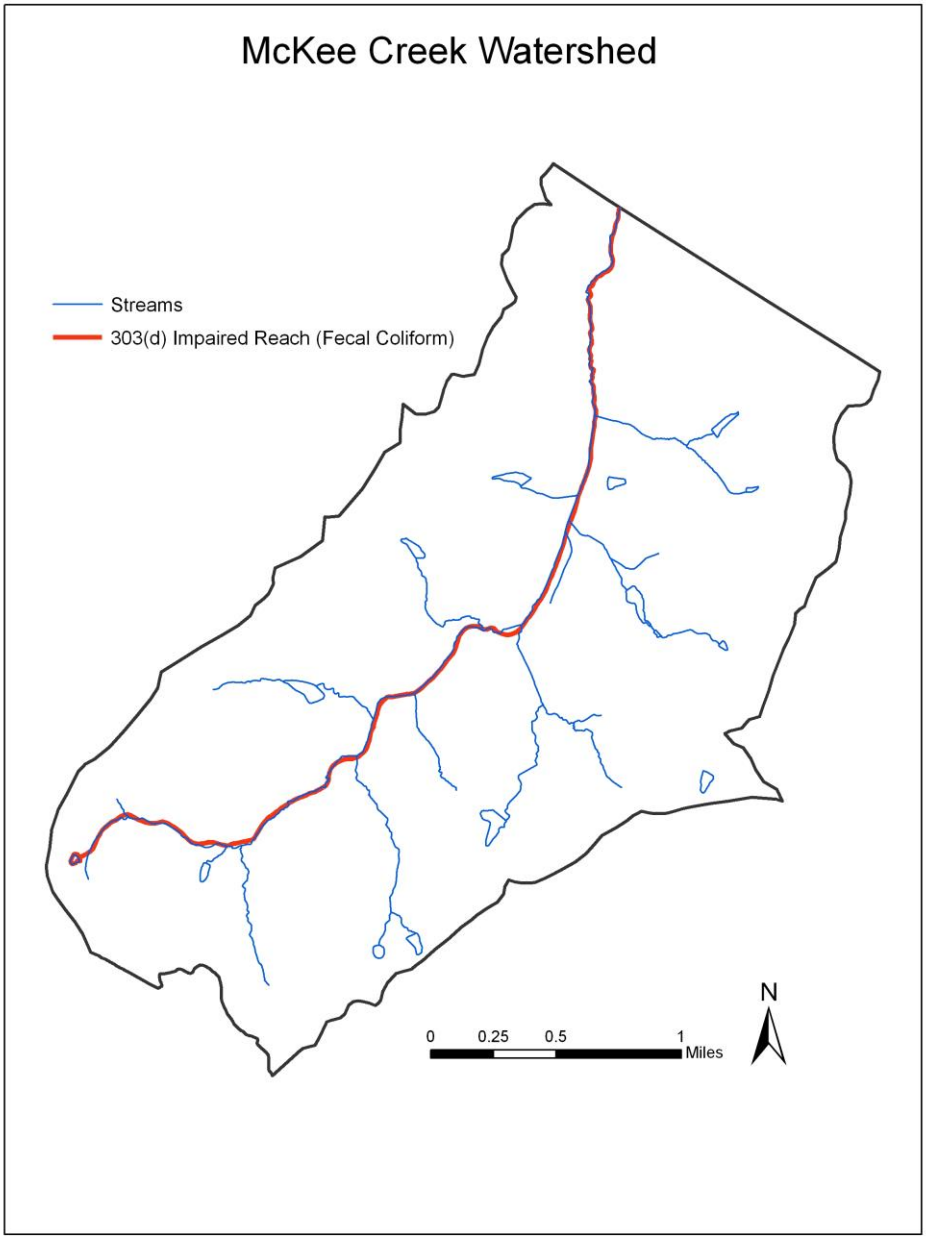

Figure 5-5: McKee Creek Watershed

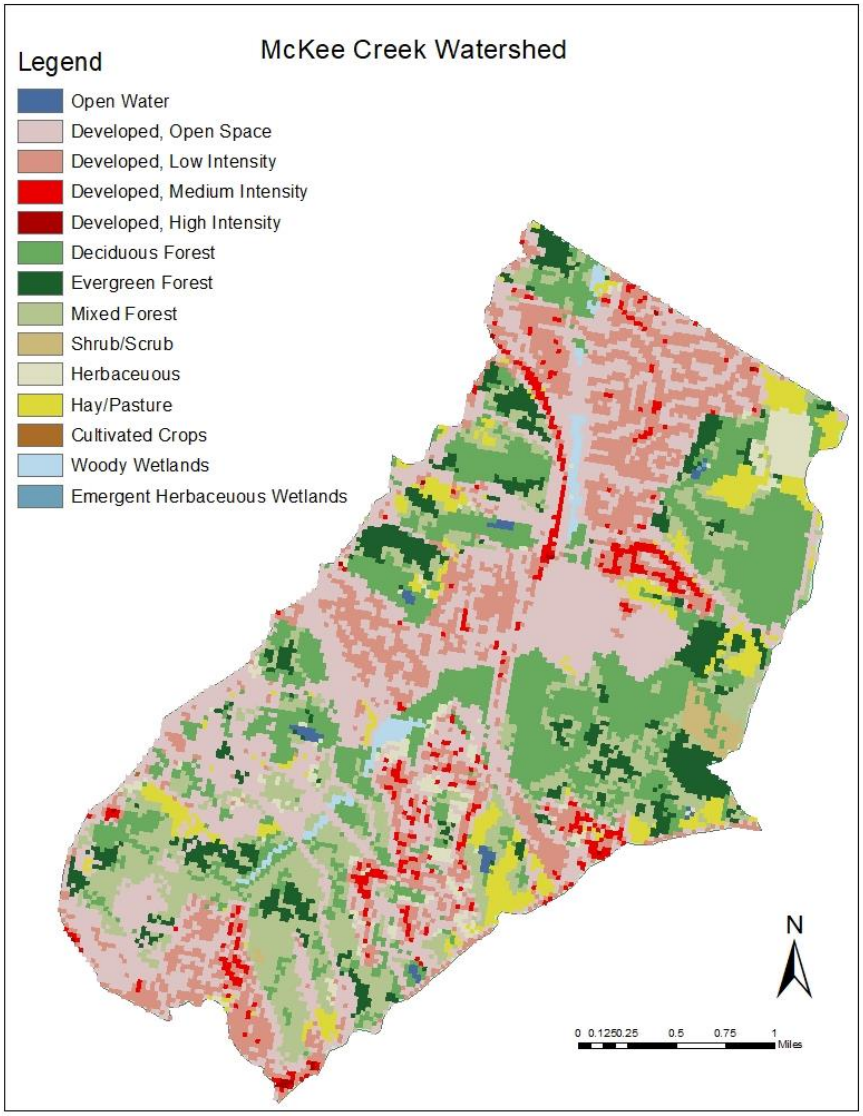

Figure 5-6: McKee Creek Watershed Land Uses

5.3 Steele Creek Watershed

The Steele Creek watershed originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin (HUC 030501030108). The upper portion of the watershed within NC is approximately 15.6 square miles with about 16% 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 5-7 through 5-9** 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.

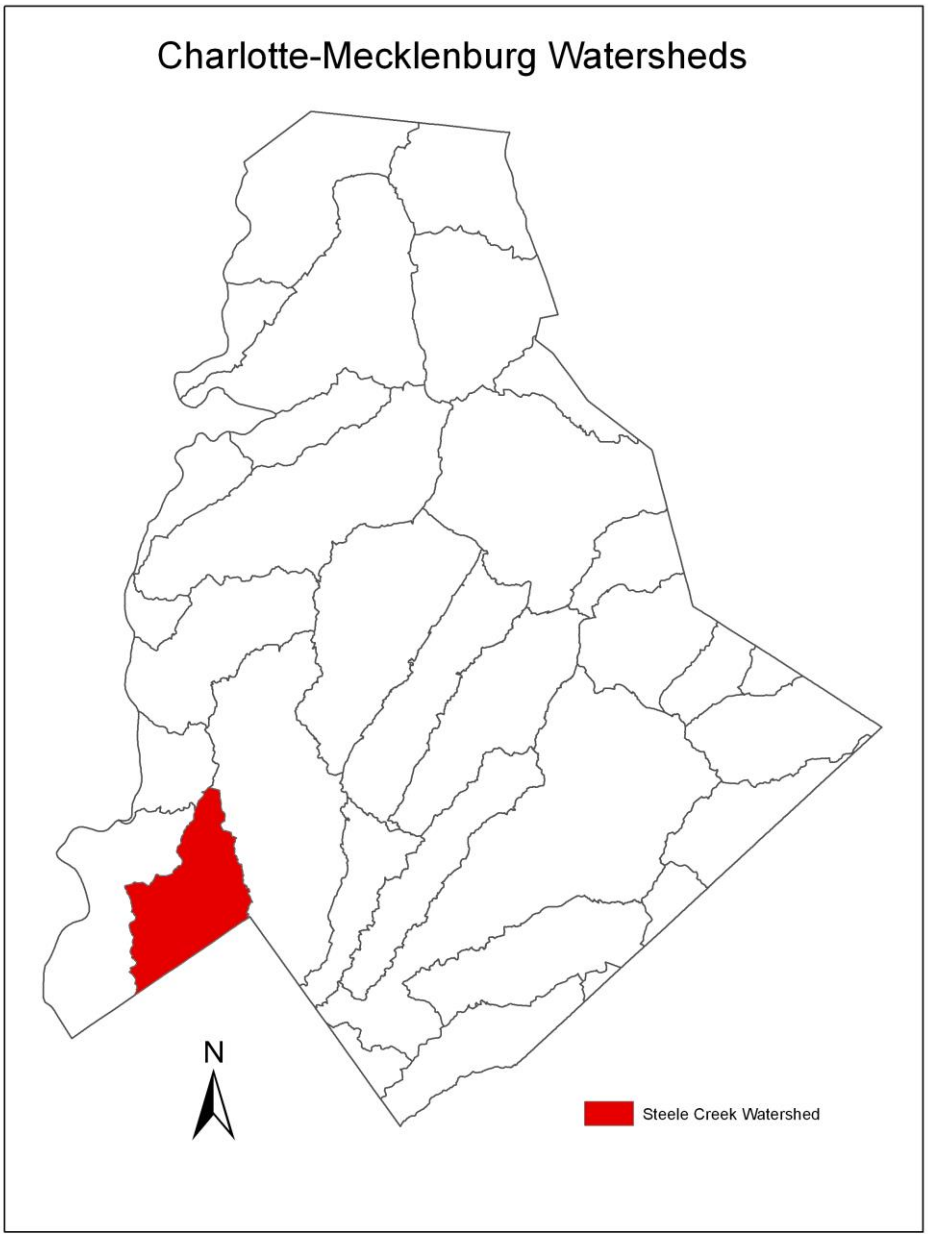

Figure 5-7: Charlotte-Mecklenburg Watersheds

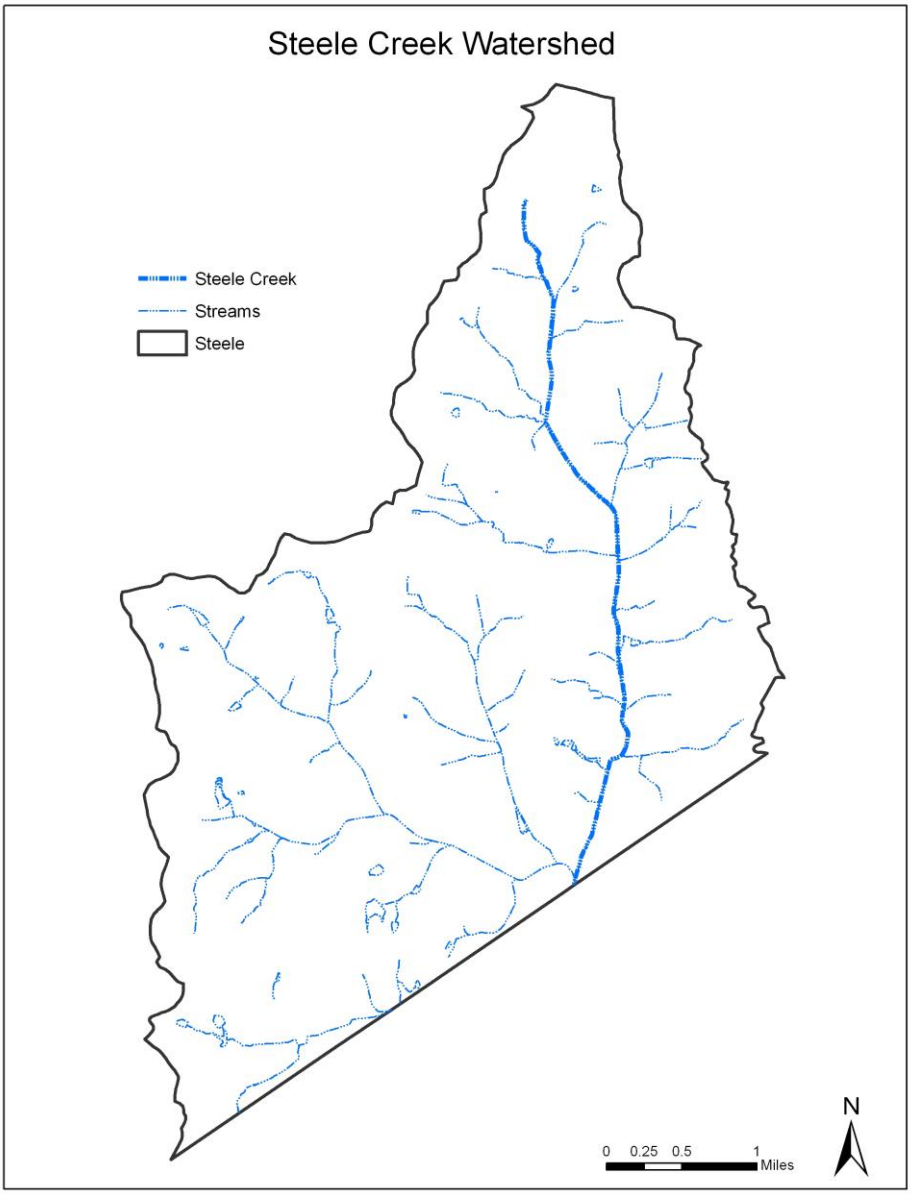

Figure 5-8: Steele Creek Watershed

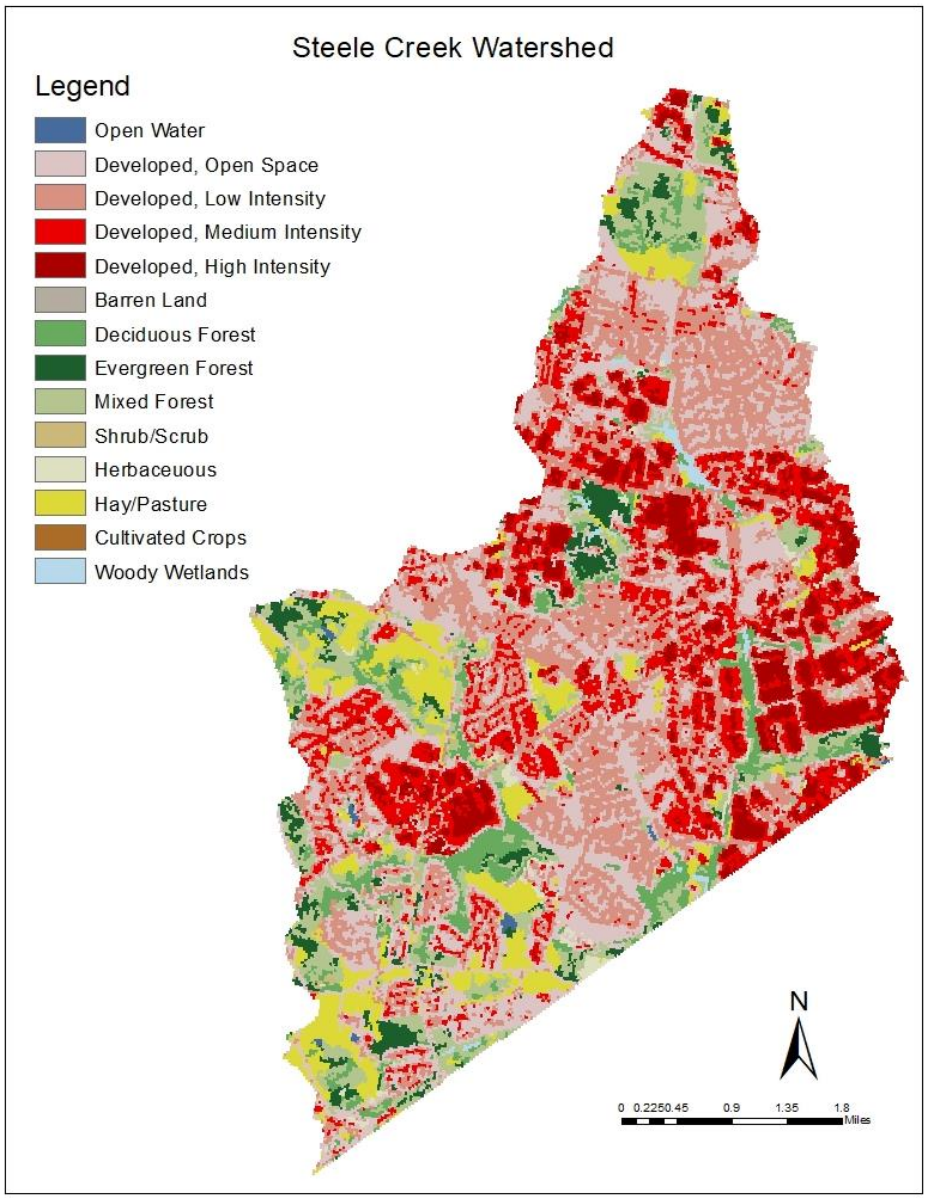

Figure 5-9: Steele Creek Watershed Land Uses

5.4 Sugar/Irwin Creek Watershed

Sugar Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 5-10 through 5-12** 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 5-11** 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 22% impervious while the Sugar Creek drainage area is about 37.5 square miles with about 16% impervious cover.

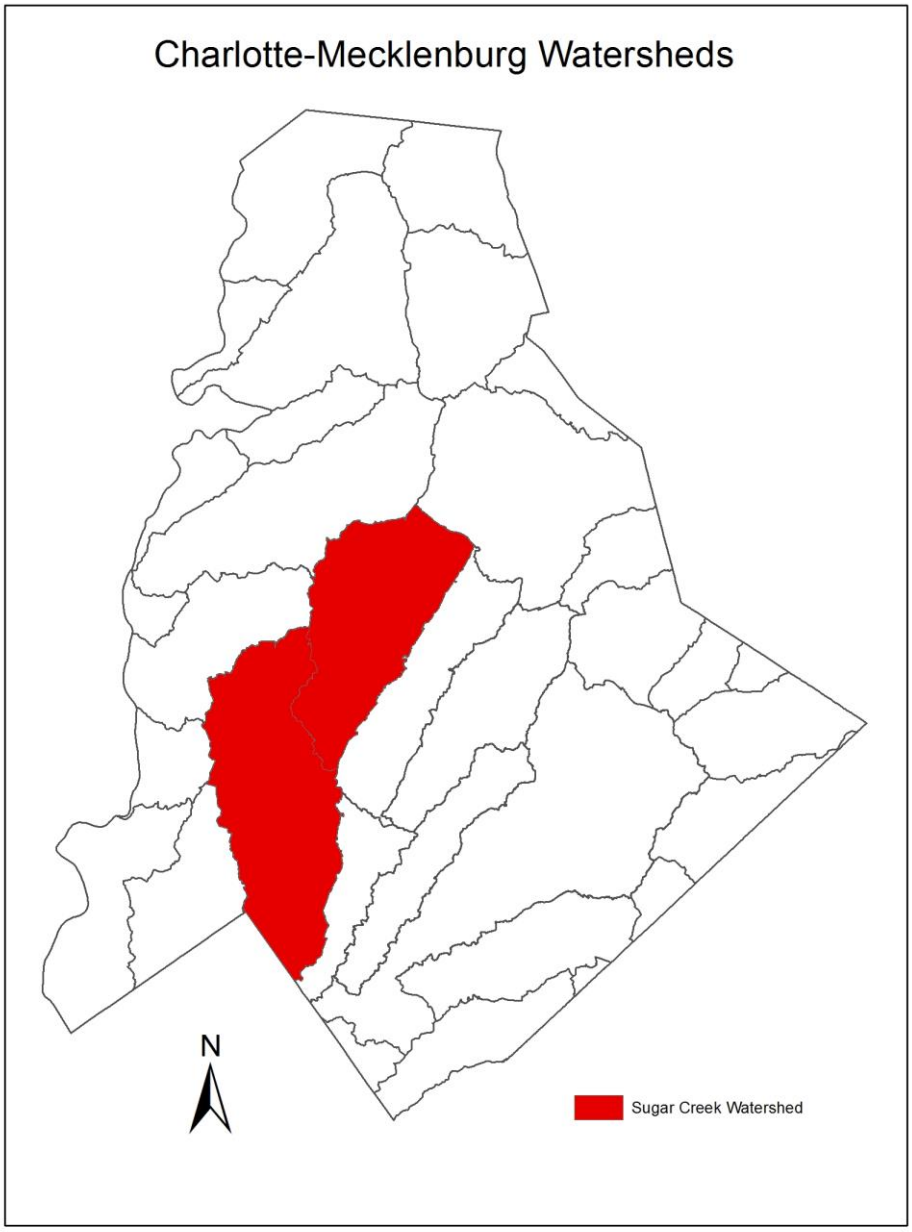

Figure 5-10: Charlotte-Mecklenburg Watersheds

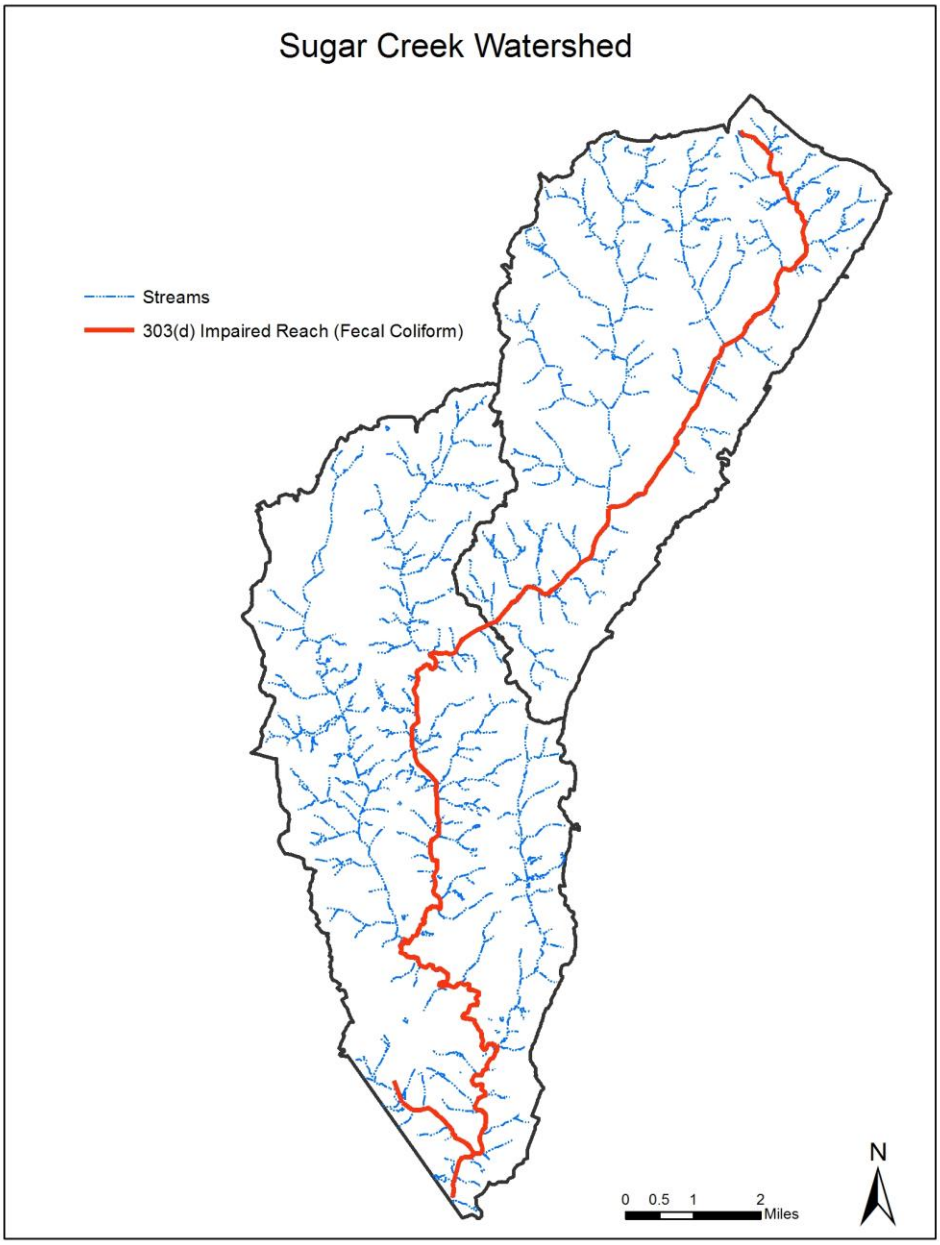

Figure 5-11: Sugar Creek Watershed

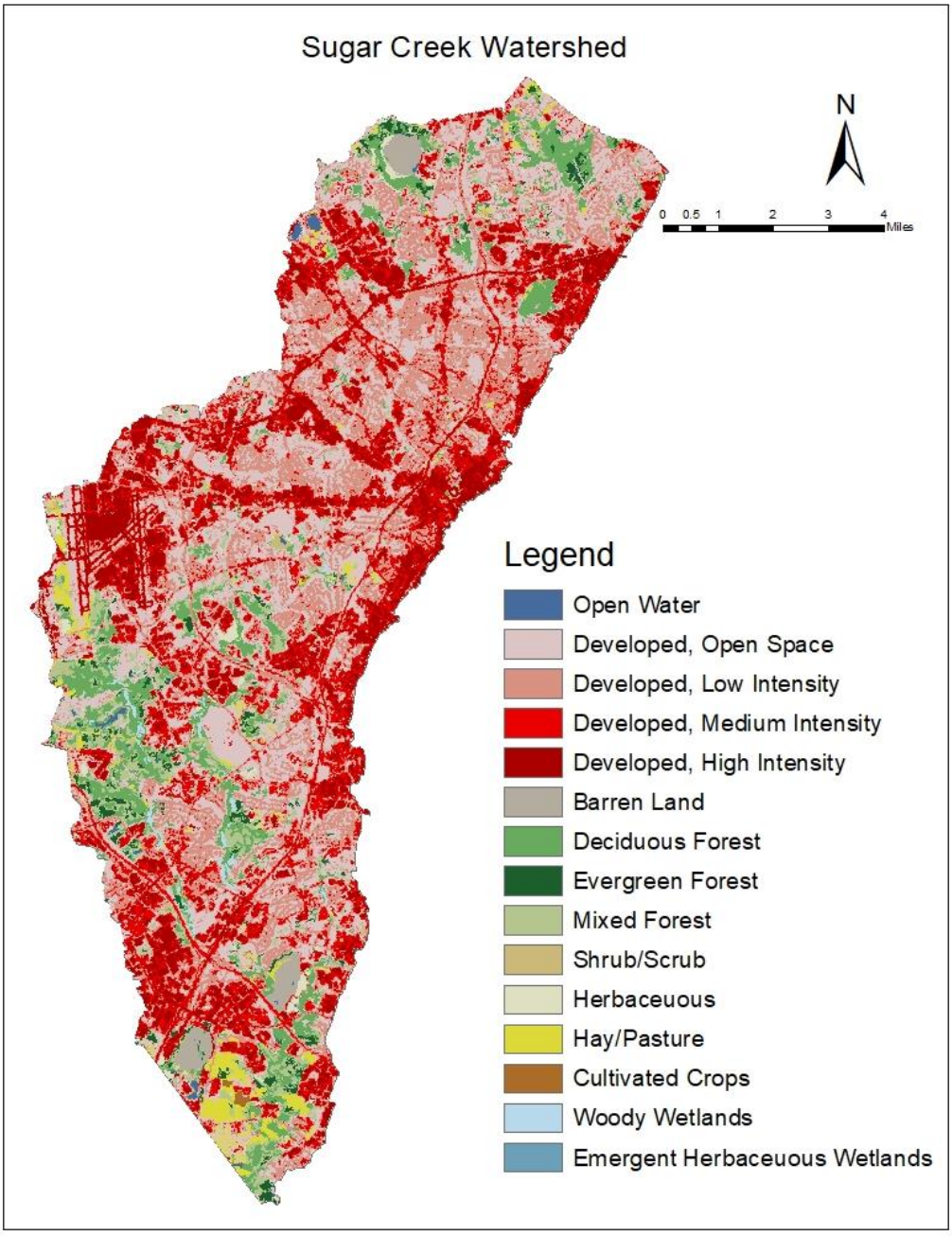

Figure 5-12: Sugar Creek Watershed Land Uses

5.5 Little Sugar Creek Watershed

Little Sugar Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 5-13 through 5-15** 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 5-14** 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 29% impervious, Briar Creek is about 21.6 square miles and 24% impervious, and Lower Little Sugar Creek is about 10.1 square miles and 23% impervious. Little Sugar Creek is located in the DWR 12-digit sub watershed 030501030102.

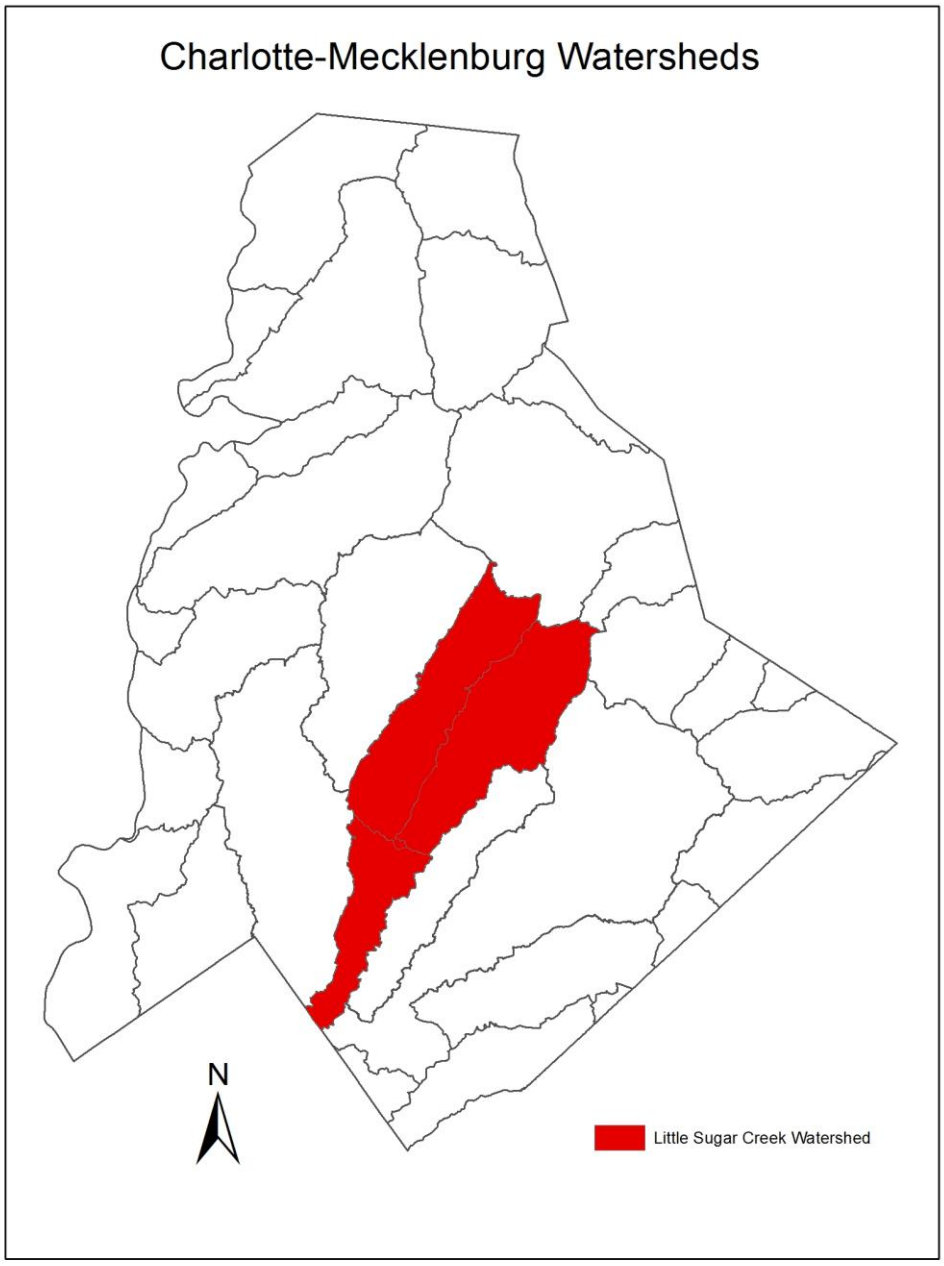

Figure 5-13: Charlotte-Mecklenburg Watersheds

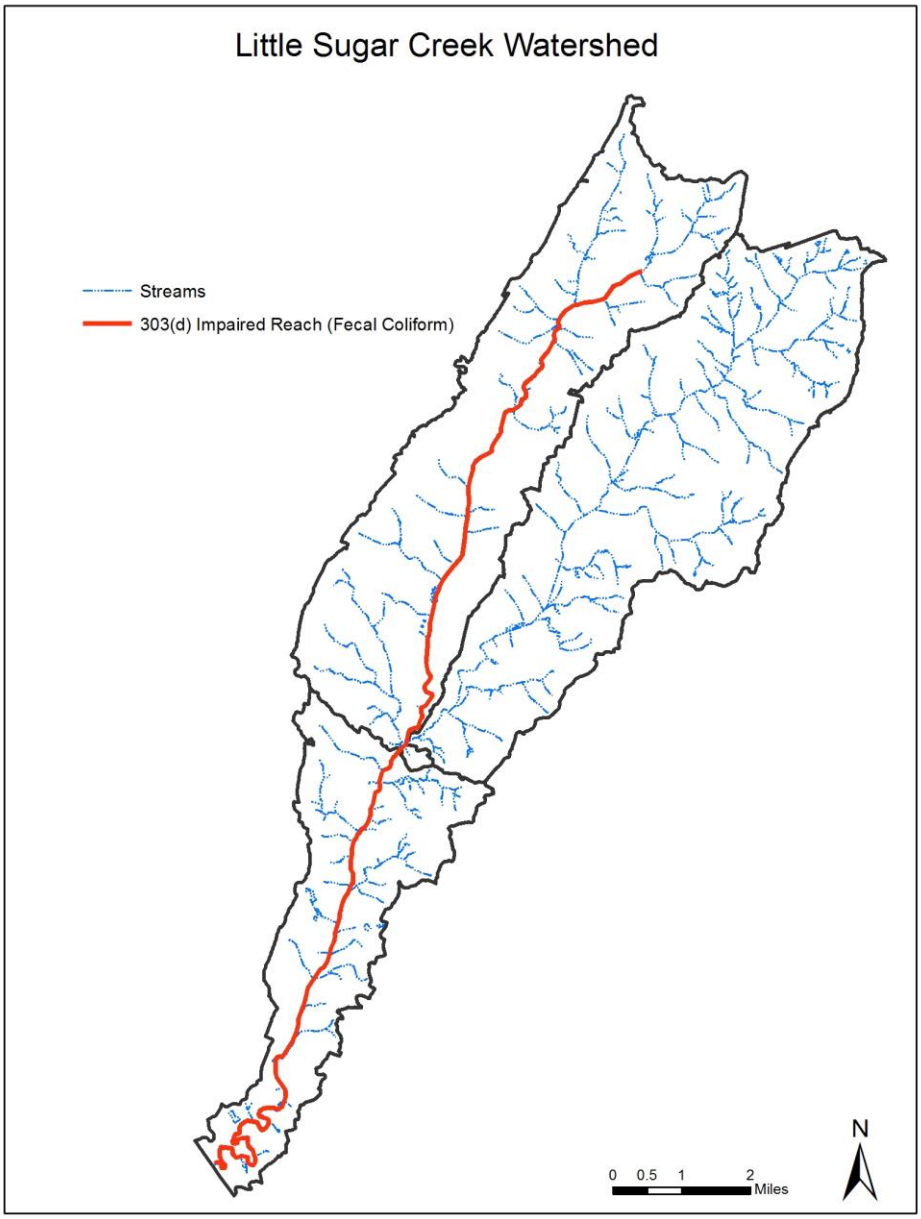

Figure 5-14: Little Sugar Creek Watershed

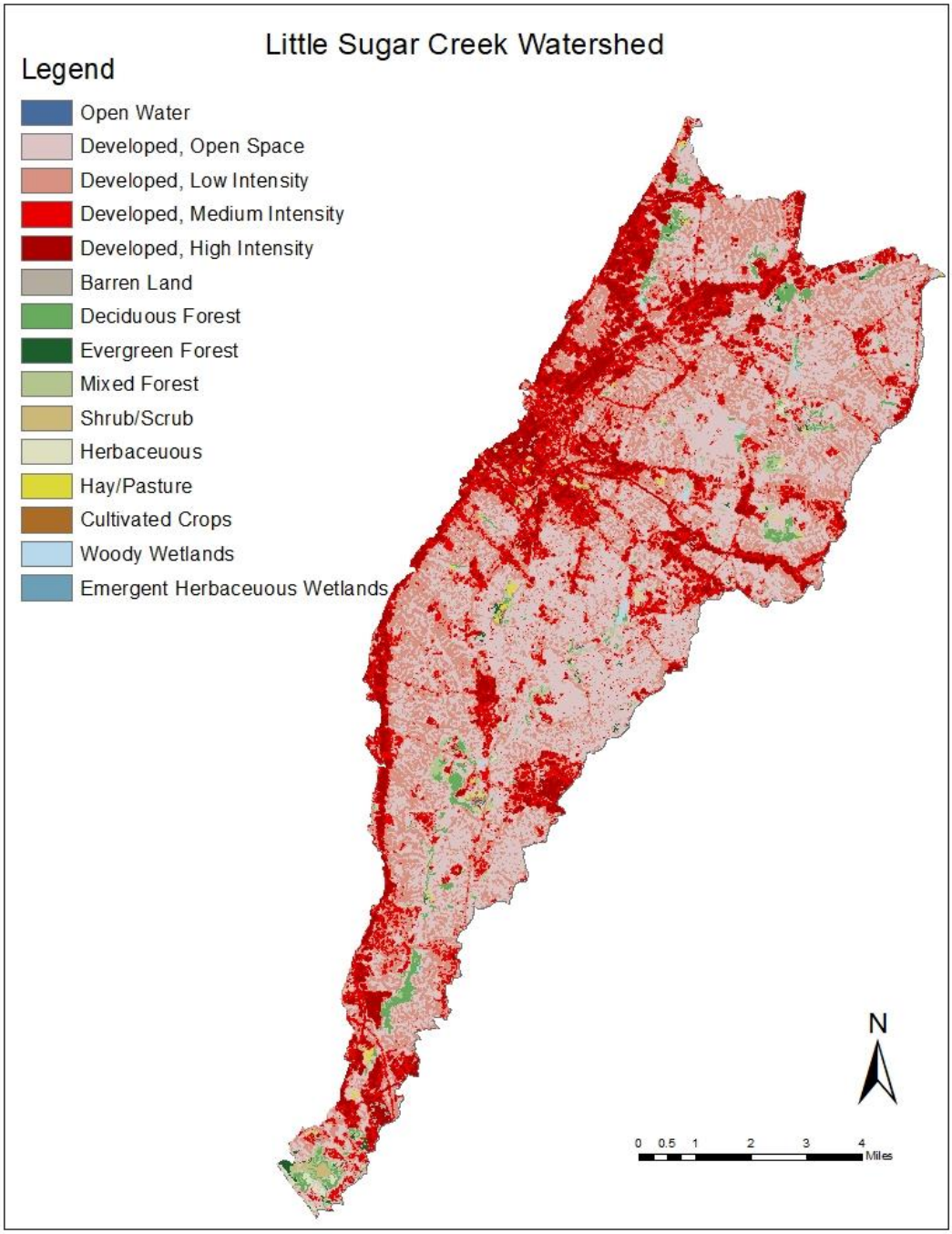

Figure 5-15: Little Sugar Creek Watershed Land Uses

5.6 McAlpine Creek Watershed

McAlpine Creek originates in Mecklenburg County, NC and drains to York County, SC in the Catawba River Basin. **Figures 5-16 through 5-18** 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 5-**

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 18% impervious, McMullen Creek is about 15.2 square miles and 22% impervious, and Four Mile Creek is about 18.6 square miles and 16% impervious. McAlpine Creek is located in the DWR 12-digit sub watershed 030501030104.

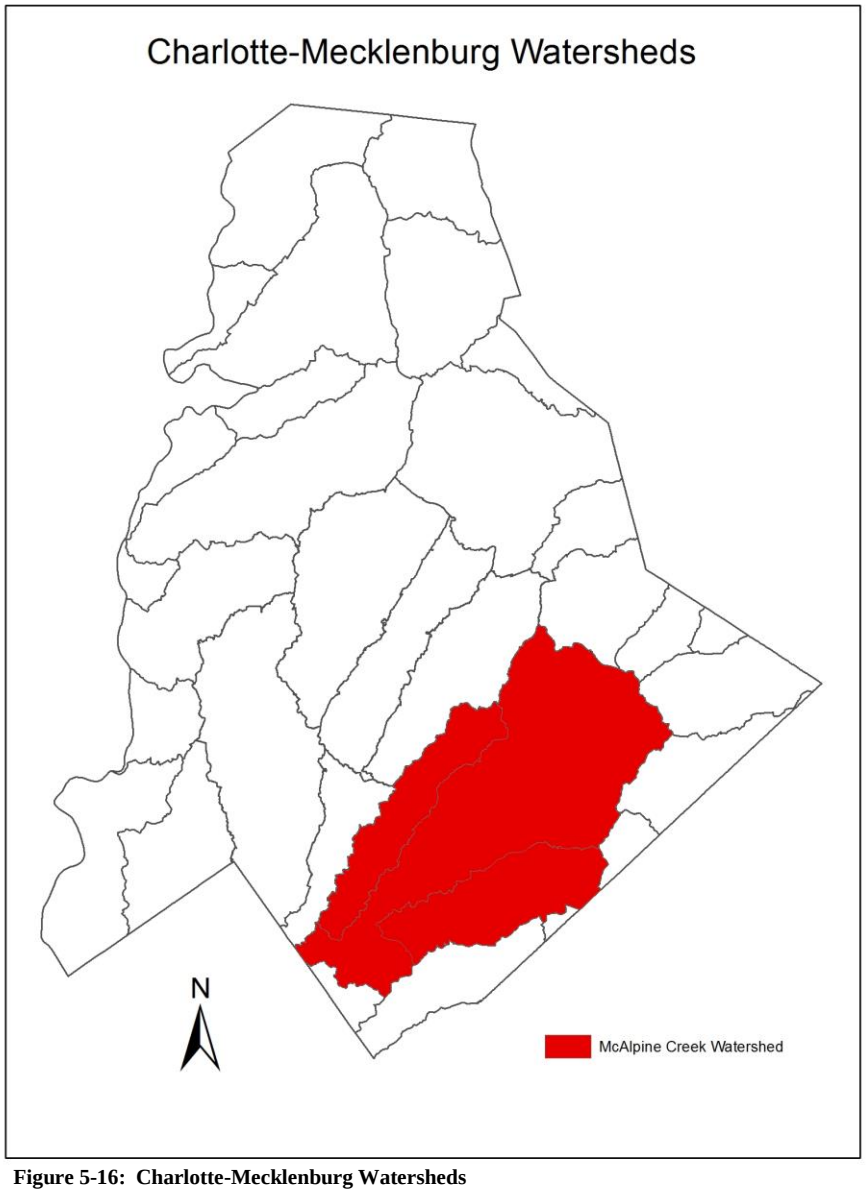

Figure 5-16: Charlotte-Mecklenburg Watersheds

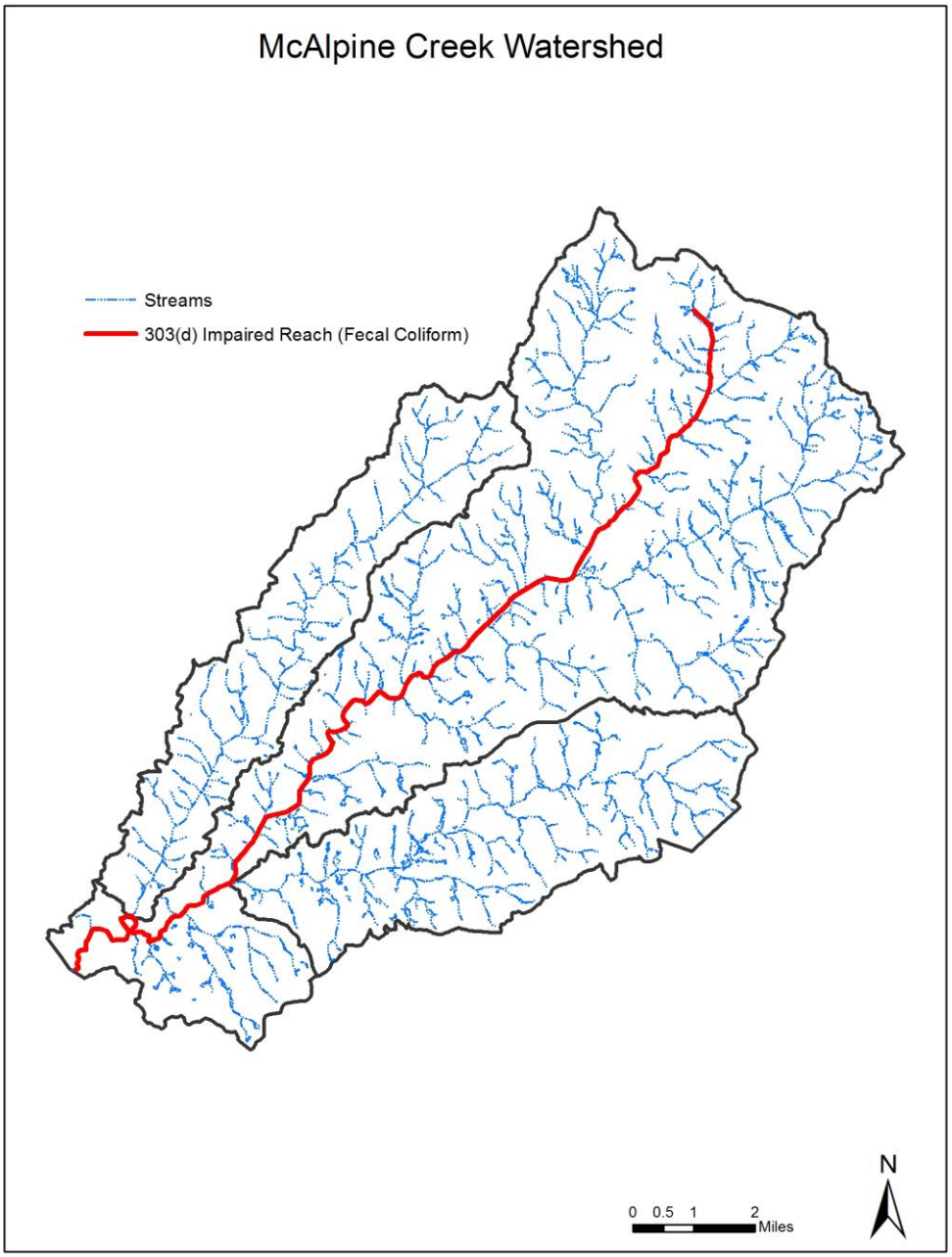

Figure 5-17: McAlpine Creek Watershed

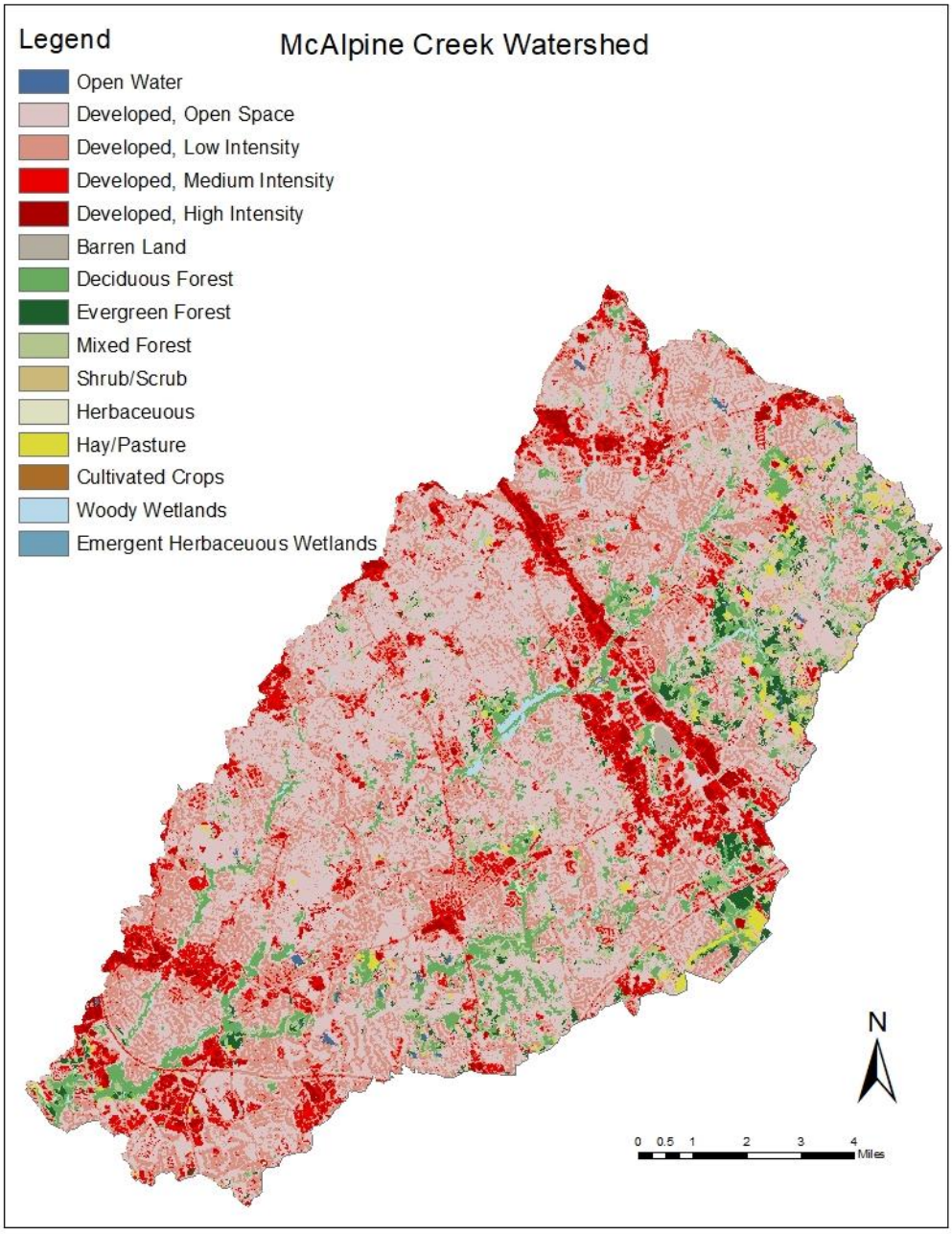

Figure 5-18: McAlpine Creek Watershed Land Uses

Section 6: MS4 Outfall Identification

The 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 outfalls for this plan is 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	4,310
Long Creek	1,742
McAlpine Creek	7,120
McKee Creek	166
Steele Creek	851
Sugar Creek	4,631

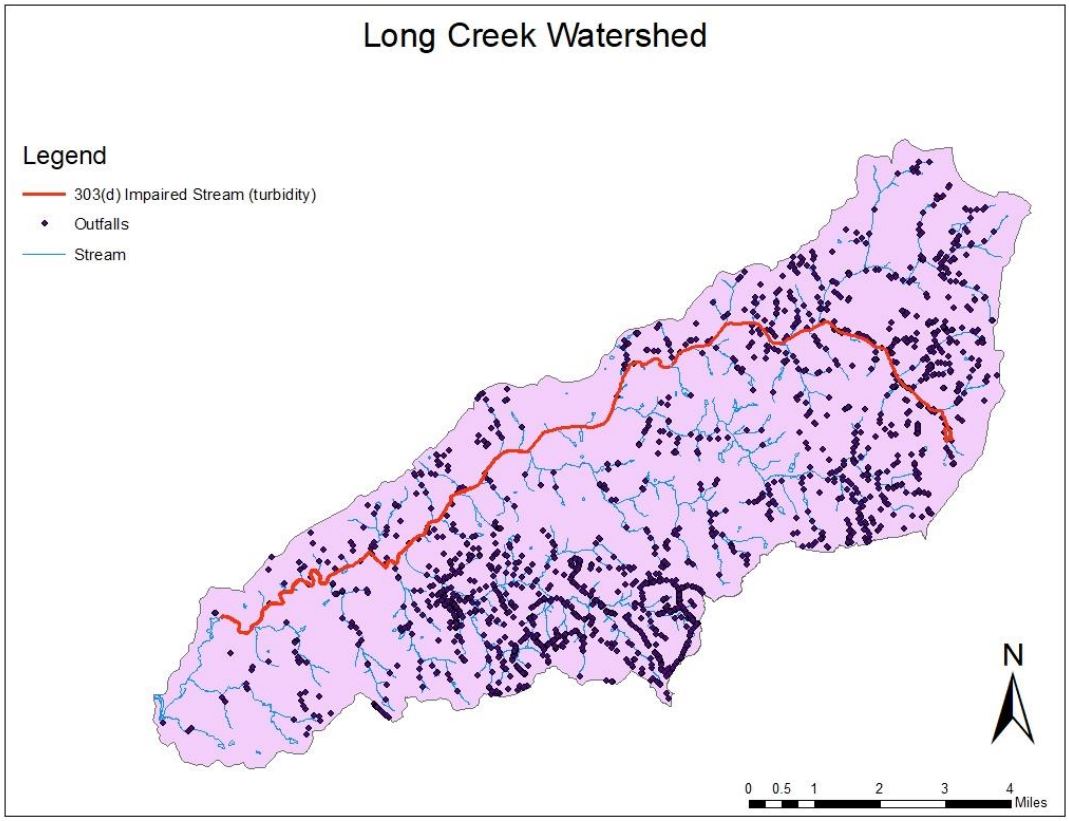

Figure 6-1: Long Creek Watershed Outfalls

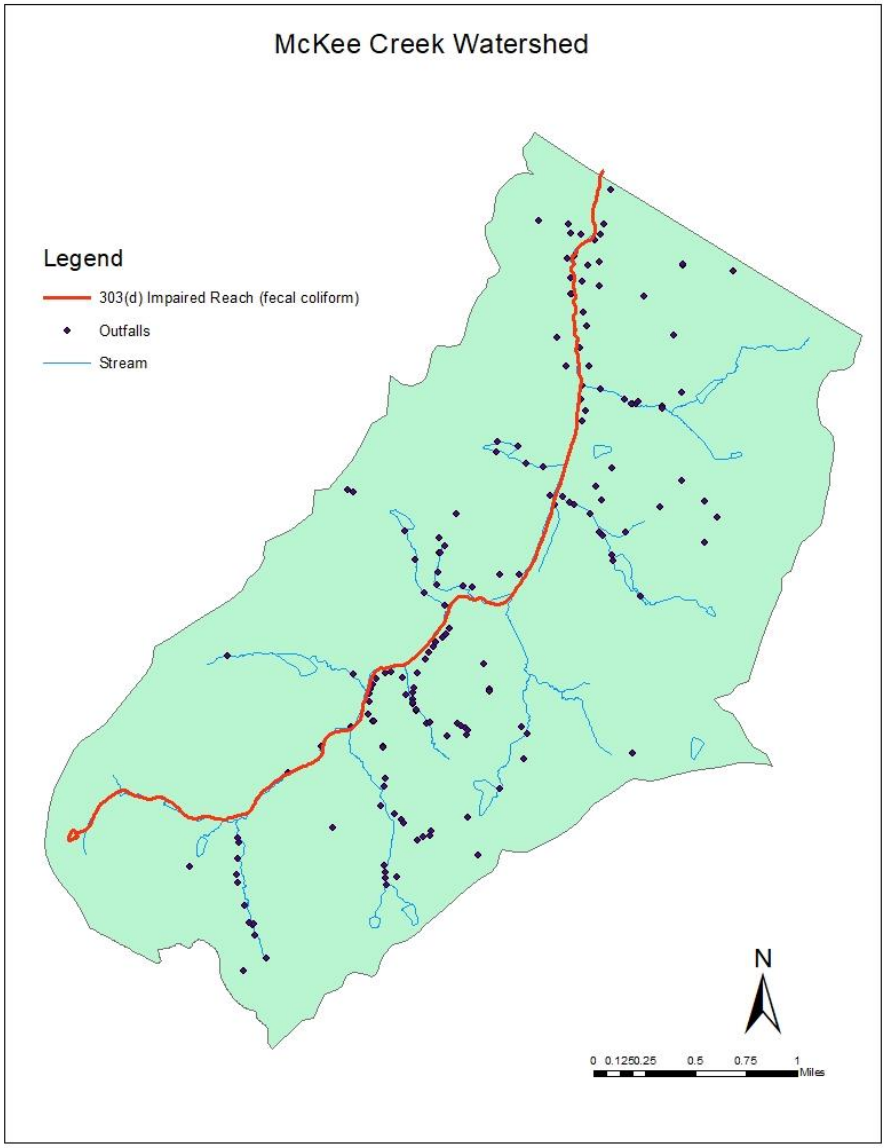

Figure 6-2: McKee Creek Watershed Outfalls

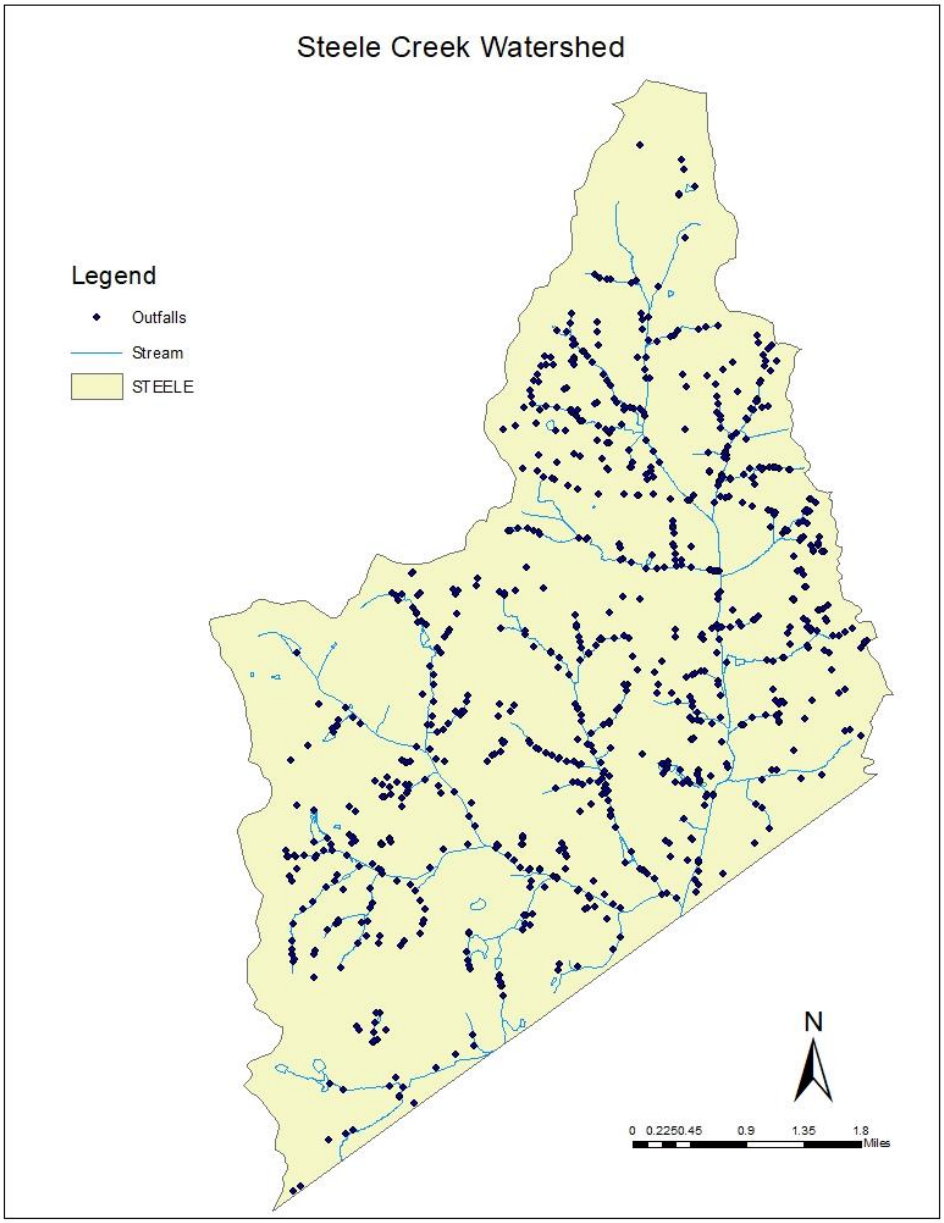

Figure 6-3: Steele Creek Watershed Outfalls

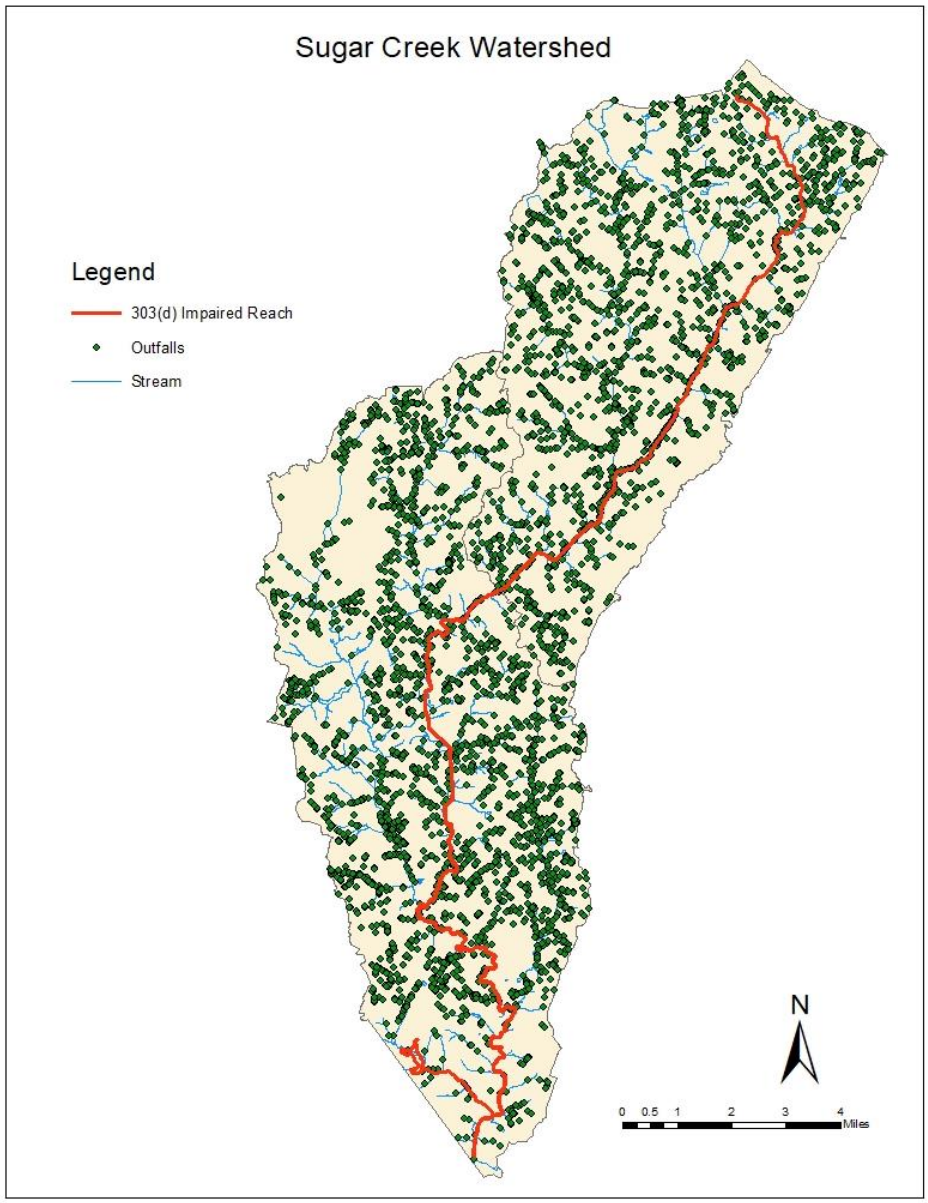

Figure 6-4: Sugar Creek Watershed Outfalls

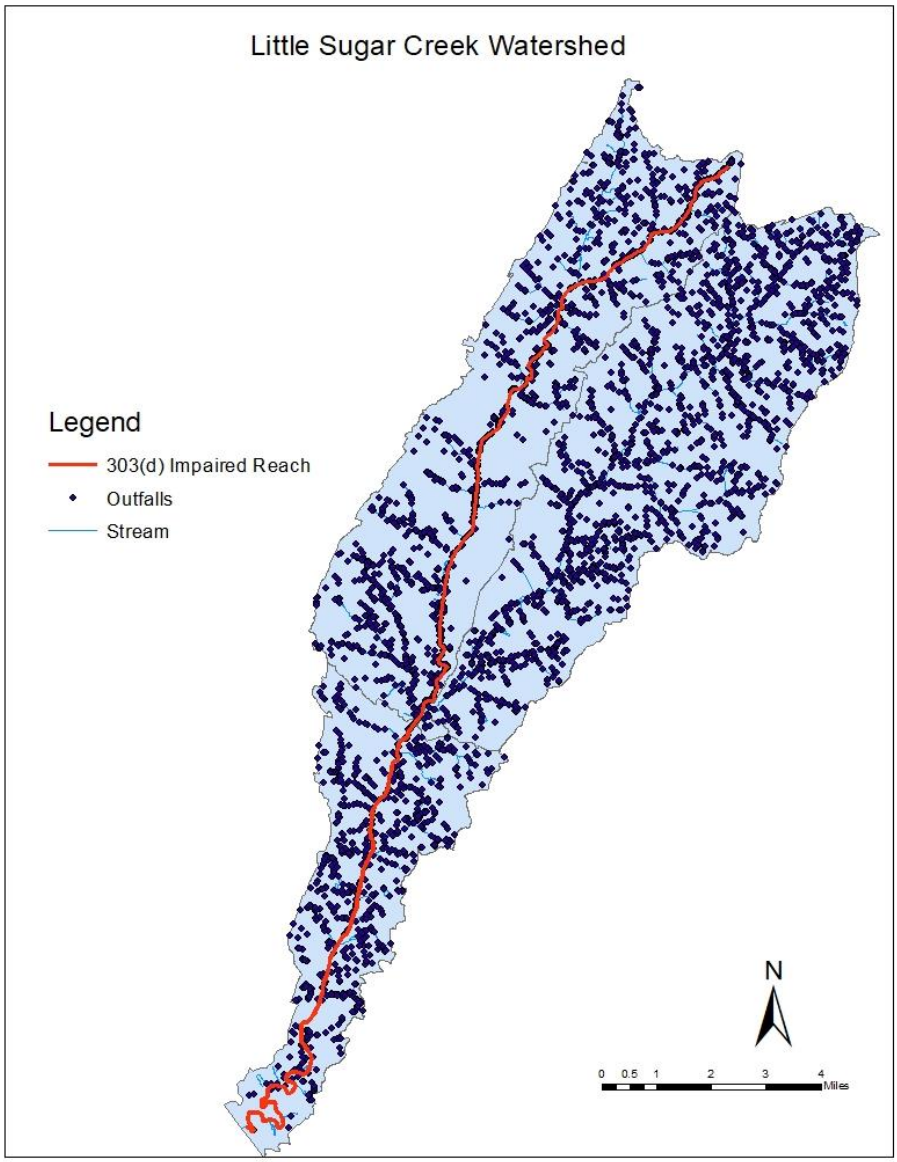

Figure 6-5: Little Sugar Creek Watershed Outfalls

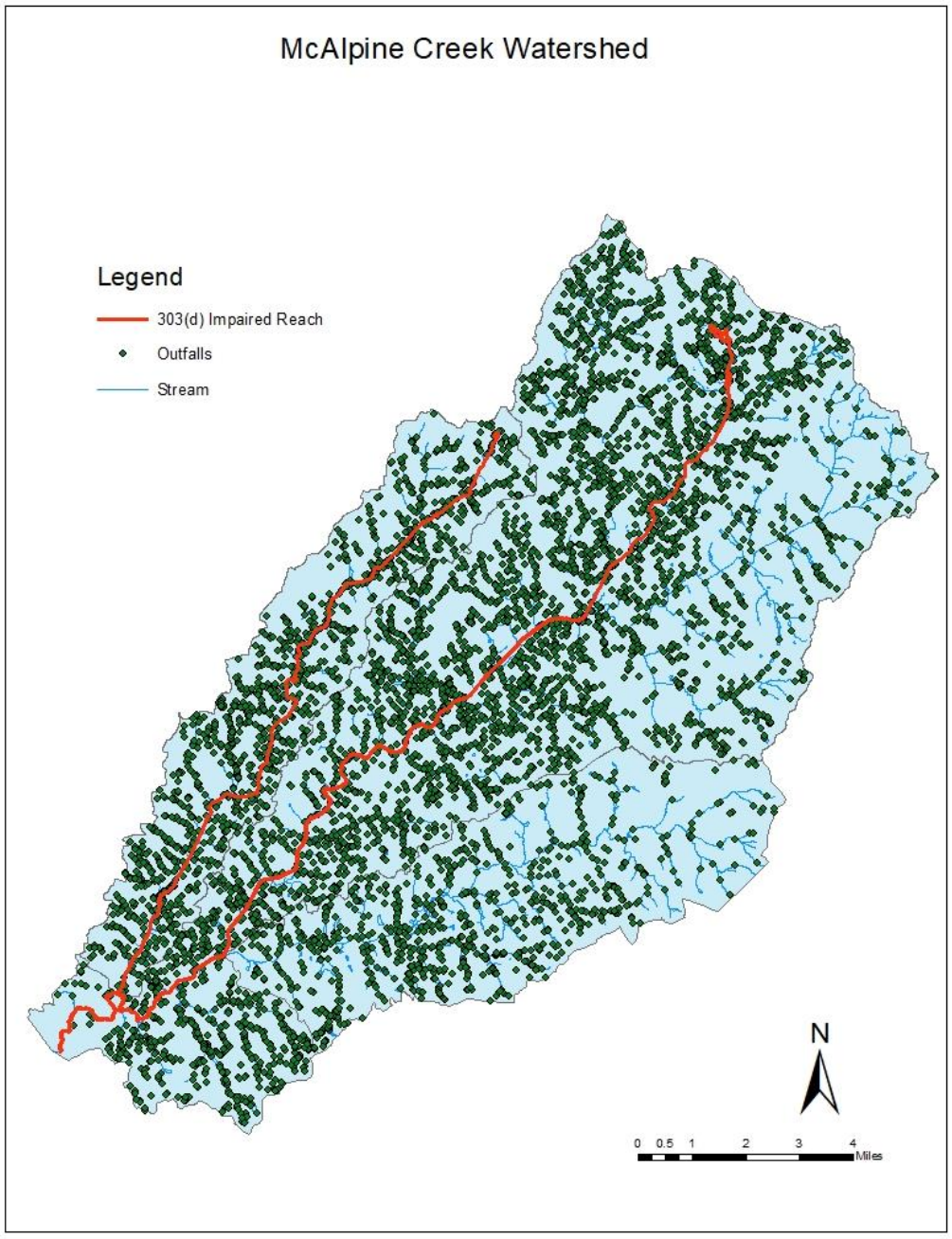

Figure 6-6: McAlpine Creek Watershed Outfalls

Section 7: 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 surface 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 measures, as 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. **Please Note: Some BMPs, such as those involving public interaction activities, may be temporarily suspended or limited during FY2021 due to COVID-19 precautions.**

7.1 Public Education & Outreach

7.1.1 Print Materials

Print materials such as utility bill inserts, brochures, flyers, and environmental notices are distributed to the public in a variety of ways to help educate them about surface 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, digital advertising and print media to communicate surface 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” is 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 surface water quality issues and programs, including pollution prevention, public reporting of problems, and volunteer opportunities.

7.1.5 Social Media

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

7.1.6 Public Hotline/Helpline

The City, in cooperation with Mecklenburg County, operates a joint customer service hotline to receive information about a variety of concerns. Citizens can call 311 to report pollution, erosion control issues, flooding, and blockages to the drainage system as well as request other City/County services. The 311-call center is staffed to receive calls Monday through Friday from 7 am to 7 pm. Citizens can also submit requests for service to 311 online anytime (24/7/365).

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 a number of public events and provides a wide variety of presentations to promote and communicate surface water quality and pollution prevention messages to the public each year.

7.1.9 Fats, Oils, Grease and Wipes Program

The City's utility department (Charlotte Water) maintains a public education program focused on keeping food related fats, oils, grease and wipes 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 surface 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 Spring Clean

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 twice per year and they are provided garbage bags, gloves and trash grabbers. Volunteers can also participate in Big Spring Clean 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 surface water quality. One way is that volunteers are provided test kits for collecting physical surface water quality data and the means to report this information back to CMSWS. A second way is volunteers are trained to visually assess streams for pollution problems and then are assigned stream locations to monitor visually and report back any detected problems. 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 and maintain 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. This BMP is only implemented within the City's corporate limits.

7.3 Illicit Discharge Detection and Elimination (IDDE)

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

CMSWS staff walks sub basins of all watersheds within the City on a five-year rotational basis to look for dry weather flows, pollution problems, illegal dumping, illicit discharges, and SSOs. As part of this effort, staff inspect MS4 outfalls and conduct monitoring. When indicated by observations and monitoring results, staff follow up to identify and eliminate pollution sources.

7.3.2 Multi-Family Residential Community Initiative

This effort focuses on multi-family residential communities and their sanitary sewer lateral connections. CMSWS staff coordinates with management firms of these communities to ensure their private sewer lateral systems are inspected and properly maintained, and their residents are educated about proper cooking oil, grease and wipes disposal, thus reducing the potential for SSOs from these private systems.

7.3.3 Pollution Control Ordinances

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 ordinances serve as a deterrent to such practices, thus preventing pollution problems.

7.3.4 Septic System Program

The County maintains a septic system permit 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 repaired and any discharges from these systems to the MS4 or surface waters are corrected.

7.3.5 Municipal Employee Education on IDDE

As part of the City and County NPDES MS4 programs, municipal employees receive education about recognizing illicit discharges and the various methods for reporting suspected surface water and water pollution problems. This program provides the information necessary for employees to recognize and report illicit discharges that may be discovered while performing their regular job duties in the field.

7.3.6 Illicit Discharge Elimination Program (IDEP)

This program supports the IDDE program by conducting targeted investigations in priority problem areas by quickly assessing multi-family residential communities, business corridor areas, and target industries for illicit discharges. These programs allow for numerous quick assessments in a variety of targeted areas, businesses, and industries known for potential illicit discharges.

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 helps to 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, lift station inspection and maintenance, and inspections of the public sewer system in targeted areas known for potential sanitary sewer overflows.

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.

7.3.10 Citizen Service Request Response

CMSWS maintains a service request program that provides response and investigations to reports from the public concerning stormwater and pollution issues, illicit discharges, illicit connections, spills, environmental emergencies, and SSOs. Staff follow up to ensure that identified pollution issues are eliminated and the impacts are remediated.

7.3.11 Investigations into Stream Monitoring Data Exceedances

City and County staff conduct follow-up field investigations in response to monitoring data "action/watch" level exceedances from fixed interval monitoring conducted under the TMDL monitoring strategy.

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, construction, performance and maintenance 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 erosion control measures and structural BMPs are in place and operating properly.

7.4.4 Citizen Service Request Response

City and County staff respond to reports from the public concerning erosion control and sedimentation issues.

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

City and County post-construction stormwater ordinances, as well as other watershed protection ordinances and programs, require the use and protection of vegetated buffers on development sites. These 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. The Plans are reviewed each year to ensure that they're being properly implemented and are up to date.

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. This BMP is only implemented within the City's corporate limits.

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. This BMP is only implemented along City-maintained streets within the City's corporate limits.

7.6.5 Yard Waste Collection

The City provides curbside yard waste collection services for City residents for the collection of leaves, grass clippings, and woody debris. Also, the County operates several full-service recycling centers which accept and process yard waste from City and County residents at no charge.

7.6.6 Street ROW Litter Removal

The City provides litter and debris pick-up by City staff along street right of ways (ROWs) and medians on a rotating schedule. This BMP is only implemented within the City's corporate limits.

7.6.7 Street Dead Animal Removal

The City provides dead animal pick-up by City staff on City-maintained streets, ROWs, and medians as needed. This BMP is only implemented within the City's corporate limits.

7.7 Industrial Facilities Evaluation and Monitoring

7.7.1 Facility Inspections and Monitoring

The City and County conduct inspections and monitoring of industrial facilities to ensure that they are implementing good housekeeping and stormwater pollution prevention practices. These inspections and monitoring activities ensure any detected pollution problems are corrected to reduce the discharge of stormwater pollutants to the MS4 and surface waters.

7.8 Surface 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 surface 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: Implementation Strategy for BMP Measures

The BMP Measures identified in Section 7 are currently being implemented in the TMDL watersheds as noted. The identified BMP measures are all ongoing (conducted throughout the year) or annual (conducted during specific time frames each year). As noted in Section 7, some BMPs, such as those involving public interaction activities, may be temporarily suspended or limited during FY2021 due to COVID-19 precautions.

Section 9: Monitoring Strategy

The monitoring strategy for the TMDL watersheds was developed during 2016 as required by the NPDES MS4 permit schedule applicable at that time. The current monitoring strategy is shown in Appendix A.

Section 10: WQ Data Assessment

Fixed interval surface water quality data collected from 2006 through 2019 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 October 10, 2018, states that the "MS4 Permittee is not responsible for attaining surface 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 utilizes fixed interval surface water data to determine surface water quality trends. The data presented below, while illustrating how in-stream surface 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.

10.1 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.4 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** is discussed in this sub-section.

10.1.1 McKee Creek

Fixed interval stream data for fecal coliform was collected at the CMSWS monitoring site MY7B on McKee Creek. A summary of the data collected from July 2006 through July 2019 is provided in **Figure 10-1**. A total of 157 samples have been collected over this period under the fixed interval monitoring program. Of these, 53% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

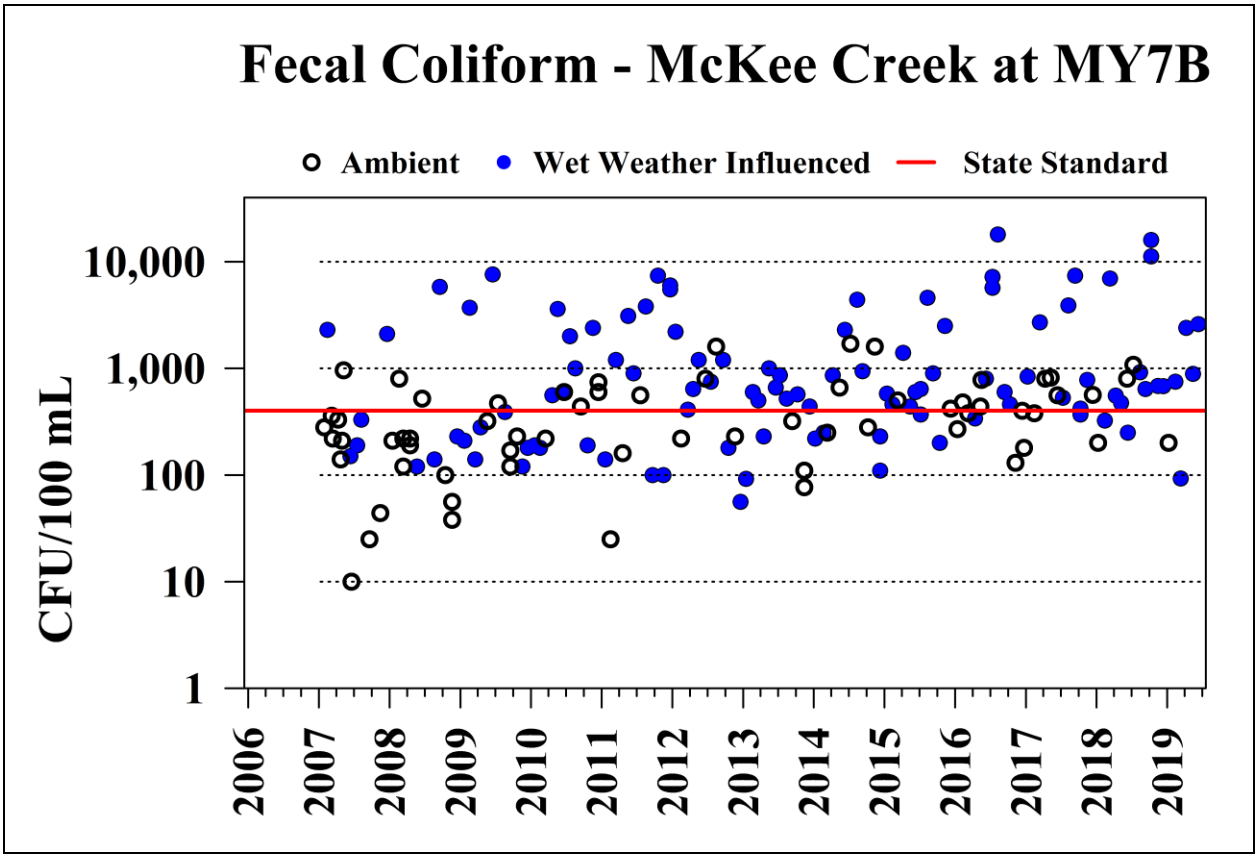

Figure 10-1: McKee Creek - MY7B - Overall Monitoring Data

10.1.2 Steele Creek Watershed

Fixed interval stream data for fecal coliform were collected at the CMSWS monitoring site MC47A on Steele Creek. A summary of the data collected from July 2006 through July 2019 is provided in **Figure 10-2**. A total of 171 samples have been collected over this period under the fixed interval monitoring program. Of these, 51% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

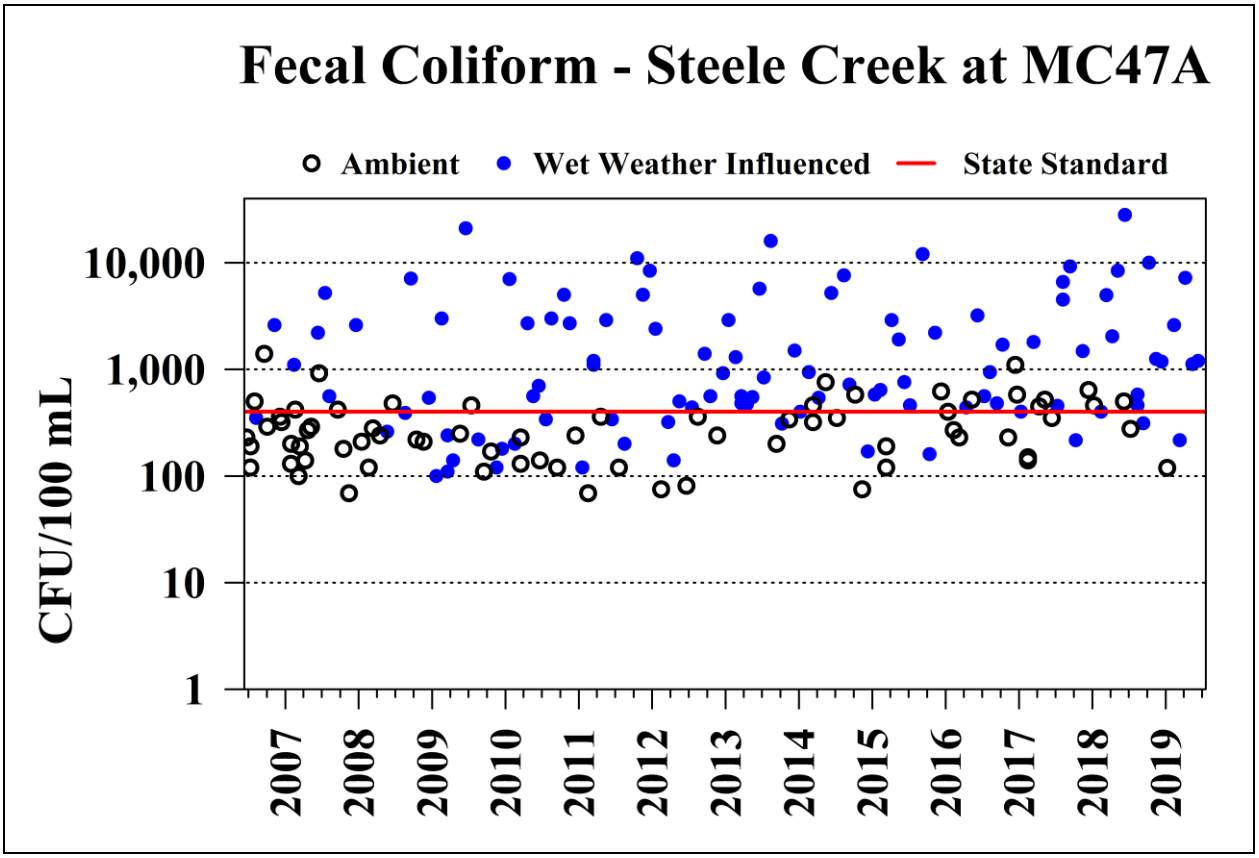

Figure 10-2: Steele Creek - MC47A - Overall Monitoring Data

10.1.3 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 surface 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 2006 through July 2019 is provided in **Figures 10-3 and 10-4**.

A total of 165 samples have been collected at MC27 over this period under the fixed interval monitoring program. Of these, 43% exceeded the 400 cfu/100mL State standard with 90%

confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

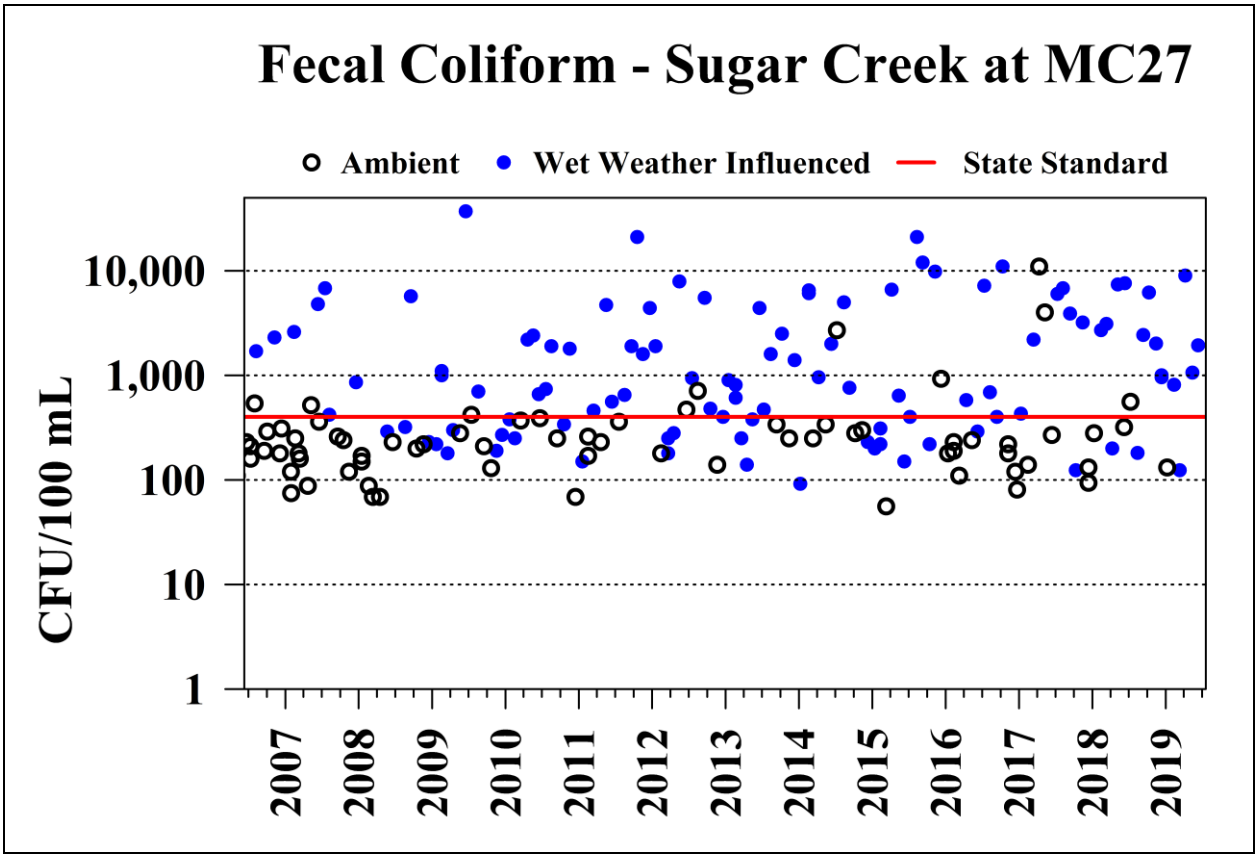

Figure 10-3: Sugar Creek - MC27 - Overall Monitoring Data

During the same period, a total of 162 samples were collected at MC22A under the fixed interval monitoring program. Of these, 47% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

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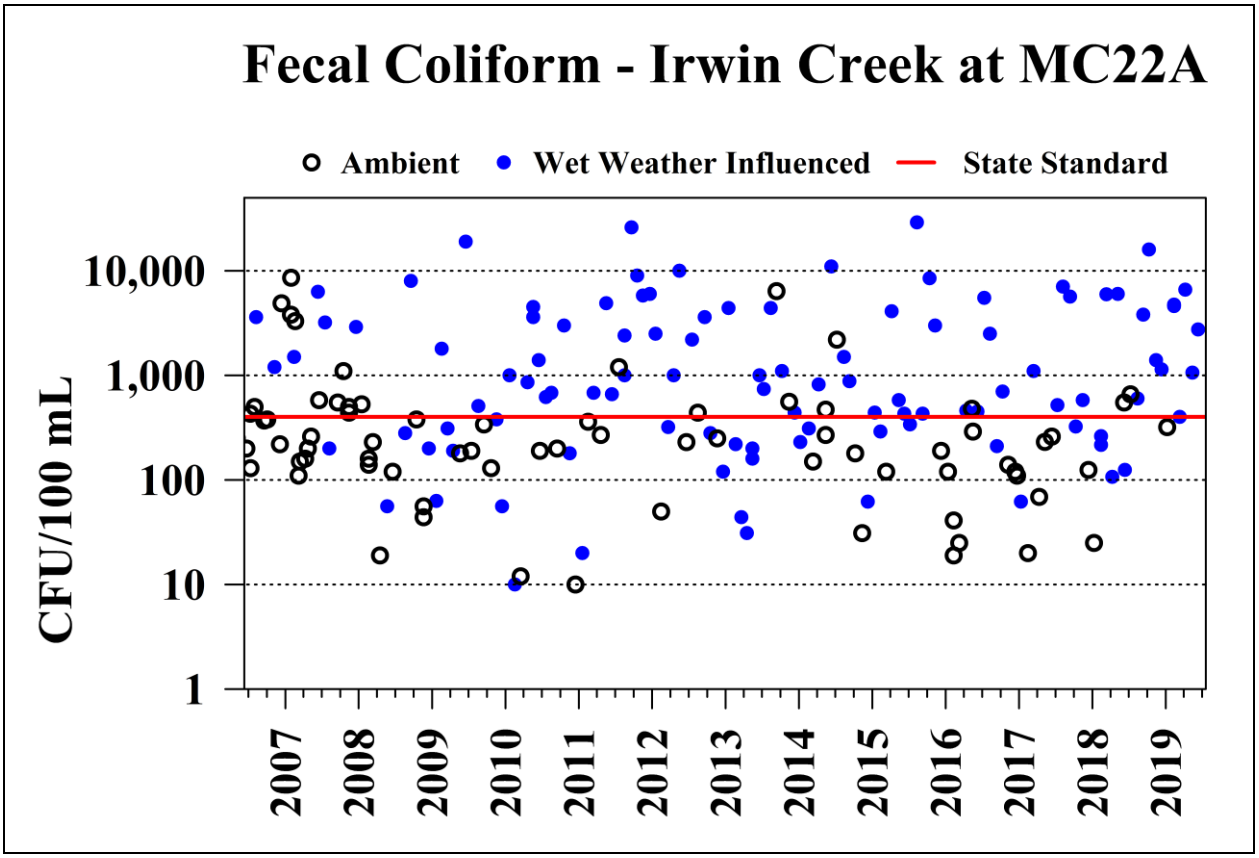

Figure 10-4: Irwin Creek - MC22A - Overall Monitoring Data

10.1.4 Little Sugar Creek Watershed

There are two monitoring locations on Little Sugar Creek, MC49A in southern Mecklenburg County just outside the City, and MC29A-1 just downstream of downtown area of the City. An initial assessment of available watershed and surface 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 2006 through July 2019 is provided in **Figures 10-5 and 10-6**.

A total of 166 samples have been collected at MC49A over this period under the fixed interval monitoring program. Of these, 53% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour

preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

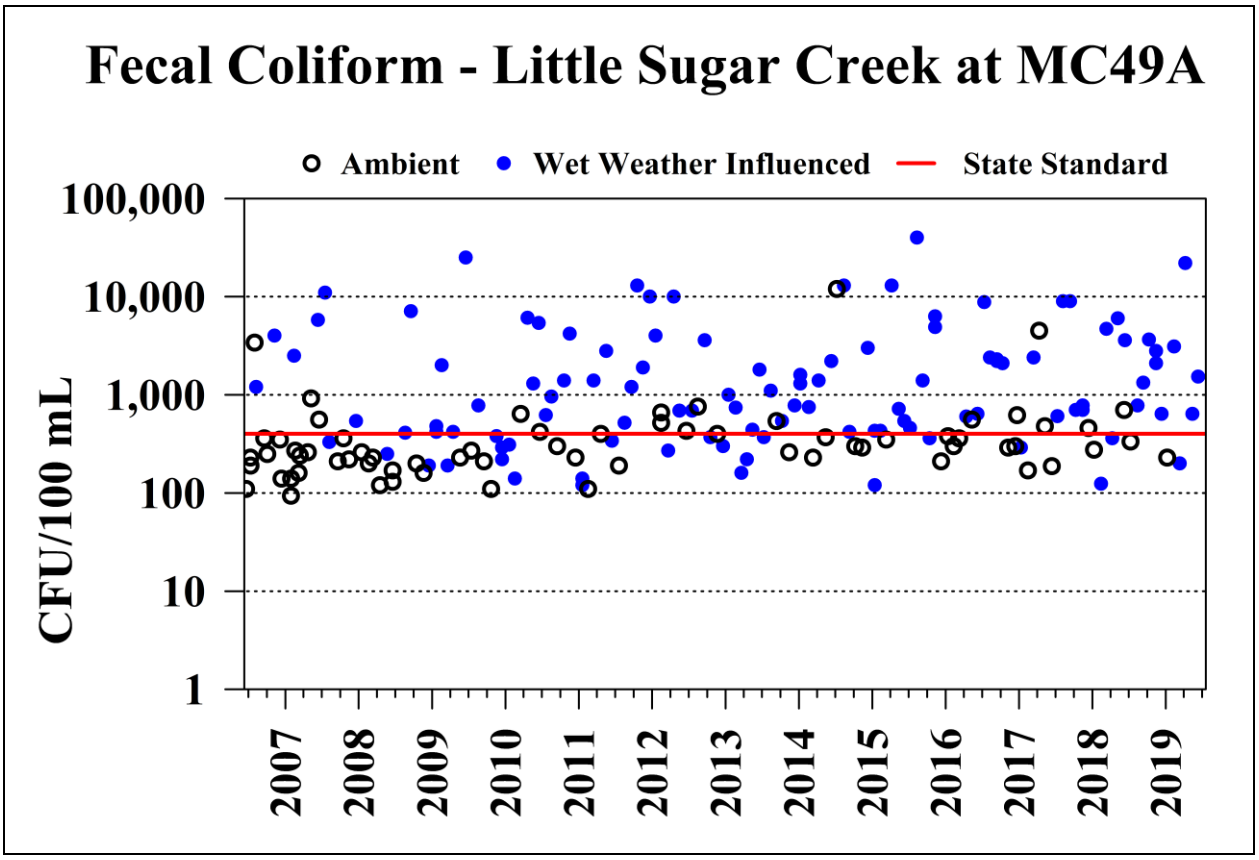

Figure 10-5: Little Sugar Creek - MC49A - Overall Monitoring Data

A total of 173 samples have been collected at MC29A-1 over this period under the fixed interval monitoring program. Of these, 79% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

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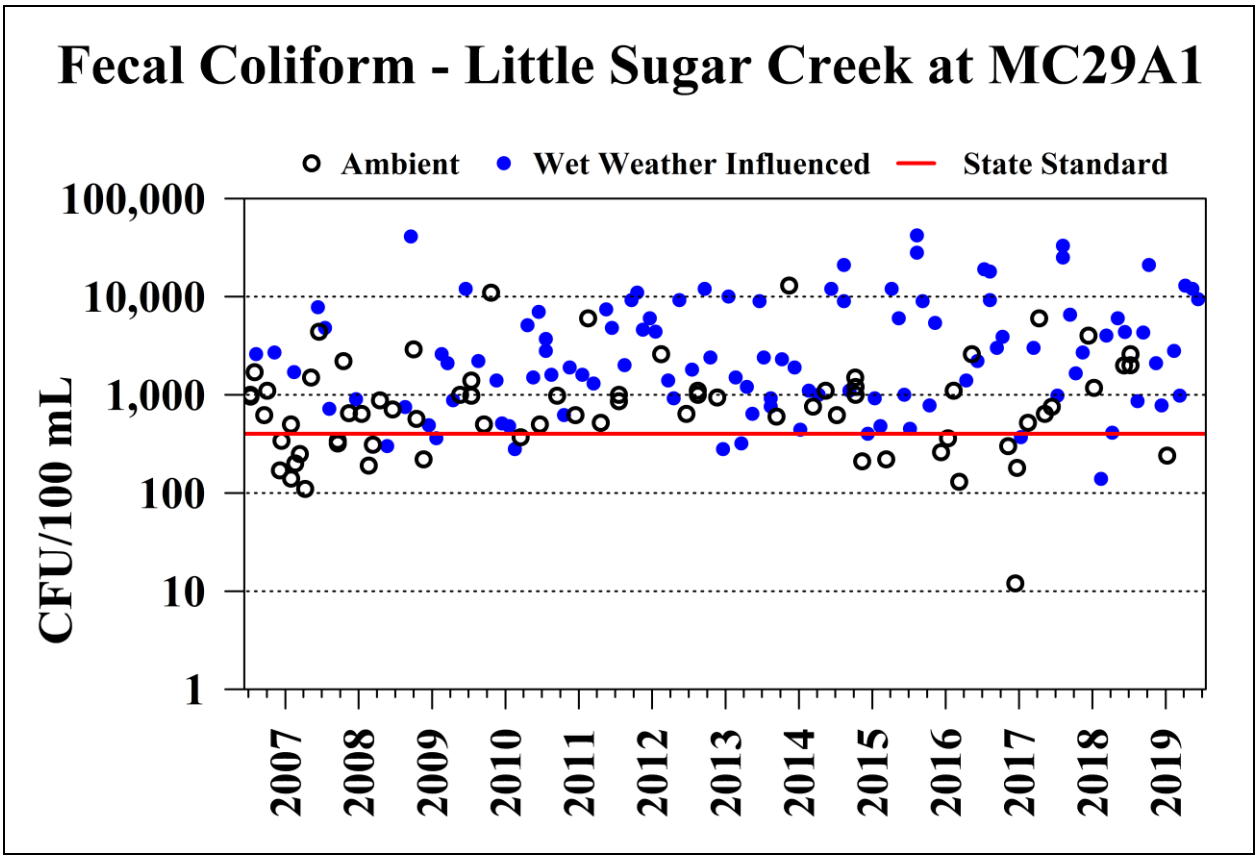

Figure 10-6: Little Sugar Creek - MC29A-1 - Overall Monitoring Data

10.1.5 McAlpine Creek Watershed

There are two monitoring locations on McAlpine Creek, MC45B just downstream of the North Carolina/South Carolina border, and MC38 downstream of the confluence with Campbell Creek and Irvins Creek. An initial assessment of available watershed and surface 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 2006 through July 2019 is provided in **Figures 10-7 and 10-8**.

A total of 161 samples have been collected at MC45B over this period under the fixed interval monitoring program. Of these, 34% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be much more frequent under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the

sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

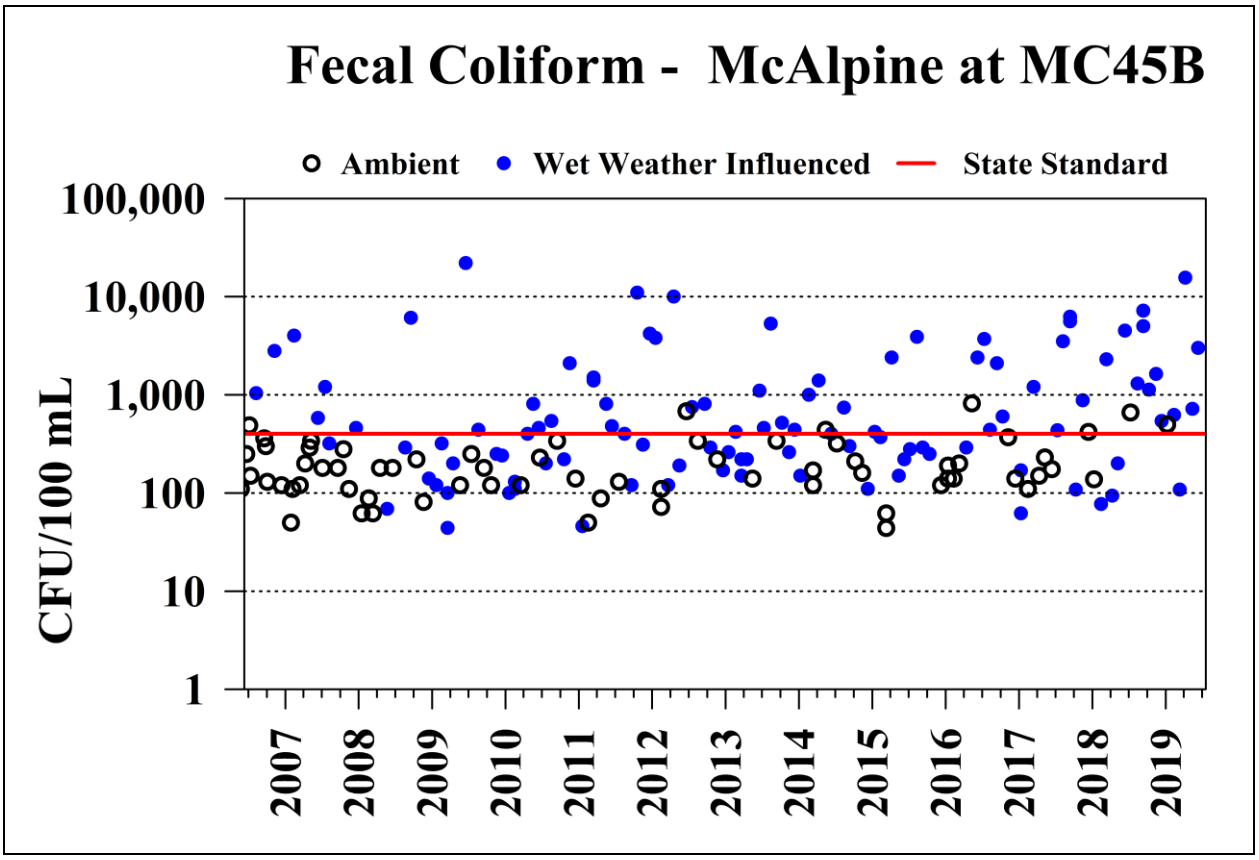

Figure 10-7: McAlpine Creek - MC45B - Overall Monitoring Data

A total of 166 samples have been collected at MC38 over this period under the fixed interval monitoring program (**Figure 10-8**). Of these, 48% exceeded the 400 cfu/100mL State standard with 90% confidence. Exceedances tended to be much more frequent and more extreme under wet weather influenced sampling conditions (meaning some precipitation within the County in the 72-hour preceding the sampling event), however exceedances did occur under both ambient and wet weather influenced conditions.

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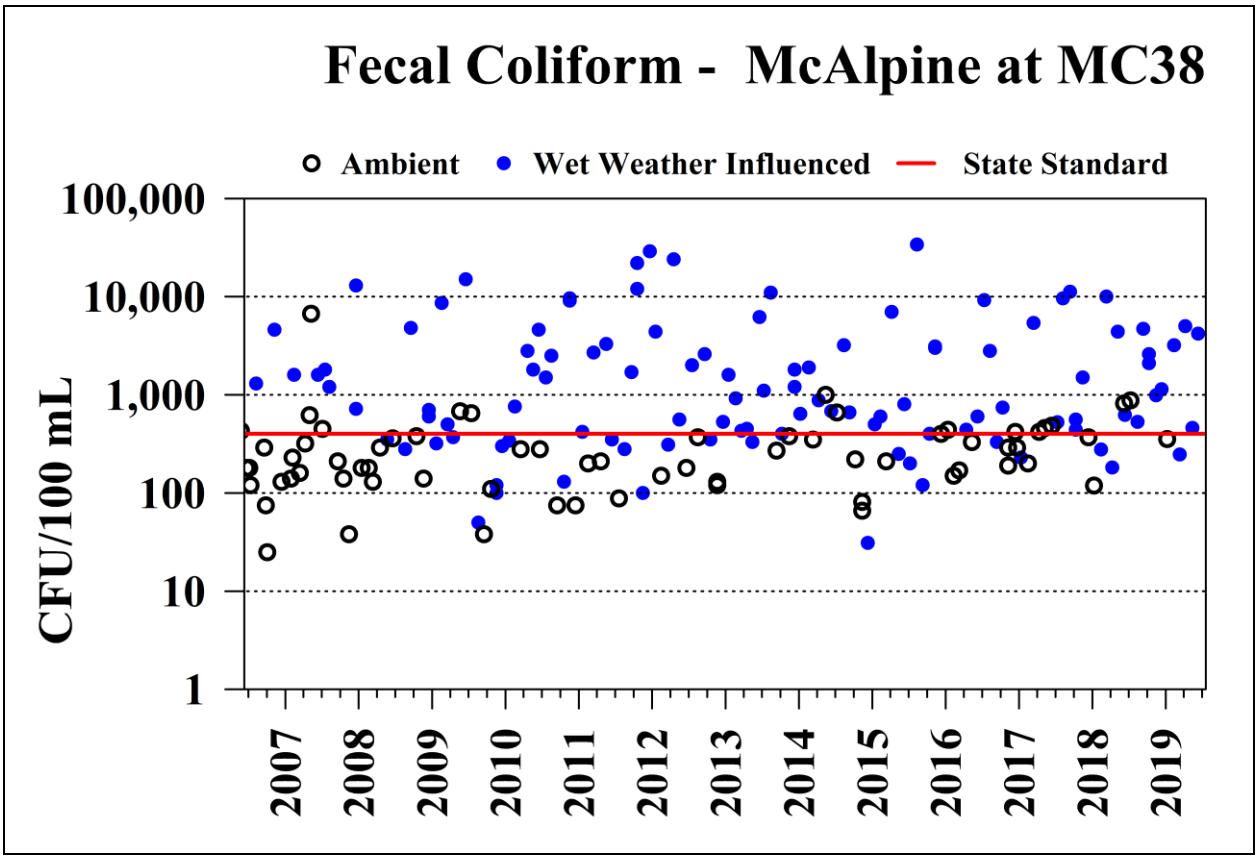

Figure 10-8: McAlpine Creek - MC38 - Overall Monitoring Data

10.1.6 Fecal Coliform Summary

The State standard for fecal coliform is exceeded by more than 10% with 90% confidence for all watersheds with a fecal coliform TMDL identified above, based on fixed interval data collected between 2006 and 2019. These exceedances are more common in wet weather influenced conditions, but exceedances also occurred during ambient conditions in each of these watersheds. Since exceedance rates are highly influenced by wet weather, long term variations in the exceedance rates should account for how many samples in a given year are influenced by wet weather conditions. For instance, between August 2008 and July 2009, approximately 27% of samples were collected during wet weather conditions, whereas in the past two years (Aug 2017-July 2018 and Aug 2018 – July 2019), 69% and 87% of fixed interval samples were collected during wet weather conditions, respectively. A higher percentage of wet weather events on fixed interval sampling days is expected to result in a higher percentage of samples that exceed surface

water quality standards. Since "wet weather" is defined as at least 0.1 inches of rainfall recorded anywhere in the City of Charlotte/Mecklenburg County in the 72 hours prior to sampling, future analysis may also attempt to utilize rain gages in closer proximity to each monitoring station to more accurately verify whether a sample was influenced by wet weather conditions, as rainfall in one part of the City/County does not necessarily mean it is raining everywhere in the City/County.

10.2 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 surface 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.

10.2.1 Long Creek Watershed

An initial assessment of available watershed and surface water quality data was conducted utilizing stream data for turbidity collected at the CMSWS monitoring site MC14A on Long Creek. A summary of the data collected from January 2010 through July 2019 is provided in **Figure 10-9**. A total of 156 samples were collected during this period, with 16% exceeding the 50 NTU State standard with 90% confidence. These exceedances all occurred under wet weather conditions.

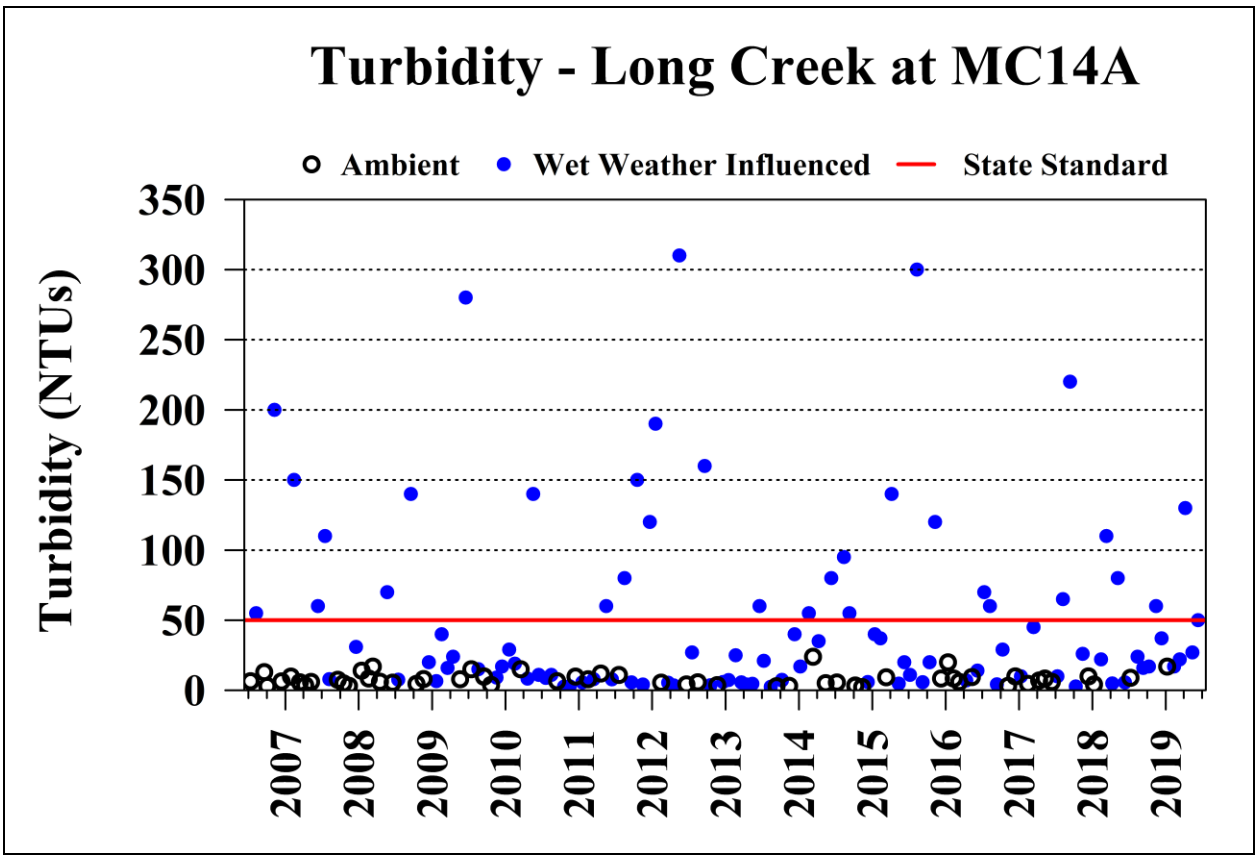

Figure 10-9: Long Creek - MC14A - Overall Monitoring Data

10.3 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 10-10 through 10-14**.

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 July 2019, only one sample collected from a TMDL watershed was lower than the instantaneous State standard of 4 mg/L. On October 10, 2017, a value of 3.81 mg/L was recorded at McAlpine Creek (MC38). No other sample violated the standard during this period of record. The 2018 NC Integrated Report categorizes each of these watersheds as 1i for DO, meaning that they have a TMDL but are not impaired and are supporting their designated uses.

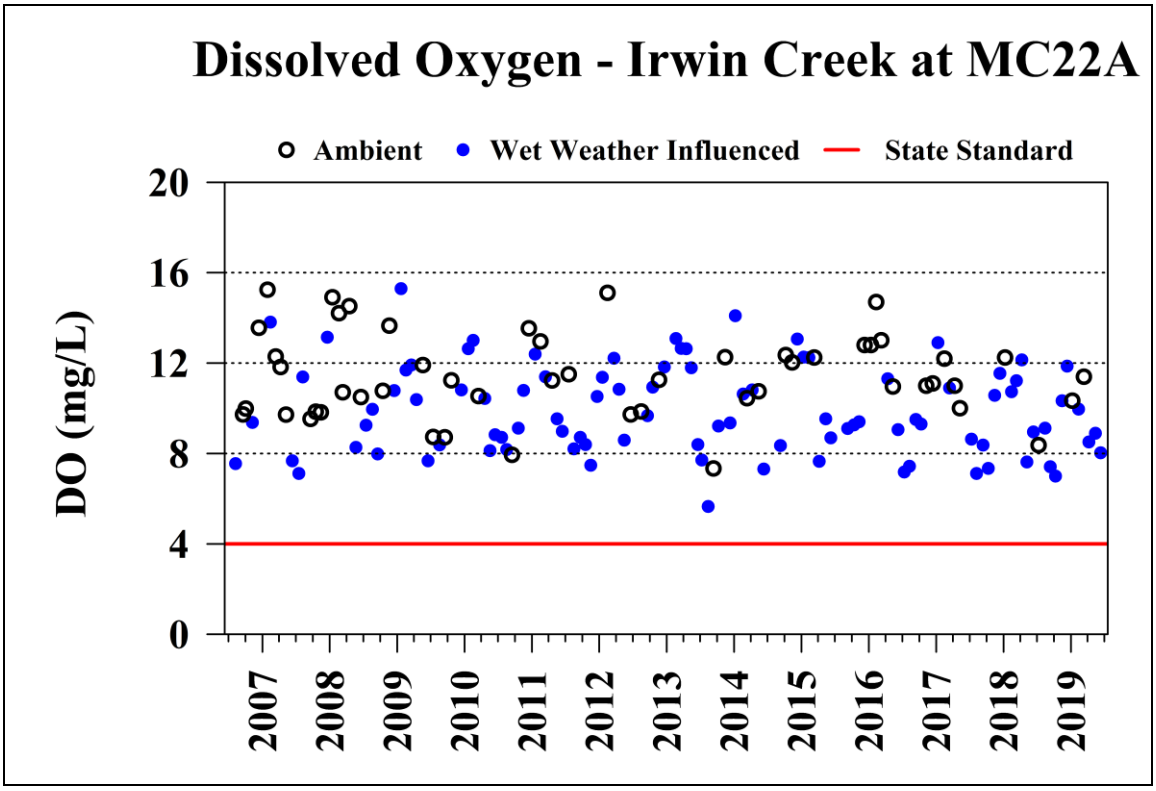

Figure 10-10: Irwin Creek - MC22A - Overall Monitoring Data

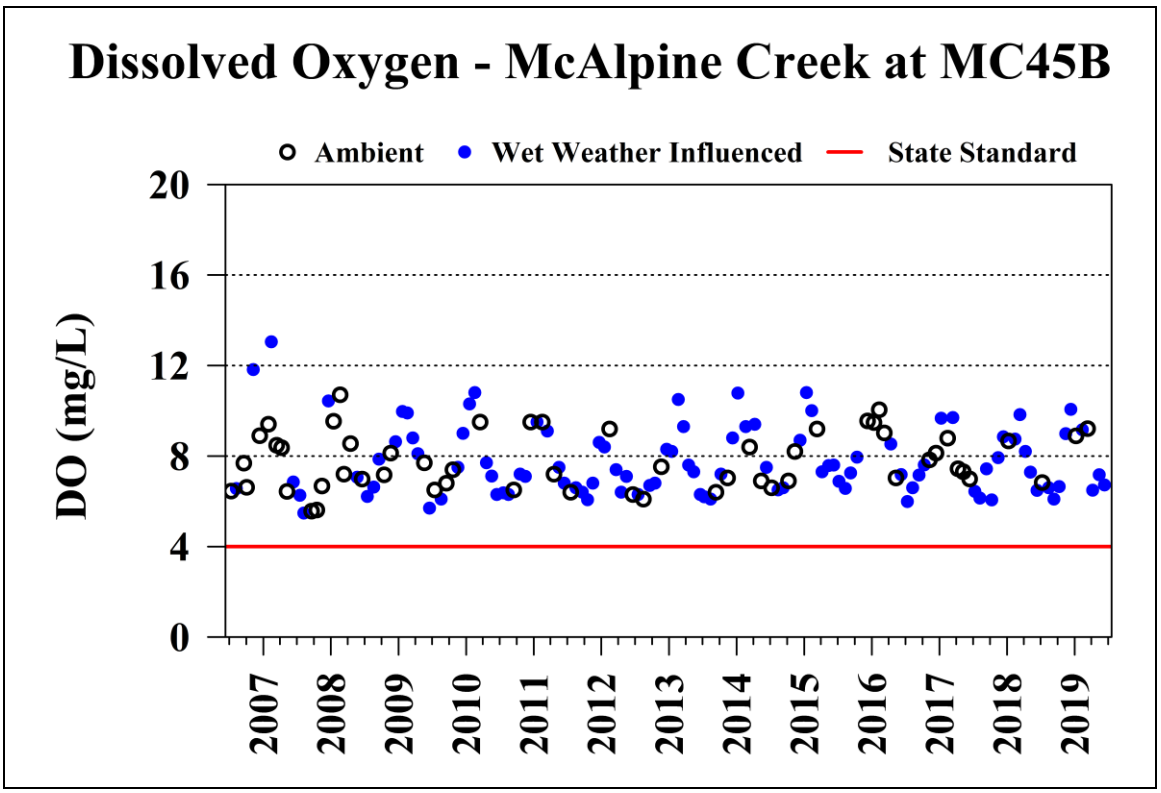

Figure 10-11: McAlpine Creek - MC45B - Overall Monitoring Data

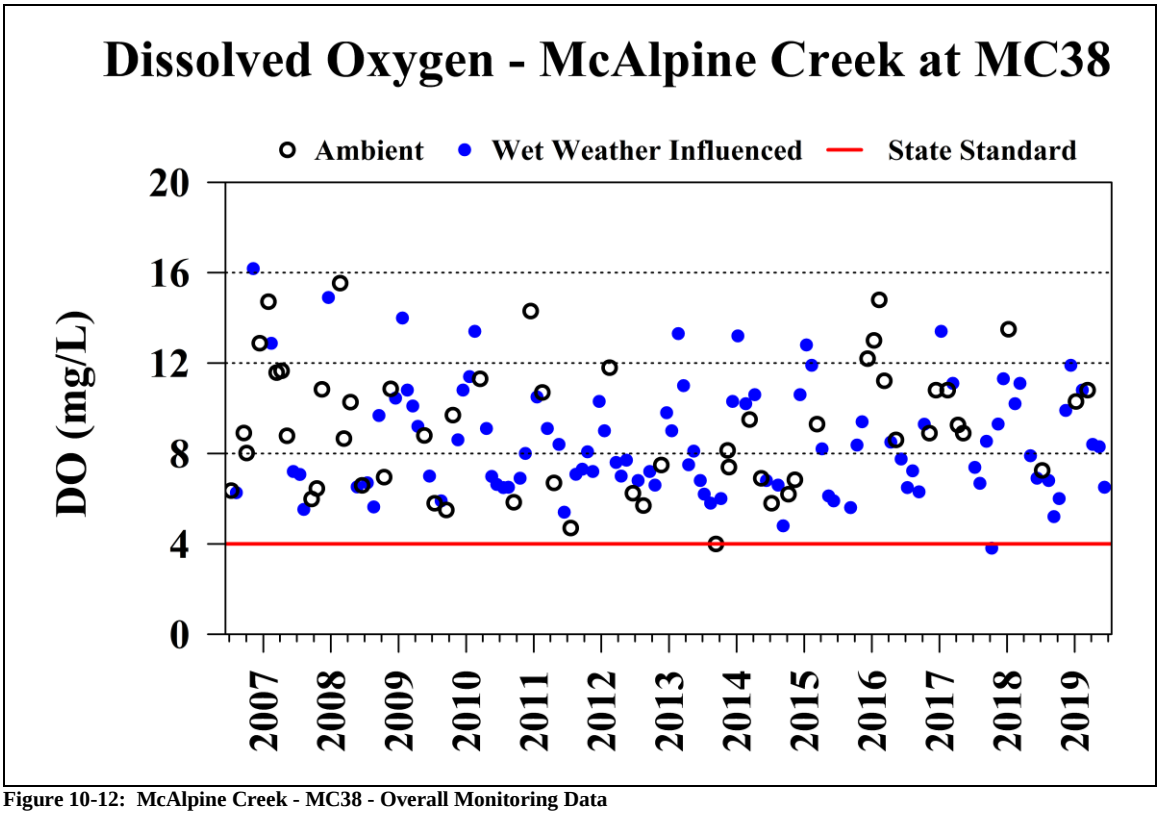

Figure 10-12: McAlpine Creek - MC38 - Overall Monitoring Data

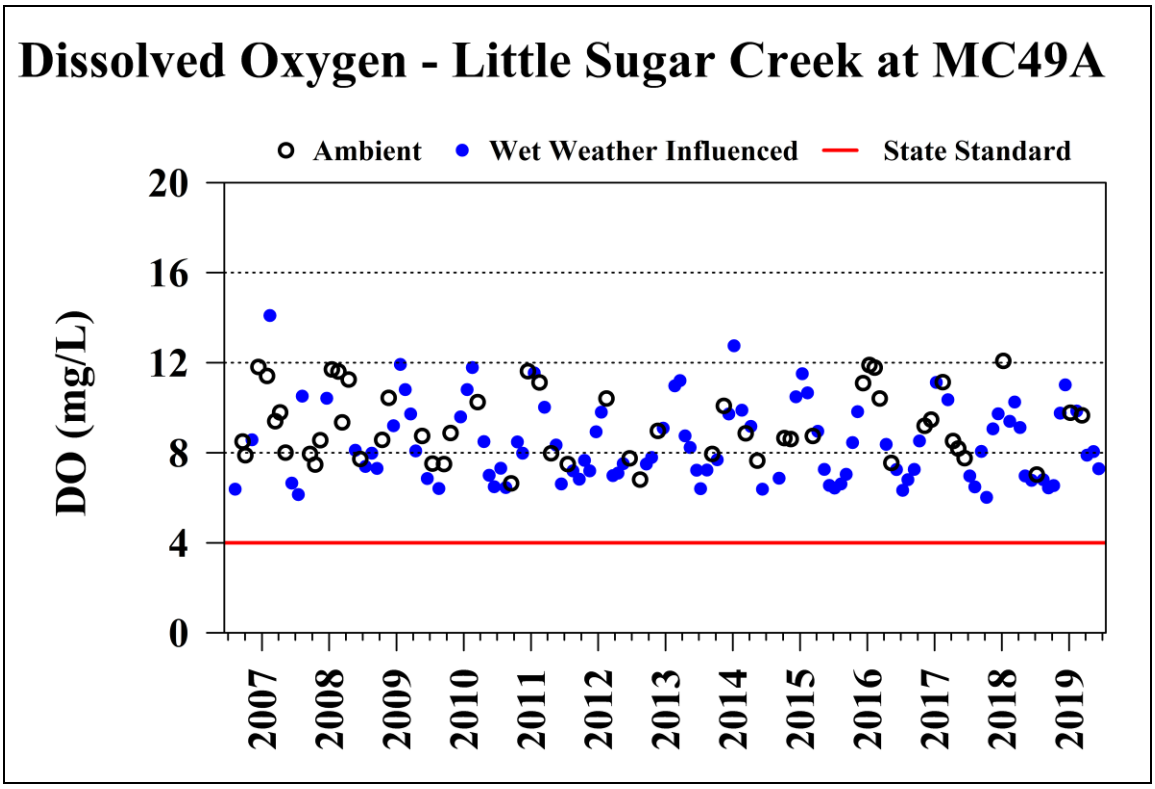

Figure 10-13: Little Sugar Creek - MC49A - Overall Monitoring Data

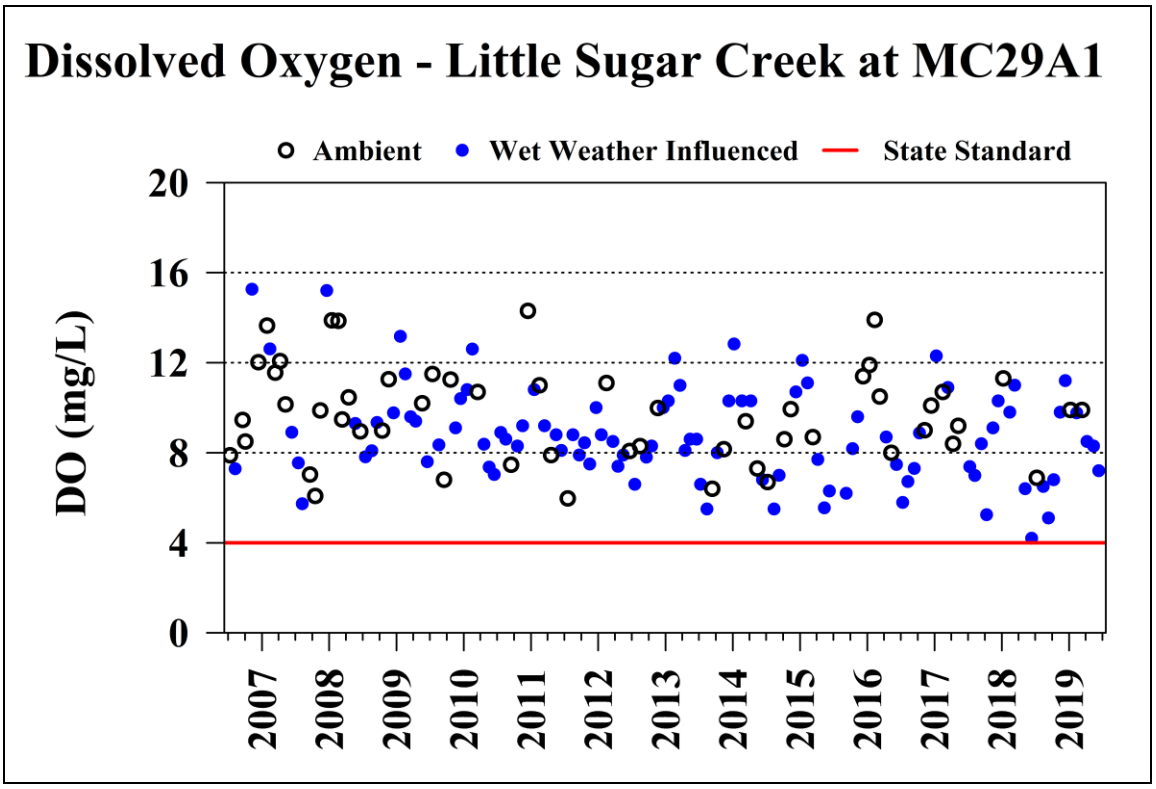

Figure 10-14: Little Sugar Creek - MC29A-1 – Overall Monitoring Data

10.4 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.

10.5 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 11: Reporting and Incremental Success

As part of the NPDES MS4 annual report process, data and information concerning the TMDL Watershed Plan are submitted and also includes an evaluation of 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

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   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

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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.

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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

Charlotte-Mecklenburg TMDL Watershed Monitoring Strategy

Section 1: Purpose

The purpose of this monitoring strategy is to meet the requirements of the City of Charlotte and Mecklenburg County NPDES MS4 permit programs which require the development of a TMDL watershed plan and associated monitoring strategy within the City of Charlotte and associated Mecklenburg County jurisdictions. Information gained from the monitoring conducted under this strategy can be used to conduct surface water quality assessment activities aimed at determining short-term and long-term trends and identifying significant sources of the pollutant of concern related to the MS4 NPDES regulated waste load allocation (WLA). In addition, the information can be used for evaluating the performance of BMPs utilized in the TMDL watershed plan, where possible; and for assessing progress toward the goals of the TMDL watershed plan at the TMDL identified monitoring points.

Section 2: TMDL Watershed Monitoring Program

2.1 Monitoring Methods

Monitoring methods utilized in this strategy consist of directly accessing the stream to conduct specified monitoring within the stream channel at a point representative of the overall stream flow at the time of monitoring. In most cases, this is center channel of the stream. When possible, staff enters the stream to directly fill sample bottles from the stream flow. Monitoring also follows the procedures set forth in the Charlotte-Mecklenburg QAPP.

2.2 Sample Types and Frequency

Samples collected under this strategy are fixed interval grab samples taken, at a minimum, on a quarterly basis at each monitoring location. A specific day of each calendar quarter (specifically, the 2nd Tuesday of the first month of each calendar quarter) is assigned for monitoring to allow for sampling over a range of flows and seasonal variability over the long-term at each monitoring location.

2.3 Monitoring Parameters

Table 2-1 provides a list of the surface water quality parameters sampled at applicable monitoring sites.

Table 2-1: Surface Water Quality Monitoring Parameters.

Parameter	Sample Type	Frequency
Fecal Coliform	Grab	Quarterly
Total Suspended Solids	Grab	Quarterly

Turbidity	Grab	Quarterly
Dissolved Oxygen	Grab	Quarterly

Section 3: Monitoring Sites

3.1 Basis for Locating Monitoring Sites

The goal of the TMDL watershed monitoring strategy is to locate at least one monitoring site within each of the TMDL watersheds to characterize surface water quality conditions for the applicable pollutant of concern within the watershed. Sites are located at the downstream most accessible point within the watershed. Where possible, sites are located at the TMDL compliance point(s) as identified in each applicable TMDL document.

3.2 Site Locations/Description

Table 3-1 contains a description and location of the monitoring sites within the monitoring strategy.

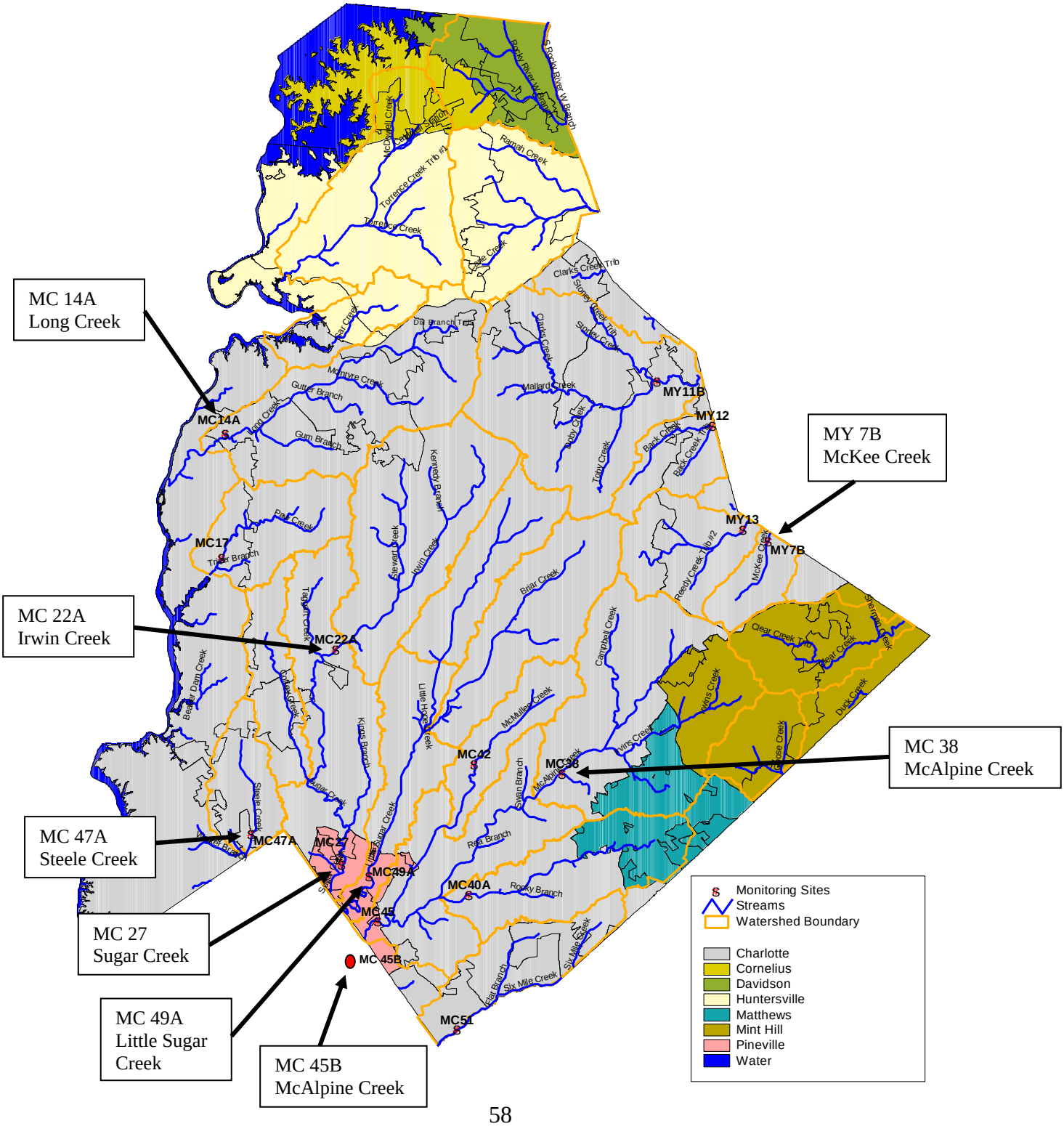
Table 3-1: Description of TMDL Watershed Monitoring Sites.

Site #	Stream	Location
MY7B	McKee Creek	Reedy Creek Rd. bridge, south of Harrisburg Rd.
MC14A	Long Creek	Pine Island Dr. at End of Street at Golf Course
MC47A	Steele Creek	Carowinds Blvd. bridge
MC22A	Irwin Creek	Westmont Dr. bridge, at Irwin Creek WWTP
MC27	Sugar Creek	Hwy. 51 bridge, east of Downs Rd.
MC49A	Little Sugar Creek	Hwy. 51 bridge, west of Carolina Place Mall
MC38	McAlpine Creek	Sardis Rd. bridge, between Sardis Ln. & Sardis Rd. N.
MC45B	McAlpine Creek	Harrisburg Rd. bridge, in South Carolina

3.3 Site Map

Figure 3-1 shows a map and location of the TMDL watershed monitoring sites.

Figure 3-1: TMDL Watershed Monitoring Sites



Section 4: Sample and Data Analysis

4.1 Sample Analytical Methods

Table 4-1 shows the monitoring parameters, reporting limits and analytical methods used to analyze samples collected under the strategy.

Table 4-1: Charlotte Water Laboratory Analytical Methods and Minimum Reporting Levels (RLs)

Parameter	Reporting Limit	Units	Analytical Method
Fecal Coliform	1.00	CFU/100 ml	SM 9222-D
Total Suspended Solids	1.00	mg/L	SM 2540-D
Turbidity	0.05	NTU	SM 2130-B
Dissolved Oxygen	N/A	N/A	N/A

4.2 Quality Assurance

Staff of Charlotte-Mecklenburg Storm Water Services conducts the monitoring and sample collection activities under this strategy. The Charlotte Water laboratory analyzes the surface water quality monitoring samples. Charlotte-Mecklenburg Storm Water Services has developed a Quality Assurance Project Plan (QAPP) which details sampling protocols and procedures; including sample handling, preservation, transportation, equipment calibration and maintenance, laboratory protocols, QA/QC, field blanks, and trip blanks. The QAPP has been approved by NCDEQ DWR. Charlotte-Mecklenburg Storm Water Services is certified for field analyses and is registered with the State of North Carolina under certification No. 5235. The Charlotte Water maintains laboratory certification No. 192.

4.3 Record Keeping

All records and data generated under the monitoring strategy is maintained for a minimum period of five (5) years as required by the NPDES MS4 permit. In most cases, applicable field data and laboratory data are stored in electronic format. Hard copy field notes, logbooks, calibration records, and bench sheets are also maintained.

Section 5: Data Evaluation and Assessment

Data is evaluated and assessed as discussed in Section 10 of the overall TMDL watershed plan.