Draft Environmental Impact Statement
for
Charlotte-Mecklenburg Utilities / City of Mount Holly / City of Belmont
Regional Wastewater Treatment

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Abbreviations

A&E	American & Efird
ACOE	(United States) Army Corps of Engineers
BAR	Basinwide Assessment Report
BFE	Base Flood Elevation
BMI	Benthic Macroinvertebrates
BMP	Best Management Practice
BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
BUA	Built Upon Area
CA	Critical Area
CBOD	Carbonaceous Biochemical Oxygen Demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFS	Cubic Feet per Second
CMMA	Charlotte-Mecklenburg Metropolitan Area
CWA	Clean Water Act
DENR	(North Carolina) Department of Environment and Natural Resources
DAQ	(North Carolina DENR) Division of Air Quality
DFIRM	Digital Flood Insurance Rate Map
DWR	(North Carolina DENR) Division of Water Resources
DO	Dissolved Oxygen
DWR	(North Carolina DENR) Division of Water Quality
EAA	Engineering Alternatives Analysis
EIS	Environmental Impact Statement
EPA	(United States) Environmental Protection Agency
ESRI	Environmental Systems Research Institute
ESA	Endangered Species Act
ETJ	Extra Territorial Jurisdiction
FACW	Facultative Wet
FEMA	Federal Emergency Management Agency
FERC	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FM	Force Main
FOG	Fats, Oil and Grease
FWS	Fish and Wildlife Services
Gal	Gallon
GDP	General Development Policies
GIS	Geographic Information Systems
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
GS	General Statutes
HQW	High Quality Waters

HUC	Hydrologic Unit Code
IBI	Index of Biotic Integrity
lbs	Pounds
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LUESA	(Charlotte-Mecklenburg) Land Use and Environmental Services Agency
LWWS-CA	Lake Wylie Watershed Critical Area
LWWS-PA	Lake Wylie Watershed Protected Area
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
MEP	Maximum Extent Practicable
MIL	Mountain Island Lake
MILWS-CA	Mountain Island Lake Critical Area
MILWS-PA	Mountain Island Lake Protected Area
MRLC	Multi-Resolution Land Characteristics (Consortium)
MS4	Municipal Separate Storm Sewer System
NACWA	National Association of Clean Water Agencies
NC	North Carolina
NCAC	North Carolina Administrative Code
NCBI	North Carolina Biotic Index
NCGS	North Carolina Geologic Survey
NCNRCS	North Carolina Natural Resources Conservation Service
NFIP	National Flood Insurance Program
NH_3-N	Ammonia as nitrogen
NHID	Natural Heritage Inventory Database
NHP	Natural Heritage Program
NLCD	National Land Cover Dataset
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPW	Non-Potable Water
NRCS	Natural Resources Conservation Service
NTU	Nephelomethric Turbidity Units
NWI	National Wetlands Inventory
NWP	Nationwide Program
O&M	Operations & Maintenance
OBL	Obligate Wet
PA	Protected Area
pH	Concentration of hydrogen ions
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROW	Right of Way
SCDHEC	South Carolina Department of Health and Environmental Control
SEPA	State Environmental Policy Act

SHPO	State Historic Preservation Office
SIU	Significant Industrial Use
SMP	Shoreline Management Plan
SSO	Sanitary Sewer Overflow
SUSI	Stream Use-Support Index
SWIM	Surface Water Improvement and Management
TAZ	Traffic Analysis Zone
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
UDO	Unified Development Ordinance
µg/L	Microgram per Liter
UV	Ultraviolet
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
USFS	United States Forest Service
USNWC	United States National Whitewater Center
Utilities	Charlotte-Mecklenburg Utilities
WWMF	Wastewater Management Facility
WWTP	Wastewater Treatment Plant
WQ	Water Quality

Section 1. Executive Summary

Charlotte-Mecklenburg Utilities (Utilities) provides wastewater services to more than 805,000 customers in the City of Charlotte and surrounding areas in Mecklenburg County, including the towns of Matthews, Mint Hill, Pineville, Huntersville and Cornelius. As part of a coordinated effort to proactively plan for and accommodate future growth in the region, Utilities undertook a comprehensive evaluation of their current and anticipated future wastewater treatment needs by performing a Wastewater Treatment Plant Expansion Study (Expansion Study, CH2M Hill, 2007).

The Expansion Study focused on three wastewater treatment plants (WWTPs): the Irwin Creek WWTP, Sugar Creek WWTP, and McAlpine Creek Wastewater Management Facility (WWMF). Combined, these facilities have a total maximum month rated treatment capacity of 99 million gallons per day (mgd). This capacity treats a population that was projected to be 685,000 in 2010, increasing to approximately 923,000 in 2030. The primary goal of the Expansion Study was to evaluate alternatives for accommodating increasing wastewater flow rates while considering the most efficient uses of existing infrastructure and possible future expansions. Utilities owns two additional plants that provide wastewater treatment to the City of Charlotte, including the McDowell Creek WWTP and Mallard Creek WRF; however, they were not included as part of the Expansion Study.

The Expansion Study, which included extensive coordination with North Carolina and South Carolina regulatory agencies, determined that the best approach toward meeting future wastewater capacity needs would include construction of a new regional WWTP to provide wastewater service to the Long Creek Basin in Mecklenburg County, major expansion of the Sugar Creek WWTP, and moderate expansion of the McAlpine Creek WWMF. The Irwin Creek WWTP would also need to be rehabilitated. These improvements would increase the wastewater capacity from the current level of 99 mgd to 144 mgd by 2030.

The service areas for the Sugar Creek and Irwin Creek WWTPs are closer to uptown Charlotte than the McAlpine Creek WWMF; they are experiencing in-fill development, and are closer to build-out. Since most development is in-fill, secondary and cumulative impacts in these service areas are not expected to be significant. The fastest growing basins are those along the Catawba River, including the Long Creek sub-basin, Paw Creek sub-basin, Catawba Creek sub-basin, Gar Creek sub-basin, and Lower Mountain Island sub-basin. These sub-basins will be referred to herein as the Long Creek Basin. Wastewater in the Long Creek Basin in Mecklenburg County is pumped relatively long distances (approximately 20 miles) and treated at the McAlpine Creek WWMF. Because this region has relatively low density development compared to other areas serviced by Utilities, it may experience greater challenges and impacts associated with development.

A Feasibility and Preliminary Planning Study for Regional Wastewater Treatment (Black & Veatch, 2006) was conducted to provide long-range planning for wastewater treatment for the City of Mount Holly and the Long Creek Basin in Mecklenburg County. This high level feasibility study focused on developing an innovative regional solution to meet the needs of this growing area. Six options were identified to provide treatment capacity through the year 2030.

The options from the 2006 study were modified to include the current partners and updated population and flow projections which were projected out to 2034. These are further evaluated in this Draft Environmental

Impact Statement (DEIS) and based on this analysis, the preferred alternative is a new regional facility constructed in northwestern Mecklenburg County.

The City of Mount Holly and the City of Belmont have committed to participate in the regional treatment facility. The alternatives presented in Section 4 include both of these entities as users of the regional facility.

The proposed project would provide wastewater service to the City of Mount Holly (which also accepts a small portion of flow from a southeastern section of the Town of Stanley), the City of Belmont, the City of Charlotte, a small southern section of the Town of Huntersville, the Long Creek Basin in Mecklenburg County, and the Clariant Corporation adjacent to the proposed regional facility site. The new regional facility was selected to minimize environmental impacts and meet the planning goals of the region. Specifically the preferred alternative would include:

- Comparatively fewer natural resource and environmental impact issues at the building site;
- Fewer construction and operational constraints;
- Greater public recreation and open space benefits;
- Reduced energy use for pumping to south plants;
- Increased water volume in Lake Wylie for local uses such as power generation, cooling water, low flow supplementation, and drinking water;
- Concurrence with the planning goals of the affected local governments;
- Elimination of the NPDES permit discharges associated with the wastewater treatment facilities in the City of Belmont and the City of Mount Holly; and
- Modification to the existing Clariant Corporation NPDES permit.

Mitigation efforts developed in coordination with state and local agencies would minimize secondary and cumulative impacts related to growth. Measures currently in place, including smart growth land use planning, stream buffers, and stormwater Best Management Practices (BMPs), are anticipated to minimize impacts to water quality, water resources, land use compatibility, and animal habitats in the service areas as development occurs.

Section 2. Project Description

2.1 Introduction

Population growth and increased land development in the Charlotte region have resulted in increased need for wastewater collection and treatment. A Feasibility and Preliminary Planning Study for Regional Wastewater Treatment (Black & Veatch, 2006) was conducted to provide long-range planning for wastewater treatment for the City of Mount Holly and the Long Creek Basin in Mecklenburg County. The high level feasibility study focused on developing an innovative regional solution to meet the needs of this growing region. Six options were identified to provide treatment capacity through the year 2030. These are further evaluated in this DEIS. Since this study was completed, the City of Belmont and Clariant Corporation have committed to participate in the regional facility. Memoranda of Agreement between all parties are included in Appendix C. This DEIS includes updated population, flow, and wastewater characteristics projections for each entity through 2034. The North Carolina Environmental Policy Act of 1971 requires state agencies to review the potential environmental effects associated with any activity that involves an action by a state agency (such as issuance of a permit), an expenditure of public monies (or private use of public land), or has the potential for negative environmental impacts on natural resources, public health and safety, natural beauty, or historical and cultural elements of the state. According to this statute, this DEIS has been prepared to assess the possible direct, secondary, and cumulative environmental impacts associated with the proposed new regional facility construction and operation.

The proposed project would require the following federal and state permits:

- NPDES Permit
- FERC Permit
- Air Quality Permit
- Dam Permit (for Equalization Basin embankment)
- 401/404 Water Quality Certification Permit
- Erosion Control Permit
- Mecklenburg County Building Permit
- Authorization to Construct
- Non Discharge Permit

2.2 Existing Wastewater Facilities

The sections below discuss the other existing wastewater treatment facilities in the general vicinity of the service area. Figure 2.1 shows the service area in relation to the jurisdictional boundaries of the cities (City of Charlotte, City of Mount Holly and Town of Huntersville) and counties (Mecklenburg and Gaston Counties).

2.2.1 City of Charlotte and Mecklenburg County

Charlotte-Mecklenburg Utilities (Utilities) provides wastewater services to more than 805,000 customers in the City of Charlotte and surrounding areas in Mecklenburg County, including the towns of Matthews, Mint Hill, Pineville, Huntersville, and Cornelius. The Utilities wastewater collection system in this project area currently serves a population of approximately 60,000 people and collects flow from five sub-basins: Long

Creek, Paw Creek, Catawba Creek, Gar Creek, and Lower Mountain Island. Wastewater flow from these sub-basins is currently treated at the McAlpine Creek Wastewater Management Facility (WWMF), located in southern Mecklenburg County. Charlotte-Mecklenburg Utilities owns four additional plants that provide wastewater treatment throughout the City of Charlotte and Mecklenburg County, including Irwin Creek WWTP, Sugar Creek WWTP, McDowell Creek WWTP, and Mallard Creek WRF.

The McDowell Creek WWTP is located within the Town of Huntersville limits, and therefore is required to comply with the Huntersville Water Quality Ordinance. The goal of this ordinance is to establish stormwater management requirements and controls to prevent surface water quality degradation in the streams and lakes within the Town limits. Low Impact Development (LID) techniques combined with conventional stormwater retention and detention structures are the primary mechanisms for meeting this ordinance. The goal of the LID is to implement best management practices to store, infiltrate, evaporate, retain, and detain runoff on-site to replicate the pre-development runoff conditions and prevent an increase in pollutant loads above pre-development conditions. Storm pipes and surface channels on the plant site were sized to direct stormwater flows from impervious areas to level spreaders, bioretention areas, and storm ponds. In total, 24 bioretention areas and 3 stormwater detention ponds were installed during the expansion project.

A new sustainably-designed, LEED-certified building that includes treatment laboratories for water, wastewater and stormwater, office space and meetings rooms was recently constructed on land adjacent to the Irwin Creek WWTP. Together with the innovative stormwater BMPs at McDowell Creek WWTP, this building would also provide educational opportunities for students and the community.

Charlotte-Mecklenburg Utilities strives to maintain a high standard of treatment at all of their facilities. Mallard Creek WRF and McDowell Creek WWTP have received Platinum Awards; McAlpine Creek WWMF and Sugar Creek WWTP have received Gold Awards; and Irwin Creek WWTP has received a Silver Award from the National Association of Clean Water Agencies (NACWA). A summary of the treatment provided at each facility is described in the following sections. Table 2-1 summarizes the capacity and key permit limits for each of the five Utilities plants.

Table 2-1 Permit Summaries for the Five WWTPs in the Utilities Service Area

	Flow (mgd)	CBOD (mg/L)	TSS (mg/L)	NH3-N (mg/L)	TN (lb/d)	TP (lb/d)
McAlpine Creek WWMF	64.0	4.0 (S) 8.0 (W)	15.0	1.0 (S) 1.9 (W)	Monitor	1067**
Irwin Creek WWTP	15.0	5.0 (S) 10.0 (W)	30.0	1.2 (S) 2.3 (W)	Monitor	**
Sugar Creek WWTP	20.0	5.0 (S) 10.0 (W)	30.0	1.0 (S) 2.0 (W)	Monitor	**
McDowell Creek WWTP	12.0	4.2 (S) 8.3 (W)	12.0	1.0	450 (S) 500 (W)	22 (S) 27 (W)
Mallard Creek WRF	12.0	4.2 (S) 8.3 (W)	30.0	1.0 (S) 2.0 (W)	- -	- -

Mallard Creek WRF Reuse	4.0		5.0	4.0		

*(S) Summer; (W) Winter
**Combined 12-month rolling average limit of 826 lb/d

2.2.1.1 McAlpine Creek WWMF

The McAlpine Creek WWMF is the largest of all the Charlotte-Mecklenburg Utilities treatment plants with a daily capacity of 64 million gallons per day (mgd). The plant is currently designed to provide advanced wastewater treatment for the southern portion of Mecklenburg County. The plant discharges into McAlpine Creek which ultimately drains to the Catawba River south of Lake Wylie. The treatment plant consists of activated sludge treatment, clarification, and filtration for carbonaceous biochemical oxygen demand (CBOD) and total suspended solids (TSS) removal, advanced anaerobic/oxic biological nutrient removal (BNR) to reduce effluent concentrations of total phosphorus (TP), flow equalization for use during storm events, hypochlorite disinfection, and dechlorination. A combined limit for TP is in place for three of the Utilities plants: McAlpine Creek WWMF, Irwin Creek WWTP and Sugar Creek WWTP. This limit specifies that the 12-month rolling average TP load from the three plants combined must not exceed 826 lb/d.

2.2.1.2 Sugar Creek WWTP

The Sugar Creek WWTP was built in 1927 to treat wastewater for the City of Charlotte. Since then, numerous expansions, upgrades, and modifications have occurred. The plant is currently designed to treat a flow of 20 mgd and provides advanced wastewater treatment for the central portion of the city. It is located in a highly urbanized area with business, commercial, and residential development. In 1999, the plant completed a highly successful odor control project with help and participation from the surrounding community. The plant utilizes the following treatment processes: screening, primary clarification, trickling filters, activated sludge biological treatment, tertiary filtration, and ultraviolet disinfection. Treated effluent is discharged into Little Sugar Creek which discharges to the Catawba River. The design for expanding the capacity of the Sugar Creek WWTP is complete but construction has been deferred until additional capacity is needed. The project includes sustainable design methods and nutrient removal capabilities.

2.2.1.3 Irwin Creek WWTP

The Irwin Creek WWTP was built in 1927 as a twin plant to Sugar Creek WWTP. Since then, numerous expansions, upgrades, and modifications have occurred. The plant is designed to treat a flow of 15 mgd and currently provides wastewater treatment for the western portion of the city. The plant utilizes the following treatment processes: screening, primary clarification, trickling filters, activated sludge biological treatment, tertiary filtration, and ultraviolet disinfection. Treated wastewater is discharged into Irwin Creek which also discharges to the Catawba River. A rehabilitation and upgrade project is currently under construction for the Irwin Creek WWTP that would ensure the facility can continue to reliably treat its permitted capacity.

2.2.1.4 McDowell Creek WWTP

Wastewater treatment for the Towns of Huntersville and Cornelius is provided by Utilities at the McDowell Creek WWTP in northern Mecklenburg County. The plant discharges into McDowell Creek less than 0.5 miles upstream of Mountain Island Lake, which is the primary water supply for the cities of Charlotte, Gastonia, and Mount Holly. The plant was recently expanded from 6 mgd to 12 mgd to accommodate a growing population in the area. To protect water quality in Mountain Island Lake, several key treatment

technologies were incorporated into the expansion, including membrane filtration to remove turbidity, particles, and microbial contaminants, five-stage biological nutrient removal and denitrification filters to meet stringent nitrogen and phosphorus limits, and a reuse system to recycle reclaimed water to irrigation customers within the service area.

2.2.1.5 Mallard Creek WRF

The Mallard Creek WRF was built in 1979 to meet increased demand as the area northeast of Charlotte grew and has since been upgraded and expanded to allow for greater treatment capacity (combined capacity of 12 mgd with up to 4 mgd permitted for reuse). The plant provides activated sludge biological treatment and treated effluent is discharged to Mallard Creek, which is part of the Rocky River Basin. In 1998, the plant began operation of Charlotte-Mecklenburg Utilities' first reclaimed water system permitted for 4 mgd, for irrigation at The Tradition Golf Links. Mallard Creek WRF is certified to the ISO 14001:2004 Environmental Management Systems standard. The ISO 14001 standard specifies requirements for establishing an environmental policy, determining environmental aspects and impacts, planning objectives, setting measurable targets, implementation and operation of programs to meet objectives and targets, corrective and preventive action analysis, and management review.

2.2.2 City of Mount Holly

The City of Mount Holly provides wastewater collection and treatment for a population of nearly 11,000 people, and provides regional treatment for a portion of the flow from the Town of Stanley. The existing Mount Holly WWTP is located on the Catawba River to the southeast of the city. The plant was originally constructed in 1965 and was expanded to 4 million gallons per day (mgd) in the 1970s and operates at this capacity presently. The Mount Holly WWTP consists of screening, equalization, extended aeration, secondary clarifiers, chlorine disinfection, and dechlorination.

The Mount Holly WWTP is an extended aeration facility with permit limits for both BOD and TSS of 30 mg/L. Although the plant does not currently have limits for ammonia-nitrogen (NH_3-N), total nitrogen (TN), or total phosphorus (TP), it is required to monitor these parameters on a monthly basis.

2.2.3 City of Belmont

The City of Belmont provides wastewater collection and treatment for a population of approximately 11,000 people. The capacity of the WWTP is 5 mgd and discharges to the Catawba River, downstream of the existing Mount Holly WWTP. It is an extended aeration treatment process with chlorine disinfection and dechlorination with sulfur dioxide. Solids are aerobically digested and sludge is land applied. The WWTP has permit limits for BOD and TSS similar to Mount Holly (30 mg/L limits for both parameters). In addition, the plant has daily monitoring in place for ammonia, dissolved oxygen (DO), and temperature, and bi-monthly monitoring for TN and TP.

The intake for the City of Belmont water treatment plant is also located on the Catawba River. Protection of water quality is particularly important in this watershed because of the proximity of this water supply intake and the proposed WWTP. To provide additional supply and diversify their water supply sources, the City of Belmont has initiated construction of a new potable water interconnection with the City of Mount Holly.

2.2.4 Town of Stanley

The Town of Stanley serves a population of approximately 4,000 people and treats approximately half of its wastewater (0.16 mgd) at a 0.5 mgd treatment plant that discharges to Mauney Creek, which ultimately drains to the South Fork of the Catawba River. It is an extended aeration facility with permit limits for both BOD and TSS of 30 mg/L. The remainder of Stanley's wastewater (currently 0.18 mgd) is sent for treatment at the existing Mount Holly WWTP. An agreement between the two utilities capped the amount of flow sent to Mount Holly at 0.20 mgd. This agreement will remain in place, and the wastewater would be treated at the regional facility.

2.2.5 Clariant Corporation

Clariant Corporation operates a specialty organic chemical manufacturing facility immediately north of the Long Creek Pumping Station in Mecklenburg County. Process and sanitary wastewater are treated at an onsite WWTP which consists of neutralization, primary clarification, activated sludge treatment, final settling, and post aeration. The 3.9 mgd capacity WWTP is also used to treat wastewater associated with a groundwater remediation facility. Though its capacity is 3.9 mgd, actual average flows at Clariant Corporation are approximately 0.3 mgd.

2.3 Regional Wastewater Treatment Planning Study

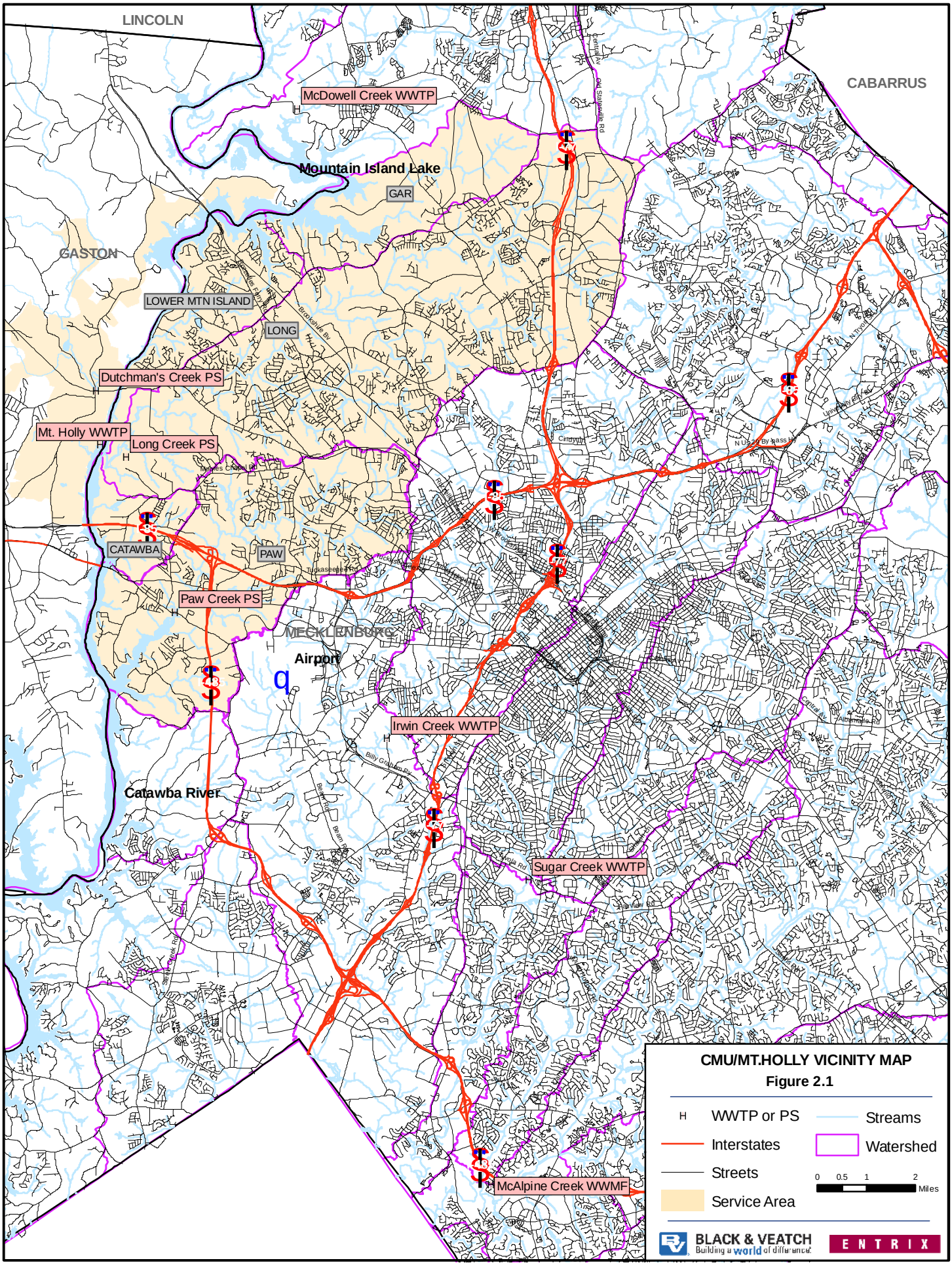
Charlotte-Mecklenburg Utilities and the City of Mount Holly cooperated in a feasibility and preliminary planning study which evaluated the growing wastewater demands in both service areas and identified a number of alternatives that would meet future wastewater projections (Black & Veatch, 2006). The study found that several regional treatment scenarios were conceptually feasible and favored the construction of a new facility. Scenarios identified in the study included a new regional WWTP adjacent to the existing Long Creek Pumping Station in western Mecklenburg County as well as combinations of expansion and new construction on the Gaston County side of the Catawba River. Since this study was completed, the City of Belmont and Clariant Corporation have committed to participate in the regional facility. Memoranda of Agreement between all parties are included in Appendix C. This DEIS includes updated population, flow, and wastewater characteristics projections for each entity through 2034.

Key elements of the options are summarized below:

- **No Action** – Continue to operate the existing systems at the current rates without providing additional wastewater treatment for an expanding population. Additional treatment needs could be met through a combination of septic systems and neighborhood package treatment plants. The state has informed Mount Holly and Belmont that their NPDES permit will be modified to include nutrient limits. Those upgrades have not been made at this time but would be included in the No Action option. Wastewater from Clariant would continue to be treated by Clariant and discharged to the river.
- **Option 1: Operate separately with existing expanded and upgraded facilities** – Continue to operate separately and with existing facilities. This scenario requires Mount Holly to upgrade and expand their existing WWTP. Belmont would upgrade their WWTP. Utilities to provide conveyance and treatment

capacity at McAlpine Creek WWMF. Wastewater from Clariant would continue to be treated by Clariant and discharged to the river.

- **Option 2: Operate separately with additional and expanded/upgraded facilities** – Continue to operate separately with additional facilities. This scenario requires Mount Holly to upgrade and expand their existing WWTP. Belmont's WWTP would be decommissioned and flows treated at Mount Holly. Utilities would construct a new regional facility located at Long Creek to treat wastewater from Mecklenburg County and Clariant.
- **Option 3: Operate with upgraded and expanded Mount Holly WWTP** – Provide treatment for Mount Holly, Belmont, Clariant, and Utilities flows at the Mount Holly WWTP site by upgrading and expanding the existing WWTP. Mecklenburg County and Clariant flows would be pumped across the Catawba River. Belmont's WWTP would be decommissioned and flows pumped to Mount Holly.
- **Option 4: Operate with new regional WWTP (Mount Holly)** – Provide treatment for Mount Holly, Belmont, Clariant, and Utilities flows in Mount Holly by constructing a new regional facility on land adjacent to the existing Mount Holly WWTP. Mecklenburg County and Clariant flows would be pumped across the Catawba River. Existing Belmont WWTP would be decommissioned and flows pumped to Mount Holly.
- **Option 5: Operate with new regional WWTP (Mecklenburg County near Long Creek)** – Provide treatment for Mount Holly, Belmont, Clariant, and Utilities flows on the Mecklenburg side of the Catawba River by constructing a new regional facility on vacant land near the Long Creek Pumping Station. Existing Mount Holly and Belmont WWTPs would be decommissioned and flows would be pumped across the Catawba River.
- **Option 6: Operate with additional and upgraded facilities** – Upgrade the Mount Holly WWTP, but continue to operate at 4 mgd. Provide treatment for Mount Holly flow in excess of 4 mgd, Belmont, Clariant, and Utilities flows on the Mecklenburg side of the Catawba River by constructing a new regional facility on vacant land near the Long Creek Pumping Station. Belmont's WWTP would be decommissioned and flows would be pumped across the Catawba River.
- **Non-Discharge / Land Application** – This scenario would apply to Options 2 –6 and would involve only spray irrigation of treated effluent instead of direct discharge to a surface water body.


LINCOLN
CABARRUS
GASTON
MECKLENBURG
McDowell Creek WWTP
Mountain Island Lake
GAR
LOWER MTN ISLAND
LONG
Dutchman's Creek PS
Mt. Holly WWTP
Long Creek PS
CATAWBA
PAW
Paw Creek PS
Airport
Irwin Creek WWTP
Catawba River
Sugar Creek WWTP
McAlpine Creek WWMF
CMU/MT.HOLLY VICINITY MAP
Figure 2.1
WWTP or PS
Streams
Interstates
Watershed
Streets
Service Area
0 0.5 1 2
Miles
BLACK & VEATCH
Building a world of difference.
ENTRIX

Section 3. Purpose and Need

3.1 Project Purpose

As stated previously, proposed regional wastewater treatment is required to respond to continued growth in northwestern Mecklenburg County and Eastern Gaston County.

Population projections for the planning period are based on census data, service data, and additional long-range planning data from each entity.

3.2 Population Projections

3.2.1 City of Mount Holly

The desired 2014, 2024, and 2034 planning years are shown in Table 3-1.

Table 3-1 Mount Holly Service Area Population Projections

Year	Population
2000	5,771
2010	8,876
2014	10,759
2024	15,492
2034	27,760

Note 1: Service area usage of 60% in 2000, increasing to 100% in 2034.

3.2.2 Charlotte-Mecklenburg Utilities

The desired 2014, 2024, and 2034 planning years are shown in Table 3-2. As previously mentioned in the Executive Summary, the sub-basins listed below, when combined, form the Long Creek Basin in Mecklenburg County.

Table 3-2 Charlotte-Mecklenburg Service Area Population Projections

Sub-Basin	2000	2010	2014	2024	2034
Long Creek	5,502	28,836	33,338	45,129	75,062
Paw Creek	7,880	13,048	14,670	19,670	33,698
Catawba Creek	0	2,145	2,535	3,468	5,633
Gar Creek	232	1,112	1,616	3,045	6,083
Lower Mtn Island	364	3,217	3,803	5,202	8,449
Total	**13,978**	**48,358**	**55,962**	**76,514**	**128,924**

Note 1: Service area usage of 60% in 2000, increasing to 100% in 2034.

3.2.3 City of Belmont

The desired 2014, 2024, and 2034 planning years are shown in Table 3-3.

Table 3-3 Belmont Population Projections

Year	Population
2000	5,223
2010	6,549
2014	8,505
2024	12,193
2034	20,482

Note 1: Service area usage of 60% in 2000, increasing to 100% in 2034.

3.3 Wastewater Flow Projections

A reliable range for average annual wastewater flows is 100-120 gallons per capita per day (gpcd). Based on historical system use data and the appropriate peaking factor of 1.2 as required by the State of North Carolina, a value of 125 gpcd was calculated.

The total flow projected for 2034 from the City of Mount Holly, the City of Belmont, the Long Creek Basin in Mecklenburg County, and Clariant Corporation, including industrial flows, is 24.5 mgd. The flow projections were used as the basis of evaluation for regional facility capacity needs.

3.3.1 City of Mount Holly: Wastewater Flow Projections

As discussed in Section 2, the City of Mount Holly provides wastewater treatment service to a portion of the Town of Stanley as well as its own industrial and residential users.

Significant industrial use (SIU) permit holders are metered for billing purposes. The existing SIU wastewater flows to the Mount Holly WWTP are identified in Table 3-4.

Table 3-4 Significant Industrial Users in Mount Holly

	Actual Average Flow (mgd)	Allocated Flow (mgd)
American & Efird	0.59	1.20
Buckeye	0.10	0.15
Clariant	0.09	0.13
Freightliner	0.04	0.12
Total	0.83	1.60

Mount Holly intends to send 4 mgd to Utilities, but, as noted in its Memorandum of Agreement, has the option to send up to 6 mgd. Wastewater system allotment to SIUs is estimated to be capped at its present quantity. Additionally, wastewater flow from the Town of Stanley is anticipated to maintain its existing quantity and reach its cap in 2024. Population and wastewater flow projections for the City of Mount Holly are presented in Table 3-5.

Table 3-5 Mount Holly Service Area Wastewater Flow Projections

	Population Served					Wastewater Flows (mgd)				
	2000	2010	2014	2024	2034	2000	2010	2014	2024	2034
City of Mount Holly	5,771	8,876	10,759	15,492	27,760	0.72	1.11	1.34	1.94	3.47
Mount Holly SIU's	-	-	-	-	-	0.61	0.74	0.83	1.19	1.60
Town of Stanley	-	-	-	-	-	0.18	0.18	0.18	0.20	0.20
Total	5,771	8,876	10,759	15,492	27,760	1.5	2.0	2.4	3.3	5.3

Note 1: Maximum Month wastewater flow projections.
Note 2: SIU flow represents the wastewater flow currently allocated to industries (from Table 3-4).

3.3.2 Charlotte-Mecklenburg Utilities: Wastewater Flow Projections

Population and wastewater flow projections for the western Mecklenburg County are presented in Table 3-6.

Table 3-6 Mecklenburg County Service Area Wastewater Flow Projections

Sub-Basin	Population Served					Wastewater Flows (mgd)				
	2000	2010	2014	2024	2034	2000	2010	2014	2024	2034
Long Creek	5,502	28,836	33,338	45,129	75,062	0.69	3.60	4.17	5.64	9.38
Paw Creek	7,880	13,048	14,670	19,670	33,698	0.99	1.63	1.83	2.46	4.21
Catawba Creek	0	2,145	2,535	3,468	5,633	0.00	0.27	0.32	0.43	0.70
Gar Creek	232	1,112	1,616	3,045	6,083	0.03	0.14	0.20	0.38	0.76
Lower Mtn Island	364	3,217	3,803	5,202	8,449	0.05	0.40	0.48	0.65	1.06
SIU's	-	-	-	-	-	0.00	0.28	0.28	0.32	0.36
Total	13,978	48,358	55,962	76,514	128,924	1.8	6.3	7.3	9.9	16.5

Note 1: Maximum Month wastewater flow projections.

As discussed in Section 2, Utilities provides wastewater service in the service area to the Town of Huntersville and the City of Charlotte. The flow projections listed in Table 3-6 include both municipalities and associated SIUs.

3.3.3 City of Belmont: Wastewater Flow Projections

The existing Belmont WWTP is rated for 5 mgd. However, due to reductions in industry over the past several years, the total flow from the City of Belmont is approximately 1 mgd. Belmont intends to send 2 mgd to Utilities, but, as noted in its Memorandum of Agreement, has the option to send up to 5 mgd. Belmont currently sends 0.034 mgd of its wastewater to the Two Rivers Utilities Service Area. Figure 3.1 includes a map showing the City of Belmont's wastewater service boundary. This flow is factored into Belmont's wastewater flow projections, which are presented in Table 3-7.

Table 3-7 Belmont Service Area Wastewater Flow Projections

	Population Served					Wastewater Flows (mgd)				
	2000	2010	2014	2024	2034	2000	2010	2014	2024	2034
City of Belmont	5,223	6,549	8,505	12,193	20,482	0.7	0.8	1.1	1.5	2.6

Note 1: Maximum Month wastewater flow projections.

3.3.4 Clariant Corporation

The existing Clariant Corporation NPDES permit is for 3.9 mgd. However, the actual flow at the plant is significantly less. The flow from Clariant Corporation to be treated at the regional wastewater treatment facility would be 0.2 mgd. Clariant Corporation's existing WWTP would still treat the remainder of Clariant Corporation's wastewater which is estimated to be approximately 0.1 mgd.

3.4 Development of Load Projections and Future Influent Characteristics

In addition to wastewater flows, an estimate of pollutant loads was developed for each service area.

3.4.1 Projection of Annual Average Influent Loads

Domestic loads for 2034 were estimated using the unit load factors and projections of the served population. The industrial loads were added to the projected domestic loads to obtain total plant influent loads.

3.4.2 Projected Influent Wastewater Characteristics

The State of North Carolina defines wastewater treatment plant capacity as the monthly average condition. For planning and design purposes it is therefore necessary to develop influent characteristics representing the maximum month average associated with the 12-month average conditions projected. Maximum month to annual average flow and load peaking factors were developed from the Mount Holly, Belmont, and Utilities historical data. The 2034 influent wastewater criteria for Belmont, Mount Holly, Utilities and the combined system are summarized in Table 3-8.

Table 3-8 Combined Belmont, Mount Holly and Utilities Projected 2034 Wastewater Characteristics

	Belmont	Mount Holly	Utilities	Total
Flow (max month)	2.6 mgd	5.3 mgd	16.5 mgd	24.5 mgd
BOD_5	4,762 lbs/d	9,782 lbs/d	34,205 lbs/d	48,780 lbs/d (230 mg/L)

	Belmont	Mount Holly	Utilities	Total
TSS	4,888 lbs/d	10,041 lbs/d	49,698 lbs/d	64,667 lbs/d (306 mg/L)
NH_3-N	426 lbs/d	876 lbs/d	3,137 lbs/d	4,442 lbs/d (22 mg/L)
TP	95 lbs/d	193 lbs/d	848 lbs/d	1,136 lbs/d (5.50 mg/L)

Note 1: Clariant Corporation flow of 0.2 mgd (with characteristics similar to that of Utilities) is included in the total value.

Two Rivers Utilities Service Area
City of Belmont WWTP Service Area
Legend
City of Belmont WWTP Service Area Boundary
Two Rivers Utilities Service Area Boundary
Parcels
Belmont City Limits
Railroads
Waste Water Treatment Plants
Lift Stations
Rivers
1 inch = 550 feet
0 750 1,500 3,000 4,500 6,000 Feet
Two Rivers Utilities Service Area
City of Belmont WWTP Service Area
Perimeter
Area
City of Belmont
North Carolina

Figure 3.1

Section 4. Alternatives Analysis

This section presents a summary of the stakeholder process that was initiated as an important part of this project as well as initial project scoping. After preliminary evaluation of the options presented in Section 2 from the Feasibility and Planning Study (Black & Veatch, 2006), it is clear that there are 2 fundamental options: a new regional plant in Mount Holly and a new regional plant in Mecklenburg County. The other options are essentially variations of these two. Therefore, these two options were chosen for further, detailed analysis. The two options chosen for detailed evaluation were options 4 and 5, which will herein be referred to as Alternatives 1 and 2. For thorough analysis, Alternatives 1 and 2 will be compared with the No Action and Land Application alternatives. Economic, environmental, and community impacts are summarized and compared for each alternative. Finally, this chapter identifies the preferred alternative based on the project's purpose and need, environmental impact analysis, cost, engineering considerations, and mitigation analysis.

4.1 Project Scoping and Stakeholder Involvement

A detailed feasibility study was developed by Charlotte-Mecklenburg Utilities and the City of Mount Holly in 2006 to identify potential alternatives to meet the needs of the growing populations in these areas (Black & Veatch, 2006). The study recommended a regional solution that would provide the most beneficial use of resources while minimizing environmental impacts. As the project team moved forward with the analysis, the DEIS process was initiated and the Scoping Document submitted in July 2007 (Appendix A). The current proposed project has changed since July 2007 with the addition of the City of Belmont and Clariant Corporation. Throughout the preparation of the DEIS, meetings have been held with DWR to gain feedback and allow any comments and concerns to be addressed from project initiation.

Because of the regional nature of the proposed project, the importance of community involvement was identified early on. Recognizing that many diverse gro ups and interests may be impacted by decisions being made, a Stakeholder Group was formed. The Stakeholder Group included volunteer participants with strong community participation; local residents, property owners, and government representatives from the City of Belmont, the Town of Stanley, City of Rock Hill, Gaston County and York County, SC; community groups including Mount Holly Citizen's Group, Mount Holly Community Development Foundation, Quality of Natural Resources Commission (Gaston County) and Gaston County Chamber of Commerce; environmental regulators including North Carolina Department of Environment and Natural Resources (NC DENR), South Carolina Department of Health & Environment Control (SC DHEC), Mecklenburg County Land Use & Environmental Services Agency (LUESA) and Mecklenburg County Parks and Recreation; the Lake Wylie Marine Commission; the NC Wildlife Resources Commission (WRC); American & Efird (A&E); Clariant Corporation; land developers; industry representatives; and private environmental groups including the Sierra Club, the Catawba River Keeper Foundation, and the Catawba Lands Conservancy. In addition to the stakeholder process, additional meetings were conducted with Duke Energy, Lake Wylie Marine Commission, SC DHEC, US National Whitewater Center, developers, and the Lake Wateree Homeowners Association to address specific concerns.

The Stakeholder Group was formed to offer ideas to improve the project and allow the project team to work together with the community to achieve common goals. The project team included members from Utilities, the City of Mount Holly, the City of Belmont, Clariant Corporation, and project consultants, Black & Veatch

and Cardno ENTRIX. By better understanding the proposed action and alternatives, stakeholders were given an opportunity to identify and discuss issues of concern, advise the team about important community issues, and provide feedback on the range of alternatives and issues of greatest concern.

The Stakeholder Group met monthly from August 2007 through February 2008. In addition the Stakeholder Group met again in October 2011 for an update on the project status. The project team presented the goals of the regionalization project and key aspects of each phase of the project including regional land use and development patterns and projections, estimates of projected wastewater flow increases corresponding to this growth and development in the area, the different wastewater treatment alternatives to be considered, the potential environmental impacts associated with each alternative, and sustainable design features that would be incorporated into the new regional facility design. Copies of meeting minutes can be found in Appendix B.

Issues of concern for the community identified by the Stakeholder Group included:

- Design of the proposed facility to protect water quality in Lake Wylie, including advanced treatment for nutrients;
- Protection of drinking water quality for downstream water supply intakes;
- Sustainable design and low impact development (LID) at the proposed site to increase infiltration and limit runoff generation; and
- Implementation of a reuse water system to reduce the amount of effluent discharged from the new regional facility and to reduce the amount of potable water used for irrigation.

4.2 Engineering Alternatives Analysis

Basic sizing of treatment and conveyance facilities was developed for each alternative; site layouts were prepared and potential force main routes were evaluated. Maps showing conceptual design and layouts are included at the end of this section. Specific requirements for each alternative are discussed in Sections 4.2.1 through 4.2.4.

All alternative analyses used the new speculative limits for the proposed facility received from NC DENR in June 2013 (see Appendix K for limits). Speculative limits received for the new regional facility consisted of a TN limit of 9.4 mg/L and TP limit of 1.4 mg/L at 12 mgd, and a TN limit of 4.5 mg/L and TP limit of 0.69 mg/L at 25 mgd; the limits are based on the mass loadings included in the TMDL. Therefore, the treatment processes that were considered incorporate the ability to meet moderate nutrient limits at the outset, as well as a plan for meeting more stringent limits in the future as required by the speculative limits.

4.2.1 No Action Alternative

The City of Mount Holly and the City of Belmont were notified that nutrient limits would be included in their NPDES permits. Even though upgrades to those facilities are not in place at this time, those improvements are included in the No Action Alternative (NAA). The NAA would not involve the construction of a new treatment facility on either side of the Catawba River; however, it would include upgrading the existing Mount Holly WWTP and the existing Belmont WWTP according to the requirement from NC DENR. Wastewater from Clariant would continue to be treated by Clariant and discharged to the river. Providing no additional municipal wastewater treatment would force new development to utilize onsite septic systems or package wastewater treatment plants. Mount Holly has issued flow allocations approaching the rated capacity

of the WWTP. By not providing municipal wastewater treatment, growth in this area would be especially affected. In the Utilities service area, wastewater from the Long Creek Basin in Mecklenburg County is currently pumped over 20 miles for treatment at McAlpine Creek WWMF. This could continue in the future, but only with the construction of additional conveyance facilities and expanded treatment capacity at the McAlpine Creek WWMF. To expand its capacity, it would require a separate permitting and environmental assessment process.

Under the NAA scenario, future population expansion could still proceed, however not in a way consistent with regional planning efforts. Individual and community systems (septic tank systems on individual lots and package treatment plants in larger neighborhoods or office parks) would be installed to accommodate future growth and provide wastewater treatment. Septic systems that have been properly designed, constructed, and maintained can provide completely self-contained wastewater collection, treatment, and disposal. However, septic system performance may be impacted by inadequate tank and disposal field size, high groundwater table elevations, excessively low or high soil conductivity, or inadequate installation and maintenance. Septic system failure causes the discharge of incompletely treated or untreated wastewater which can lead to substantial groundwater and surface water pollution, including contamination of drinking water supplies. The use of package plants introduces new discharges to the watershed that are difficult to regulate. This scenario also provides less control of effluent quality than the operation of one or two well managed facilities. If designed properly, both septic systems and package treatment plants can be implemented to achieve adequate water quality treatment and be cost effective for removal of BOD and TSS, but are much less efficient at nutrient removal.

The NAA would not require temporary or permanent disturbance to lands and changes in land cover associated with the construction and maintenance of a regional wastewater facility and sewer lines. However, it is important to note that under the NAA, both Utilities and Mount Holly would still need to find methods for meeting their projected future wastewater treatment needs.

4.2.2 Alternative 1: Operate at New Regional Facility in Mount Holly

- A new regional facility would be constructed adjacent to the existing Mount Holly WWTP site to treat wastewater from both Mount Holly and Mecklenburg County.
- The Mount Holly WWTP would be decommissioned and wastewater flow from Mount Holly would be treated at the new regional facility.
- Belmont WWTP would be decommissioned and wastewater flow from Belmont would be pumped and treated at the new regional facility.
- Wastewater flows from the Long Creek Basin in Mecklenburg County would be pumped across the Catawba River.
- All wastewater from Clariant except the wastewater generated from groundwater treatment would be treated at the new regional facility. Wastewater generated from groundwater treatment would continue to be discharged through the existing Clariant discharge.

Under Alternative 1, treatment would be provided for Mount Holly, Belmont, Clariant, and Utilities flows at a new 25-mgd regional facility on land adjacent to the existing Mount Holly WWTP (Figure 4.1). A new

pumping station and forcemain would be constructed to pump flow from Belmont to the regional facility in Mount Holly (Figure 4.2). Wastewater flows from Mecklenburg County would be pumped across the Catawba River to the regional facility. All wastewater from Clariant except the wastewater generated from groundwater treatment would be sent to the regional facility (Figure 4.4). Wastewater generated from groundwater treatment would continue to be discharged through the existing Clariant discharge.

The treatment components for the regional facility would include screening, grit removal, storm flow equalization, day tanks, primary clarification, advanced nutrient removal, secondary clarification, filtration, ultraviolet disinfection, reaeration, and solids handling facilities. Effluent from the new regional facility would be discharged in a single outfall to the Catawba River. The layout of the facility will include reserved space for potential future processes necessary for EDC and PPCP removal.

The forested land to the north and west of the existing Mount Holly WWTP would need to be purchased from A&E. Regional facility construction would remove the vegetated buffer between the A&E facility, the adjacent river front park, and the Catawba River. Expansion of the pumping station and equalization basin would be done on partially wooded and partially cleared land immediately adjacent to the existing Long Creek Pumping Station. The Catawba River crossing would be directionally drilled and a forcemain installed under the river bed. By crossing the river through directional drilling techniques, direct impacts to riparian areas during construction would be eliminated and no impacts to aquatic communities or water quality would occur during construction or operation. This alternative would provide more than 16 mgd of water to Lake Wylie that would otherwise be pumped to McAlpine Creek WWMF, then discharged to Sugar Creek and ultimately to the Catawba River downstream of Lake Wylie. All parties are committed to implementing a reclaimed water system and would seek customers when the new regional facility is constructed.

Construction would begin after issuance of the ROD, issuance of all required permits, and completed facility design. The existing Mount Holly WWTP would be demolished and the property converted to a river front park. The new regional facility on the A&E property would be constructed with an initial capacity of 12 mgd. Flow from the Paw Creek Pumping Station would not be sent to the regional facility initially, as those flows would continue to be pumped to the McAlpine Creek WWMF. During a future expansion to a capacity of 25 mgd, the Paw Creek Pumping Station would be modified to enable its flows to be sent to the regional facility. The existing force main between the Long Creek and Paw Creek Pumping Stations would be utilized and no additional pipe between the stations would be required. These flows would be transferred to the Long Creek Pumping Station and pumped to the regional facility for treatment. The construction of the facility would be phased to accommodate the system flows summarized in Table 4-1.

Table 4-1 Flow Projection Summary for Alternative 1

	Wastewater Flows (mgd)		
	2014	**2024**	**2034**
Mount Holly	2.4	3.3	5.3
Mecklenburg County	7.3	9.9	16.5
Belmont	1.0	1.5	2.5

Clariant Corporation	0.2	0.2	0.2
Paw Creek Pumping Station	(1.8)	(2.5)	-
Total	**9.0**	**12.4**	**24.5**

Note 1: Paw Creek Pumping Station flow is included in Mecklenburg County flow.

4.2.3 Alternative 2: Operate at New Regional Facility in Mecklenburg County near Long Creek

- A new regional facility would be constructed near the existing Long Creek pumping station to treat wastewater from Mount Holly, Belmont, Clariant, and Mecklenburg County.
- The existing Belmont and Mount Holly WWTPs would be decommissioned and wastewater flows from Mount Holly and Belmont would be pumped across the Catawba River.
- All wastewater from Clariant except the wastewater generated from groundwater treatment would be treated at the new regional facility. Wastewater generated from groundwater treatment would continue to be discharged through the existing Clariant discharge.

Under Alternative 2, treatment would be provided for Mount Holly, Belmont, Clariant, and Utilities flows on the Mecklenburg side of the Catawba River by constructing a new 25-mgd regional facility (Figure 4.1). A new pumping station and forcemain would convey Mount Holly flows across the Catawba River to the regional facility. A new pumping station and forcemain would be constructed to pump flow from Belmont to the Paw Creek Pumping Station (Figure 4.3). All wastewater from Clariant except the wastewater generated from groundwater treatment would be sent to the regional facility (Figure 4.4). Wastewater generated from groundwater treatment would continue to be discharged through the existing Clariant discharge. Existing equalization basins on the Long Creek Pumping Station site would be used for Mount Holly's flow as well.

The treatment components would include screening, grit removal, storm flow equalization, day tanks, primary clarification, advanced nutrient removal, secondary clarification, filtration, ultraviolet disinfection, reaeration and solids handling facilities. The existing Long Creek Pumping Station would be modified to serve as the influent pumping station for the new regional facility. Effluent would be discharged in a single outfall to the Catawba River. The layout of the facility will include reserved space for potential future processes necessary for EDC and PPCP removal.

The regional facility would be constructed on a 22-acre, previously disturbed site west of the existing Long Creek Pumping Station on vacant land that has recently been purchased from ReVenture. This would result in minimal direct, secondary, and cumulative impacts compared to construction on a pristine site. The Mount Holly pumping station would be constructed on one acre of previously disturbed land outside of the 100-year floodplain on Mount Holly property. The Catawba River crossings would be directionally drilled and a forcemain installed under the river bed. By crossing the river through directional drilling techniques, direct impacts to riparian areas during construction would be eliminated and no impacts to aquatic communities or water quality would occur during construction or operation. This alternative would provide more than 16 mgd of water to Lake Wylie that is currently pumped to McAlpine Creek WWMF, then discharged to Sugar Creek and ultimately to the Catawba River downstream of Lake Wylie. Input from stakeholders suggested that a potential beneficial use of this property would be to decommission the existing facilities and construct a park. This recreation area could then be connected to other greenways and open spaces already existing along both sides of the Catawba River. All parties are

committed to implementing a reclaimed water system and would seek customers when the new regional facility is constructed.

Construction would begin after issuance of the ROD, issuance of all required permits, and completed facility design. The new regional facility would be constructed with an initial capacity of 12 mgd. Flow from the Paw Creek Pumping Station would not be sent to the regional facility initially, as those flows (including flows from Belmont) would continue to be pumped to the McAlpine Creek WWMF. During a future expansion to a capacity of 25 mgd, the Paw Creek Pumping Station would be modified to enable its flows to be sent to the regional facility. The existing force main between the Long Creek and Paw Creek Pumping Stations would be utilized and no additional pipe between the stations would be required. These flows would be transferred to the Long Creek Pumping Station and pumped to the regional facility for treatment. The construction of the facility would be phased to accommodate the system flows summarized in Table 4-2.

Table 4-2 Flow Projection Summary for Alternative 2

	Wastewater Flow (mgd)		
Source	**2014**	**2024**	**2034**
Mount Holly	2.4	3.3	5.3
Mecklenburg County	7.3	9.9	16.5
Belmont	1.0	1.5	2.5
Clariant Corporation	0.2	0.2	0.2
Paw Creek Pumping Station	(2.9)	(4.0)	-
Total	**8.0**	**11.0**	**24.5**

Note 1: Paw Creek Pumping Station flow is included in Mecklenburg County flow.
Note 2: Belmont flow is included in Paw Creek Pumping Station flow.

4.2.4 Non-Discharge / Land Application Alternative

State law requires land application to be considered as part of the Engineering Alternatives Analysis for any new facility. This option was investigated and found to be technically and economically infeasible due to the large land requirements and the lack of land available for this use. Calculations were performed assuming the range of additional water volume required for storage and land application. Based on regulation governing water reuse facilities (Section 15A NCAC 02T), onsite storage capacity for 30 days is required. The daily flows would require 750 million gallons. At an average depth of 10 feet, this would require a surface area of 230 acres.

Approximately 6,500 to 13,000 acres of land would be required for spray irrigation of 25 mgd. Since the proposed facility is located in an urban region, no such contiguous sites were available for this amount of land. The analysis was performed assuming that land would be attainable for both storage ponds and land application through purchase of multiple sites. Land cost for irrigation alone was estimated at $20,000 per acre which results in a total cost of $160 to $240 million dollars. The high cost of land and quantity of storage capacity and application area make this alternative unrealistic. As such it was eliminated from further consideration.

4.3 Siting Modifications

The Feasibility Study located the new regional facility on vacant land immediately adjacent to the Long Creek Pumping Station that has recently been purchased from ReVenture (Black & Veatch, 2006). This forested land would need to be cleared to some extent for construction of the new facility. Preservation of open spaces and existing wildlife habitats are important to the stakeholders and the project team as well. As such, a previously cleared parcel of land west of Long Creek was identified as an alternative location. This would require transfer of flows from the pumping station across Long Creek, but would allow the forested area to remain undisturbed. The forested land included in the Utilities land purchase is located immediately north of the U.S. Whitewater Center and opportunities exist for connection with other forested land on this site that has recreational uses, including biking and walking trails. Placing the facility on the disturbed site also has advantages for simplifying the effluent discharge to the Catawba River rather than Long Creek. This effectively eliminates potential direct impacts from nutrient loads and bed scouring on aquatic and benthic communities in the creek.

4.4 Effluent Outfall Locations

Original evaluations considered both Long Creek and the mainstem of the Catawba River as outfall locations. After discussions with DWR Modeling and TMDL Unit and NPDES Unit, it was decided to route the facility effluent outfall directly to the mainstem of the Catawba River which feeds Lake Wylie. Lower flows in Long Creek would provide limited mixing and dilution conditions. Discharging directly to the Catawba River effectively eliminates the potential direct impacts of nutrient loads and bed scouring on aquatic and benthic communities in the creek. By preserving the forested land adjacent to Long Creek, water quality impacts from stormwater runoff associated with development of the site were also minimized.

4.5 Alternatives Analysis Summary

An evaluation was conducted of the alternatives for a planning period through 2034. For each alternative, an economic evaluation was conducted with consideration of capital costs, operations and maintenance costs, and overall present worth costs. The environmental impacts (including both direct impacts and secondary/cumulative impacts) were summarized for each alternative as well with a complete discussion of these impacts presented in Section 6. Non-economic considerations were evaluated and included regulatory requirements, impacts to the hydroelectric plants, and public health and safety.

4.5.1 Capital Costs

An evaluation was conducted of the two different alternatives for a planning period through 2034. For each alternative, an economic evaluation was conducted with consideration of capital costs, operations and maintenance (O&M) costs, and overall present worth costs. Non-economic considerations were also included.

O&M costs were estimated for an average flow for the year 2024, considered as an equal annual cost over the 20 year period from 2014 to 2034. A present worth analysis was then conducted, equalizing all the costs to 2014 for comparison. All costs shown are in 2014 dollars.

Capital costs for each alternative included the following:

- Construction costs for treatment facilities.
  - Construction costs were estimated based on 2014 construction costs, and escalated 3% per year for the respective phase of construction.
  - A 20% contingency was included for each option.
- Pumping facilities and force mains for alternatives where appropriate.
- Land acquisition costs at $16,000 per acre.
- Engineering costs, assumed to be 15% of construction costs.
- A summary of capital costs for the alternatives are included in Table 4-3. The costs have been updated from the previous study (Black & Veatch, 2006) and are based on the speculative limits as provided by NC DENR in June 2013.

4.5.2 Operations and Maintenance Costs

O&M costs were developed based on a baseline cost of approximately $2.5 million per year. This baseline was estimated from the total annual operating budgets for Utilities' McDowell Creek WWTP, Sugar Creek WWTP, and Irwin Creek WWTP, scaled to the capacity for the new regional facility. From this baseline, adjustments were made for each alternative to reflect O&M costs.

4.5.3 Present Worth Cost Analysis

The present worth analysis was made based on the following:

- All costs adjusted to 2014 costs.
- Period for evaluation is 20 years from 2014 to 2034.
- Interest rate of 5% was used.
- O&M costs were assumed constant for the period of evaluation.
- No salvage value was included for the end of the period.

Table 4-3 Capital Cost Evaluation

	Alternative 1	Alternative 2
Construction at Long Creek site	$1,500,000	$250,000,000
Land Acquisition at Long Creek site	$2,000,000	$6,000,000
Construction at Mount Holly site	$250,000,000	$0
Land Acquisition at Mount Holly site	$5,000,000	$0
Force Main and PS Cost – to/from Mount Holly and Utilities	$9,800,000	$6,200,000
Force Main and PS Cost – from Belmont to Mount Holly	$15,000,000	$0
Force Main and PS Cost – from Belmont to Utilities	$0	$13,000,000
Force Main Cost – from Paw Creek to Long Creek	$5,200,000	$5,200,000
Decommission Belmont WWTP	$2,000,000	$2,000,000
Subtotal	$290,500,000	$282,400,000

Engineering (15% of Construction Costs)	$43,575,000	$42,3600,000
Total Capital Costs	**$334,075,000**	**$324,760,000**

Table 4-4 Present Worth Cost Evaluation

	Alternative 1	Alternative 2
Capital Costs	**$334,075,000**	**$324,760,000**
Annual Costs Carried to Year 2014 PW	$24,047,800	$24,047,800
Total Present Worth Cost	**$358,122,800**	**$348,807,800**

4.5.4 Direct Environmental Impacts

Environmental impacts of all alternatives are compared in detail in Section 6. The main factors that differentiate the level of direct environmental impacts of each alternative are primarily related to:

- Size of facility footprint
- Use of previously disturbed property
- Preservation of forested land
- Efficiency of the site layout including the need for intermediate pumping stations and placement of treatment processes

The direct impacts of the proposed project alternatives are compared in further detail in Table 6-4.

The operation of a regional wastewater facility would provide beneficial direct impacts, including increased water availability in Lake Wylie and decreased energy consumption. The proposed regional facility would be consistent with current long range planning goals for all affected local governments. The eventual discontinuation of the pumping of wastewater over 20 miles to the McAlpine Creek WWMF would result in energy savings. Increased water would be available in Lake Wylie for power generation, cooling water, and water supply. The proposed regional wastewater facility, which would produce high quality effluent with low nutrient concentrations, could also increase the amount of water available in Lake Wylie to support water quality, aquatic life, drinking water, and recreation. The effluent would also provide reclaimed water for industrial or landscape applications, which could reduce the amount of water removed from the Lake Wylie system for irrigation. These potential reductions in Lake Wylie water use for industrial or landscape applications in conjunction with the introduction of treated effluent would help to preserve drinking water supplies, particularly under drought conditions. These beneficial impacts would not be achieved under the No Action Alternative.

4.5.5 Secondary and Cumulative Impacts

Section 6 includes the detailed analysis of the secondary and cumulative impacts associated with each of the alternatives. Secondary and cumulative impacts associated with any of the alternatives would generally be related to continued urban growth and land use changes associated with population increases in the service area. Growth within the service area is anticipated regardless of the alternative selected including the No Action Alternative.

The selection of an alternative that provides regional wastewater treatment would help reduce sprawl by facilitating higher density development in areas that are proactively planning for and regulating continued development. The proposed regional wastewater facility is part of a long term planning effort conducted by Utilities, the City of Mount Holly, and the City of Belmont to provide cost-effective high quality wastewater treatment for their citizens while being protective of the environment. This project has been proposed in response to an anticipated increase in wastewater generated within the service area; the facility itself would not produce this population growth. Any secondary and cumulative impacts would be significantly reduced through the implementation of environmental controls required by regulatory programs. Many regulations in place within the service area meet or are more stringent than State and/or Federal requirements.

Overall, the construction of a regional wastewater facility would provide a number of beneficial secondary and cumulative impacts, including increased water volume in Lake Wylie and the Catawba River and decreased energy consumption associated with the eventual discontinuation of the pumping of wastewater over 20 miles to the McAlpine Creek WWMF. Increased water volume would be available in Lake Wylie for power generation, cooling water, and water supply. The proposed regional wastewater facility, which would produce high quality wastewater effluent with low nutrient concentrations, could also increase the amount of water available in Lake Wylie to protect water quality, support aquatic life, and provide recreational opportunities. The existing discharges from Belmont and Mount Holly would be eliminated. Highly treated wastewater effluent would also provide a source of reclaimed water for industrial or landscape applications. The utilization of reuse water for irrigation could reduce the demand for potable water during summer peak water use periods. These potential reductions in Lake Wylie water use for industrial or landscape applications, in conjunction with the introduction of treated wastewater effluent, would help to preserve drinking water supplies, particularly under drought conditions. These beneficial impacts would not be achieved under the No Action Alternative.

4.5.6 Regulatory Impact Minimization and Mitigation

Some direct, secondary, and cumulative impacts would occur as a result of any of the alternatives. The potential direct environmental consequences of the proposed action at the project sites have been considerably reduced as a result of avoidance and minimization during the site selection process discussed above, and would be further reduced during the design and construction of the proposed facilities. A substantial number of programs currently in place would further serve to minimize and mitigate direct impacts on the site as well as secondary and cumulative impacts throughout the service area. Regulations and guidance that would provide mitigation for any of the alternatives include local Erosion and Sediment Control Ordinances, Zoning and Subdivision Ordinances, Stormwater Ordinances, Flood Damage Prevention Ordinances, and stream buffer ordinances, as well as State and Federal programs.

4.5.7 Impacts to Lake Wylie Hydroelectric Generation and Power Plant Cooling Water

Wastewater generated within the Long Creek Basin in Mecklenburg County is currently pumped over 20 miles for treatment at the McAlpine Creek WWMF in southern Mecklenburg County. The treated effluent is discharged to the Catawba River below Lake Wylie. The proposed alternatives that treat the wastewater generated in this basin at a regional facility located near the existing pumping station or in Mount Holly near the existing WWTP would increase the quantity of effluent that is discharged to the lake. These alternatives

would be considered a benefit for the hydroelectric power plant on Lake Wylie. This increased quantity of water would also be beneficial for industrial facilities utilizing Lake Wylie water in their cooling processes.

4.5.8 Public Health

Waterbodies present in the vicinity of the potential regional project sites include the Catawba River downstream of the Mountain Island Lake Dam, and Long Creek near its confluence with the Catawba River. In these areas, both waterbodies are classified as critical areas (CA) within WS-IV water supply waters (WS-IV; CA) (DWR BIMS Database, May 14, 2007). Water supplies in moderately to highly developed watersheds are classified as WS-IV waters. Watershed areas within one-half mile of a water supply and waters within one-half mile of a water supply intake are designated as critical areas. Discharges are allowed in WS-IV; CA areas, but effluent must meet standards established by NC DWR in consultation with the NC Department of Environmental Health (DEH). Expanded wastewater discharges to water supply waters must be approved by DEH. Within water supply watersheds, the DENR also requires minimum buffer widths as well as control of non-point sources and stormwater discharges. A new regional facility would be designed to achieve high-level treatment and overflow prevention to protect public health.

4.6 Preferred Alternative

Alternative 2 was identified as the preferred alternative because it meets the developing region's need for additional wastewater treatment capacity and results in a combination of fewer negative environmental consequences. These include comparatively fewer natural resources and environmental impacts at the building site; fewer construction and operational constraints; greater public recreation and open space benefits; reduced energy use; increased volume in Lake Wylie for local uses such as power generation, cooling water, low flow supplementation, and drinking water; and concurrence with the planning goals of the affected local governments. Alternative 2 also has the potential to minimize direct impacts, including:

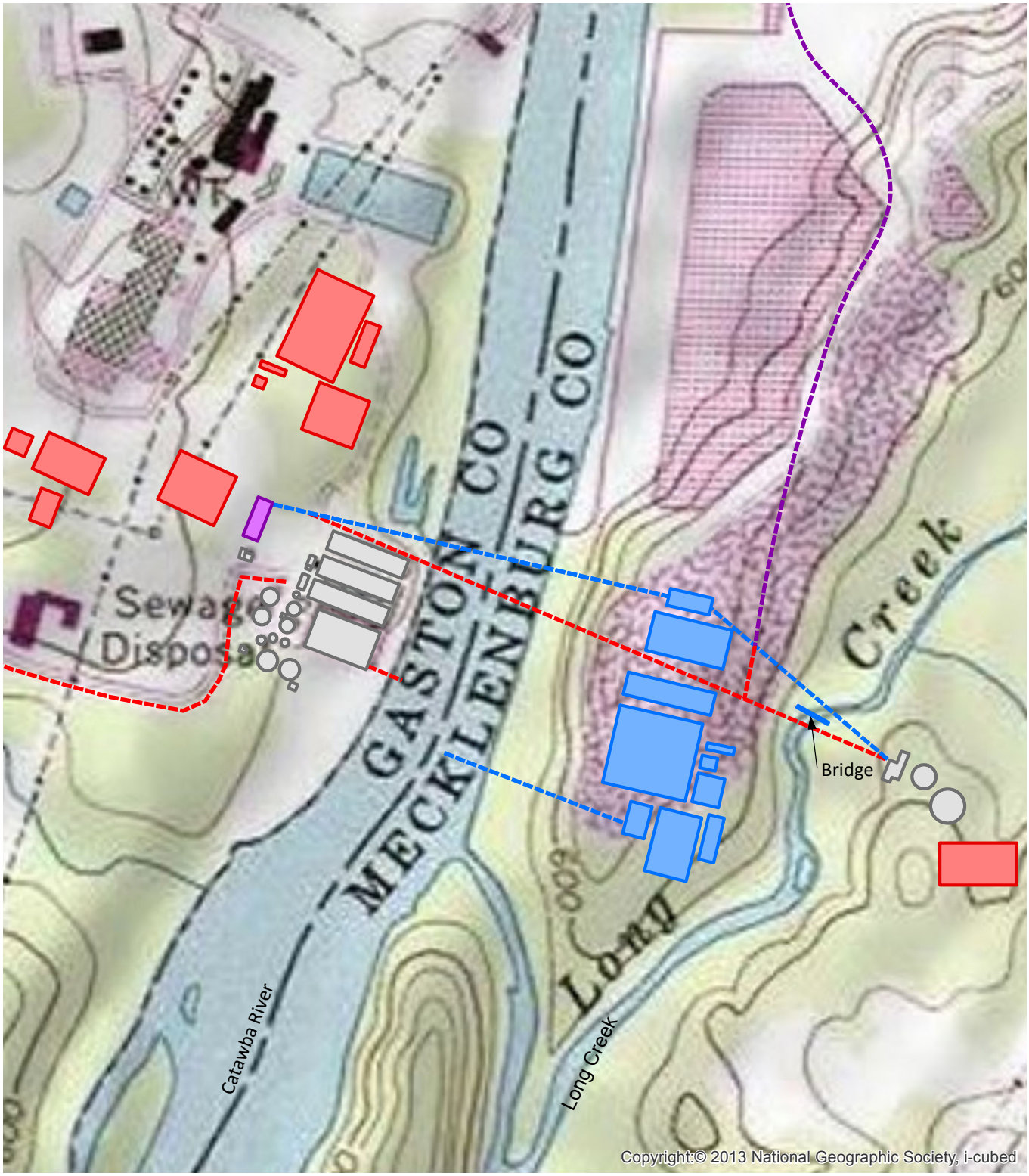
- Placement of a single regional facility is preferable to other alternatives in terms of compatibility with existing and future land uses, protection of riparian buffers, and reduced impacts to critical areas such as streams and wetlands. Advanced treatment at a new facility would produce high quality effluent with low nutrient concentrations and provide additional volume to Lake Wylie for many beneficial uses.
- The Preferred Alternative provides regional wastewater treatment with a single discharge that promotes efficient planning, design, and permitting; minimizes shoreline and wetland impacts; and achieves project goals. It would also eliminate two existing discharges.
- The Preferred Alternative reduces risk of overflows by increasing capacity through equalization facilities, backup generators, and redundant facilities.

This alternative meets the developing region's need for expanded wastewater treatment capacity with a single regional facility, a single discharge, and a single permitting and SEPA process. The effluent would also provide reclaimed water for industrial or landscape applications. As such, it appears more favorable from an environmental and regulatory process perspective and would likely have a less complex permitting process than the other alternatives. Regionalization would result in considerable savings of time, effort, and finances during the permitting and design phases as well as during operation of the facility.

Under the Preferred Alternative, future wastewater treatment needs to accommodate projected development through 2034 would be provided for Mount Holly, Belmont, and Utilities on the Mecklenburg County side of the Catawba River by constructing a new 25-mgd regional facility. With this alternative, Mount Holly and Belmont flows would be pumped across the Catawba River.

The Long Creek Pumping Station located on the Mecklenburg County side of the Catawba River was also designed to be converted into an influent pumping station for a nearby facility at some point in the future. The proposed regional facility would be located on a parcel of land that has recently been purchased from ReVenture; it was previously cleared of vegetation. This means the forested area adjacent to the Long Creek pumping station would not be disturbed. By limiting the facility footprint and incorporating low impact development (LID) techniques in site design, the impact from non-point source runoff would also be minimized. To further protect water quality, no facilities would be constructed in the 100-year floodplain or surrounding wetlands and disturbances to the riparian buffer would be minimized to the greatest extent possible.

The effluent from this combined facility would be discharged in a single outfall to the Catawba River. Discharging to the Catawba River rather than Long Creek would minimize impacts associated with higher flow velocities (streambed scouring) and quality of effluent (nutrient enrichment) to the creek. The wastewater would be treated to reclaimed water quality standards, so the effluent would also provide reclaimed water for industrial or landscape applications.



N

0 250 500 750 1,000

Feet

1 inch = 650 feet

Alternative 1

Alternative 2

Alternatives 1 and 2

Existing Facilities

BLACK & VEATCH
Building a world of difference.

Cardno ENTRIX
Shaping the Future

CHARLOTTE
CHARLOTTE-MECKLENBURG UTILITIES

Charlotte-Mecklenburg Utilities / City of Mount Holly / City of Belmont Regional Wastewater Treatment

Alternatives 1 and 2

PN: 148017

Date: November 2013

Figure 4.1

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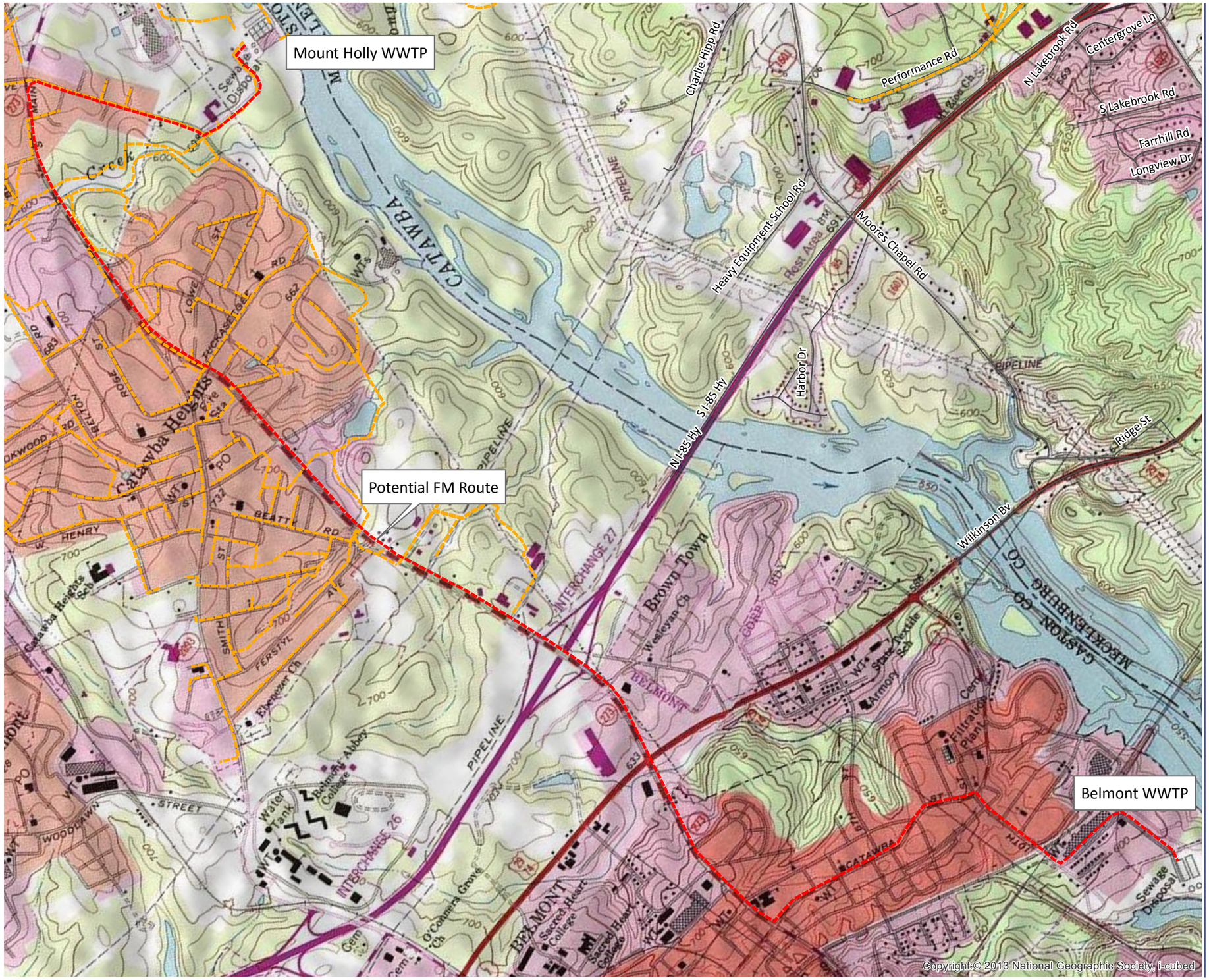

Charlotte-Mecklenburg Utilities / City of Mount Holly / City of Belmont Regional Wastewater Treatment Regionalization Study

Proposed Belmont – Mount Holly Forcemain Route

Proposed Forcemain Route
Belmont WWTP – Mount Holly WWTP

- Proposed FM Route
- Existing Pipes
- Streets

N

0 500 1,000
Feet
1 inch = 1,500 feet

PN: 148017
Date: November 2013
Figure 4.2

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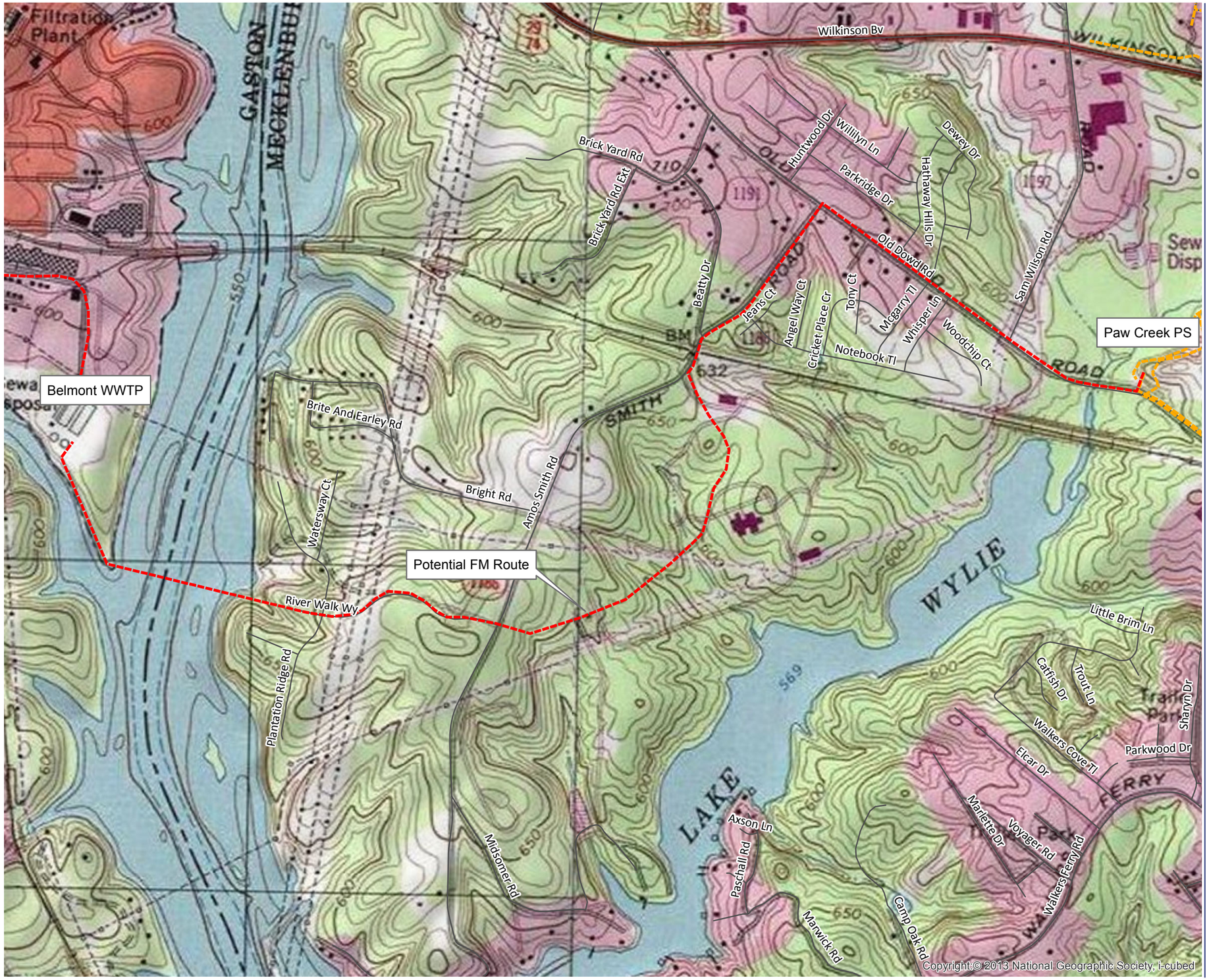

Charlotte-Mecklenburg Utilities / City of Mount Holly / City of Belmont Regional Wastewater Treatment Regionalization Study

Proposed Belmont – Utilities Forcemain Route

Proposed Forcemain Route
Belmont WWTP – Paw Creek PS

- Potential FM Route
- Existing Pipes
- Streets

N

0 500 1,000
Feet
1 inch = 1,000 feet

PN: 148017
Date: November 2013
Figure 4.3

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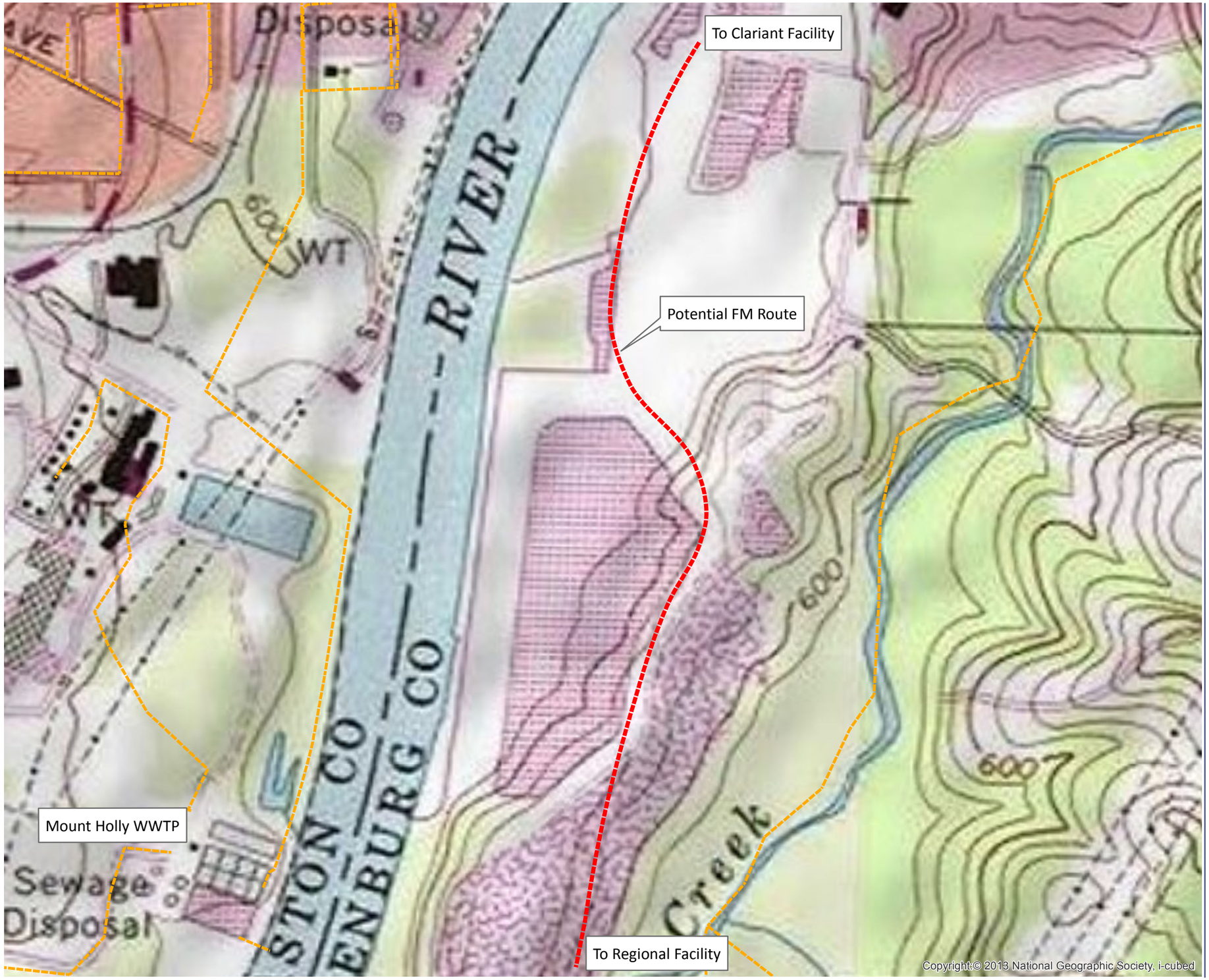

Charlotte-Mecklenburg Utilities / City of Mount Holly / City of Belmont Regional Wastewater Treatment Regionalization Study

Proposed Clariant – Utilities Forcemain Route

Proposed Forcemain Route
Clariant Corporation – Regional Facility

- Proposed FM Route
- Existing Pipes
- Streets

N

0 500 1,000
Feet
1 inch = 500 feet

PN: 148017
Date: November 2013

Figure 4.4

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Section 5. Existing Environment

This section discusses the existing characteristics of each environmental resource (5.1 through 5.13) for three project alternatives: Alternative 1 (new regional facility in Mount Holly), Alternative 2 (new regional facility in western Mecklenburg County), and the No Action Alternative (NAA). While Alternative 2 was identified as the preferred alternative in Section 4, an evaluation of the environmental conditions at the other alternative locations is provided for comparison. Alternative 2 was selected due to its potential value as a centralized, regional facility, as well as the benefits it would bring stakeholders. The existing environmental characteristics of the NAA are also evaluated to provide a baseline from which to compare the other alternatives.

The service area of the proposed regional facility and the potential project areas are described in Section 4. The environmental characteristics for the service area of the Belmont WWTP are not included because no additional capacity for Belmont is provided by the alternatives presented by this DEIS. Impacts at Belmont are limited to the direct footprint of the facility, the proposed forcemain routes, and the immediate surrounding areas. Additionally, environmental characteristics associated with the Clariant Corporation site are not included in the DEIS. Impacts at Clariant Corporation site are limited to a potential forcemain route required for interconnection to each proposed alternative. The anticipated flow contribution is minimal (0.2 mgd) and the associated forcemain will be of small diameter and limited length. Further, Clariant Corporation and Utilities now share a property line (reference Appendix L) and any required interconnection will be routed in previously cleared property.

5.1 Topography and Floodplains

5.1.1 Service Area Overview

The service area is within North Carolina's Southern Piedmont Physiographic Province. This province consists of generally rolling, well-rounded hills and ridges with a few hundred feet of elevation difference between hills and valleys. Elevations in the Southern Piedmont range from 500 to 900 feet above sea level. Resistant knobs and hills occur in the Southern Piedmont Province. According to the North Carolina Geological Survey, the service area consists mainly of late Proterozoic to middle Paleozoic intrusive geologic formations (NCGS, 1994). Lithology of the service area is illustrated in Figure 5.1a. The service area is characterized by moderate topography, with elevations ranging from approximately 580 to 840 feet above mean sea level. A 20-foot interval contour map for the service area is provided as Figure 5.1b.

5.1.2 Project Area

5.1.2.1 No Action Alternative

The NAA implies that the Mount Holly and the Belmont WWTPs as well as the Long Creek and Paw Creek Pump Stations will remain in operation at the current sites. Large portions of the existing structures located at the Mount Holly WWTP, Long Creek Pump Station, and Paw Creek pump station are within the 100-year floodplain (Figure 5.1c) of the Catawba River, Long Creek, and Paw Creek respectively. The majority of the Belmont WWTP is outside of the 100-year floodplain (Figure 5.1c).

5.1.2.1.1 Topography

- **Existing Mount Holly WWTP:** Elevations range from 580 – 600 feet above sea level.
- **Existing Belmont WWTP:** Elevations range from 580 – 600 feet above sea level.
- **Existing Long Creek Pump Station:** Elevations range from 580 – 600 feet above sea level.
- **Existing Paw Creek Pump Station:** Elevation is 580 feet above sea level.

5.1.2.1.2 Floodplains

- **Existing Mount Holly WWTP:** Approximately 60 percent of the existing facilities are located within the 100-year floodplain (Figure 5.1c).
- **Existing Belmont WWTP:** The parcel is adjacent to the 100-year flood plain, but the facilities are not within the floodplain (Figure 5.1c).
- **Existing Long Creek Pump Station:** Approximately 50 percent of the existing facilities are located in the 100-year floodplain (Figure 5.1c).
- **Paw Creek Pump Station:** Approximately 90% of the Paw Creek Pump Station property is within the 100 year floodplain (Figure 5.1c).

5.1.2.2 Alternative 1

Under Alternative 1, a new regional facility will be constructed adjacent to the existing Mount Holly WWTP, a new pump station will be constructed at the existing Belmont WWTP site, and a new forcemain will be constructed from the Belmont pump station to the new regional facility. Wastewater from the Mecklenburg County side will be pumped across the Catawba River.

5.1.2.2.1 Topography

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP**: Elevations range from 580 – 630 feet above sea level.
- **Proposed Pump Station at Existing Belmont WWTP**: Elevations range from 580 – 600 feet above sea level.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed Regional Facility**: Elevations range from 580 – 720 feet above sea level.
- **Existing Long Creek Pump Station and Proposed EQ Basin**: Elevations range from 580 – 600 feet above sea level.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility**: Elevations range from 580 – 630 feet above sea level.
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain**: Elevations range from 580 – 620 feet above sea level.

5.1.2.2.2 Floodplains

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** Proposed facilities will be built outside of 100-year floodplain (Figure 5.1d).
- **Proposed Pump Station at Existing Belmont WWTP:** The parcel is adjacent to the 100-year flood plain, but the facilities are not within the floodplain (Figure 5.1e).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed Regional Facility:** The proposed forcemain from the Belmont WWTP to the Mount Holly WWTP is outside of the 100-year-floodplain except where it crosses Fites Creek, US-29, and UT 3 (Figure 5.1e). Approximately 35 linear feet of forcemain will cross the floodplain at Fites Creek, approximately 320 linear feet at US-29, and approximately 35 linear feet at UT-3.
- **Existing Long Creek Pump Station and Proposed EQ Basin:** The new facilities will be built outside of 100-year floodplain (Figure 5.1d).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Approximately 2805 linear feet of forcemain will cross Long Creek and its floodplain, as well as the Catawba River (Figure 5.1d).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** The forcemain route is within the 100-year floodplain of the Catawba River for 1900 feet near the Clariant WWTP (Figure 5.1d).

5.1.2.3 Alternative 2

Under Alternative 2, a new regional facility will be constructed adjacent to the existing Long Creek Pump Station. A new pump station will be constructed at the existing Mount Holly WWTP site, and a new forcemain will be constructed from the new Mount Holly Pump Station to the new regional facility across the Catawba River. A new pump station will be constructed at the existing Belmont WWTP site and a new forcemain will be constructed from Belmont to the Paw Creek Pump Station. A new forcemain will be constructed from the existing Long Creek Pump Station to the new regional WWTP facility. The existing Belmont WWTP and Mount Holly WWTP will be decommissioned.

5.1.2.3.1 Topography

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station**: Elevations range from 580 – 610 feet above sea level.
- **Proposed Pump Station at Existing Mount Holly WWTP**: Elevations range from 580 – 600 feet above sea level.
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility**: 580 – 620 feet above sea level.
- **Proposed Pump Station at Existing Belmont WWTP**: Elevations range from 580 – 600 feet above sea level.

- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station**: 580 – 700 feet above sea level.
- **Existing Long Creek Pump Station**: Elevations range from 580 – 600 feet above sea level.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility**: 580 – 620 feet above sea level.
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility**: Elevations range from 580 – 620 feet above sea level.

5.1.2.3.2 Floodplains

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station:** The new facilities will be built outside of the 100-year floodplain (Figure 5.1f).
- **Proposed Pump Station at Existing Mount Holly WWTP:** Approximately 60 percent of the existing facilities are located within the 100-year floodplain (Figure 5.1f).
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility:** The proposed forcemain route from the Mount Holly WWTP to the Long Creek regional facility is within the 100-year floodplain on the Mount Holly WWTP side and where it crosses under the Catawba River (Figure 5.1f). Approximately 980 linear feet will cross the floodplain as it crosses the Catawba River.
- **Proposed Pump Station at Existing Belmont WWTP**: The parcel is adjacent to the 100-year flood plain, but the facilities are not within the floodplain (Figure 5.1f).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station:** Approximately 1,000 linear feet of this forcemain will be within the floodplain at the existing Belmont WWTP site; approximately 1,500 linear feet are in the floodplain at the Catawba River crossing; and approximately 900 linear feet are within the floodplain at the Paw Creek Pump Station (Figure 5.1f).
- **Existing Long Creek Pump Station:** Approximately 50 percent of the existing facilities are located in the 100-year floodplain (Figure 5.1f).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Approximately 580 linear feet will be within the floodplain (Figure 5.1f).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facilit**y: The forcemain route is within the 100-year floodplain of the Catawba River for 1900 feet near the Clariant WWTP (Figure 5.1f).

5.2 Soils

5.2.1 Service Area Overview

Soils data were obtained from the NRCS Soil Conservation Service, and calculations of the area extents of soil units within the service area were conducted in GIS using ESRI Spatial Analyst.

Soils found within the service area are primarily within the Cecil and Cecil-Urban associations, with others in the Iredell-Mecklenburg, Wilkes-Enon, Enon, Helena, Vance,and Monacan associations. These associations are described as follows:

- Cecil: Gently sloping to strongly sloping, well drained soils that have predominantly clayey subsoil. Formed in residuum from acid igneous and metamorphic rock.
- Cecil-Urban land: Nearly level to strongly sloping urban areas on well drained soils that have predominantly clayey subsoil. Formed in residuum from acid igneous and metamorphic rock.
- Iredell-Mecklenburg: Nearly level to strongly sloping, moderately well drained and well drained soils that have predominantly clayey subsoil. Formed in residuum from diorite, gabbro, and other rock high in ferromagnesian minerals.
- Wilkes-Enon: Gently sloping to steep, well drained soils that have predominantly clayey subsoil. Formed in residuum from diorite, hornblende schist, and other basic rock, or from mixed acidic and basic rock.
- Enon, Helena, Vance: Gently sloping to strongly sloping, well drained and moderately well drained soils that have predominantly clayey subsoil. Formed in residuum from mixed acidic and basic igneous and metamorphic rock.
- Monacan: Nearly level, somewhat poorly drained soils that have predominantly loamy subsoil. Formed in fluvial sediment on floodplains.

All soils found in the service area are listed in Table 5-2 in Appendix D.

The most common soils in the service area are Cecil sandy clay loams CeB2 and CeD2, which collectively make up 30.5 percent of the service area. The next most common soils are Pacolet sandy loam PaE, which make up 8.4 percent of the service area. These common soils are described in Appendix D.

5.2.2 Project Area

5.2.2.1 No Action Alternative

The No Action Alternative would not disturb lands or change land cover associated with the construction of a new regional WWTP or new sewer lines. Under this No Action Alternative, the current Mount Holly and Belmont WWTPs would remain in operation at their current sites, as would the Long Creek and Paw Creek pumping stations. No new forcemains would be constructed.

The soil types found at the existing wastewater treatment plants and pumping stations are provided in Table 5-1. The underlying soils at the current Mount Holly WWTP are predominantly Cecil-Urban land complex soils (CfB) (Figure 5.2a). The soils at the Belmont WWTP are predominantly urban land soils (Ur) (Figure

5.2a). The Paw Creek pump station is situated on Pacolet sandy loam (PaF), Monacan loam (MO), loamy Udorthents (UL), and Cecil sandy clay loam (CeD2) soils (Figure 5.2a). Soils at the Long Creek pump station are Monacan loam (MO), Enon sandy loam (EnD), Mecklenburg fine sandy loam (MeB), and Cecil sandy clay loam (CeB2 and CeD2) soils (Figure 5.2a). Table 5-1 lists all soils and their contribution to the total area at each of the existing WWTP and pumping station sites.

Table 5-1 Soils at the Existing Wastewater Treatment Plants and Pumping Stations

Map Symbol	Soil Type	Acres	Percent of total
Belmont WWTP			
Ur	Urban land	13	74%
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	3	14%
CH	Chewalca loam, frequently flooded	1	7%
CfB	Cecil-Urban land complex, 2 to 8% slopes	1	4%
GaE	Gaston sandy clay loam, 15 to 25% slopes	<1	2%
GaD2	Gaston sandy clay loam, 8 to 15% slopes, eroded	<1	1%
Long Creek Pumping Station			
EnD	Enon sandy loam, 8 to 15% slopes	5	71%
MeB	Mecklenburg fine sandy loam, 2 to 8% slopes	1	14%
CeB2	Cecil sandy clay loam, 2 to 8% slopes, eroded	0.4	6%
MO	Monacan loam	0.4	6%
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded	0.2	3%
Mount Holly WWTP			
CfB	Cecil-Urban land complex, 2 to 8% slopes	9	72%
W	Water	3	26%
CH	Chewalca loam, frequently flooded	0.3	2%
Paw Creek Pumping Station			
PaF	Pacolet sandy loam, 25 to 45% slopes	1.2	48%
MO	Monacan loam	0.8	32%
UL	Udorthents, loamy	0.3	12%
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded	0.2	8%

5.2.2.2 Alternative 1

If Alternative 1 were selected, a new regional WWTP would be constructed on land adjacent to the existing Mount Holly WWTP on the west side of the Catawba River. The construction would disturb soils during excavation, filling, and grading. To transport wastewater to the new facility, the Long Creek pumping station and equalization basin would be expanded onto adjacent land, and a new pumping station would be constructed on the existing Belmont WWTP site. This expansion would also cause soil disturbances. Three new forcemains would be routed to the new regional WWTP, one from the newly constructed Belmont pumping station, one from the Long Creek pumping station, and one from Clariant. The routing for the forcemains would disturb the soils during pipe placement. One new discharge pipe would be placed from the WWTP to the Catawba River (Lake Wylie).

The soils at the site of the proposed regional Mount Holly WWTP are predominantly Gaston sandy clay loam (GaB2) and Cecil-Urban land complex (CfB), with smaller areas of Chewalca loam (CH) and Helena sandy loam (HeB) (Figure 5.2b, Table 5-2). The Long Creek pumping station expansion would occur on loam soils of the same types as those at the current site: Monacan loam (MO), Enon sandy loam (EnD), Mecklenburg fine sandy loam (MeB), and Cecil sandy clay loam (CeD2) (Figure 5.2b). Similarly, the new Belmont pumping station would be built on the same urban land soils (Ur) as the existing Belmont WWTP (Figure 5.2c).

The Belmont to Mount Holly forcemain would cross primarily Cecil-Urban land complex (CfB), urban land (Ur), and sandy clay loams (GaB2 and GaD2) (Figure 5.2c, Table 5-3). A new forcemain from the Long Creek pumping station to the new regional WWTP would cross Enon sandy loam (EnB, EnD), Monacan loam (MO), Wilkes loam (WkE), Chewalca loam, and Gaston sandy clay loam (Figure 5.2c, Table 5-3).

Table 5-2 Soils at the Site of the Proposed Mount Holly Wastewater Treatment Plant

Map Symbol	Soil Type	Acres	Percent of total
Proposed New Regional WWTP Near Mount Holly			
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	64	48%
CfB	Cecil-Urban land complex, 2 to 8% slopes	30	22%
CH	Chewalca loam, frequently flooded	24	18%
W	Water	10	7%
HeB	Helena sandy loam, 2 to 8% slopes	4	3%
PaE	Pacolet sandy loam, 15 to 25% slopes	3	2%
Proposed Discharge Pipe from WWTP%			
CfB	Cecil-Urban land complex, 2 to 8% slopes	170 ft	100%

Table 5-3 Soils along the Proposed Routes of New Forcemains under Alternative 1

Map Symbol	Soil Type	Linear feet	Percent of total
Proposed Forcemain from Belmont WWTP to Mount Holly WWTP			
CfB	Cecil-Urban land complex, 2 to 8% slopes	152 88	51 %
Ur	Urban land	525 2	18 %
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	410 3	13 %
GaD2	Gaston sandy clay loam, 8 to 15% slopes, eroded	224 0	7 %
PaD2	Pacolet sandy clay loam, 8 to 15% slopes	148 0	5 %

WkF	Wilkes loam, 25 to 45% slopes	750	3 %
CH	Chewalca loam, frequently flooded	672	2 %
WnB	Winnsboro loam, 2 to 8% slopes	148	1 %
Proposed Forcemain from Long Creek Pumping Station to New WWTP next to Mount Holly WWTP			
W	Water	719	26 %
EnB	Enon sandy loam, 2 to 8% slopes	533	20 %
MO	Monacan loam	442	16 %
WkE	Wilkes loam, 15 to 25% slopes	435	16 %
CH	Chewalca loam, frequently flooded	287	11 %
EnD	Enon sandy loam, 8 to 15% slopes	170	6 %
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	133	5 %
Proposed Forcemain from Clariant WWTP to Long Creek Forcemain to New Mount Holly WWTP			
MO	Monacan loam	2014	43 %
WkE	Wilkes loam, 15 to 25% slopes	1878	39 %
EnB	Enon sandy loam, 2 to 8% slopes	834	18 %

5.2.2.3 Alternative 2

If Alternative 2 were selected, a new regional WWTP (Long Creek WWTP) would be constructed on land adjacent to the existing Long Creek Pump Station on the east side of the Catawba River. This construction would disturb the soil during excavation, filling, and grading. To transport wastewater to the new facility, new pumping stations would be constructed on the existing Mount Holly WWTP site and the Belmont WWTP site, both of which may cause soil disturbances during excavation, filling, and grading. Four new forcemains would be routed. Each would disturb the soil during pipe placement (Belmont to Paw Creek, existing Mount Holly WWTP to new Regional WWTP, Long Creek pumping station to new Regional WWTP, and Clariant to new Regional WWTP) and during the placement of one discharge pipe from the Long Creek WWTP to the Catawba River.

The soils at the site of the proposed regional Long Creek WWTP are predominantly Enon sandy loam (EnB), Monacan loam (MO), Cecil sandy clay loam, and Wilkes loam (WkE) (Figure 5.2d, Table 5-4). The Mount Holly pumping station construction (and decommissioning of the existing WWTP) would occur on Cecil-urban land complex soils (CfB) (Figure 5.2d). Similarly, the new Belmont pumping station would be built on the same urban soil (Ur) as the existing Belmont WWTP (Figure 5.2d).

Soils along the forcemain route from the Mount Holly pumping station to the Long Creek WWTP are primarily Chewalca loam (CH), Gaston sandy clay loam (GaB2), and Cecil-urban land complex soils (CfB) on the west side of the Catawba River, and Wilkes, Enon, and Monacan loams (WkE, EnB, and MO) on the east side of the river (Figure 5.2d, Table 5-5).

A short forcemain from the Long Creek pumping station to the Long Creek WWTP would traverse Monacan loam (MO), Wilkes loam (WkE), Enon sandy loam (EnD), and Mecklenburg fine sandy loam (MeB). (Figure 5.2d, Table 5-5).

Soils along the forcemain route from the existing Belmont WWTP to the Paw Creek pumping station are primarily Cecil sandy clay loam (CeB2 and CeD2) with some Pacolet sandy loam (PaE and PaF), Chewalca loam, and other minor components as well (Figure 5.2d, Table 5-5).

A discharge pipe is proposed from the Long Creek WWTP to the Catawba River; it would cross Enon sandy loam (EnB), Monacan loam (MO), and Wilkes loam (WkE) (Figure 5.2d, Table 5-5).

Table 5-4 Soils along the Proposed Routes of New Forcemains under Alternative 1

Map Symbol	Soil Type	Acres	Percent of total
Proposed Long Creek Regional WWTP			
EnB	Enon sandy loam, 2 to 8% slopes	31	22%
MO	Monacan loam	25	18%
EnD	Enon sandy loam, 8 to 15% slopes	22	15%
CeB2	Cecil sandy clay loam, 2 to 8% slopes, eroded	18	13%
WkE	Wilkes loam, 15 to 25% slopes	18	13%
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded	12	9%
MeB	Mecklenburg fine sandy loam, 2 to 8% slopes	9	6%
W	Water	6	4%

Table 5-5 Soils along New WWTP, Forcemains and Discharge Pipes under Alternative 2

Map Symbol	Soil Type	Linear feet	Percent of total
Proposed Forcemain from existing Mount Holly WWTP to Long Creek WWTP			
W	Water	686	44%
CH	Chewalca loam, frequently flooded	236	15%
EnB	Enon sandy loam, 2 to 8% slopes	188	12%
WkE	Wilkes loam, 15 to 25% slopes	157	10%
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	154	10%
MO	Monacan loam	103	7%

CfB	Cecil-Urban land complex 2 to 8% slopes (Gaston)	37	2%
Proposed Forcemain from Long Creek Pumping Station to Long Creek WWTP			
MO	Monacan loam	425	48%
WkE	Wilkes loam, 15 to 25% slopes	201	22%
EnD	Enon sandy loam, 8 to 15% slopes	180	20%
W	Water	84	9%
MeB	Mecklenburg fine sandy loam, 2 to 8% slopes	2.0	<1%
Proposed Forcemain from Belmont WWTP to Paw Creek Pumping Station			
CeB2	Cecil sandy clay loam, 2 to 8% slopes, eroded	7631	48%
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded	2699	17%
W	Water	1160	7%
PaF	Pacolet sandy loam, 25 to 45% slopes	1124	7%
CH	Chewalca loam, frequently flooded	1039	7%
PaE	Pacolet sandy loam, 15 to 25% slopes	728	5%
Ur	Urban land	727	5%
MO	Monacan loam	358	2%
UL	Udorthents, loamy	159	1%
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	147	1%
GaE	Gaston sandy clay loam, 15 to 25% slopes	3	<1%
Proposed Discharge Pipe from Long Creek WWTP			
EnB	Enon sandy loam, 2 to 8% slopes	328	48%
MO	Monacan loam	178	26%
WkE	Wilkes loam, 15 to 25% slopes	178	26%
Clariant Forcemain Soils (See Table 5-3)			

5.3 Land Use and Land Cover

5.3.1 Service Area Overview

Land use and land cover are related concepts which have important differences. Land use classifications describe how people are using (or plan to use) the land, while land cover describes the physical (natural and human-made) features of the Earth's surface. Land use classifications do not map directly to specific land cover classifications or vice versa. Together, these may provide a comprehensive picture of a geographic area. Land cover was determined using National Land Cover Database (NLCD 2006) and land use was determined using county-level tax parcel and zoning data. Results of both are presented below.

5.3.1.1 Land Cover

Land cover presented in this report describes the most recently available (2006) condition of the proposed service areas, and indicates the general land cover types (trees, grasses, houses, etc.) that characterize the landscape. Although these data include structures and vegetation existing in 2006, they do not indicate current or planned activities or how the area will be managed.

Land cover in the service area is illustrated in Figure 5.3a. This land cover dataset was obtained from the National Land Cover Database 2006 (NLCD 2006) and is interpreted primarily from 2006 LANDSAT Enhanced Thematic Mapper satellite images with 30 meter resolution (MLRC, 2006; http://www.mrlc.gov/). As such, this land cover data provides an understanding of overall distribution in the service area in 2006, but is not expected to be accurate at a fine scale.

Land cover from the NLCD 2006 is summarized into fifteen categories for the purposes of this report. These categories are defined as follows:

- **Open Water:** All areas of open water, generally with less than 25 percent cover of vegetation or soil.
- **Developed, Open Space:** Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover in these pixels. These areas most commonly include large-lot single family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- **Developed, Low Intensity:** Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 percent – 49 percent of total cover. These areas most commonly include single-family housing units.
- **Developed, Medium Intensity:** Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 percent – 79 percent of the total cover. These areas most commonly include single-family housing units.
- **Developed, High Intensity:** Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 percent – 100 percent of the total cover.
- **Deciduous Forest:** Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
- **Evergreen Forest:** Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
- **Mixed Forest:** Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.

- **Shrub/Scrub:** Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
- **Grassland/Herbaceous:** Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
- **Pasture/Hay:** Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
- **Cultivated Crops:** Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
- **Wetlands:** Includes areas where the soil or substrate is periodically saturated or covered with water.

The land cover data for the service area is summarized in Figure 5.3b and separated by county in Figure 5.3c.

According to the NLCD, and as illustrated in Figures 5.3a and 5.3b, the approximately 54,000 acre service area is made up primarily of developed land cover classes (43.9 percent), including developed open space, developed low intensity, developed medium intensity, and developed high intensity land cover. The largest amount of this developed land cover is developed open space and low intensity development, comprising 26.4 percent and 11.0 percent of the service area land cover, respectively. Forested land cover accounts for 38.3 percent of the service area, including deciduous (30.3 percent of the service area), evergreen forest (7.2 percent), and mixed forest (0.8 percent). The remaining 17.8 percent of the service area is composed primarily of pasture and hay (8.8 percent), grasslands (3.5 percent), open water (3.3 percent), shrub/scrub (0.4 percent), crops (0.3 percent) and woody wetlands (1.4 percent).

Figure 5.3c illustrates land cover as a percentage of each County's land within the service area. This figure shows that a higher proportion of the Mecklenburg County portion of the service area exhibits a deciduous forested land cover (30.2 percent) than the Gaston County portion of the service area (20.2 percent). Low Intensity Development and Open Space Development comprise a greater proportion of the land cover in Gaston County (22.7 percent and 30.1 percent respectively) than in Mecklenburg County (13.6 percent and 24.7 percent respectively).

Impervious Surface

Impervious land cover data is available from the NLCD (2006) for the proposed service area. These data were obtained from the Multi-Resolution Land Characteristics Consortium (MRLC; http://www.mrlc.gov/). The method employed to map percent imperviousness for NLCD 2006 consists of three key steps: deriving reference data of imperviousness from the high spatial resolution images, calibrating density prediction models using reference data and LANDSAT spectral bands; and extrapolating the developed models spatially to map per-pixel (30 m^2) imperviousness.

Figure 5.3d illustrates percent imperviousness per pixel within the service area. Darker red pixels indicate a greater percentage of impervious land cover in that area. The figure shows the highest concentration of impervious surface to the east of the service area, in the City of Charlotte. Within the Mecklenburg County portion of the service area, concentrations of impervious surface exist along major thoroughfares connecting to Charlotte, particularly Interstate 77, Interstate 85, Interstate 485, US Route 29, NC Route 17, and NC Route 27. The Gaston County side of the service area had a higher percentage of impervious surfaces in 2006 than the Mecklenburg County side. The greatest concentration of impervious surface in the Gaston County portion of the service area in 2006 was along the NC Route 27 corridor.

5.3.1.2 Land Use

Tax parcel and zoning data were used to determine land use classifications in both Mecklenburg and Gaston Counties in the proposed service area. This information was available in GIS format from both 2010 (Gaston) and 2013 (Mecklenburg). Additionally, parcel data was checked via Gaston and Mecklenburg Counties' online interactive GIS software accessed in 2013. Parcel layers provided by each county contained specific land use code attributes representing the current land use of each parcel. The two data sets were compared and land use codes were grouped according to similar characteristics. ArcMap GIS analysis and data management tools (ESRI, 2006) were used to develop a single, general land use layer covering the entire proposed service area in the two counties. Nine distinct land use types were created based on the parcel data codes and recommendations from Mecklenburg County (Isley, pers. Comm., 2007).

The land use codes used in this report are as follows:

- Commercial and Services: Land that is used for commercial and service enterprises such as offices and retail stores.
- Industrial: Industrial land uses such as manufacturing.
- Institutional: Includes land that is used for government, church, and educational institutions.
- Residential land uses: High density residential, medium density residential, and low density residential. These include single family residential land uses of varying densities.
- Multi-Family Residential: Includes multi-family residential uses such as townhomes, condominiums, and apartment homes.
- Open Space: Includes lands whose current use is open space such as vacant land, unimproved lots, and greenways.
- Cropland and Pasture: Includes lands used for production of agriculture.
- Transitional/Construction: Includes lands upon which there is construction in progress.
- Transportation: Transportation infrastructure such as parking lots and roadway corridors.

Land use data for the service area is illustrated in Figure 5.3e. The distribution of land use as a proportion of the service area and by County is shown in Table 5-6.

Table 5-6 Land Use for the Proposed Service Area and by County

Land Use Category	Total Service Area Percentage	Gaston County	Mecklenburg County
Commercial and services	8%	12%	8%
Cropland and pasture	1%	5%	1%
Industrial	13%	11%	13%
Institutional	3%	12%	2%
Multi-family residential	2%	2%	2%
Open Space	9%	14%	8%
Residential	62%	43%	65%
Transitional/Construction	<1%	1%	<1%
Transportation	<1%	<1%	<1%

Land cover and land use at and adjacent to the proposed WWTP alternative sites and potential forcemain routes were interpreted from 2011 aerial photography and county parcel records. This information is illustrated in Figures 5.3f, 5.3g, 5.3h and 5.3i.

5.3.2 Project Area

5.3.2.1 No Action Alternative

The NAA implies that the Mount Holly WWTP and the Belmont WWTP will continue to operate at the current sites, and the Long Creek and Paw Creek pump stations will continue to send wastewater over 20 miles to McAlpine WWTP.

- **Existing Belmont WWTP:** Land use near the Belmont WWTP is primarily industrial, open space, and residential. Land cover is forested between the existing facility and Catawba River (Figure 5.3f).
- **Existing Mount Holly WWTP:** The site is zoned Industrial. The parcel labeled open space next to the current WWTP is owned by the City of Mount Holly and contains multiple ball fields. Land surrounding the WWTP site is a mixture of industrial, residential and multi-family areas, and open space (Figure 5.3f).
- **Existing Long Creek Pump Station:** The pump station is on industrial land owned by the City of Charlotte. This pump station is adjacent to Long Creek and land used by the U.S. National Whitewater Center for mountain bike trails. The U.S. National Whitewater Center property is classified as residential.
- **Existing Paw Creek Pump Station:** The Paw Creek Pump Station is located on land classified as industrial surrounded by open space. Adjacent properties have industrial, residential and additional open space classifications.

5.3.2.2 Alternative 1

Under Alternative 1, a new regional facility will be constructed adjacent to the existing Mount Holly WWTP. A new pump station will be constructed at the existing Belmont WWTP site, and a new forcemain will be

constructed from the Belmont pump station to the new regional facility. Wastewater from the Mecklenburg County side will be pumped across the Catawba River from the existing Long Creek pump station. Wastewater from Clariant will be pumped to the forcemain that connects the Long Creek Pump Station to the new regional facility on the Gaston County side of the River.

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** The site is zoned Industrial and is owned by American and Efird. Adjacent parcels are zoned industrial and used for manufacturing. One parcel is owned by the City of Mount Holly and used as a park with ball fields and the existing Mount Holly WWTP. A small amount of land zoned residential is located on the western edge of the proposed WWTP location (Figure 5.3g). The existing land cover at the site is primarily forested.
- **Proposed Pump Station at Existing Belmont WWTP Site:** Land use near the Belmont WWTP is primarily industrial, open space, and residential. Land cover is forested between the existing facility and Catawba River.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed Regional Facility:** The proposed forcemain crosses I-85, US-29, and Fites Creek. The forcemain route runs almost entirely in road right-of-ways, primarily through parcels categorized as residential, commercial, institutional, industrial and multi-family residential (Figure 5.3h). Near the existing Mount Holly WWTP, the land use is primarily multi-family residential, residential, industrial, and open space.
- **Existing Long Creek Pump Station and Proposed EQ Basin:** This pump station is adjacent to Waters of the State (Long Creek) and land used by the U.S. National Whitewater Center for mountain bike trails (this land is part of the larger Tuckesegee Ford Regional Park). The land it occupies is classified as industrial and is owned by the City of Charlotte and is bordered by commercial and open space land (Figure 5.3h). The land cover is a mix of forested and managed vegetation.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The proposed route crosses Catawba River and Long Creek. On the Gaston County side of Catawba River, the land use is industrial, running mainly through the current Mount Holly WWTP parcel. On the Mecklenburg County side, the forcemain runs through land owned by the City of Charlotte that is classified as industrial. The land cover is a mix of forested and open space.
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** Land use is classified as industrial. Land cover along the proposed route that follows existing road right-of-ways is open space with some forested land and active groundwater remediation facilities.

5.3.2.3 Alternative 2

Under Alternative 2, a new regional facility will be constructed across Long Creek from the existing Long Creek Pump Station, a new pump station will be constructed at the existing Mount Holly WWTP site, and a new forcemain will be constructed from the new Mount Holly Pump Station to the new regional facility to carry wastewater from the Gaston County side across the Catawba River. A new pump station will be

constructed at the existing Belmont WWTP site, and a new forcemain will be constructed from Belmont to the Paw Creek Pump Station. A new forcemain will be constructed from the existing Long Creek Pump Station to the new regional WWTP facility. The existing Belmont and Mount Holly WWTPs will be decommissioned.

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station:** Land use at the proposed site is classified as industrial land (Figure 5.3i). Land cover is partially forested on previously disturbed land.
- **Proposed Pump station at Mount Holly WWTP:** The site is zoned Industrial. The parcel labeled open space next to the current WWTP is owned by the City of Mount Holly and contains multiple ball fields. Land surrounding the WWTP site is a mixture of industrial, residential and multi-family areas, and open space (Figures 5.3f and i).
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility:** The proposed route of this forcemain crosses Catawba River and Long Creek. On the Gaston County side of Catawba River, the land use is industrial, running mainly through the current Mount Holly WWTP parcel. On the Mecklenburg County side, the forcemain runs through land owned by the City of Charlotte and classified as industrial. The land cover is a mix of forested and open space.
- **Proposed Pump Station at Existing Belmont WWTP:** Land use near the Belmont WWTP is primarily industrial, open space, and residential. Land cover is forested between the existing facility and Catawba River.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station**: The proposed force main will cross Catawba River (Waters of the State). On the Gaston County side of Catawba River, the forcemain is on land classified as industrial, but has forested land cover. On the Mecklenburg County side of Catawba River, it passes through land classified as residential, commercial, multi-family, and open space (Figure 5.3i). The pump space is on property classified as industrial surrounded by open space. The land cover is primarily existing maintained road right of ways, a railroad crossing, and forested land near the Paw Creek pump station.
- **Existing Long Creek Pump Station:** This pump station is adjacent to Long Creek and land used by the U.S. National Whitewater Center for mountain bike trails (this land is part of the larger Tuckesegee Ford Regional Park). The land it occupies is classified as industrial and is owned by the City of Charlotte.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The proposed route crosses Long Creek on land owned by the City of Charlotte. At the site of the new regional facility, the land is classified as industrial and the land cover is a mix of forested and managed open space.

- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility:** Land use is classified as industrial. Land cover along the proposed route that follows existing road right-of-ways is open space with some forested land and active manufacturing and groundwater remediation facilities.

5.4 Wetlands

5.4.1 Service Area Overview

The most common types of natural wetland communities that exist within the Service Area are Piedmont Bottomland Forest, Piedmont Alluvial Forest, and Piedmont Swamp Forest (Shafale and Weakley, 1990). The vegetation in these systems is dominated by mixtures of flood-tolerant, deciduous tree species such as sweet gum (Liquidambar styraciflua), American elm (Ulmus americana), red maple (Acer rubrum), black willow (Salix nigra), swamp cottonwood (Populus heterophylla), and green ash (Fraxinus pennsylvanica).

National Wetlands Inventory (NWI) GIS layer data (USFS 2011) and a hydric soils GIS layer (NRCS 2007) were used to characterize existing wetland conditions throughout the proposed service area (Figures 5.4a and 5.4b). There are 2,827 acres of NWI wetlands within the service area (Table 5-7). Of these, the largest proportion is lacustrine limnetic (56.5 percent), which are permanently flooded impoundments located along Mountain Island Lake and the Catawba River/Upper Lake Wylie. Palustrine forested/shrub wetlands are the next largest type of NWI wetland in the service area (30.1 percent), and are vegetated with broad-leafed deciduous trees. Another 12.3 percent of the wetlands in the proposed service area are classified as palustrine, unconsolidated bottom. In total, palustrine systems account for 43.4 percent of all wetlands in the proposed service area and constitute the vast majority of wetland areas that are not a permanently flooded portion of the Catawba River. These wetlands are primarily located adjacent to stream channels in the floodplain or ponds at the heads of streams and provide floodwater storage, filtration, nutrient uptake and wildlife habitat.

Table 5-7 NWI Wetland Areas in the Service Area

System	Subsystem	Class	Area (ac)	Area (%)
Lacustrine	Limnetic	Unconsolidated Bottom	1597	56.5%
Palustrine	N/A	Aquatic Bed	2	<0.1%
Palustrine	N/A	Emergent	28	1.0%
Palustrine	N/A	Forested/Shrub	852	30.1%
Palustrine	N/A	Unconsolidated Bottom	347	12.3%
Riverine	Lower Perennial	Unconsolidated Shore	1	<0.1%
Total			**2827**	**100.0%**

Hydric soils are common in low-lying areas and typically run along stream valleys (Figure 5.4b). Soils within the service area that are defined as hydric by the NRCS include Helena, Iredell, Monacan, and Chewacla soil units. Table 5-8 summarizes areas of hydric soils for each sub-basin within the service area. The Long Creek sub-basin has a significantly higher percentage of hydric soils than other sub-basins within the service area, as evidenced by Helena and Iredell units found between low-order streams in the middle portion of this sub-basin. Based on a contour analysis, these soils are found in low slope areas, and the lack of efficient drainage

may contribute to the presence of these soils. Monacan soils are present along the stream valleys of Long Creek and in the other Mecklenburg County sub-basins. Hydric soils along stream valleys in Gaston County are mapped as Chewacla. The Lower Mountain Island Lake sub-basins and the service area portion of the Dutchmans Creek sub-basin have the next highest percentages of hydric soils (11.6 percent and 8.0 percent respectively) within the service area.

Table 5-8 Hydric Soils by Sub-basin

Sub-basin	Area (acres)	Percent of Sub-basin
Gar Creek	408.8	7.7%
Long Creek	4083.1	17.6%
Paw Creek	699.3	5.5%
Lower MI Lake	494.8	11.6%
Catawba River (Mecklenburg Co.)	110.2	5.6%
Catawba River (Gaston Co.)	158.6	7.8%
Dutchmans Creek	354.8	8.0%

A much smaller portion of the service area is covered by NWI wetland sites than hydric soil types, either due to the minimum 5 acre spatial resolution used to identify NWI wetlands, discrepancies in NWI aerial wetland analysis, or the absence of wetlands where hydric soil types are defined. Hydrologic changes over time, natural history succession, or differences in agency determinations of wetlands, among other reasons, may explain the absence of wetlands where there are hydric soils. The NWI areas are almost exclusively located along stream and river channels.

5.4.2 Project Area

Field visits were conducted in August 2007, April 2011, and June 2012 to determine the extent and type of wetland habitat within the proposed alternative sites. No jurisdictional determinations were conducted as part of these field visits; however, preliminary wetland boundaries were field delineated within the proposed WWTP project areas and along the proposed forcemain alignments from the Long Creek Forcemain to the Regional WWTP near Mount Holly, and the forcemain from the Mount Holly WWTP to the proposed Long Creek WWTP (Figure 5.4d). Wetlands were not delineated at the Belmont WWTP, the Paw Creek pump station, or along the proposed forcemain alignments from the Belmont WWTP to the Paw Creek pump station, but were field identified during a site visit in June 2012.

Wetlands were identified along the edges of the Catawba River and on the floodplains of tributary streams, including Long Creek, Fites Creek, Paw Creek, and two unnamed tributaries. These wetlands provide benefits such as flood control, stormwater retention, stormwater filtration, groundwater recharge, nutrient uptake, and wildlife habitat.

5.4.2.1 No Action Alternative

- **Mount Holly WWTP:** Wetland communities near the City of Mount Holly WWTP were either adjacent to streams that flow into the Catawba River or floodplain wetlands adjacent to the Catawba River (Figure 5.4c). Evidence of wetland hydrology included riverine floodplain, drift lines, moss

collars, and the presence of a canopy of 80 to 90 percent facultative wet (FACW) and an obligate wet (OBL) tree species. Hydric soils in these wetlands are Chewacla loam. The plant community is Piedmont/Low Mountain Alluvial Forest (Schafale and Weakley 1990). These wetlands provide floodwater storage, filtration, nutrient uptake and wildlife habitat.

- **City of Belmont WWTP:** Wetland communities near the City of Belmont WWTP are associated with the Catawba River floodplain (Figure 5.4c).
- **Long Creek Pump Station:** Wetland communities adjacent to the pump station are associated with the Long Creek floodplain and are Piedmont alluvial forest (Figure 5.4c).
- **Paw Creek Pump Station:** Wetland communities adjacent to the pump station are associated with the Paw Creek floodplain and are Piedmont semi-permanent impoundment (Figure 5.4c).

5.4.2.2 Alternative 1

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** Wetland communities are present adjacent to a small drainage area that that flows into the Catawba River and floodplain wetlands adjacent to the Catawba River (Figure 5.4d). Evidence of wetland hydrology included riverine floodplain, drift lines, moss collars, and the presence of a canopy of 80 to 90 percent facultative wet (FACW) and an obligate wet (OBL) tree species. Hydric soils in these wetlands are Chewacla loam. The plant community is Piedmont/Low Mountain Alluvial Forest (Schafale and Weakley 1990).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed Regional Facility:** Wetlands along the Belmont WWTP to Mount Holly WWTP forcemain alignment are presented in Figure 5.4e. The proposed forcemain route from the Belmont WWTP to the Mount Holly WWTP does not cross through any NWI identified wetlands, but it does cross three unnamed tributaries to the Catawba River (UTs 2-4), an unnamed tributary to Fites Creek (UT 1), and Fites Creek (Figure 5.4e).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Wetland communities adjacent to the pump station are associated with the Long Creek floodplain and are Piedmont alluvial forest. The forcemain crosses under Catawba River floodplain on both sides of the River. The equalization basin would not impact any wetlands (Figure 5.4d).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** No wetlands would be impacted and the forcemain runs along road right of ways (Figure 5.4d).

5.4.2.3 Alternative 2

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station:** Wetland communities near the proposed WWTP on the Mecklenburg County side are mostly associated with the Long Creek floodplain, which is at the same elevation and contiguous with the Catawba River floodplain (Figure 5.4f). One small wetland area was identified along an unnamed tributary that drains to Long Creek in the northern portion of the proposed project area. Evidence of wetland hydrology

included riverine floodplain, drift lines, rack lines, moss collars, a FACW and OBL canopy of 80 to 100 percent, and evidence of ponding. Hydric soils in these wetlands are mapped as Monacan loam. The plant community as described in Section 5.11 of this document is Piedmont/Low Mountain Alluvial Forest (Schafale and Weakley 1990).

- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility:** The forcemain will cross under Catawba River floodplain wetlands on both sides of the River (Figure 5.4f).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station:** Wetland communities near the proposed forcemain route from the Belmont WWTP to the Paw Creek pump station are mostly associated with the Catawba River and Paw Creek floodplains, and are predominantly Piedmont Alluvial Forest and Piedmont Semi-Permanent Impoundment (Figure 5.4f). A small wetland area (not identified by NWI Layer) is present adjacent to the unnamed stream that is crossed by the proposed forcemain alignment (Piedmont Alluvial Forest and Piedmont semi-permanent impoundment). These wetlands provide floodwater storage, filtration, nutrient uptake and wildlife habitat.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Wetland communities adjacent to the pump station are associated with the Long Creek floodplain and are Piedmont alluvial forest (Figure 5.4f).
- **Proposed Forcemain from Existing Clariant WWTP to Long Creek Regional Facility:** No wetlands would be impacted since the forcemain runs along road right of ways (Figure 5.4f).

5.5 Prime and Unique Farmland

5.5.1 Service Area Overview

Three categories of important farmlands are recognized in North Carolina: prime, unique, and statewide. Only prime and statewide are found within the service area. Criteria describing prime farmlands were defined by the U.S. Department of Agriculture in 1978 and amended in 1994. Criteria describing farmland of statewide significance were developed by the North Carolina Natural Resources Conservation Service (NCNRCS) in 1988. Important farmlands within the service area are depicted in Figure 5.5a.

Soils that flood and are somewhat poorly drained, poorly drained, and very poorly drained meet the requirement for prime farmland under the following conditions:

1. The soils are drained and the drainage system is adequate to maintain the water table at a sufficient depth during the growing season to allow cultivated crops common to the area to be grown, and
2. The soils are protected or not frequently flooded during the growing season.

Soils that do not quite meet the requirements for prime farmland are generally classified as Farmlands of Statewide Importance. This could be due to steepness of slopes, reduced permeability, susceptibility to erosion, low available water capacity, or some other non-optimal soil property.

Figure 5.5a illustrates that many of the soils found within the service area are included in the prime farmland and farmland of statewide importance categories. However, as was discussed in the land use section, agricultural land uses make up five percent of the land use within the Gaston County portion of the service area and one percent of the Mecklenburg County portion. Agricultural lands throughout the service area currently support a range of developed land uses, primarily medium density residential. The soils with farmland designations in the service area are listed in Table 5-5a in Appendix E.

5.5.2 Project Area

5.5.2.1 No Action Alternative

- **Existing Mount Holly WWTP:** The existing Mount Holly WWTP is not located on prime farmland or farmland of statewide importance.
- **Existing Belmont WWTP:** The existing Belmont WWTP is partially located on prime farmland.
- **Existing Long Creek Pump Station:** The existing Long Creek pump station is located on a combination of prime farmland and farmland of statewide importance (Figure 5.5b).
- **Existing Paw Creek Pump Station:** The existing Paw Creek pump station is located on an area that would be considered prime farmland if drained (Figure 5.5b).

5.5.2.2 Alternative 1

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP :** The proposed regional site at Mount Holly is located entirely on prime farmland, although the parcel is primarily forested (Figure 5.5c).
- **Proposed Pump Station at Existing Belmont WWTP:** The existing Belmont WWTP is partially located on prime farmland (Figure 5.5d).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont to Proposed Regional Facility:** The proposed forcemain crosses some prime farmland and farmland of statewide importance (Figure 5.5d). However, the proposed forcemain is almost entirely on roadways that will not be used for agriculture.
- **Existing Long Creek Pump Station and Proposed EQ Basin:** The pump station and proposed EQ basin would be partially located primarily on farmland of statewide importance and partially on prime farmland (Figure 5.5c).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The proposed route will cross some prime farmland and farmland of statewide importance on the Mecklenburg County side (Figure 5.5c).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** The proposed forcemain will run through a few small areas of prime farmland (Figure 5.5c).

5.5.2.3 Alternative 2

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station:** About 60 percent of the proposed regional facility will be located on prime farmland (Figure 5.5e).
- **Proposed Pump Station at Existing Mount Holly WWTP:** The proposed pump station is not located on prime farmland or farmland of statewide importance.
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility:** The proposed forcemain will cross prime farmland (Figure 5.5e).
- **Proposed Pump Station at Existing Belmont WWTP:** The existing Belmont WWTP is partially located on prime farmland.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station:** A significant portion of the proposed forcemain crosses prime farmland and a smaller amount of farmland of statewide importance (Figure 5.5e). However, the proposed forcemain is almost entirely on roadways that will not be used for agriculture.
- **Existing Long Creek Pump Station:** The pump station is located primarily on farmland of statewide importance and partially on prime farmland (Figure 5.5e).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The proposed route will cross some prime farmland and farmland of statewide importance
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility:** The proposed forcemain will run through a few small areas of prime farmland (Figure 5.5e).

5.6 Public Lands and Scenic, Recreational, and Natural Areas

5.6.1 Service Area Overview

There are a number of areas within the service area in Mecklenburg and Gaston County that are being preserved as open space. Many areas were established to protect certain plant communities or other natural features. There are a number of locations that were created to provide recreational opportunities for the public. Figure 5.6a identifies the locations of preserved open space, public lands, natural and recreational areas within the service area. Table 5-9 identifies the amount of public recreational or nature preserve lands within the service area.

Table 5-9 Significant Public, Scenic, and Recreational Lands in the Service Area

Public Lands	County	Area (Acres)
Latta Plantation Nature Preserve	Mecklenburg	1,343
Mt. Island Lake Initiative	Mecklenburg/Gaston	2,361
Gar Creek Nature Preserve	Mecklenburg	353
Haymarket Nature Preserve	Mecklenburg	100
Shuffletown Prairie Nature Preserve	Mecklenburg	23

Shuffletown Community Park	Mecklenburg	54
Hornet's Nest Park	Mecklenburg	102
Coulwood Community Park	Mecklenburg	25
Sunset Hills Golf Course	Mecklenburg	264
Smith District Park	Mecklenburg	209
Catawba Wildflower Glen	Mecklenburg	13
Long Creek Bluff	Mecklenburg	16
Berryhill Nature Preserve	Mecklenburg	160
Gateway Nature Preserve	Mecklenburg	137
River Street Park	Gaston	10
Tuckaseegee Park and Greenway	Gaston	28
US National Whitewater Center/Tuckesegee Ford Regional Park	Mecklenburg	270
Long Creek Greenway	Mecklenburg	289
Gum Branch Greenway	Mecklenburg	46
Paw Creek Greenway	Mecklenburg	38

Latta Plantation Nature Preserve

Latta Plantation is Mecklenburg County's largest nature preserve with 1,343 acres committed for the preservation of natural communities. The preserve is located at the northern end of the service area and is directly adjacent to Mountain Island Lake. Latta Plantation preserves habitat for 97 species of bird, 17 species of mammals, 14 species of reptiles, and nine species of amphibians. There are currently two federally endangered plants on the preserve, Schweinitz's sunflower and Michaux's sumac, and one federal candidate species, the Georgia aster. The preserve's location along the northeastern banks of Mountain Island Lake helps to protect the water quality of the lake.

There are many recreational and educational opportunities offered in Latta Plantation. There are 16 miles of hiking and horseback riding trails throughout the park. The preserve's nature center provides opportunities to view live animals, a habitat garden, bird feeding stations, butterfly gardens, and other nature oriented demonstration areas. Other facilities within the preserve include the Carolina Raptor Center, Latta Plantation Equestrian Center, and the Historic Latta Plantation home site.

Mountain Island Lake Initiative

The Mountain Island Lake Initiative is a coalition of non-profit organizations and state and county agencies dedicated to the preservation of lands adjacent to the lake and the protection of water quality in the lake. Partners include the Catawba Lands Conservancy, the Community Foundation of Gaston County, the Foundation for the Carolinas, the Trust for Public Lands, Gaston County, Lincoln County, and Mecklenburg County. Land acquisition began in 1998 with a $6.15 million dollar grant from the Clean Water Management Trust Fund. A total of 1,231 acres and 6 miles of shoreline were purchased along the western shore of the lake. A second, approximately 300-acre acquisition was made on what was supposed to become a 400 home development known as Water's Edges through revenue bonds secured by the City of Gastonia. The Initiative

has since preserved 2,361 acres of the lake's watershed, including 9 miles of shoreline and 15 miles of stream bank.

Gar Creek Nature Preserve
Located one mile east of the Latta Plantation Preserve, the Gar Creek Nature Preserve is 353 acres in size. Upland forest is the dominant habitat on the preserve, accounting for 76 percent of the land area. This nature preserve is located within the Gar Creek watershed and provides significant water quality protection for Gar Creek. According to Mecklenburg County Biologists, Gar Creek has the best water quality of any tributary within the Mecklenburg portion of the service area. Strict zoning laws are in place within the Gar Creek watershed to protect drinking water supplies in Mountain Island Lake.

Haymarket Nature Preserve
Located on the banks of Mountain Island Lake adjacent to Highway 16, the Haymarket Nature Preserve is a 100-acre tract that was established in 2007. The preserve was purchased for watershed protection using the Clean Water Management Trust Fund. Haymarket Nature preserve is comprised of land that was once logged and farmed. Today, the preserve is 90 percent forested. There are large stands of planted loblolly pines on the preserve, along with second-growth hardwood forest. Two power line right-of-ways run through the preserve, creating open habitat for various wildflowers such as asters and goldenrods.

Shuffletown Prairie Nature Preserve
The Shuffletown Prairie Nature Preserve is a 23-acre site just west of downtown Charlotte. This site is a remnant piedmont prairie that hosts several endangered plant species including Schweinitz's sunflower and smooth coneflower. The Trust for Public Land and Mecklenburg County worked together in acquiring the property. The land has been set aside for use as an environmental education site for Mecklenburg County's environmental education program. Shuffletown Prairie is designated as a Natural Heritage Site of National Significance.

Gateway Nature Preserve
Gateway Nature Preserve is a 137-acre tract located in west Mecklenburg County, adjacent to Highway 29/74 on the east bank of Lake Wylie. The site is comprised of mixed hardwoods, pine plantations, and a significant power line right-of-way. The shoreline and adjacent 500' buffer comprise a North Carolina Natural Heritage Site (NC Natural Heritage Program). Additionally, the preserve is home to one of the largest populations of Georgia Aster (*Symphyiotrichum georgianum*) known to exist.

Berryhill Nature Preserve
Berryhill Nature Preserve is a 160-acre tract located in west Mecklenburg County. Nestled on the southeastern shore of Paw Creek, a major tributary of the Catawba River/Lake Wylie, the preserve is home to a diversity of forest habitats. Most notably, the shoreline and adjacent 500' buffer comprise a North Carolina Natural Heritage Site (NC Natural Heritage Program) featuring mature hardwood forests.

Catawba Lands Conservancy Preserves
The Catawba Lands Conservancy preserves and protects properties within the Catawba River watershed. Two parcels are located within the service area. The Catawba Wildflower Glen is a 13-acre parcel that is home to 110 plant species including yellow lady's slipper, bloodroot, and Catesby's trillium. Long Creek Bluff is a 16-acre parcel upstream of the proposed WWTP on Long Creek. This parcel was originally part of the Clariant

property. Other areas owned by the Catawba Land Conservancy within the service area include Long Creek Bluffs (16 acres) and the Gar Creek Brandemaier (14 acres). Other rare plant sites include the Gar Creek, McCoy Road Prairie (20 acres) and Shuffletown Prairies (18 acres) in Mecklenburg County, which provide critical habitat for several endangered plants and the rare piedmont prairie plant community.

Greenways

Three significant greenways are located in Mecklenburg County within the proposed service area. The largest of these, Long Creek Greenway, contains multiple tracks along the upper portion of Long Creek within the service area. Smaller greenways along Gum Branch and Paw Creek are located in the southeastern portion of the proposed service area.

Mecklenburg County Parks

Numerous public/municipal parks and recreational facilities are located within the service area in Mecklenburg County. Hornet's Nest Park, a 102-acre park, is located in the eastern portion of the service area in the McIntyre Creek subwatershed. McIntyre Creek is a tributary to Long Creek. The park features many recreational opportunities, including a softball complex, an 18 hole disc golf course, tennis courts, picnic shelters, basketball courts, volleyball courts and a lake fishing pier. A unique feature of the park is the 1,150-foot regulated BMX bicycle track where bicycle motocross competitions occur every Saturday. Coulwood Park is a 25-acre facility that provides tennis courts, baseball fields, an amphitheater and nature/walking trails. Shuffletown Park is a 54-acre facility that provides volleyball courts, baseball and soccer fields, and a dog park. Robert C. Smith District Park is a 209-acre facility with soccer fields, meadows and walking trails. In addition, there is a publicly accessible golf course, Sunset Hills, within the service area.

City of Mount Holly Parks

There are four local parks in Mount Holly in Gaston County that are within the proposed service area. River Street Park is a 10-acre facility that offers traditional park facilities along with a canoe launch on Dutchmans Creek. Smaller traditional neighborhood parks within the proposed service area include Woodlawn Park and Veteran's Park. Tuckaseegee Park is a new riverside park currently under construction. The 28-acre park includes the construction of a greenway adjacent to the Catawba River, a dog park, baseball and soccer fields, a gymnasium/community center, a riverfront promenade, and boat launches among many other amenities. Mount Holly has acquired 220 acres to construct 4 miles of greenway trails from downtown to the Mountain Island Lake Dam and connect to the new Tuckaseegee Park. This property will be placed into a conservation easement.

US National Whitewater Center (USNWC) /Tuckesegee Ford Regional Park

The USNWC is an extensive whitewater and mountain bike recreational facility located within the Tuckesegee Ford Regional Park in the southern portion of the proposed regional WWTP service area. The whitewater facility encompasses over 300 acres of land. Mecklenburg County has provided a long term lease of 270 acres along the Catawba River for the facility and Duke Energy provides an additional 37 acre lease on Sadler Island. This is a unique facility that houses the world's only multi-channel recirculating whitewater river. The facility offers adventure trips and instruction in climbing, whitewater sports, and mountain biking. There has been discussion among the stakeholder's group about potential plans for the expansion of mountain bike trails from the whitewater facility into forested areas of the Mecklenburg County proposed alternative

site. Other plans that were discussed include a bridge over the Catawba River from the whitewater facility to a proposed park along the Mount Holly riverfront.

5.6.2 Project Area

5.6.2.1 No Action Alternative

There are no public lands, scenic, or recreational areas within the existing WWTP or forcemain sites. The existing Mount Holly WWTP is adjacent to park land managed by the City of Mount Holly (Figure 5.6b). The US Whitewater Center and Tuckaseege Ford Park are located on the property adjoining the existing Long Creek pump station. The Catawba River (Lake Wylie) is an important recreational resource that is heavily used in this area, particularly by kayakers from the Whitewater Center. The existing Paw Creek pump station is within a half mile of a Mecklenburg County greenway.

5.6.2.2 Alternative 1

There are no public lands, scenic, or recreational areas within the proposed Regional WWTP near Mount Holly, or that are impacted by the potential forcemain routes between the Belmont WWTP and the proposed WWTP (Figure 5.6c). Existing and proposed City of Mount Holly parks are located along the Catawba River close to the proposed WWTP site (Figure 5.6c). The Catawba River is an important recreational resource that is heavily used in this area, particularly by kayakers from the Whitewater Center.

The forcemain from the Long Creek pump station to the proposed Regional WWTP near Mount Holly does not impact any land that would be used by the Whitewater Center (Figure 5.6c), but it does cross land used for the Long Creek thread trail. The forcemain from Clariant to the Long Creek forcemain would not be visible from the Catawba River.

This Alternative could create additional park space along the Catawba River that would be associated with the removal of the existing Mount Holly and Belmont WWTPs.

5.6.2.3 Alternative 2

There are no public lands, scenic, or recreational areas between Belmont WWTP and Paw Creek pump station, or between the Mount Holly WWTP and the proposed Long Creek WWTP other than the Catawba River (Figure 5.6d). Since both forcemains will be directionally drilled under the River, there will be no visual impact associated with the forcemains for users of the Catawba River (Lake Wylie). The forcemains from Clariant and the Long Creek pump station to the Long Creek forcemain would not be visible from the Catawba River.

The US Whitewater Center and Tuckasegee Ford Regional Park is located on the property to the south of the proposed Long Creek Regional WWTP (Figure 5.6d). Selection of this Alternative creates the opportunity for forested land preserved under this Alternative to be used for public recreation via mountain bike trails associated with the Whitewater Center. A new boat launch near the existing Long Creek Pump Station and Long Creek Trail could also be made possible by the selection of this Alternative. This Alternative also provides the potential for the creation of additional park space along the Catawba River associated with the removal of the existing Mount Holly and Belmont WWTPs.

5.7 Areas of Archaeological or Historical Value

5.7.1 Service Area Overview

The North Carolina Environmental Policy Act requires the conservation and protection of North Carolina's natural resources and preservation of "the important historic and cultural elements of our common inheritance." Historic designations are provided for structures through State and Federal programs. Properties with State and Federal historic designation within the service area are illustrated in Figure 5.7a. Two properties within the service area have federal historic designation (shown in red). Fourteen properties within the service area have state historic designation (shown in orange).

The State Historic Preservation Office was formally asked for comments on the proposed project. The consultant met with SHPO staff twice to discuss the project and review SHPO maps. Documented archaeological sites exist just southwest of the proposed Regional Facility on the Mecklenburg side of the Catawba River, and SHPO would require archaeological surveys to be conducted on previously undisturbed areas outside of the 100-year floodplain prior to initiation of any construction activities. Due to the existing level of disturbance on the Gaston County portion of the proposed alternate sites, SHPO would not require archeological surveys for construction on the Gaston County side of the Catawba River.

5.7.2 Project Area

5.7.2.1 No Action Alternative

No areas of archaeological or historical value are present within the footprints of the existing facilities.

5.7.2.2 Alternative 1

Due to the existing level of disturbance on the Gaston County portion of the proposed sites, SHPO would not require archeological surveys for the proposed regional facility near the existing Mount Holly WWTP. The proposed Belmont pump station would be located on property that has already been disturbed, and the forcemain route is almost entirely within existing road right-of-ways.

Documented archaeological sites exist southwest of the Long Creek Pump Station and proposed EQ Basin. Archaeological surveys would be required by SHPO before the initiation of construction activities if the project impacts previously undisturbed areas outside of the 100-year floodplain.

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** No archaeological or historical sites of value are known to be present, and previous history of disturbance led SHPO to indicate that an archaeological survey would not be needed.
- **Proposed Pump Station at Existing Belmont WWTP:** Located on property that has already been disturbed. No archaeological or historical sites of value are likely to be present.
- **Proposed Forcemain from Proposed Pump Station to at Existing Belmont WWTP to Proposed Regional Facility:** No archaeological or historical sites of value are known to be present. The forcemain route is almost entirely within existing road right-of-ways.

- **Existing Long Creek Pump Station and Proposed EQ Basin:** An archaeological survey would not be needed because the EQ basin would be constructed adjacent to the existing Long Creek Pumping station and between two access roads.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** An archaeological survey would not be needed because the forcemain runs through the Long Creek floodplain and across previously disturbed land before crossing under the Catawba River.
- **Proposed Forcemain from Existing Clariant to Proposed Long Creek Forcemain:** No archaeological or historical sites of value are known to be located along the proposed forcemain route, and soils along the route (next to existing roads) have all been previously disturbed.

5.7.2.3 Alternative 2

Documented archaeological sites exist just southwest of the proposed regional facility in Mecklenburg County. Also, the historic Tuckesegee Ford (a historic river crossing location) is located just south of the proposed regional WWTP location in Mecklenburg County. The Tuckasegee Ford is part of a larger regional park that contains the Whitewater Center. To avoid damaging possible areas with archaeological value, the project has been designed so that construction would take place almost entirely on previously disturbed land. The SHPO would expect archaeological surveys to be performed prior to construction activities if they were to occur in previously undisturbed areas outside of the 100-year floodplain. No archaeological surveys would be required on the Gaston County side of the Catawba River.

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station:** This facility will be constructed on previously disturbed soils between Long Creek and the Catawba River.
- **Proposed Pump station at Existing Mount Holly WWTP:** The pump station would be constructed on land currently in use as a WWTP.
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility:** The forcemain route starts on land currently in use as a WWTP, crosses under the Catawba River, and then enters previously disturbed land.
- **Proposed Pump Station at Existing Belmont WWTP :** The proposed pump station would be on the existing WWTP parcel. No archaeological or historical sites of value are likely to be present.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station:** The proposed route is through residential property adjacent to the Catawba River, which then runs along existing roadways to the existing Paw Creek pump station.
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The forcemain would run under Long Creek and its floodplain onto previously disturbed land.
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility:** No archaeological or historical sites of value are known to be located along the proposed forcemain route; soils along the route (next to existing roads) have all been previously disturbed.

5.8 Air Quality

5.8.1 Service Area Overview

The Environmental Protection Agency (EPA) has established air quality standards for six primary pollutants. The Charlotte-Mecklenburg Metropolitan Area (CMMA) does not currently meet the Federal air quality standard for 8-hour ozone exposure. Within the CMMA, ozone concentrations tend to increase during the day and are usually highest between 12 p.m. and 6 p.m. The highest ozone levels are formed during hot, sunny weather, particularly when wind speeds are low. The North Carolina Division of Air Quality (DAQ) develops ozone forecasts that can be viewed at: http://daq.state.nc.us/airaware/ozone/. Mecklenburg County provides additional information on air quality within the County, which is updated hourly, and can be obtained by calling the SMOGLINE (704-333-7664).

The CMMA does meet air quality standards for carbon monoxide, sulfur dioxide, nitrogen dioxide, particulate matter, and lead. Local and regional programs have been established to maintain and improve air quality and reduce ozone formation within the CMMA. There are eight different air quality monitoring stations within the CMMA. Data from these stations and others within the CMMA are used to assess compliance with EPA's air quality standards. Air quality within the service area has been improving but has not yet achieved compliance with the 2008 ozone standard (DAQ, 2009).

5.8.2 Project Area

5.8.2.1 No Action Alternative

There are no current air quality concerns or odor complaints at existing facilities.

5.8.2.2 Alternative 1

There are no current air quality concerns or odor complaints at existing facilities, including the Belmont and Mount Holly WWTPs, or the Long and Paw Creek pump stations.

5.8.2.3 Alternative 2

There are no current air quality concerns or odor complaints at existing facilities, including the Belmont and Mount Holly WWTPs, or the Long and Paw Creek pump stations.

5.9 Noise Levels

5.9.1 Service Area Overview

Noise levels are not a persistent concern for the service area in general. Potential nuisance conditions may be periodically present in the service area on construction sites, such as new home developments and roadway construction.

5.9.2 Project Area

5.9.2.1 No Action Alternative

- Nuisance noise conditions are not a current concern at any of the existing project areas, including the Mount Holly and Belmont WWTPs or the Long Creek and Paw Creek pump stations.

- The pumps at the Paw Creek and Long Creek pump stations are enclosed by buildings, which limits the noise detectable outside the facilities.

5.9.2.2 Alternative 1

- Nuisance noise conditions are not a current concern at any of the existing project areas, including the Mount Holly and Belmont WWTPs or the Long Creek and Paw Creek pump stations.
- The pumps at the Paw Creek and Long Creek pump stations are enclosed by buildings, which limits the noise detectable outside the facilities. The conversion of forested land to regional WWTP would result in increased noise levels due to the temporary construction and ongoing operation of the facility. The use of backup generators during occasional power outages would increase noise levels substantially for short periods of time. This area is adjacent to existing manufacturing facilities.
- The three new forcemains would be constructed primarily underground and not create a substantial increase in noise associated with their operation. The pump stations created to accompany these forcemains would utilize buildings to house the pumps, which would limit noise increases beyond the existing property boundaries at the Long Creek pump station and the Belmont WWTP. The forcemain from the Clariant WWTP to the Long Creek forcemain runs through an active industrial and groundwater remediation site.
- The pumps at the Paw Creek and Long Creek pump stations are enclosed by buildings, which limits the noise detectable outside the facilities. Increases in pump capacities will be accommodated within the existing building footprints.

5.9.2.3 Alternative 2

- The conversion of previously disturbed land to a regional WWTP would result in increased noise levels due to the temporary construction and ongoing operation of the facility. The use of backup generators during occasional power outages would increase noise levels substantially for short periods of time. This area is adjacent to existing manufacturing facilities.
- The four new forcemains would be constructed primarily underground and not create a substantial increase in noise associated with their operation. The pump stations created to accompany these forcemains would utilize buildings to house the pumps, which would limit noise increases beyond the existing property boundaries at the Belmont and Mount Holly WWTPs, the Long Creek pump station, and the forcemain from Clariant WWTP to the Long Creek regional WWTP.

5.10 Water Resources

5.10.1 Watersheds and Waterbodies

5.10.1.1 Service Area Overview

The main sub-basins within the service area are Long, Paw, Gar, Catawba and Dutchmans (Figure 5.10a). Long, Paw, Catawba, and Dutchmans sub-basins drain to the Lake Wylie section of the Catawba River system and the Gar sub-basin flows into Mountain Island Lake. Most streams in the service area are classified

as WS-IV or Class C waters. Class WS-IV waters are protected for drinking water use. Class C waters are protected for secondary recreation, fishing, and for the support of aquatic life.

The service area includes all or portions of six 14-digit hydrologic units and two DWR sub-basins (Figure 5.10a). Table 5-10 identifies the DWR sub-basins and associated USGS Hydrologic Unit Codes (HUC) within the service area.

Table 5-10 Sub-basins within the Service Area

Sub-basin Name	DWR Sub-basin	USGS HUC Code
Mecklenburg County		
Mountain Island Lake	03-08-33	03050101170015
Gar Creek	03-08-33	03050101170015
Long Creek	03-08-34	03050101170020
Catawba	03-08-34	03050101170020
Paw Creek	03-08-34	03050101170030
Gaston County		
Dutchmans Creek	03-08-33	03050101160040
Catawba	03-08-34	03050101160050

Lakes

The service area is adjacent to two major water bodies, Mountain Island Lake and Lake Wylie, along a 14.9 mile stretch of the Catawba River system. The service area includes 5.2 miles along Mountain Island Lake (surface area = 3,234 acres) and 9.7 miles along the northern portion of Lake Wylie (surface area = 12,450 acres). These lakes are managed by Duke Energy as part of the Catawba-Wateree project. Water levels are controlled primarily for hydroelectric power generation, but also managed for water supply and aquatic habitat protection. Mountain Island Lake was built in 1924 to support the Mountain Island Hydroelectric Station and serves as the water supply for the City of Mount Holly, the City of Gastonia, and the City of Charlotte. Lake Wylie was constructed in 1904, is the oldest lake on the Catawba River, and supports the Wylie Hydroelectric Station, the Allen Steam Station, and the Catawba Nuclear Station. Lake Wylie serves as a drinking water supply for the towns of Belmont, NC and Rock Hill, SC.

Streams

The proposed service area contains many tributaries that flow in a dendritic pattern into the Catawba River. Major tributaries in the Mecklenburg County side of the service area include Long Creek, Paw Creek, Thomas Pond, Gum Branch, Gutter Branch, McIntyre Creek, Dixon Branch, and Gar Creek. Major tributaries on the Gaston County side of the service area include Fites Creek, Dutchmans Creek, South Stanley Creek, and Taylors Creek (Figure 5.10b).

5.10.1.2 Project Area

5.10.1.2.1 Common to all Alternatives

The existing infrastructure (NAA) and both potential alternatives are located adjacent to the Catawba River in the upper sections of Lake Wylie. The sub-basins associated with the proposed project sites are identified in Table 5-11. The main streams associated with the existing sites are presented in Figure 5.10c.

Table 5-11 Proposed Alternative Site Locations

Sub-basin Name	DWR Sub-basin	USGS HUC Code
Mecklenburg County		
Long Creek	03-08-34	03050101170020
Paw Creek	03-08-34	03050101170030
Gaston County		
Catawba	03-08-34	03050101160050

5.10.1.2.2 Alternative 1

On the Gaston County side, Fites Creek runs along the southern boundary of the alternative WWTP location and the Catawba River borders the site on the east (Figure 5.10d). The proposed Belmont WWTP to Mount Holly WWTP forcemain crosses Fites Creek and three unnamed tributaries to the Catawba River (Figure 5.10e). The proposed forcemain from the Long Creek Pump Station to the new regional facility would cross Long Creek and the Catawba River (Figure 5.10d). Table 5-12 identifies the waterbodies adjacent to and crossed by new infrastructure that would be constructed as part of Alternative 1.

Table 5-12 Waterbodies Associated With the Proposed Alternative 1 Site Locations

Waterbody	Location	Length within Project Area (ft)
New Regional Facility Under Alternative 1		
Catawba River (Lake Wylie)	Runs along eastern edge of property	3,655
Fites Creek	Runs through SE portion of property	976
Forcemain from Belmont WWTP to new Regional WWTP in Gaston Co		
Fites Creek	Forcemain crosses stream near the intersection of Nuttall Road and NC 273	< 10
Unnamed tributary (UT 2) to Catawba River	Crosses stream near Beaty Road, NC 273 (Beatty Drive), and Ferstle Avenue	< 10
Unnamed tributary (UT 3) to Catawba River	Crosses stream near YMCA Drive	< 10
Unnamed tributary (UT 4) to Catawba River	Crosses stream near US 29/US 74	< 10
Forcemain from Long Creek Pump Station to new Regional Facility in Gaston Co.		
Long Creek	Forcemain crosses Creek just west of existing pump station	40
Catawba River	Forcemain crosses river north of mouth of Long Creek across Catawba River and into Gaston Co north of mouth of Fites Creek	1900 (475 crossing of Catawba)
Forcemain from Clariant to Long Creek Forcemain		
No waterbody Crossings	Catawba River runs along Western edge of property but would not be crossed by forcemain	0

5.10.1.2.3 Alternative 2

Long Creek and an unnamed tributary to Long Creek flow through or along the edge of the property that would contain the regional WWTP, and the Catawba River borders the site on the west (Figure 5.10f). The wastewater line connecting the Long Creek Pump Station with the new regional WWTP would cross Long Creek (Figure 5.10f). The proposed forcemain from the Mount Holly WWTP to the proposed WWTP crosses the Catawba River (Figure 10f). The proposed forcemain from the Belmont WWTP to the Paw Creek Pump station crosses the Catawba River and Paw Creek, as well as two unnamed tributaries to Paw Creek (Figure 5.10f). Table 5-13 identifies the waterbodies adjacent to and crossed by new infrastructure that would be constructed as part of Alternative 2.

Table 5-13 Waterbodies Associated With the Proposed Alternative 2 Site Locations

Waterbody	Location	Length within Project Area (ft)
New Regional Facility Under Alternative 2		
Catawba River (Lake Wylie)	Runs along western edge of property	1,459
Long Creek	Runs through middle of property	4,902
Unnamed Tributary to Long Creek	Along northern property boundary	1,425
Unnamed Tributary to Long Creek	Along southern property boundary	1,668
Long Creek Pump Station Forcemain to New WWTP		
Long Creek	Forcemain crosses Creek just west of existing pump station	40
Forcemain from Mount Holly WWTP in Gaston Co. to new Regional WWTP in Mecklenburg Co.		
Catawba River	Forcemain crosses river from Gaston Co. north of mouth of Fites Creek across Catawba River and into Mecklenburg Co north of mouth of Long Creek	1900 (475 crossing of Catawba)
Pump Station and Forcemain from Belmont WWTP to Paw Creek Pump Station		
Catawba River (Lake Wylie)	Runs along southern and eastern edge of Belmont WWTP property	5,386 (1,380 crossing of Catawba)
Unnamed Ephemeral Stream	Forcemain crosses stream along Amos Smith Road near Dowd Road	2
Unnamed Perennial Tributary	Forcemain crosses tributary along River Walk Way	10
Paw Creek	Forcemain crosses creek near Paw Creek pump station	50
Forcemain from Clariant to New WWTP		
No waterbody Crossings	Catawba River is located along Western edge of property, but is not crossed by forcemain	0

5.10.2 Waterbody Classifications

5.10.2.1 Service Area Overview

Surface waters in North Carolina are classified by the DWR based on their designated use. All surface water bodies are minimally classified as Class C (secondary recreation) waters with water quality standards established to protect aquatic life. Additional classifications are associated with more stringent water quality requirements for protection of primary recreation (Class B) and drinking water supplies (Classes WS-I through WS-V) (DWR, 2007a). Several water bodies within the proposed service area are classified as WS-IV

waters, indicating that the water bodies must be protected as a human water supply, but classification as WS-I, II, or III was not feasible (DWR, 2007b). Some of these water bodies have additional primary classifications such as "critical area" or CA. The classification CA is applied to watershed areas within one-half mile of a water supply and waters within one-half mile of a water supply intake. All other water bodies within the service area are classified as Class C except for an unnamed tributary to Little Paw Creek that is classified from its source to Little Paw Creek as Class B.

Figure 5.10f shows the classification of surface water bodies within the proposed service area, along with water supply intakes and wastewater discharge locations. Many smaller streams have not been explicitly classified and carry the same classification as the downstream waterbody (Figure 5.10f). Compliance with water quality standards is assessed by the DWR based on comparison of water quality data to the specific water body's classification.

5.10.2.2 Project Area

5.10.2.2.1 Common to all Alternatives

The waterbodies on or near existing facilities (NAA) and both proposed alternatives are primarily WSIV-CA due to their close proximity to Lake Wylie. Waters adjacent to the Mount Holly and Belmont WWTP and Long Creek pump station are designated WS-IV, B; CA. The only exception is Paw Creek which is crossed by the Belmont to Paw Creek pump station forcemain under Alternative 2. At that location, Paw Creek has a "C" classification (Figure 5.10g).

5.10.3 Water Quality Monitoring

5.10.3.1 Service Area Overview

North Carolina Division of Water Quality (DWR) Monitoring

The DWR collects biological, chemical, and physical data to characterize water quality conditions in all of the river basins throughout the state. This information is published every five years in a Basinwide Assessment Report (BAR) for each basin and used in the basinwide planning process. The DWR monitoring program includes ambient water quality, fish, and benthic macroinvertebrates (BMI) sampling program. Figure 5.10h shows the locations of DWR's ambient and biological monitoring stations within the proposed service area.

DWR's ambient monitoring system is a network of surface water monitoring stations where routine physical, chemical, and bacterial pathogen samples are collected. Parameters measured at each station include temperature, pH, specific conductance, turbidity, total suspended residue, dissolved oxygen (DO), various metals, fecal coliform, and weather conditions. Other parameters may be measured depending on site specific concerns or suspected water quality issues.

Fish and benthic macroinvertebrate communities are rated based on the NC Biotic Index (NCBI), a North Carolina-specific version of the IBI method (Karr, 1981). The NCBI scores are a measure of the ecological health of the waterbody and reflect water quality conditions and the effects of watershed disturbances. The DWR uses the NCBI scores for water quality assessment and review of compliance with water quality standards. Stream BMI or fish populations are rated as "Excellent", "Good", "Good-Fair", "Fair", or "Poor" based on parameters related to the NCBI scores at each stream sampling site.

Mecklenburg County Monitoring

Charlotte-Mecklenburg's LUESA monitors three stations within the service area on a monthly basis for a variety of parameters, including fecal coliform bacteria, turbidity, metals, nutrients, and physio-chemical parameters such as dissolved oxygen, temperature, conductivity and pH (Figure 5.10h). A number of other sites are monitored by LUESA for benthic macroinvertebrates, fish and instream habitat conditions. Benthic macroinvertebrate monitoring results are analyzed using the NCBI metrics used by the DWR for benthic macroinvertebrates (DENR 2006). A rating of "Excellent", "Good", "Good-Fair", "Fair", or "Poor" is assigned for each sampling site based on BMI assemblages.

In August of 2007, LUESA produced its first index of water quality conditions called the "Stream Use-Support Index" (SUSI) (LUESA 2007). Ratings were developed for the three LUESA SUSI monitoring stations within the proposed service area, including MC50 on Gar Creek, MC14A on Long Creek, and MC17 on Paw Creek (See Figure 5.10i). All water quality data are used to generate a SUSI score for each sub-basin based on monthly chemical monitoring as well as annual BMI monitoring. The scores are grouped into categories to indicate whether the water bodies are meeting their designated uses. The categories include "degraded" (score of 0 to 50), "impaired" (score of 50 – 70), "partially supporting" (score of 70 – 90), and "fully supporting" (score of 90 – 100).

Currently, LUESA has 11 permanent monitoring stations in Lake Wylie that are monitored every other month for biological and physio-chemical parameters. These stations are primarily located in shallow water coves and at the mouths of tributaries. There are an additional seven Lake Wylie stations that are monitored in the summer months for fecal coliform bacteria. Starting in May 2007, LUESA conducted additional water quality sampling at four stations in the mainstem of the lake.

5.10.3.2 Project Area

5.10.3.2.1 Common to all Alternatives

No water quality monitoring stations are co-located with proposed facilities under any alternative (Figure 5.10h). Water quality data is collected by LUESA at monitoring stations located upstream and downstream of the Long Creek and Paw Creek pump stations. Biological data is collected in Long Creek upstream of the Long Creek pump station and in Paw Creek upstream of the Paw Creek pump station (5.10i). The State of North Carolina collects water quality in Lake Wylie at multiple stations upstream and downstream of the existing Mount Holly, Clariant, and Belmont wastewater discharges (Figure 5.10h).

5.10.4 Water Quality Status

5.10.4.1 Service Area Overview

The latest Catawba River Basin Assessment Report (DWR, 2008) documented fish, benthic macroinvertebrate, and ambient water quality monitoring results for the service area from 2002 through 2007. The Catawba River Basinwide Water Quality Plan (BP) (DWR, 2010) identified the impairment status of waters within the service area. These reports provided information regarding the water quality status of surface waters within the service area (Table 5-14). Table 5-15 summarizes the results of DWR and LUESA biological monitoring at stations within service area.

The interpretations of biological sampling results from the DWR 2008 BAR were complicated by the drought conditions that were present when samples were obtained in 2002 and 2007. Water quality may have declined due to hydrologic constraints (i.e. low water levels or the absence of water) or due to deteriorating conditions within the watershed. The Gar Creek site could not be sampled in 2002 due to a lack of flow, and in 2007, biological sampling indicated reduction from good in 1997 to good-fair. The 2003 Catawba BAR indicated that the lower Dutchmans Creek NCBI scores in 2002 may have been related to drought conditions. Benthic indices within the Dutchmans Creek watershed in 2007 ranged from fair to good-fair. According to LUESA, Long Creek benthic macroinvertebrate populations were negatively impacted in 2002, likely due to the severe drought, but have recovered to the current Fair rating (LUESA, 2007). In August 2007, each of the three sub-basins within the proposed service area monitored by LUESA were rated "partially supporting" according to SUSI ratings (LUESA, 2007). In April 2013, these three sub-basins are still rated by LUESA as partially supporting (LUESA, 2013).

In September 2007, the Paw Creek sub-basin was downgraded to impaired, but results from 2010 indicate that it has recovered to partially supporting. Based on the results of biological surveys conducted over the past several years at the Paw Creek monitoring station, water quality appears to be deteriorating, and is likely attributed to development and unknown sediment sources upstream (Roux personal communication, Dec. 2007). Gar Creek is a rural stream that is used by LUESA as a reference site because of good water quality throughout the Gar Creek watershed. Much of the Gar Creek watershed is within a water supply protection area where development density is limited. Paw Creek is located within a heavily developed watershed and receives a variety of point and non-point source pollutants. Stormwater flows have negatively impacted aquatic habitats in Paw Creek. The Mecklenburg County Water Quality Program's Bioassessment Report concluded that Charlotte streams are experiencing habitat impairment associated with stream bank erosion, point and non-point source pollution including, industrial discharges, sewer line leaks, treated wastewater effluent, and stormwater pollutants (Roux 2007).

Table 5-14 Water Quality Status of Waterbodies within the Service Area Based on DWR Water Quality Monitoring and LUESA SUSI Results

Monitoring Station	Data Collected	Status or Rating	Source
DWR Stations			
Long Creek at SR 2042 near Paw Creek	Water quality (monthly)	Generally meets WQ standards except for turbidity , TSS, and copper	DWR 2008 BAR
Dutchmans Creek at SR 1918 near Mountain Island	Water quality (monthly)	Elevated turbidity	DWR 2010 BP
Mountain Island Lake	Water quality at 18 stations in 8/2002. No sampling in 2007.	Oligotrophic	DWR 2003 BAR
Lake Wylie	Water quality at 7 stations sampled 10 times May through September 2007	Eutrophic; no criteria were exceeded	DWR 2008 BAR
LUESA SUSI Stations*			

Paw Creek (MC17)	Water quality, BMI, Fish	Partially Supporting	8/2007
Paw Creek (MC17)	Water quality, BMI, Fish	Impaired	9/2007
Paw Creek (MC17)	Water quality, BMI, Fish	Partially Supporting	2/2010
Long Creek (MC14A)	Water quality, BMI, Fish	Partially Supporting	8/2007
Long Creek (MC14A)	Water quality, BMI, Fish	Partially Supporting	9/2007
Long Creek (MC14A)	Water quality, BMI, Fish	Partially Supporting	2/2010
Gar Creek (MC50)	Water quality, BMI, Fish	Partially Supporting	8/2007
Gar Creek (MC50)	Water quality, BMI, Fish	Partially Supporting	9/2007
Gar Creek (MC50)	Water quality, BMI, Fish	Partially Supporting	2/2010

*LUESA fish sampling occurs once every 5 years and is not included in the SUSI rating calculation

Table 5-15 Biological Ratings for Streams within the Service Area

Stream	County	Sample Type	Organization	Date	Rating
Dutchmans Creek at SR 2128	Gaston	NCBI BMI	DWR	1997	Good
Dutchmans Creek at SR 2128	Gaston	NCBI BMI	DWR	2002	Good-Fair
Dutchmans Creek at SR 1918	Gaston	NCBI BMI	DWR	2007	Good-Fair
Gar Creek at SR 2074	Meck	NCBI BMI	DWR	2007	Good-Fair
Paw Creek at Hwy 74	Meck.	NCBI BMI	LUESA	2006	Poor
Long Creek at Pine Island Dr.	Meck.	NCBI BMI	LUESA	2006	Fair
Gar Creek	Meck.	NCBI BMI	LUESA	2006	Fair-Good
Gum Branch at Gum Branch Rd.	Meck.	Fish IBI	LUESA	2002	Fair
Long Creek at Oakdale Rd.	Meck.	Fish IBI	LUESA	2002	Fair
Long Creek at Pine Island Dr.	Meck.	Fish IBI	LUESA	2002	Fair
Long Creek at Pine Island Dr.	Meck.	Fish IBI	LUESA	2003	Fair
Paw Creek at Wilkinson Blvd.	Meck.	Fish IBI	LUESA	2003	Poor-Fair
Gar Creek at Beatties Ford Rd.	Meck.	Fish IBI	LUESA	2004	Fair-Good
Long Creek at SR 2042 nr Paw Creek	Meck.	NCIBI Fish	DWR	2004	Good

Impaired Waterbodies within the Service Area

According to the 2010 Catawba River Basinwide Water Quality Plan (DWR, 2010), some water bodies within the proposed service area are not meeting water quality standards and their designated uses. Dutchmans Creek and Stanley Creek were added to the list of impaired waters (303d list) in 2010 due to elevated turbidity and low dissolved oxygen levels, respectively. Two additions to the 2008 303d list occurred in the service area due to elevated copper levels in Long Creek and low pH values in the Catawba River downstream of Mountain Island Lake. Long Creek (turbidity) and Lake Wylie are considered impaired by DWR (Figure

5.10j and Table 5-16), but these waters are no longer on the 303d list due to the existing total maximum daily loads (TMDLs).

Table 5-16 Impaired Waterbodies within the Service Area

Waterbody	Impairment	Current Status
Dutchmans Creek	Turbidity	Added to the 303d list in 2010
Stanley Creek	low dissolved oxygen	Added to the 303d list in 2010
Long Creek	Copper	Added to the 303d list in 2008
Long Creek	Turbidity	TMDL established in 2/2005 for turbidity & TSS
Catawba River	low Ph	Added to the 303d list in 2008
Lake Wylie	chlorophyll-a	TMDL established in Feb/1996 for TN, TP and chlorophyll-a

Long Creek was included on the 303d list of impaired waters in 2002 and 2004 due to exceedance of the turbidity water quality standard (DWR, 2003). A total maximum daily load (TMDL), the amount of pollutant that can be assimilated without violating water quality standards, was developed and approved for turbidity in Long Creek in 2005. The TMDL identified non-point sources as the major contributors of sediment to Long Creek (DWR, 2004). Sediment controls throughout the watershed are currently being implemented to meet the water quality standard of 50 NTU (DWR, 2004). The municipal separate storm sewer system (MS4) waste load allocation was calculated to be 1000 lbs/day of total suspended solids (TSS), a surrogate for turbidity. For non-point sources, the Long Creek TMDL assigned load allocations of TSS by land cover type as follows: 226.2 lbs/day for forest, 65.7 lbs/day for residential, 2.9 lbs/day for agricultural, and 1.1 lbs/day for other land covers. The total allowable TSS load from all combined sources is 1,290 lbs/day.

In the past Lake Wylie exhibited signs of eutrophication, including exceedances of the chlorophyll-*a* standard (40 µg/L), elevated surface dissolved oxygen levels, and the presence of algal blooms (DWR, 2004). As a result, Lake Wylie was placed on the 303d list in 1992, and a TMDL for chlorophyll-*a* was approved in February 1996. It was among the first TMDLs completed in North Carolina and was fully implemented by 2001.To reduce the frequency of algal blooms and decrease chlorophyll-*a* concentrations, nutrient (nitrogen and phosphorus) reduction targets were established for point and non-point sources. Documentation for the TMDL is contained in the 1995 Catawba River basin plan. The point source allocations for total phosphorous and total nitrogen are 825 lbs/day and 8,885 lbs/day respectively. The most recent assessment by DWR indicates that water quality standards are now being met in Lake Wylie (DWR, 2010). Under this TMDL, the cities of Mount Holly and Belmont will receive lower wastewater nutrient limits during the next NPDES permitting cycle.

5.10.4.2 Project Area

5.10.4.2.1 Common to all Alternatives

The following waterbodies are adjacent to existing infrastructure (NAA) and both proposed alternatives:

- Catawba River (Lake Wylie) is impaired for pH and chlorophyll-*a* and has a TMDL in place.
- Long Creek is impaired for copper and turbidity and has a TMDL in place.
- No other waterbodies adjacent to existing or proposed alternatives are considered impaired by DWR.

South Carolina Portion of the Catawba River Downstream of Lake Wylie

The State of South Carolina is currently developing a TMDL for phosphorus, pH, TN, TP, and chlorophyll-*a* for Lake Wateree. Lake Wateree is located just downstream of Lake Wylie. The TMDL is being developed in partnership with the North Carolina Department of Environment and Natural Resources, stakeholders in the Lake Wateree basin, and with the Environmental Protection Agency's Region 4. South Carolina is concerned about nutrient loading coming from North Carolina.

In the summer of 2001, SC DHEC filed a Petition for a Contested Case in the North Carolina Office of Administrative Hearings regarding the renewal of the NPDES permit for McAlpine Creek WWMF, which is operated by Charlotte-Mecklenburg Utilities. The primary complaint on the part of SC DHEC was that the permit was renewed without a phosphorus limit. Nearly all of South Carolina's municipal dischargers to the mainstem Catawba River upstream of Lake Wateree have phosphorus limits, generally equivalent to 2 mg/L of total phosphorus.

In January 2002, SC DHEC, DWR and Utilities reached an agreement regarding phosphorus limits at the McAlpine Creek WWMF and expanded the permitting strategy to include the WWTPs on Sugar and Irwin Creeks. The final agreement included phosphorus limits at all three Utilities' facilities (McAlpine Creek WWMF, Sugar Creek WWTP and Irwin Creek WWTP) in the form of a bubble limit and a mass cap.

5.10.5 Groundwater Quality

5.10.5.1 Service Area Overview

The project area is within North Carolina's Piedmont physiographic area. This area is generally underlain by consolidated rocks, such as granite, gneiss, schist, and slate. Groundwater here occurs in the fractures of the consolidated rocks, in pore spaces of the residual weathered rock (saprolite), and in the alluvium of the stream valleys where water occurs in pore spaces. North Carolina's groundwater, while generally abundant, is not inexhaustible and is not evenly distributed (DWR, 2007).

The North Carolina Department of Environment and Natural Resources Division of Water Resources (DWR) maintains a network of groundwater resources monitoring wells to assess North Carolina's groundwater supply. None of these wells have been installed in Mecklenburg or Gaston Counties.

A combination of public water supplies and groundwater wells are used for individual water supplies within the project area. In Mecklenburg County, approximately 15 percent of residents use groundwater as a primary drinking water source, and irrigation and industrial uses are also common (LUESA, 2012). The average well yield is 30 gpm, however, 48 percent of wells yield 15 gpm or less. Groundwater recharge is directly dependent on precipitation (LUESA, 2012). No Gaston County specific information has been identified.

5.10.5.2 Project Area

5.10.5.2.1 Common to all Alternatives

As mentioned in section 5.10.5.1, available data on groundwater are limited for both the service and project areas. However, a groundwater mitigation effort is located on the adjacent property just north of the proposed WWTP location under Alternative 2. The groundwater mitigation is being conducted by Clariant to remove contaminants including chlorinated compounds from the groundwater.

5.10.6 Water Supply

5.10.6.1 Service Area Overview

There are a number of water bodies within the service area that supply drinking water to municipalities around the Charlotte Mecklenburg Metropolitan Area. Mountain Island Lake is the source of drinking water for the City of Charlotte, the City of Gastonia, the City of Mount Holly, the Town of Huntersville, and Mecklenburg County. Lake Wylie is the source of drinking water for the City of Belmont and downstream communities, including the Cities of York and Rock Hill, South Carolina.

The lower sections of all tributaries within the service area that flow into Lake Wylie and Mountain Island Lake have been classified as water supply waters. Figure 5.10g identifies the location of water bodies within the service area that have a water supply designation. A list of the water supply waters within the service area is provided in Table 5-17. The service area is approximately 54,070 acres, 62 percent of which is within a water supply watershed (57 percent of the 47,163-acre Mecklenburg County service area and 100 percent of the 6,864-acre Gaston County service area). Water supply protection rules (discussed in Section 7) limit the density and types of development that can occur within these portions of the proposed service area.

Table 5-17 Water Supply Waters within the Service Area

Water Body and Section	Water Supply Classification
Catawba River (Mountain Island Lake) from Cowan's Ford Dam to water intake at River Bend Steam Station	WS-IV; CA
Catawba River (Mountain Island Lake) from intake at River Bend Steam Station to Mountain Island Dam	WS-IV, B; CA
Catawba River (Lake Wylie) from Mountain Island Dam to Interstate	WS-IV; CA
Catawba River (Lake Wylie) from Interstate 85 to upstream side of Paw Creek arm of Lake Wylie	WS-IV; CA
Catawba River (Lake Wylie) from upstream side of Paw Creek arm of Lake Wylie to South Carolina State Line	WS-IV, B
Gar Creek from source to 0.6 miles upstream of mouth	WS-IV
Gar Creek from 0.6 miles upstream of mouth to Catawba River/Mountain Island Lake	WS-IV;CA
Long Creek from 0.6 miles downstream of Mecklenburg County SR 2074 to 0.4 miles upstream of Mecklenburg County SR 1606	WS-IV
Long Creek from 0.4 miles upstream of Mecklenburg County SR 1606 to Catawba River (Lake Wylie)	WS-IV;CA
Gum Branch from source to Long Creek	WS-IV

Dutchmans Creek from source to a point 0.8 miles upstream of Taylor's Creek	WS-IV
Dutchmans Creek from a point 0.8 miles upstream of Taylor's Creek to Catawba River/Lake Wylie	WS-IV
Stanley Creek from 1 mile upstream of Gaston County SR 1918 to Dutchmans Creek	WS-IV
South Stanley Creek from source to Dutchmans Creek	WS-IV
Taylor's Creek from source to Dutchmans Creek	WS-IV
Fites Creek from source to 0.3 miles downstream of NC 273	WS-IV
Fites Creek from 0.3 miles downstream of NC 273 to Catawba River/Lake Wylie	WS-IV;CA

5.10.6.2 Project Area

5.10.6.2.1 Common to all Alternatives

Lake Wylie and the streams adjacent to the project area are all classified as water supply waters. The City of Belmont's water supply intake is located in Lake Wylie approximately 2.0 miles downstream of the proposed outfall locations. Both of the proposed WWTP alternate sites are located on property adjacent to Lake Wylie within the critical area associated with the City of Belmont's water supply intake. Figure 5.10g identifies the water supply classifications of waters within the service area as well as the general location of water supply intakes and permitted discharges near the proposed alternate sites and within the entire service area.

Table 5-18 identifies the water quality standards that have been established for drinking water supplies. The permit for any proposed WWTP will require that the instream concentrations do not exceed these standards. In addition, the permit for the proposed WWTP will require that the facility meets the nutrient discharge limits determined by the Lake Wylie TMDL. The new regional facility will utilize the combined total nitrogen and total phosphorus allocation from the Belmont and Mount Holly WWTPs. The reuse quality effluent produced by the regional facility will meet the nutrient concentration limits established by DWR to prevent the deterioration of water quality in Lake Wylie.

Table 5-18 Instream Water Quality Standards for Drinking Water

Water Quality Parameter	Maximum Concentration1
Nitrate	10 mg/L
Solids	500 mg/L
Sulfates	250 mg/L
Nickel	25 µg/L
Arsenic	10 µg/L
Manganese	200 µg/L

[1]DWR "Redbook" Surface Water and Wetland Standards (May 2007)

5.11 Forest Resources

5.11.1 Service Area Overview

Descriptions of the terrestrial systems are presented in the context of plant community classifications. These classifications follow Schafale and Weakley (1990) where possible. This publication is the standard used throughout North Carolina for classifying natural communities. Representative faunal species that are likely to occur in these habitats (based on published range distributions) are also cited.

There are six identified plant community types within the service area (Natural Heritage Program). These include basic oak-hickory forest, dry-mesic oak-hickory forest, mesic mixed hardwood forest (Piedmont subtype), Piedmont/low mountain alluvial forest, basic mesic forest (Piedmont subtype) and dry oak-hickory forest:

- Dry-mesic oak-hickory forests occur on mid-slopes, upland flats, and low ridges on acidic soils;
- Mesic mixed hardwood forests are transitional forests between alluvial or bottomland forests and upland communities such as dry-mesic oak-hickory forests;
- Basic mesic forests occupy lower slopes, north facing slopes, ravines, and occasionally well drained stream bottoms with basic soils;
- Basic oak-hickory forests typically occupy slopes, ridges, upland flats, and other dry to dry-mesic sites with basic or circumneutral soils;
- Dry oak-hickory forests typically occupy ridge tops, upper slopes, steep south facing slopes, and other upland areas with acidic soils.

These forest types and the predominant plant species found there are described in greater detail in Appendix F. The distribution and composition of these plant communities throughout the service area reflects landscape-level variations in topography, soils, hydrology, and past and present land use practices. Agriculture, development, and forestry practices have also greatly influenced the present vegetative patterns.

Successional and Piedmont Prairie remnant areas can also be found scattered throughout the service area. The presence of Schweinitz's sunflower at the Mount Holly proposed alternative site indicates the presence of plants associated with relic Piedmont prairie ecosystems. There is a fringe alluvial forest along Lake Wylie

and Long Creek. Intermittent flooding during high flow periods drives the hydrology of the alluvial forest. Periodic flooding provides nutrient input through sediment deposition, making this system very productive. Several wetland areas were observed at the proposed project alternative sites within this forest type. These wetland areas are discussed in Section 5.4.

5.11.2 Project Area

The following terrestrial community descriptions are based on field visits conducted at the proposed WWTP alternative sites and the proposed forcemain from the Mount Holly WWTP to the proposed WWTP. The entire 140-acre parcel on the Mecklenburg County side adjacent to Long Creek was surveyed to identify the plant communities. On the Mount Holly side of Lake Wylie, the plant communities present on 133 acres including and surrounding the existing Mount Holly treatment plant were surveyed. Figure 5.11a identifies the physical boundaries of the field surveys at the proposed alternate sites and identifies the types of plant communities present.

Four main plant communities occur within the proposed WWTP alternative sites: dry-mesic oak-hickory forest, mesic mixed hardwood forest (Piedmont subtype), Piedmont/Low Mountain alluvial forest, and disturbed or successional areas. Disturbed areas include maintained residential and commercial areas, lawns, park land and landscaped areas surrounding businesses. Native vegetation is present in the transition zones between residential/commercial and natural areas. Dry-mesic oak-hickory forest and mesic mixed hardwood forest are found on all of the proposed alternative sites. Piedmont/Low Mountain alluvial forest is present on the Mecklenburg site along the Catawba River and Long Creek and on the Gaston site along the Catawba River and tributaries that flow into the river. Successional areas are found on the soil borrow area on the Mecklenburg site between the Catawba River and Long Creek and within the power line right-of-ways at both locations. These successional areas are visible on Figure 5.11a. One small patch (four stems) of the federally endangered Schweinitz's sunflower (*Helianthus schweinitzii*) was located in a power line right-of-way near the Mount Holly WWTP (Figure 5.11a). Appendix F contains descriptions of the predominant plant species found at the proposed project sites. The proposed pump station at the Mount Holly WWTP and the proposed forcemain from the Mount Holly WWTP to the proposed WWTP run from developed property on the Mount Holly WWTP under the riparian buffer on both sides of the river and across dry-mesic oak hickory forest and into an early successional community on the proposed WWTP site.

Figure 5.11b identifies the main plant communities at the Belmont WWTP to Paw Creek pump station forcemain route. The main plant communities that occur within the proposed Belmont pump station area and forcemain alignment are: dry-mesic oak-hickory forest, mesic mixed hardwood forest (Piedmont subtype), Piedmont bottomland forest, and maintained open space. Maintained open space includes existing road right-of-ways and lawns and landscaping in residential and commercial areas. Patches of dry-mesic oak-hickory forest and mesic mixed hardwood forest are found along portions of the proposed alignment outside of the road right -of-way. Piedmont bottomland forests are present where the proposed forcemain crosses two perennial streams. Appendix F contains descriptions of the predominant plant species found at the proposed project sites.

Figure 5.11c identifies the main plant communities present within a 200-foot buffer along the proposed Belmont WWPT to Mount Holly WWTP forcemain route. The main plant communities that occur along the

route include dry oak-hickory forests and maintained open space. Open space consists of existing road right-of-ways, managed residential and commercial areas, and utility corridors. Dry oak-hickory forests are scattered between residential and commercial areas and along road right-of-ways. The majority of the proposed forcemain route coincides with NC 273, secondary roads, and commercial areas. Therefore, much of the plant communities immediately surrounding the proposed forcemain route are mowed right-of-ways or landscaped areas.

A summary of forest resources affected by each alternative is presented below.

5.11.2.1 No Action Alternative

- **Existing Belmont WWTP:** The existing site is situated mainly in a previously disturbed area. There exists a buffer of dry oak-hickory forest between the site and the Catawba River (Figure 5.11a).
- **Existing Mount Holly WWTP:** The existing facilities are primarily on disturbed land, however, the site does contain mixed mesic hardwood forest (PS), dry-mesic oak-hickory forest, and the federally endangered Schweinitz's sunflower was identified in the utility corridor next to the WWTP (Figure 5.11a).
- **Existing Long Creek Pump Station:** The existing site is on maintained grasses. The site is surrounded by dry-mesic oak-hickory forest and mixed mesic hardwood forest (PS) (Figure 5.11a).
- **Existing Paw Creek Pump Station:** is located adjacent to the Paw Creek floodplain and has a 10 to 40 foot buffer of maintained grass around the facility. No rare or threatened species are likely to be present on the site. The site is surrounded by Piedmont bottomland forest and mixed mesic hardwood forest (Figure 5.11a).

5.11.2.2 Alternative 1

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** The proposed facility would be located on existing stands of mixed mesic hardwood forests (PS) and some previously disturbed lands (Figure 5.11b). The federally endangered Schweinitz's sunflower was identified in the utility corridor at the edge of the proposed WWTP property.
- **Proposed Pump Station at Existing Belmont WWTP:** The pump station would be constructed at the existing site, which is situated mainly in a previously disturbed area. There exists a buffer of dry oak-hickory forest between the parcel and the Catawba River (Figure 5.11a and 5.11c).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed Regional Facility:** The proposed forcemain would be placed almost entirely on existing road right-of-ways. For a short distance at the Mount Holly site, the forcemain would cross areas of mixed mesic hardwood forest (PS) (Figure 5.11c).
- **Existing Long Creek Pump Station and Proposed EQ Basin:** The proposed facility would be located on existing stands of mixed mesic hardwood forests (PS) (Figure 5.11b).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** The forcemain would cross areas of dry mesic oak-hickory forest (Figure 5.11b).

- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** The forcemain will mainly be located on previously disturbed areas along roadways and a small area with early field successional vegetation (Figure 5.11b).

5.11.2.3 Alternative 2

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station**: The proposed facility would be located on previously disturbed areas of land that is covered by early field successional vegetation (Figure 5.11d).
- **Proposed Pump Station at Existing Belmont WWTP** : The pump station would be constructed at the existing site, which is situated mainly in a previously disturbed area. There exists a buffer of dry oak-hickory forest between the parcel and the Catawba River (Figure 5.11d).
- **Proposed Pump Station at Existing Mount Holly WWTP** : The proposed pump station would be constructed on previously disturbed land that is covered by maintained grasses (Figure 5.11d).
- **Existing Long Creek Pump Station**: The existing site is on maintained grasses. The site is surrounded by dry-mesic oak-hickory forest and mixed mesic hardwood forest (PS) (Figure 5.11d).
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station**: The proposed forcemain will cross dry oak-hickory forest on the Gaston County side of the Catawba River. On the Mecklenburg County side, the forcemain would cross through mixed mesic hardwood forest, dry oak-hickory forest, managed residential vegetation (grasses), and Piedmont bottomland forest (Figure 5.11d).
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility**: The proposed forcemain would cross a small area of dry mesic oak-hickory forest, which surrounds the site of the proposed regional facility (Figure 5.11d).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility**: The forcemain would cross dry mesic oak-hickory (Figure 5.11d).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility**: The forcemain will mainly be located on previously disturbed areas along roadways and a small area with early field successional vegetation (Figure 5.11d).

5.12 Shellfish, Fish, and Their Habitats

5.12.1 Overview of Service Area and Areas Adjacent to Alternative Sites

5.12.1.1 Fish Community

The Catawba River basin is host to 93 fish species and supports both cold water fish communities in the mountains, and warmer water communities in the southern Piedmont. Sport fishing is an important industry in both Lake Wylie and Mountain Island Lake. These lakes support populations of popular sport fish such as largemouth bass (*Micropterus salmoides*), crappie (*Pomoxis sp.*), striped bass (*Morone saxatilis*), various sunfish (*Lepomis sp.*), white bass (*Morone chrysops*), and white perch (*Morone americana*).

Fish community data were compiled by Duke Energy as part of the Catawba-Wateree Hydro Project Aquatic-01 report (Coughlan 2005). Sites included the Mountain Island Lake tailrace, the Mountain Island Lake bypass reach, and Long Creek upstream of the project site (Figure 5.12a). A combined total of 26 species were collected in the tailrace site and in the Lake Wylie site. Fish community data has also been compiled by the DWR Biological Assessment Unit for Long Creek in Mecklenburg County and Dutchman's Creek in Gaston County (DWR 2008). Seventeen species were collected in Long Creek in July 2004 and fifteen species were collected in Dutchman's Creek in June of 1993. The specific species found at each location are provided in Appendix G.

Mecklenburg County also collected fish community data and IBI scores, (which are included in Appendix G), for Gar Creek (STA MC50 2004 and 2009), Paw Creek (STA MC17 2003 and 2007), Long Creek (STA MC14 2002 and 2007) (MC10 2002), and Gum Branch (MC13 2002). Biological habitat in several creeks along the I-485 corridor is being negatively impacted by road construction and urbanization (Roux Pers. Comm.). These impacts may negatively affect the current fish community in these tributaries. Table 5-19 summarizes the locations and dates of recent fish surveys within the service area. Table 5-20 includes rare, threatened, or endangered fish species found within the service area based on the North Carolina Natural Heritage Program (NHP) records as of April 2014. The seagreen darter has been found in Fites Creek in Gaston County.

Table 5-19 Previous Fish Surveys Conducted Within the Service Area

Stream	Collectors	Date
Mt. Island Lake Tailrace	Duke Energy	4/22/2004
Mt. Island Lake Bypass Reach	Duke Energy	8/3/2004
Long Creek	Duke Energy	6/29/2004
Lake Wylie	Duke Energy	6/7/2004
Gar Creek MC50	Mecklenburg LUESA	4/22/2004
Paw Creek MC17	Mecklenburg LUESA	8/3/2004
Long Creek MC14A	Mecklenburg LUESA	9/22/2004
Long Creek MC10	Mecklenburg LUESA	10/15/2003
Gum Branch MC13	Mecklenburg LUESA	10/15/2002
Long Creek	DWR	7/3/2004

In November of 2007, the WRC requested that additional fish surveys be performed to better determine the status of fish communities within the service area. Fish surveys were conducted by The Catena Group at ten locations in early 2008 (Figure 5.12b). All of the streams surveyed contained a community of common fish species typical of similar sized water bodies in this portion of the Catawba River Basin. Table 5-20 identifies the sites sampled, the number of fish species found, and the number of fish found per unit of effort, which provides an idea of relative abundance of fish at that site. The individual fish species present and site descriptions are included in Appendix G.

Table 5-20 2008 Utilities Fish Sampling Locations

Station	Station Description	Number of Species	Number of Fish	Catch per Unit Effort (# of fish found/min)	Most Common Species
1	Long Creek upstream of Beatties Ford Rd.	14	105	7.37	rosyside dace
2	McIntyre Creek nr Oakdale golf course	12	112	15.34	swallowtail shiner
3	Gutter Branch upstream of Kelly Rd.	8	72	10.03	rosyside dace
4	Gum Branch upstream of Gum Branch Rd.	13	187	25.69	swallowtail shiner
5	Ticer Branch off Old Dowd Rd.	9	26	3.36	tessellated darter
6	Fites Creek downstream of NC 273	11	128	14.07	rosyside dace
7	South Stanley Creek upstream of Woodlawn Rd.	10	71	9.16	rosyside dace
8	Long Creek downstream of Mount Holly Rd.	19	104	5.99	greenfin shiner
9	Gar Creek upstream of Beatties Ford Rd.	4	14	0.97	creek chub
10	Little Paw Creek downstream of Mount Olive Church Rd.	7	60	8.61	creek chub

5.12.1.2 Mussel Community

There are sixteen species of mussels known to inhabit the Catawba River Basin in North Carolina. The majority of these species are listed as threatened or endangered by either state or federal law. Six species not included in the sixteen are thought to be extirpated from the Catawba-Wateree Basin in both North and South Carolina (Alderman 2005). Mussel species were once abundant throughout most of the Atlantic slope but now, due to habitat degradation, only inhabit small isolated portions of streams, rivers, and lakes. Surveys conducted over the past 20 years in 500 reaches in the Catawba-Wateree River Basin reveal evidence of mussel populations in only 40 percent of the locations (Alderman 2005). The proposed service area has experienced similar aquatic habitat degradation due to Catawba River impoundments and urbanization associated with the growth of the Charlotte and Gastonia metropolitan areas.

The United States Fish and Wildlife Service (USFWS) lists one federally endangered species of freshwater mussel (*Lasmigona decorata,* the Carolina heelsplitter) within the two USGS 7.5' quadrangle maps that cover the proposed service area (Mountain Island Lake and Mount Holly). Within these quadrangles, there are three additional species considered by the State of North Carolina to be significantly rare or threatened. These are Carolina Elktoe (*Alasmidonta robusta),* Eastern Creekshell (*Villosa delumbis*), and (*Strophitus undulates).* These species and their state and federal statuses are summarized in Table 5-21 and are described in more detail in Appendix H.

The North Carolina Department of Environment and Natural Resources' Natural Heritage Program (NHP) serves as an information clearinghouse with respect to rare and endangered species. Figure 5.12d shows locations where NHP has conducted mussel surveys. As of 2014, two mussel species (Creeper and Eastern creekshell) are currently listed as occurring in the Mountain Island Lake Quadrangle (NHP 2014).

A number of field surveys have been conducted in the region to characterize the occurrence of freshwater mussels in the service area. In 2004, mussel surveys were conducted for Duke Energy at several locations in Mountain Island Lake, the Mountain Island tailrace and the Mountain Island bypassed reach, as part of the Catawba-Wateree FERC relicensing process (Figure 5.12a). Surveys conducted in Lake Wylie as part of this effort were outside of the proposed service area. Paper pondshell (*Utterbackia imbecillis*) was the only species collected from the Mountain Island Lake site. Three species were collected in the tailrace including Carolina lance (*Elliptio angustata*), paper pondshell, and a pondhorn species (*Unimerus sp*). Nine mussel species were collected in the bypass reach. These included Eastern elliptio (*E. complanata*), variable spike (*E. icterina*), Carolina lance, Atlantic spike (*E. producta*), a pondhorn species, paper pondshell, Eastern floater (*Pyganodo cataracta*), creeper (*Strophitus undulates*), and Eastern creekshell (*Villosa delumbis*) (Table 5-22).

Additional survey data from 2002 in the proposed service area was received from the NHP for Long Creek, Gum Branch, and Gutter Branch, and no mussels were found in these tributaries (Figure 5.12d). The NHP data from 1993 for Long Creek revealed no mussels collected. The NHP 1987 data for Long Creek, Gar Creek, Dixon Branch, Gutter Branch, Gum Branch, McIntyre Creek, and Paw Creek identified the presence of one mussel type at one location: eastern elliptio in Dixon Branch. Eastern elliptio is one of the most hearty mussel species in the Catawba basin (Alderman 2005).

Table 5-21 Federal and State Listed Fish and Mussels within the Mountain Island Lake and Mount Holly USGS Quads

Scientific Name	Common Name	State Status	Federal Status	Project Area*	Service Area*
Fish Species					
Etheostoma thalassinum	Seagreen Darter	SR	None	Current	NHP
Mussel Species					
Lasmigona decorata	Carolina heelsplitter	E	E	Historical	NHP
Alasmidonta robusta	Carolina elktoe	SR	None	Historical	NHP
Villosa delumbis	Eastern creekshell	SR	None	Current	NHP
Strophitus undulatus	Creeper	T	None	Current	NHP

E = Endangered; SR= Significantly Rare; P = Proposed for listing; T = Threatened; SC = Special Concern
* Record the Result of Field Surveys and NHP Data (Duke 2004 indicates found in the Duke Energy survey from 2004 as described in the text).

Table 5-22 Mussel Species Collected in the Service Area During 2004 Surveys By Duke Energy

Mussel Species	Mountain Island Lake	Mt. Island Lake Bypass Reach	Mt. Island Lake Tailrace
Utterbackia imbecillis	X	X	X
Elliptio angustata		X	X
Unimerus sp		X	X
Elliptio complanata		X	
Elliptio icterina		X	
Elliptio producta		X	
Pyganodo cataracta		X	
Strophitus undulatus		X	
Villosa delumbis		X	

In November of 2007, the WRC requested that mussel surveys be conducted to obtain recent community information and to determine if there is any evidence of the federally endangered Carolina heelsplitter in streams within the service area. In early 2008, mussel surveys were conducted by The Catena Group at 20 locations throughout the service area (Figure 5.12b). An approximate survey length of 500 meters was sampled at each site. All habitat types (riffle, run, pool, slack-water etc.) were sampled with a two person team. The survey began at the downstream end of the survey reach and proceeded upstream, with the team spread across the stream into survey lanes. A combination of visual, bathyscope (glass-bottom viewing buckets), and tactile methodologies were employed where appropriate. Timed searches were employed in each reach and searches were conducted for relict shells. Sampling locations were selected throughout the service area on all main tributaries and on smaller streams throughout the service area. Exact sampling locations were adjusted so that sampling occurred in areas where appropriate habitat was present for the target

species, the Carolina heelsplitter. No native mussels were found at any of the monitoring locations. The non-native invasive Asian clam (*Corbicula fluminea*) was present at many of the sampling locations. Table 5-23 identifies the monitoring locations, species found, and survey time spent at each location. The freshwater mussel and fish survey report is included in Appendix G.

5.12.1.3 Benthic Macroinvertebrate Community

The Catawba River basin supports a diverse array of aquatic invertebrate species. Regular surveys for macroinvertebrates are conducted by Mecklenburg County Biologists in all major tributaries to the Catawba River on the Mecklenburg County side of the service area. The DWR conducts surveys at two locations in the service area, Dutchmans Creek in Gaston County and Gar Creek in Mecklenburg County. These surveys are conducted to assess stream health. A score relating stream health is reported for each sampling location. These stream health scores are reflective of the overall invertebrate community composition. Figure 5.12e shows the locations for both Mecklenburg County and the DWR benthic monitoring sites. More information about water quality is provided in Section 5.10. Mecklenburg County BMI (benthic macroinvertebrate index) data is provided in Appendix H for Gar Creek (MC50 2002-2009), Gum Branch (MC13 2002, 2004, 2005), Long Creek (MC10 2003-2005), Long Creek (MC14A 2002-2009) and Paw Creek (MC17 2002-2009).

Table 5-23 2008 Mussel Survey Locations

Site	Station Description	Native Mussels	Other Species in the Phylum Mollusca	Sampling Effort (hr)
1	Paw Creek upstream of I-85	0	Asian clam uncommon	1.5
2	Unnamed Tributary to Long Creek near U.S. Whitewater Center	0	Asian clam abundant	1.0
3	Long Creek upstream of NC 27	0	Asian clam common and physid snail (Physella sp.) uncommon	2.0
4	Dutchmans Creek upstream of Sandy Ford Rd.	0	Asian clam common	2.0
5	Stanley Creek upstream of Lowland Dairy Rd.	0	Asian clam common	1.5
6	Gar Creek near River Circle Rd.	0	Asian clam abundant	1.33
7	Gar Creek upstream of McCoy Rd.	0	none	1.17
8	Gum Branch upstream of Valley Dale Rd.	0	Asian clam uncommon	1.17
9	Unnamed Tributary to Catawba River near Riverside Dr.	0	none	1.17
10	Long Creek near Bellhaven Blvd.	0	Asian clam uncommon	1.83

11	Unnamed Tributary to Dixon Branch	0	none	1.17
12	Long Creek upstream of Beatties Ford Rd.	0	Asian clam common	2.0
13	Fites Creek upstream of Catawba River	0	Asian clam and physid snail common	1.67
14	Taylors Creek upstream of Dutchmans Creek	0	Asian clam uncommon	1.0
15	Unnamed Tributary to Paw Creek upstream of Paw Creek	0	none	1.0
16	Paw Creek downstream of Toddville Rd.	0	Asian clam common	1.83
17	McIntyre Creek upstream of Beatties Ford Rd.	0	Asian clam uncommon	1.83
18	Gutter Branch downstream of Oakdale Rd.	0	Asian clam common	1.83
19	Unnamed Tributary to Long Creek upstream of US 21	0	none	1.0
20	Little Paw Creek	0	Asian clam uncommon	1.83

5.12.2 Project Area

5.12.2.1 No Action Alternative

No rare or threatened fish or mussels have been found in streams adjacent to existing wastewater faciltities and pump stations.

5.12.2.2 Alternative 1

No rare or threatened fish or mussels have been found in streams adjacent to proposed wastewater faciltities, forcemains, and pump stations.

5.12.2.3 Alternative 2

No rare or threatened fish or mussels have been found in streams adjacent to proposed wastewater faciltities, forcemains, and pump stations.

5.13 Wildlife and Natural Vegetation

5.13.1 Service Area Overview

5.13.1.1 Terrestrial Wildlife

This section identifies the types of wildlife expected to be found in the predominantly disturbed or successional and forested environments that make up the majority of the project locations and the service area.

Species that prefer open areas to feed and nest can be found in the disturbed communities. The faunal species present in these disturbed habitats are opportunistic and capable of surviving on a variety of resources. The European starling (*Sturnus vulgaris*), northern mockingbird (*Mimus polyglottos*), and American robin (*Turdus migratorius*) are common birds that use these habitats to find insects, seeds, or worms. Mourning doves (*Zenaida macroura)* and red-tailed hawks (*Buteo jamaicensis*) may be found perching on overhead power lines. The American crow (*Corvus brachyrhynchos*) and the Virginia opossum (*Didelphis virginiana*) are true opportunists and will eat virtually any edible items including vegetation, fruits, seeds, insects, and carrion.

Many species are highly adaptive and may utilize the edges of forests and clearings or prefer a mixture of habitat types. The Eastern cottontail (*Sylvilagus floridanus*) prefers a mix of herbaceous and woody vegetation, and may be found in the dense shrub vegetation or out in the roadside and residential areas. White-tailed deer (*Odocoileus virginianus*) will utilize the forested areas as well as the adjacent open areas. The black rat snake (*Elaphe guttata*) will come out of forested habitat to forage on rodents in open areas. Indigo bunting (*Passerina cyanea*), brown thrasher (*Toxostoma rufum*), and common yellowthroat (*Geothlypis trichas*) are Neotropical migrants that inhabit dense, shrubby vegetation along transitional areas. The blue jay (*Cyanocitta cristata*), song sparrow (*Melospiza melodia*), and cardinal (*Cardinalis cardinalis*) can be seen utilizing edge habitat all year round.

Forested areas are important habitat for many wildlife species, providing crucial foraging, nesting, and/or denning areas. Raccoons (*Procyon lotor*) are generally associated with swamps and streamside forests, and their tracks are often seen along stream banks. Beavers (*Castor canadensis*) are semiaquatic mammals that live along small wooded streams, which they often dam to form shallow impoundments. The barred owl (*Strix varia*) utilizes river bottoms and moist woodlands for nesting as well as feeding. Neotropical migratory birds, in particular, are dependent on these areas. Species such as the yellow-throated warbler (*Dendroica dominica*), prothonotary warbler (Protonotaria citrea), and the Louisiana waterthrush (*Seiurus motacilla*) thrive in wooded riparian areas, while the summer tanager (*Piranga olivacea*), and the red-eyed vireo (*Vireo olivaceus*) prefer the upland woods. Species such as the downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), Carolina wren (*Thryothorus ludovicianus*), Carolina chickadee (*Parus carolinensis*), and the tufted titmouse (*Parus bicolor*) are found in wooded areas throughout the year. Other species that live in forested areas but are seldom seen include the gray fox (*Urocyon cinereoargenteus*) and bobcat (*Felis rufus*).

Forested areas dominated by pine are especially appealing to the pine warbler (*Dendroica pinus*), ruby-crowned kinglet (*Regulus calendula*), prairie warbler (*Dendroica discolor*), and brown-headed nuthatch (*Sitta pusilla*).

Although a specific survey for terrestrial wildlife species was not performed, the presence of wildlife species was noted at the proposed project sites during wetland delineations, field wetland identification, and endangered plant surveys. Species were determined to be present based on direct observation, tracks found, or identified by sound, and are identified in Table 5-24. Since the proposed Belmont WWTP to Mount Holly WWTP forcemain runs almost exclusively in road right-of-ways, no wildlife surveys were conducted along this proposed alignment.

Table 5-24 Terrestrial Wildlife Species Present in the Project Area

Common Name	Scientific Name	Mecklenburg County	Gaston County
American Crow	*Corvus brachyrhynchos*	X	
Black Racer	*Coluber constrictor priapus*	X	X
Blue Jay	*Cyanocitta cristata*	X	X
Box Turtle	*Terrapene Carolina*	X	X
Carolina Chickadee	*Poecile carolinensis*	X	X
Coyote	*Canis latrans*	X	X
Crayfish	*Cambarus sp.*	X	X
Great Blue Heron	*Ardea Herodias*	X	X
Great Heron	*Butorides virescens*		X
Hermit Thrush	*Catharus guttatus*	X	X
Northern Cardinal	*Cardialis cardinalis*	X	X
Osprey	*Pandion haliaetus*		X
Raccoon	*Procyon lotor*	X	X
Whitetail Deer	*Odocoileus virginianus*	X	X
Wood Duck	*Aix sponsa*	X	
Wood Thrush	*Hylocichla mustelina*	X	

5.13.1.2 Rare and Protected Species and Habitats

Federally Protected Species

The United States Fish and Wildlife Service (USFWS) maintains a list of species that qualify for protection under the Endangered Species Act (ESA). According to the DENR Natural Heritage Inventory Database (NHID), June 2013, there are six federally endangered, threatened, federal species of concern, or candidate species for listing, currently within the USGS 7.5' quadrangle maps of Mountain Island Lake and Mount Holly near the proposed regional facility locations (excluding mussels, Table 5-25). These two maps cover the entire proposed service area. All federally listed species are state protected species as well. Federally listed endangered species include Smooth coneflower (*Echinacea laevigata*), Schweinitz's sunflower (*Helianthus schweinitzii*), and Michaux's sumac (*Rhus michauxii*). The Georgia aster (*Symphyotrichum georgianum*) is a candidate species for federal listing and is currently listed by North Carolina as threatened. The Carolina birdfoot-trefoil (*Acmispon helleri*) is a federal species of concern and is listed by North Carolina as significantly rare and vulnerable. The tall larkspur (*Delphinium exaltatum*) is also listed as a federal species of concern and is considered endangered in North Carolina. Descriptions of these species and their current and historic ranges can be found in Appendix H. Figure 5.12c illustrates current and historic occurrences of rare and endangered species included in the Natural Heritage Program's database.

State Listed Species

There are eleven state listed species that are not federally protected (Table 5-26). State significantly rare-proposed species include the Virginia stickseed (*Hackelia virginiana*), bigleaf magnolia (*Magnolia macrophylla*), glade milkvine (*Matelea decipiens*), and Heller's rabbit-tobacco (*Pseudognaphalium helleri*).

A plume moss (*Fissidens scalaris*) is state listed as a significantly rare-other, meaning that the range is sporadic and cannot be described by other significantly rare categories. The glade wild quinine (*Parthenium auriculatum*) is state listed as significantly rare-threatened. The loggerhead shrike (*Lanius ludoricianus*) is a state listed species of special concern. In 2013 there were no Natural Heritage occurrence records for any state listed species within the WWTP project alternative areas, including the Belmont WWTP and forcemain route (Figure 5.12c). The NHP data base now includes the vegetation survey that was performed for this project in 2007, which found a few Schweinitz's sunflowers. As mentioned previously in Section 5.11, Schweinitz's sunflower, which is both federally and state endangered, was found in one location within the proposed WWTP location for Alternative 1 (Figure 5.11a).

Table 5-25 Federally Listed Species under the ESA within the Service Area

Major Group	Scientific Name	Common Name	State Status	Federal Status	Project Area*	Service Area**
Vascular Plant	*Helianthus schweinitzii*	Schweinitz's Sunflower	E	E	Yes	Yes
Vascular Plant	*Rhus michauxii*	Michaux's Sumac	E-SC	E	No Record	Yes
Vascular Plant	*Echinacea laevigata*	Smooth Coneflower	E-SC	E	No Record	Yes
Vascular Plant	*Symphyotrichum georgianum*	Georgia aster	T	C	No Record	Yes
Vascular Plant	*Acmispon helleri*	Carolina Birdfoot-trefoil	SR-V	FSC	No Record	Yes
Vascular Plant	*Delphinium exaltatum*	Tall Larkspur	E	FSC	No Record	Yes

E = Endangered; T = Threatened; V=Vulnerable; FSC = Federal Species of Concern; C = Candidate for listing;
SC = Special Concern; SR= Significantly Rare
* Record the Result of Field Surveys and NHP Data
** Record the Result of NHP Data Only

Table 5-26 State Listed Species in Mountain Island Lake and Mount Holly USGS Quads

Major Group	Scientific Name	Common Name	State Status	Federal Status	Project Area*	Service Area**
Vascular Plant	*Hackelia virginiana*	Virginia Stickseed	SR-P	None	No Record	No Record
Vascular Plant	*Matelea decipiens*	Glade Milkvine	SR-P	None	No Record	Yes
Vascular Plant	*Parthenium auriculatum*	Glade Wild Quinine	SR-T	None	No Record	No Record
Vascular Plant	*Pseudognaphalium helleri*	Heller's Rabbit-Tobacco	SR-P	None	No Record	Yes
Moss	*Fissidens scalaris*	A Plume Moss	SR-O	None	No Record	No Record

Vertebrate Animal	*Lanius ludovicianus*	Loggerhead Shrike	SC	None	No Record	No Record
Vascular Plant	*Magnolia macrophylla*	Bigleaf Magnolia	SR-P	None	No Record	No Record
Mammal	*Peromyscus polionotus*	Oldfield Mouse	SC	None	No Record	No Record

SR= Significantly Rare; P = Proposed for listing; T = Threatened; SC = Special Concern
* Record the Result of Field Surveys and NHP Data ** Record the Result of NHP Data Only

Other Significant Species

According to the USFWS list for Gaston County (http://ecos.fws.gov/tess_public/StartTESS.do), additional protected species include the bald eagle (*Haliaeetus leucocephalus*) and the bog turtle (*Clemmys muhlenbergii*). For Mecklenburg County, the USFWS list includes the bald eagle as threatened and the Michaux's sumac as endangered. The bald eagle has since been removed from the Endangered Species Act list of endangered species, but is still protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. There is one active bald eagle nest within approximately 2,000 feet of the Belmont WWTP. The nest is situated in a tree on a residential property within a densely populated neighborhood in Belmont. The Carolina elktoe (*Alasmidonta robusta*), previously found in Mecklenburg County in Long Creek, is thought to be extirpated from North Carolina. The southern bog turtle, a federally threatened species, has not been found within the proposed service area; it has been found in Gaston County.

5.13.2 Project Area

5.13.2.1 No Action Alternative

- **Existing Mount Holly WWTP:** The existing facilities are not on forested land. However, the site does contain mixed mesic hardwood forest (PS) and dry-mesic oak-hickory forest, and the federally endangered Schweinitz's sunflower was identified in the utility corridor on site.
- **Existing Belmont WWTP:** The existing site is situated mainly in a previously disturbed area. A buffer of dry oak-hickory forest exists between the site and the Catawba River.
- **Existing Long Creek Pump Station:** The existing site is on maintained grasses. The site is surrounded by dry-mesic oak-hickory forest and mixed mesic hardwood forest (PS).
- **Existing Paw Creek Pump Station:** The pump station is located adjacent to the Paw Creek floodplain and has a 10 to 40 foot buffer of maintained grass around the facility. No rare or threatened species are likely to be present on the site. The site is surrounded by Piedmont bottomland forest and mixed mesic hardwood forest.

5.13.2.2 Alternative 1

- **Proposed Regional Facility Adjacent to Existing Mount Holly WWTP:** Wildlife species observed at the proposed regional facility site include Black Racer (*Coluber constrictor priapus*), Blue Jay (*cyanocitta cristata*), Box Turtle (*Terrapene carolina*), Carolina Chickadee (*Poecile carolinensis*), coyote (*Canis latrans*), crayfish (*Cambarus sp.*), Great Blue Heron (*Ardea Herodias*), Great Heron

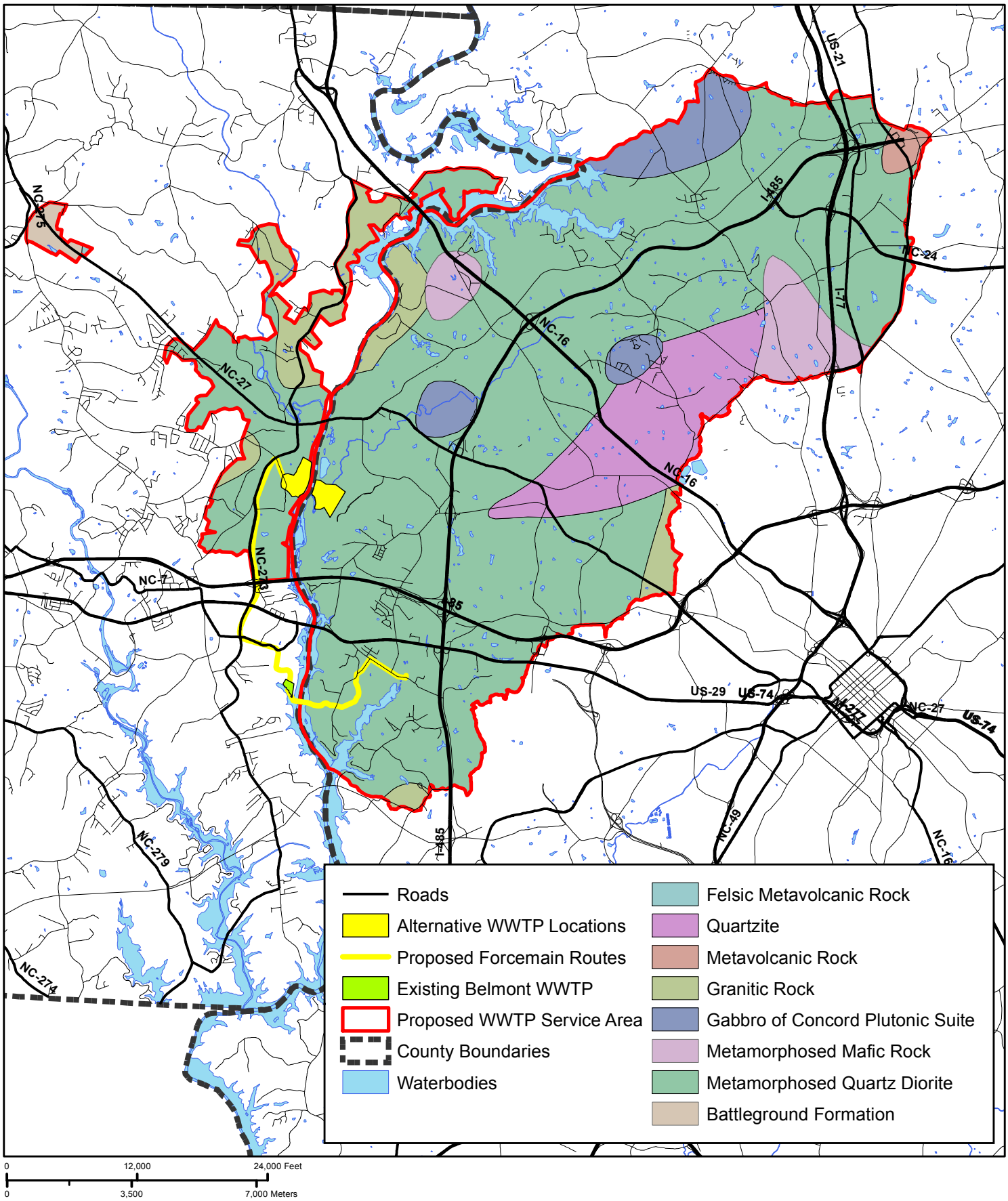
(*Butorides virescens*), Hermit Thrush (*Catharus guttatus*), Northern Cardinal (*Cardialis cardinalis*), Osprey (*Pandion haliaetus*), raccoon (*Procyon lotor*), and Whitetail Deer (*Odocoileus virginianus*). Schweinitz's Sunflower was identified in the utility corridor of the proposed WWTP location. However, the new facilities would mainly be located in what is currently forested area where Schweinitz's Sunflowers do not thrive.

- **Proposed Pump Station at Existing Belmont WWTP :** The pump station would be constructed at the existing site, which is not suitable habitat for wildlife.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Proposed regional facility:** The proposed forcemain would be placed almost entirely on existing road right-of-ways. Therefore, no wildlife surveys were conducted as this is not considered suitable habitat.
- **Existing Long Creek Pump Station and Proposed EQ Basin:** Wildlife species observed at the proposed pump station site include American Crow (*Corvus brachyrhynchos*), Black Racer (*Coluber constrictor priapus*), Blue Jay (*cyanocitta cristata*), Box Turtle (*Terrapene carolina*), Carolina Chickadee (*Poecile carolinensis*), coyote (*Canis latrans*), crayfish (*Cambarus sp.*), Great Blue Heron (*Ardea Herodias*), Hermit Thrush (*Catharus guttatus*), Northern Cardinal (*Cardialis cardinalis*), raccoon (*Procyon lotor*), Whitetail Deer (*Odocoileus virginianus*), Wood Duck (*Aix sponsa*), and the Wood Thrush (*Hylocichla mustelina*).
- **Proposed Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Wildlife species observed along the proposed route include American Crow (*Corvus brachyrhynchos*), Black Racer (*Coluber constrictor priapus*), Blue Jay (*cyanocitta cristata*), Box Turtle (*Terrapene carolina*), Carolina Chickadee (*Poecile carolinensis*), coyote (*Canis latrans*), crayfish (*Cambarus sp.*), Great Blue Heron (*Ardea Herodias*), Hermit Thrush (*Catharus guttatus*), Northern Cardinal (*Cardialis cardinalis*), raccoon (*Procyon lotor*), Whitetail Deer (*Odocoileus virginianus*), Wood Duck (*Aix sponsa*), and the Wood Thrush (*Hylocichla mustelina*).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Long Creek Forcemain:** Wildlife species observed near the proposed forcemain route include American Crow (*Corvus brachyrhynchos*), Blue Jay (*cyanocitta cristata*), Box Turtle (*Terrapene carolina*), Carolina Chickadee (*Poecile carolinensis*), Great Blue Heron (*Ardea Herodias*), Hermit Thrush (*Catharus guttatus*), Northern Cardinal (*Cardialis cardinalis*), raccoon (*Procyon lotor*), and Whitetail Deer (*Odocoileus virginianus*).

5.13.2.3 Alternative 2

- **Proposed Regional Facility Adjacent to Existing Long Creek Pump Station**: Wildlife species observed at the proposed site include American Crow (Corvus brachyrhynchos), Black Racer (Coluber constrictor priapus), Blue Jay (cyanocitta cristata), Box Turtle (Terrapene carolina), Carolina Chickadee (Poecile carolinensis), coyote (Canis latrans), crayfish (Cambarus sp.), Great Blue Heron (Ardea Herodias), Hermit Thrush (Catharus guttatus), Northern Cardinal (Cardialis cardinalis), raccoon (Procyon lotor), Whitetail Deer (Odocoileus virginianus), Wood Duck (Aix sponsa), and the Wood Thrush (Hylocichla mustelina).

- **Proposed Pump Station at Existing Mount Holly WWTP**: The pump station would be constructed at the existing site, which is not suitable habitat for wildlife.
- **Proposed Forcemain from Proposed Pump Station at Existing Mount Holly WWTP to Proposed Regional Facility**: Wildlife species observed along the proposed forcemain route include American Crow (Corvus brachyrhynchos), Black Racer (Coluber constrictor priapus), Blue Jay (cyanocitta cristata), Box Turtle (Terrapene carolina), Carolina Chickadee (Poecile carolinensis), coyote (Canis latrans), crayfish (Cambarus sp.), Great Blue Heron (Ardea Herodias), Hermit Thrush (Catharus guttatus), Northern Cardinal (Cardialis cardinalis), raccoon (Procyon lotor), Whitetail Deer (Odocoileus virginianus), Wood Duck (Aix sponsa), and the Wood Thrush (Hylocichla mustelina).
- **Proposed Pump Station at Existing Belmont WWTP**: The pump station would be constructed at the existing site, which is not suitable habitat for wildlife.
- **Proposed Forcemain from Proposed Pump Station at Existing Belmont WWTP to Existing Paw Creek Pump Station**: The proposed forcemain would be constructed almost entirely on existing road right-of-ways, which are not suitable habitat for wildlife.
- **Existing Long Creek Pump Station**: Wildlife species observed at the existing pump station site include American Crow (Corvus brachyrhynchos), Black Racer (Coluber constrictor priapus), Blue Jay (cyanocitta cristata), Box Turtle (Terrapene carolina), Carolina Chickadee (Poecile carolinensis), coyote (Canis latrans), crayfish (Cambarus sp.), Great Blue Heron (Ardea Herodias), Hermit Thrush (Catharus guttatus), Northern Cardinal (Cardialis cardinalis), raccoon (Procyon lotor), Whitetail Deer (Odocoileus virginianus), Wood Duck (Aix sponsa), and the Wood Thrush (Hylocichla mustelina).
- **Forcemain from Existing Long Creek Pump Station to Proposed Regional Facility:** Wildlife species along the proposed include American Crow (*Corvus brachyrhynchos*), Black Racer (*Coluber constrictor priapus*), Blue Jay (*cyanocitta cristata*), Box Turtle (*Terrapene carolina*), Carolina Chickadee (*Poecile carolinensis*), coyote (*Canis latrans*), crayfish (*Cambarus sp.*), Great Blue Heron (*Ardea Herodias*), Hermit Thrush (*Catharus guttatus*), Northern Cardinal (*Cardialis cardinalis*), raccoon (*Procyon lotor*), Whitetail Deer (*Odocoileus virginianus*), Wood Duck (*Aix sponsa*), and the Wood Thrush (*Hylocichla mustelina*).
- **Proposed Forcemain from Existing Clariant WWTP to Proposed Regional Facility:** Wildlife species observed near the proposed forcemain route include American Crow (Corvus brachyrhynchos), Blue Jay (cyanocitta cristata), Box Turtle (Terrapene carolina), Carolina Chickadee (Poecile carolinensis), Great Blue Heron (Ardea Herodias), Hermit Thrush (Catharus guttatus), Northern Cardinal (Cardialis cardinalis), raccoon (Procyon lotor), and Whitetail Deer (Odocoileu



0 12,000 24,000 Feet

0 3,500 7,000 Meters

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Figure 5.1a. Service Area Lithology

Proposed Regional WWTP

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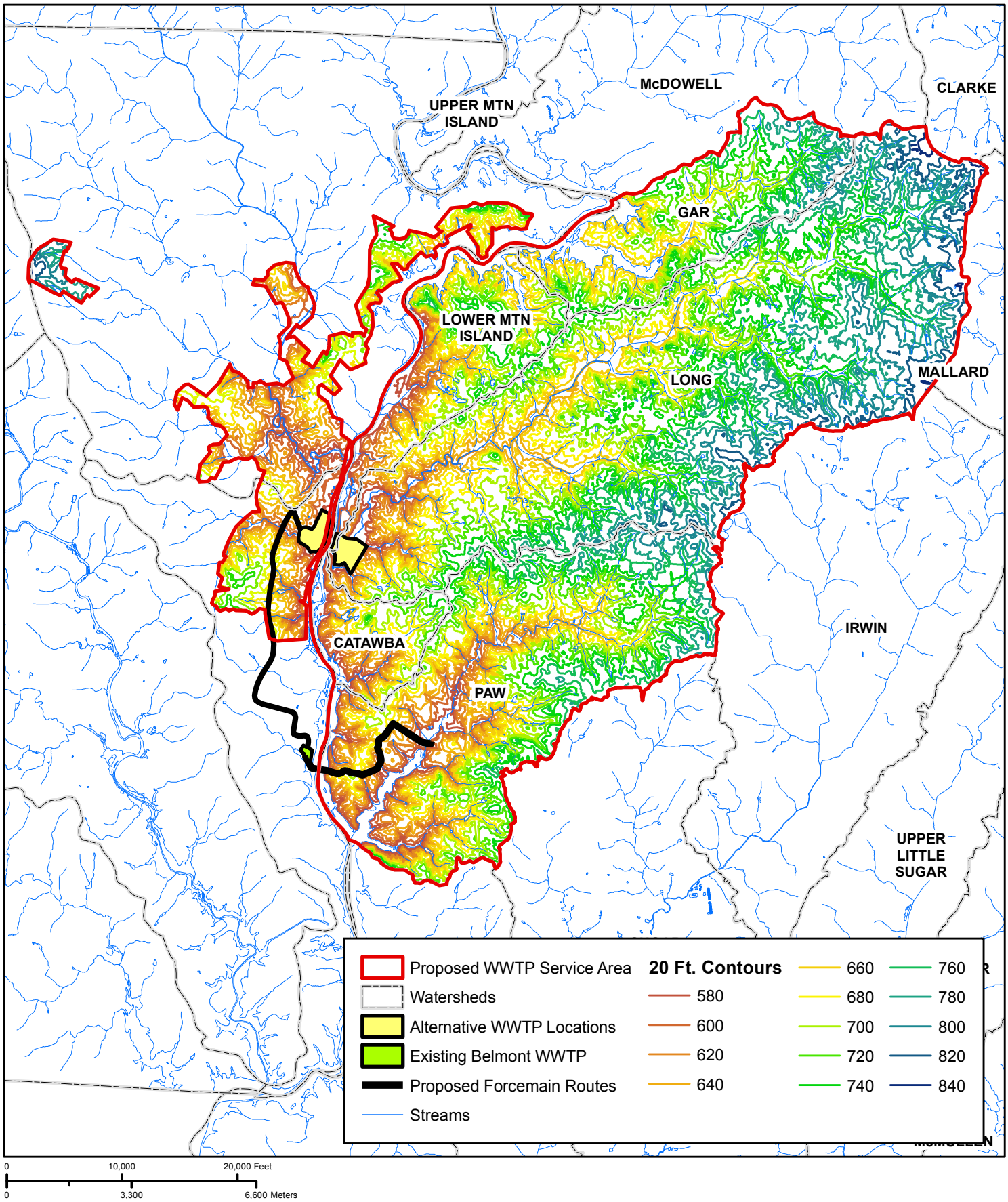
Raleigh, NC 27612
ph. (919) 239-8900; fx (919) 239-8913
www.entrix.com

Date: 4/25/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_April2011\Fig5.1a_Lithology.mxd



0 10,000 20,000 Feet

0 3,300 6,600 Meters

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Figure 5.1b. Service Area Topography

Proposed Regional WWTP

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Mount Holly WWTP Parcel
Long Creek Pumping Station
Belmont WWTP Parcel
Paw Creek PS Parcel
Existing Facilities
Waterbodies
Streams
100 Year Floodplain

Elevation (ft)

580
600
620
640
660

0 770 1,540 Feet
0 240 480 Meters

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Figure 5.1c
No Action Alternative
Topography and Floodplains at Existing Facilities

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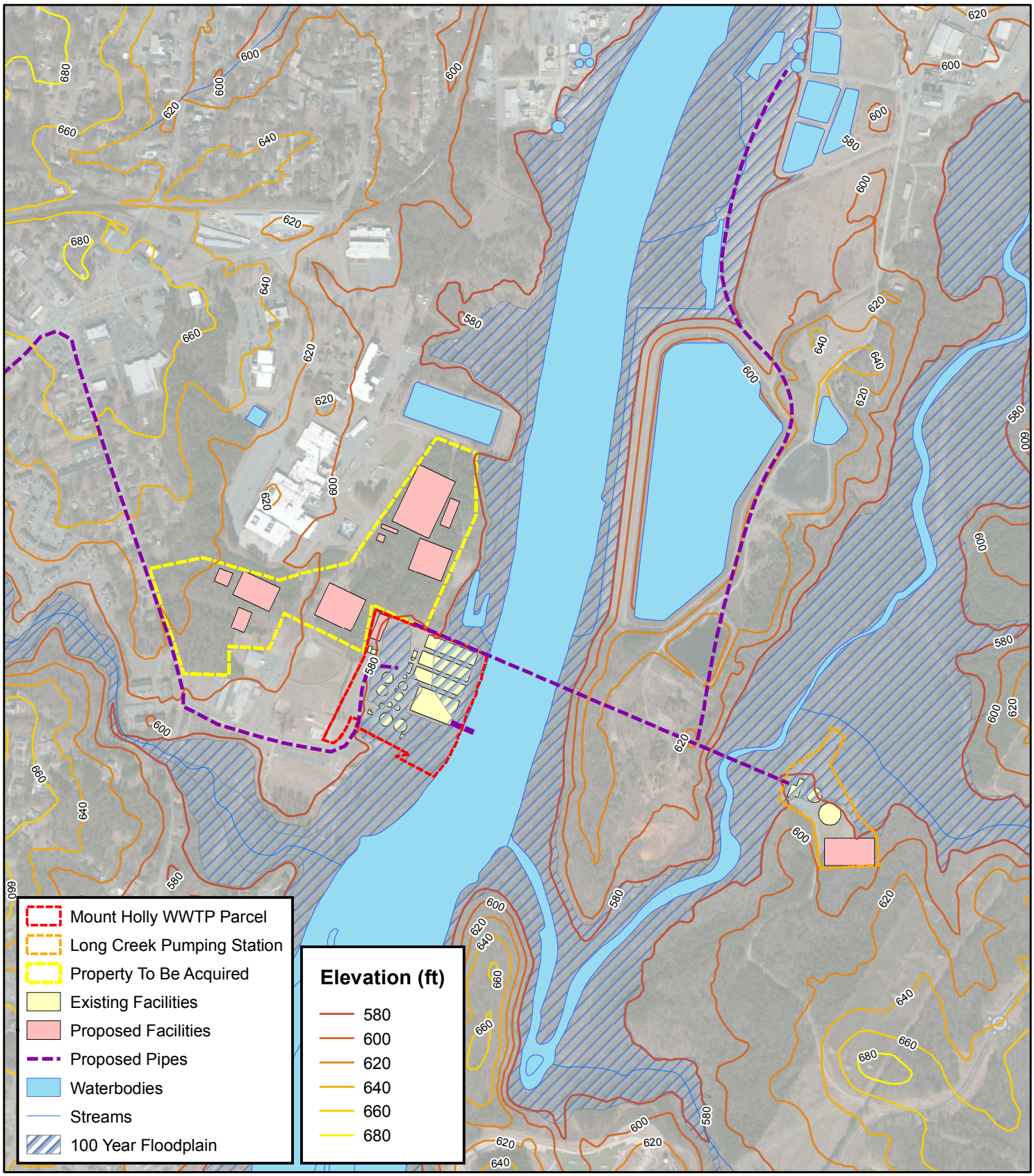
Date: 11/02/2013; PM: LE; Author: MV; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_October2013\Fig5.1c_Topography_NAA_mcv.mxd



0 850 1,700 Feet
0 270 540 Meters

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Figure 5.1d
Alternative 1: Proposed Mount Holly WWTP Topography and Floodplains at Existing and Proposed Facilities

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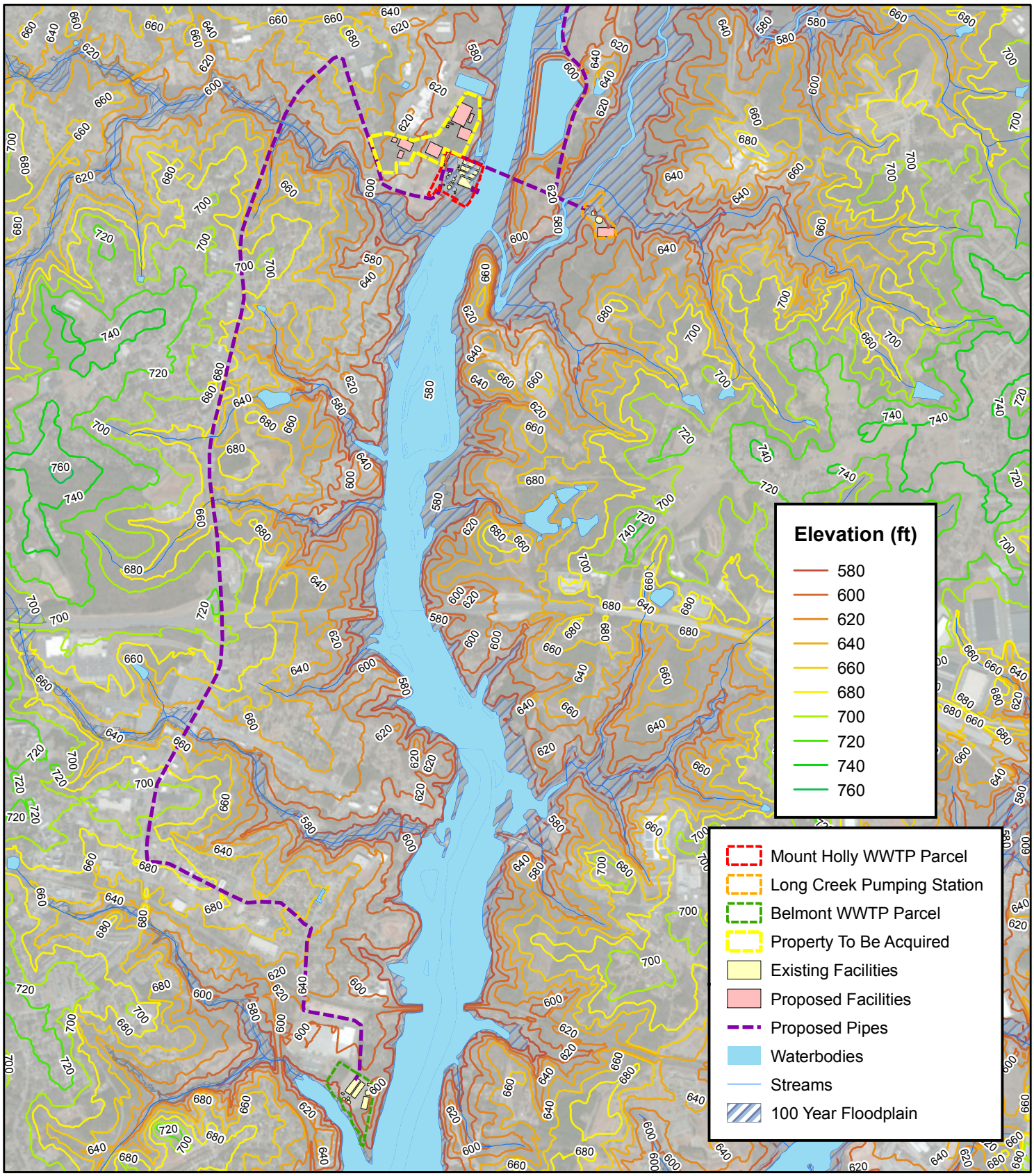
Date: 11/02/2013; PM: LE; Author: MV; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_October2013\Fig5.1d_Topography_A1a_mcv.mxd



0 2,500 5,000 Feet

0 790 1,580 Meters

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Figure 5.1e

Alternative 1: Proposed Mount Holly WWTP Topography and Floodplains along Belmont to Mount Holly Forcemain Route

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Raleigh, NC 27612
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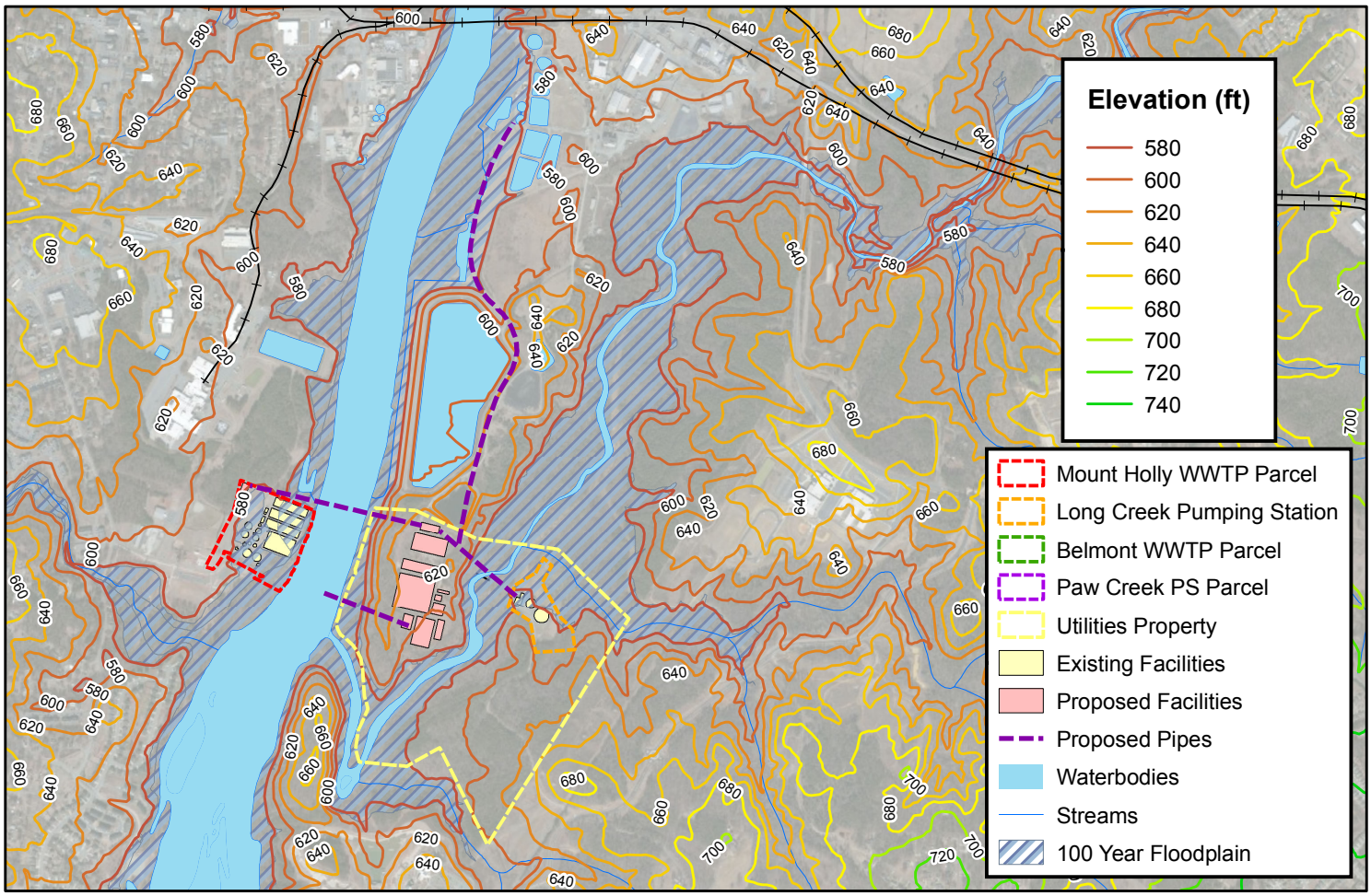
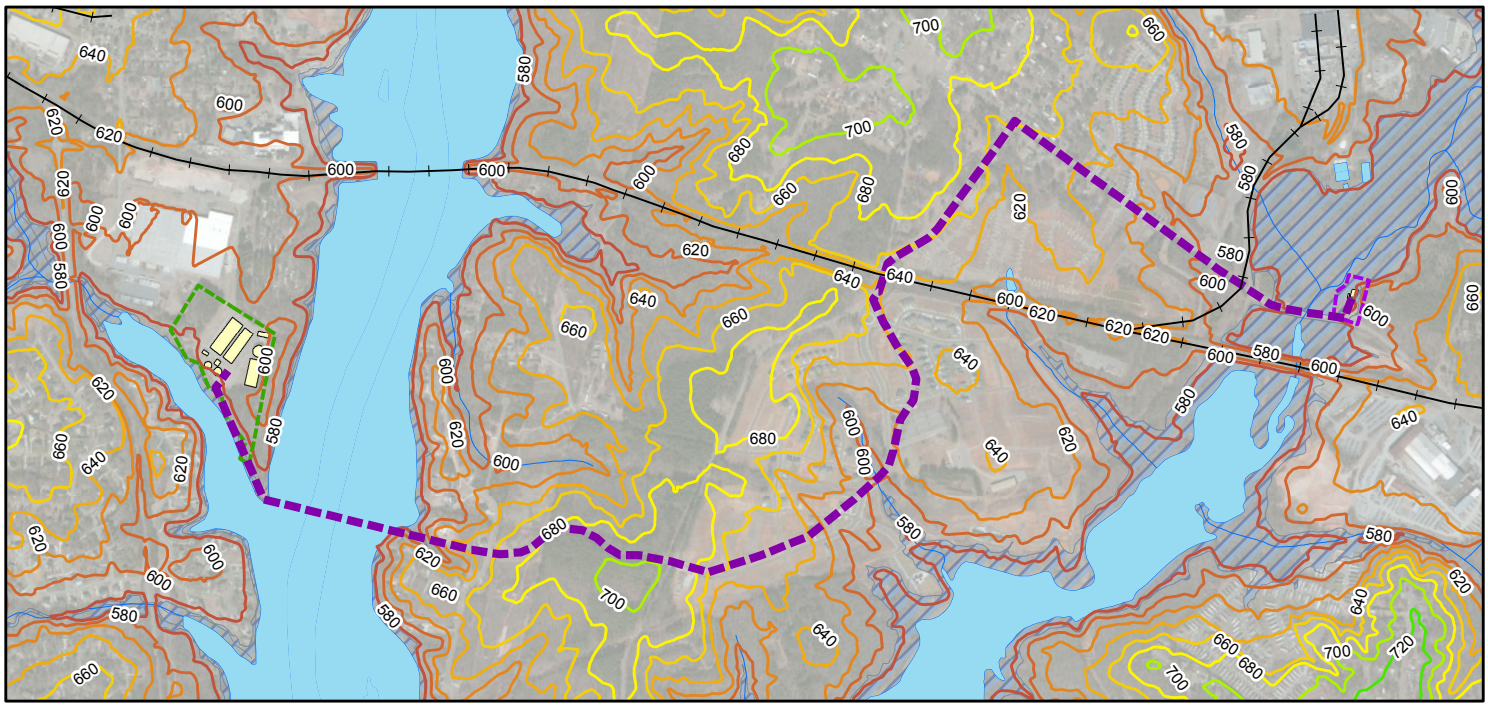
Date: 11/02/2013; PM: LE; Author: MV; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_October2013\Fig5.1e_Topography_A1b_mcv.mxd





0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.1f
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Topography and Floodplains

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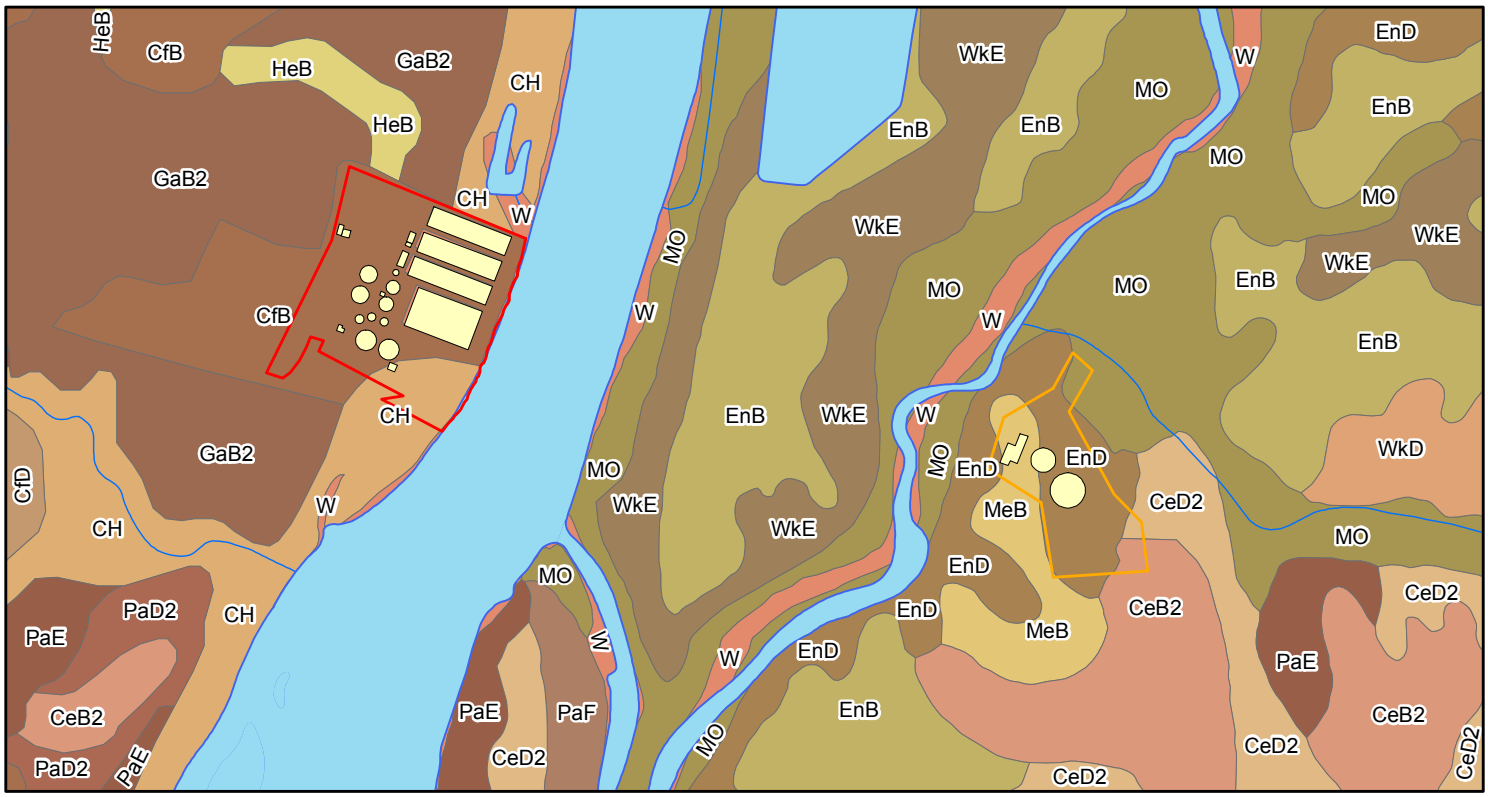

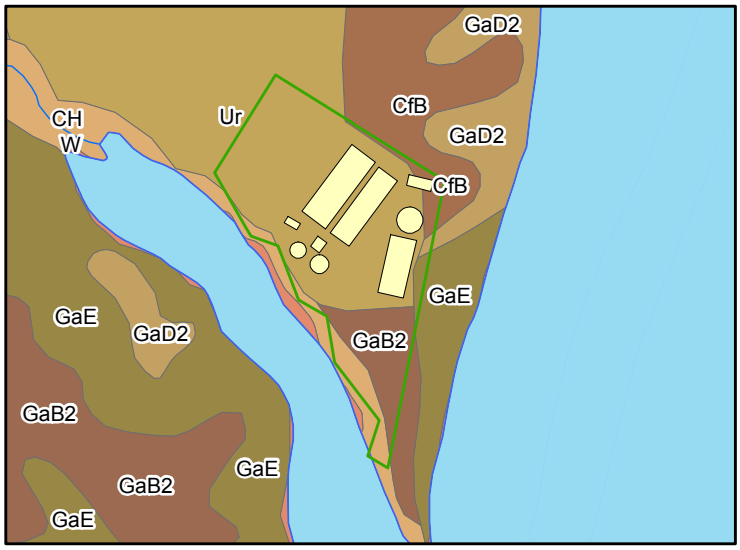

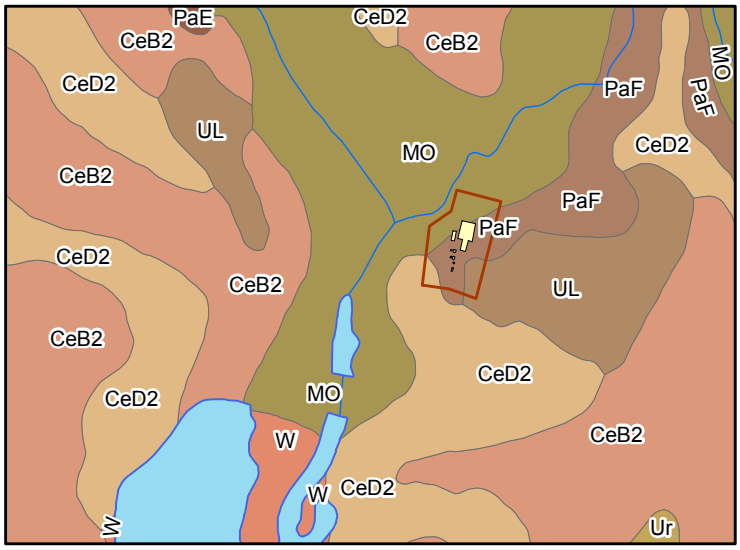

- Mount Holly WWTP Parcel
- Long Creek Pumping Station
- Belmont WWTP Parcel
- Existing Facilities
- Paw Creek PS Parcel
- Waterbodies
- Streams

Soils

ApB	CfD	GaB2	PaD2	W
ApD	Co	GaD2	PaE	WkB
CH	DaB	GaE	PaF	WkD
CeB2	DaD	HeB	UL	WkE
CeD2	EnB	MO	Ud	WkF
CfB	EnD	MeB	Ur	WnB

0 770 1,540 Feet
0 240 480 Meters

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Figure 5.2a
No Action Alternative
Soils at Existing Facilities

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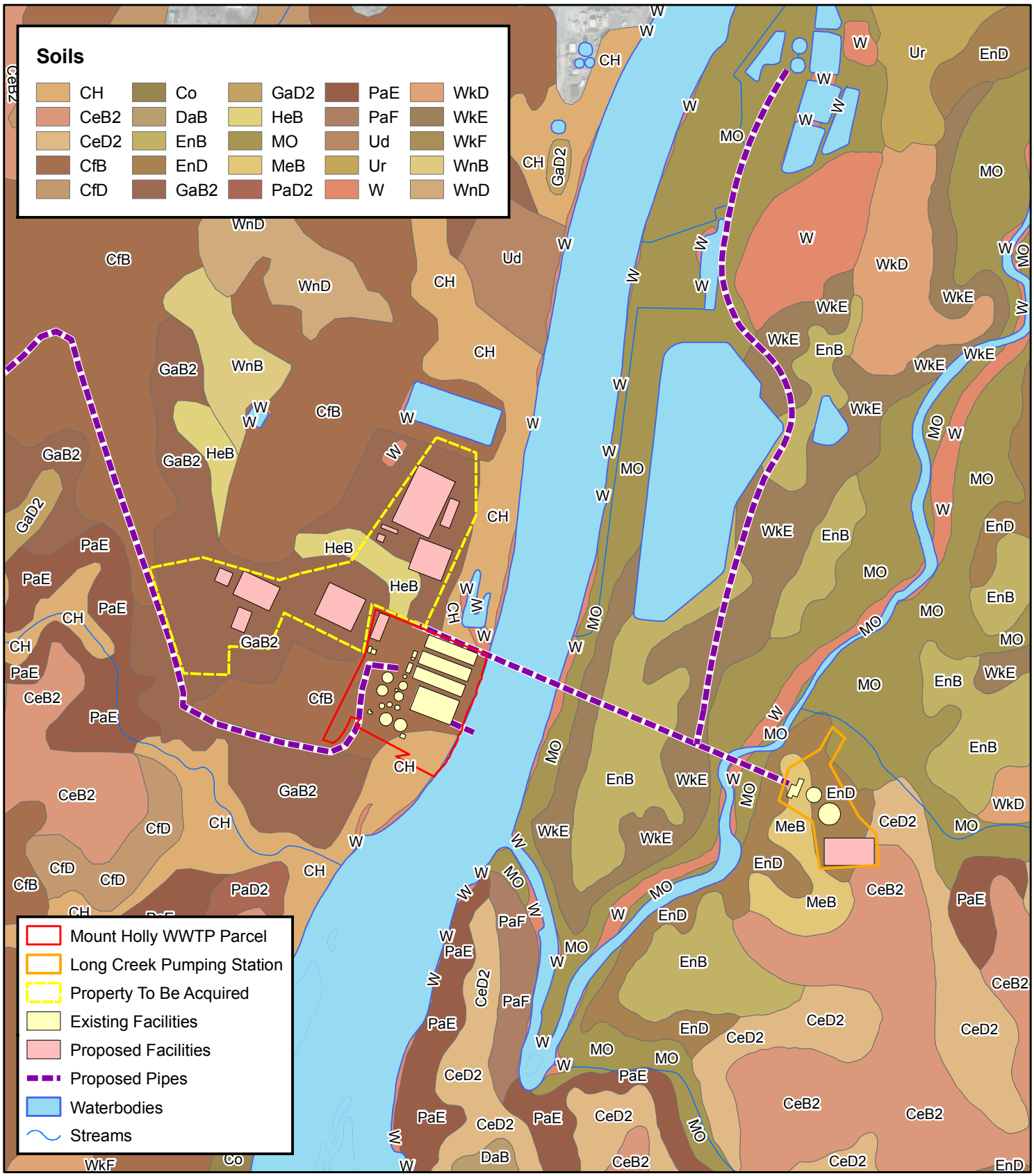

0 850 1,700 Feet
0 270 540 Meters

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Figure 5.2b
Alternative 1: Proposed Mount Holly WWTP
Soils at Existing and Proposed Facilities

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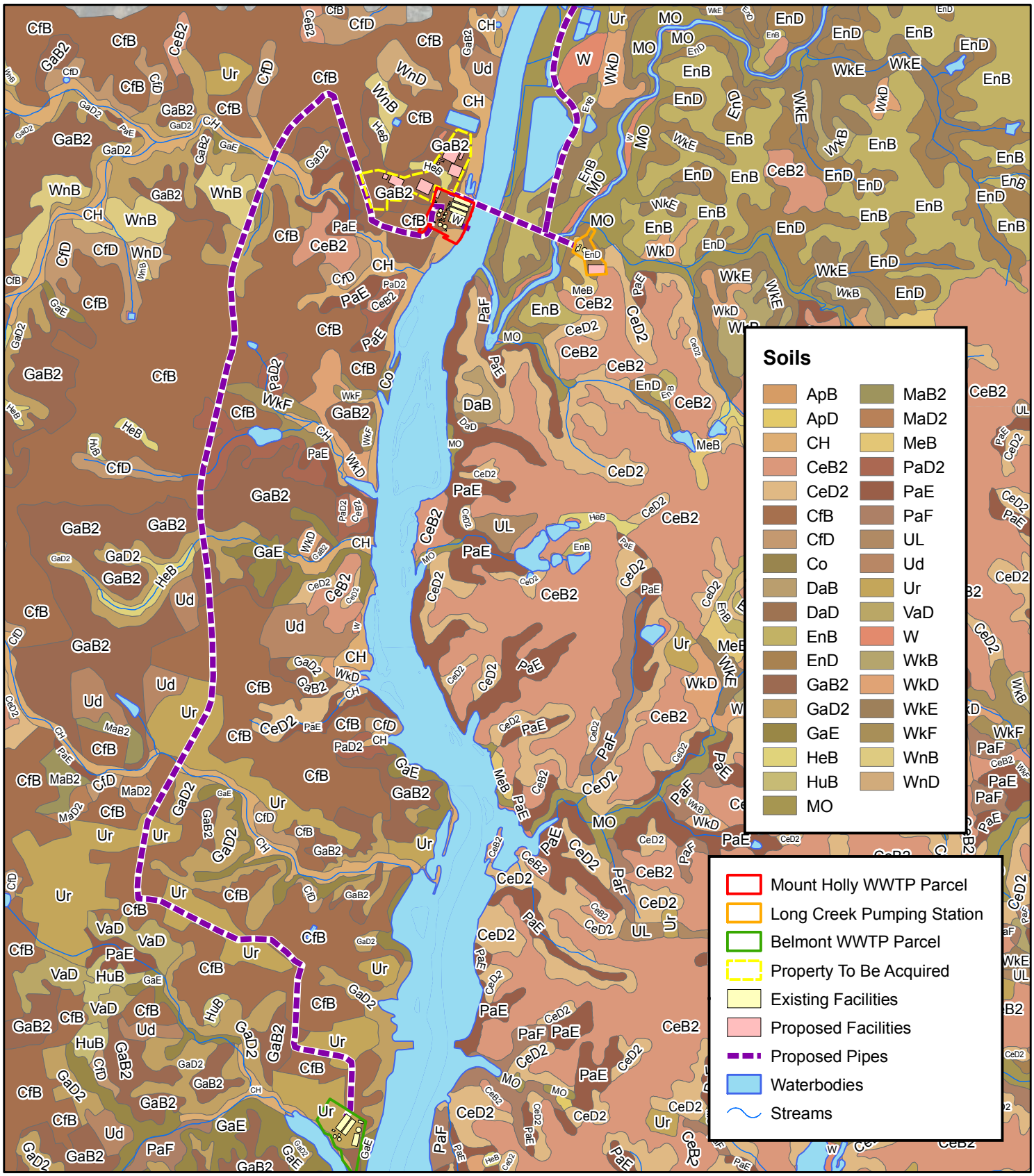

0 2,500 5,000 Feet

0 790 1,580 Meters

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Figure 5.2c

Alternative 1: Proposed Mount Holly WWTP Soils along Belmont to Mount Holly Forcemain Route

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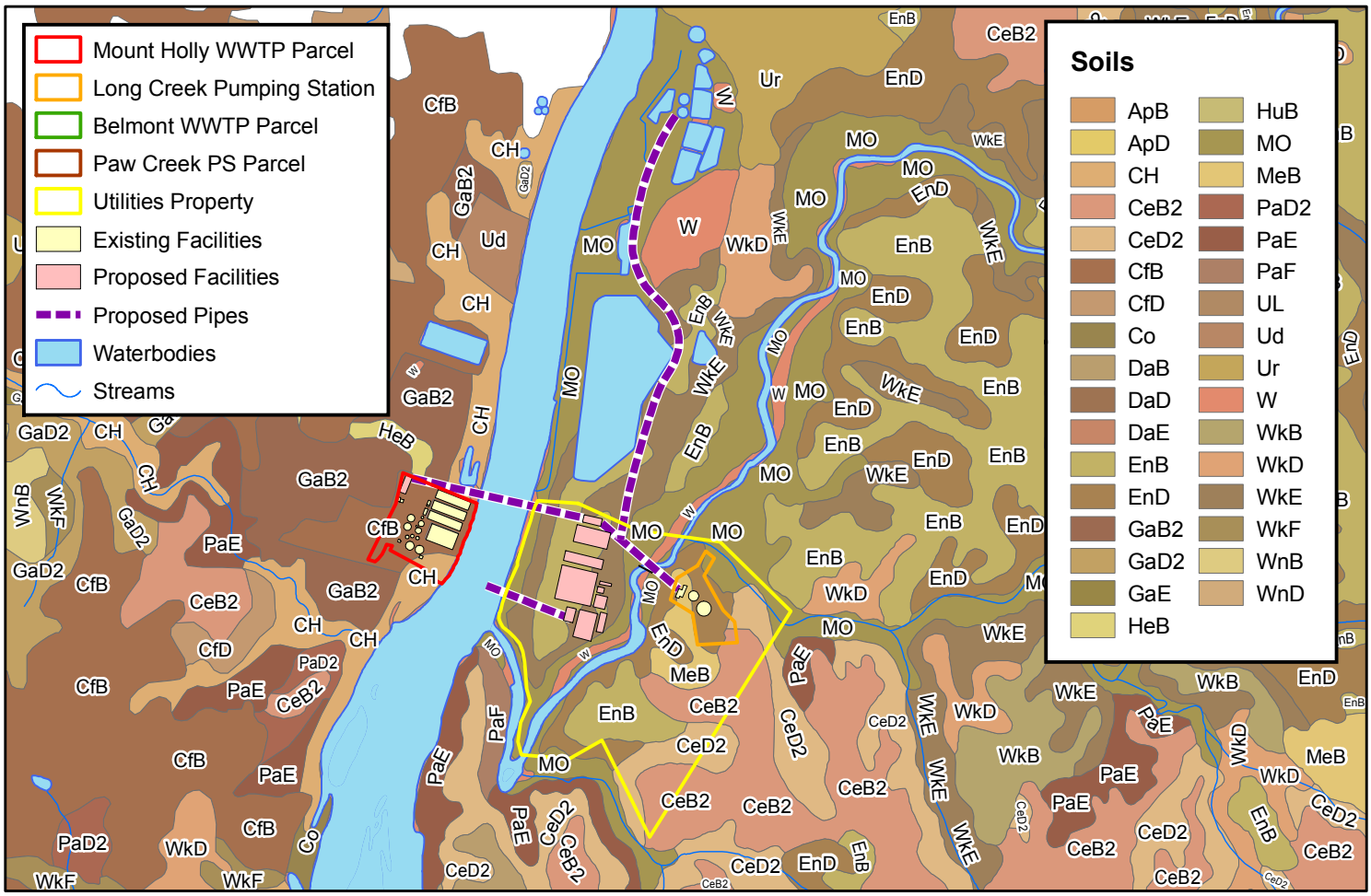

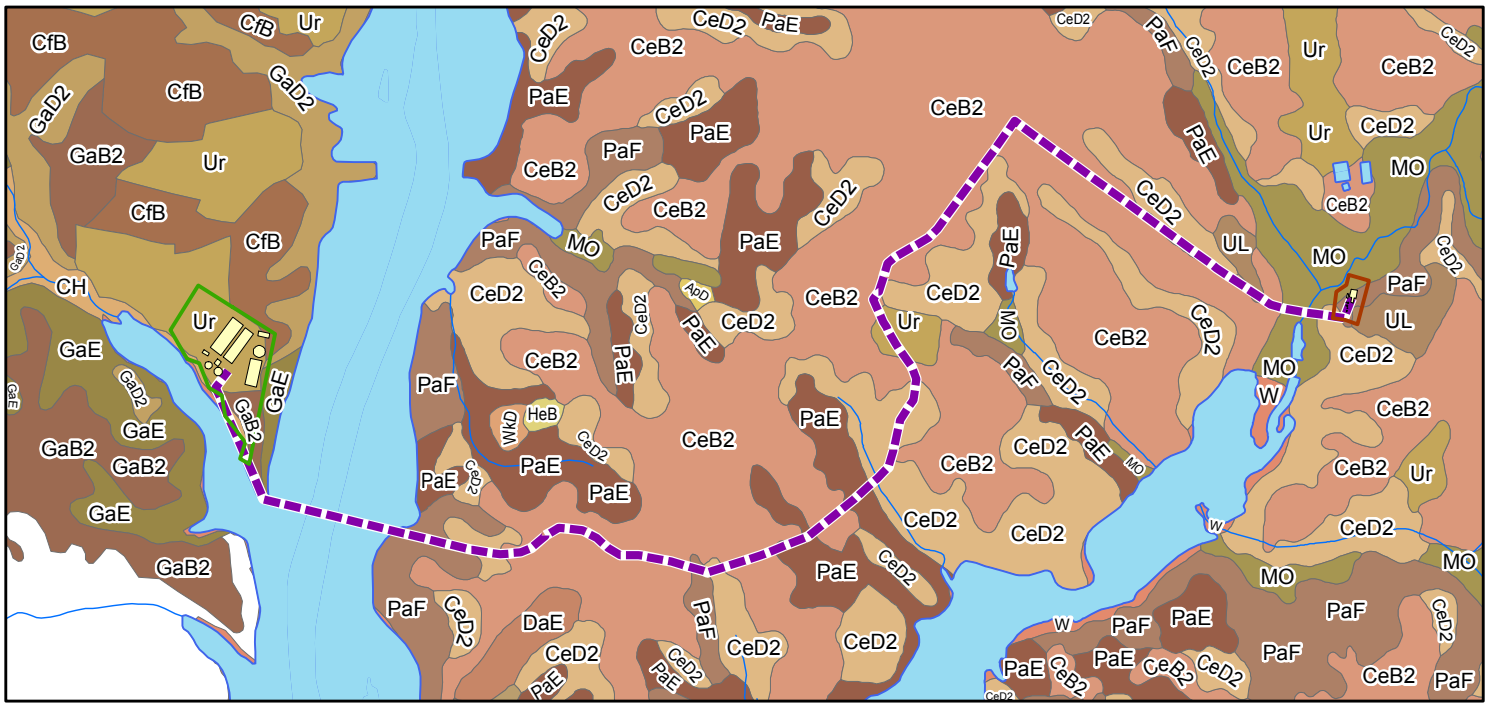

0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.2d
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Soils

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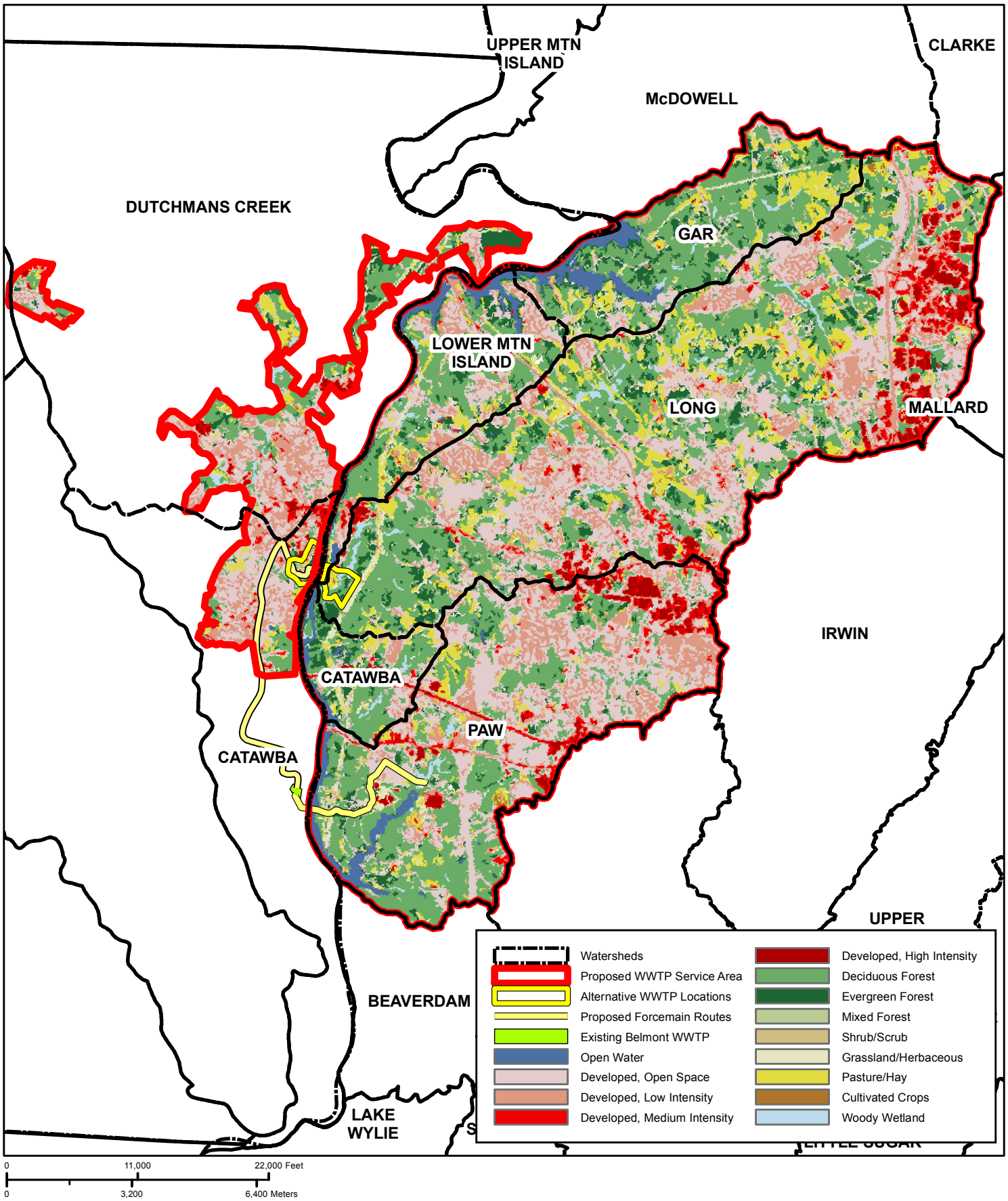

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Figure 5.3a. Service Area
2006 NLCD Landcover Classification

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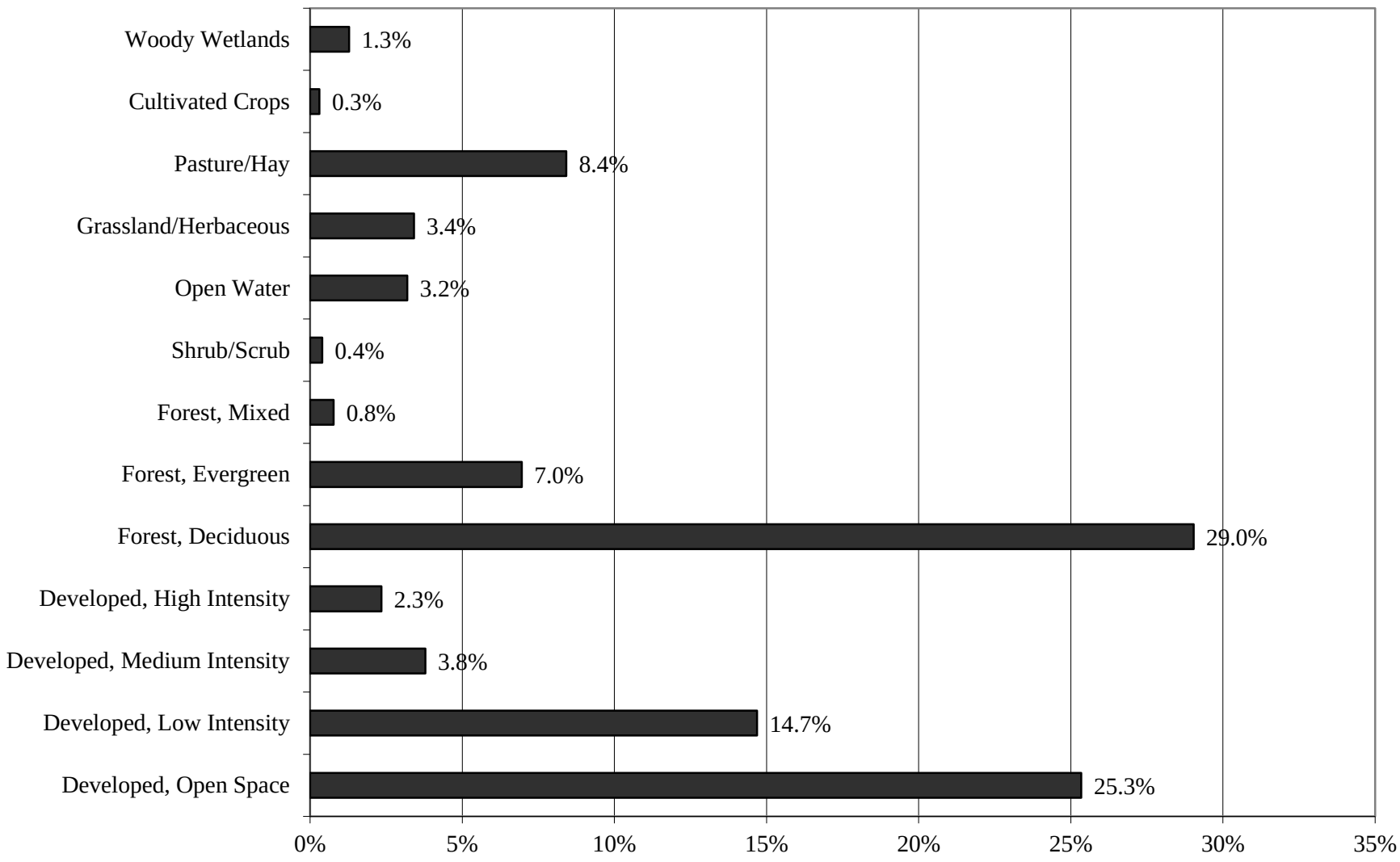


Figure 5.3b 2006 NLCD Land Cover Classes - Percent of Service Area

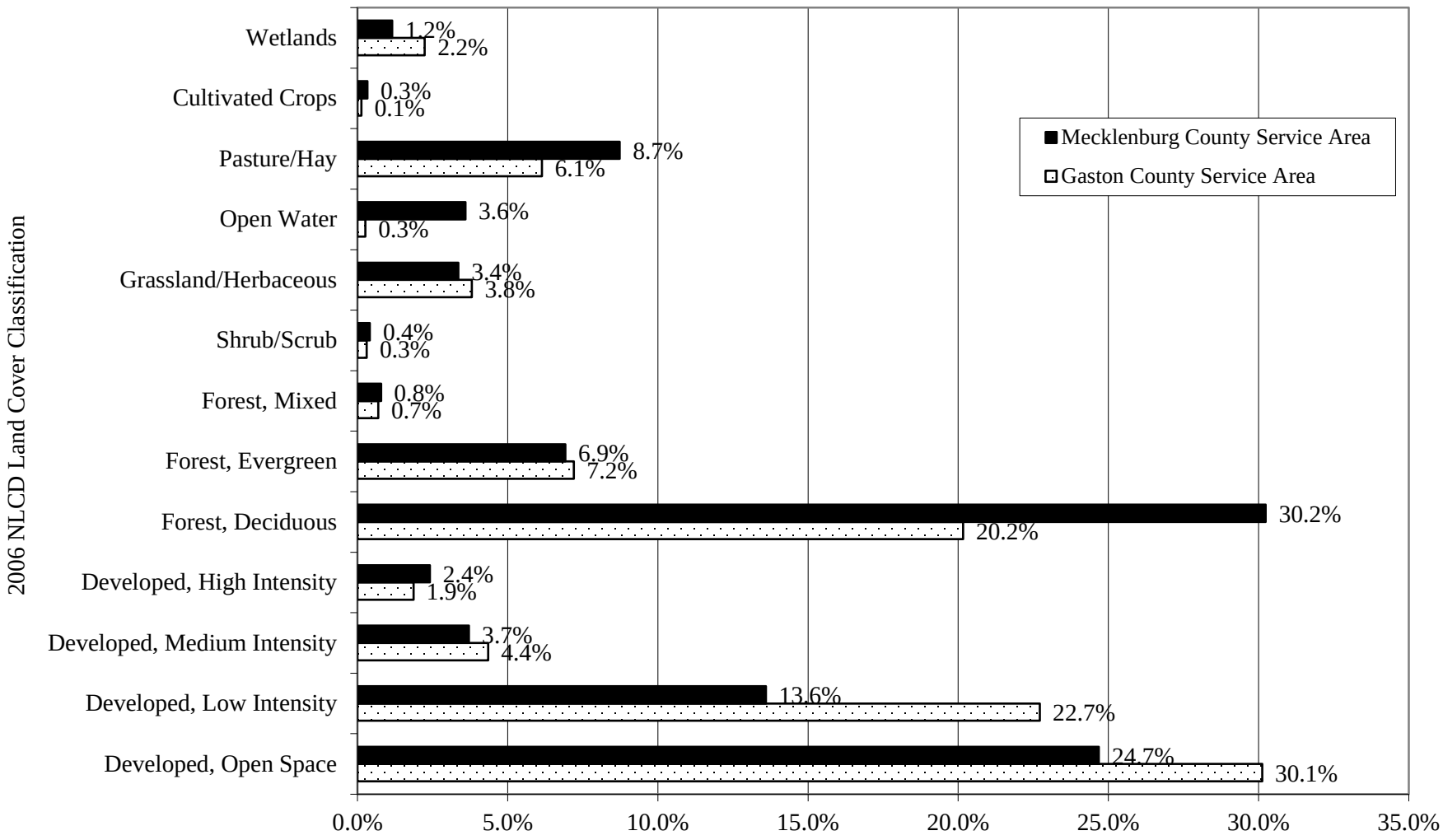
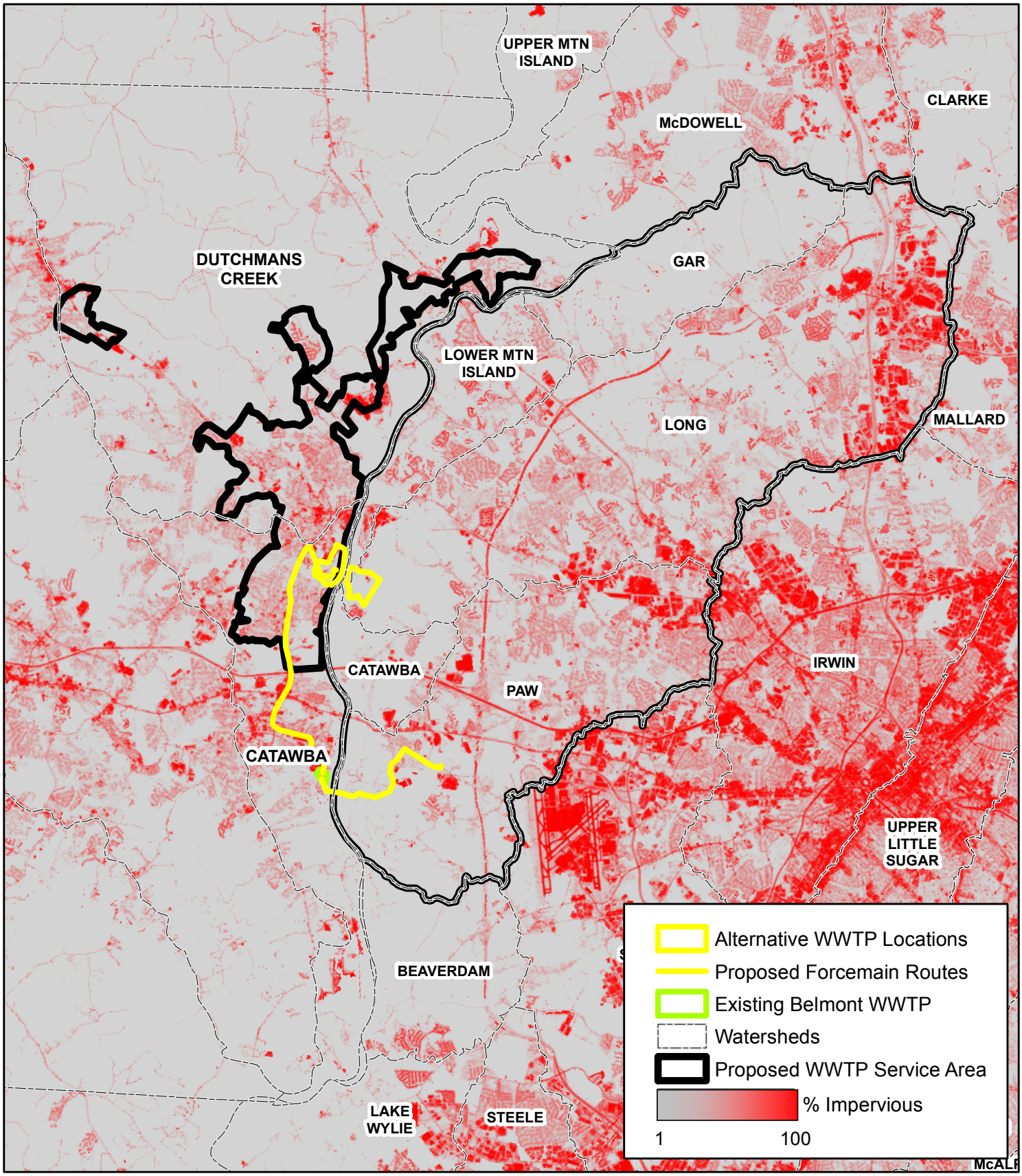


Figure 5.3c Land Cover - Percent of Service Area within County



0 12,000 24,000 Feet

0 3,400 6,800 Meters

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Figure 5.3d. Service Area
2006 NLCD Impervious Cover

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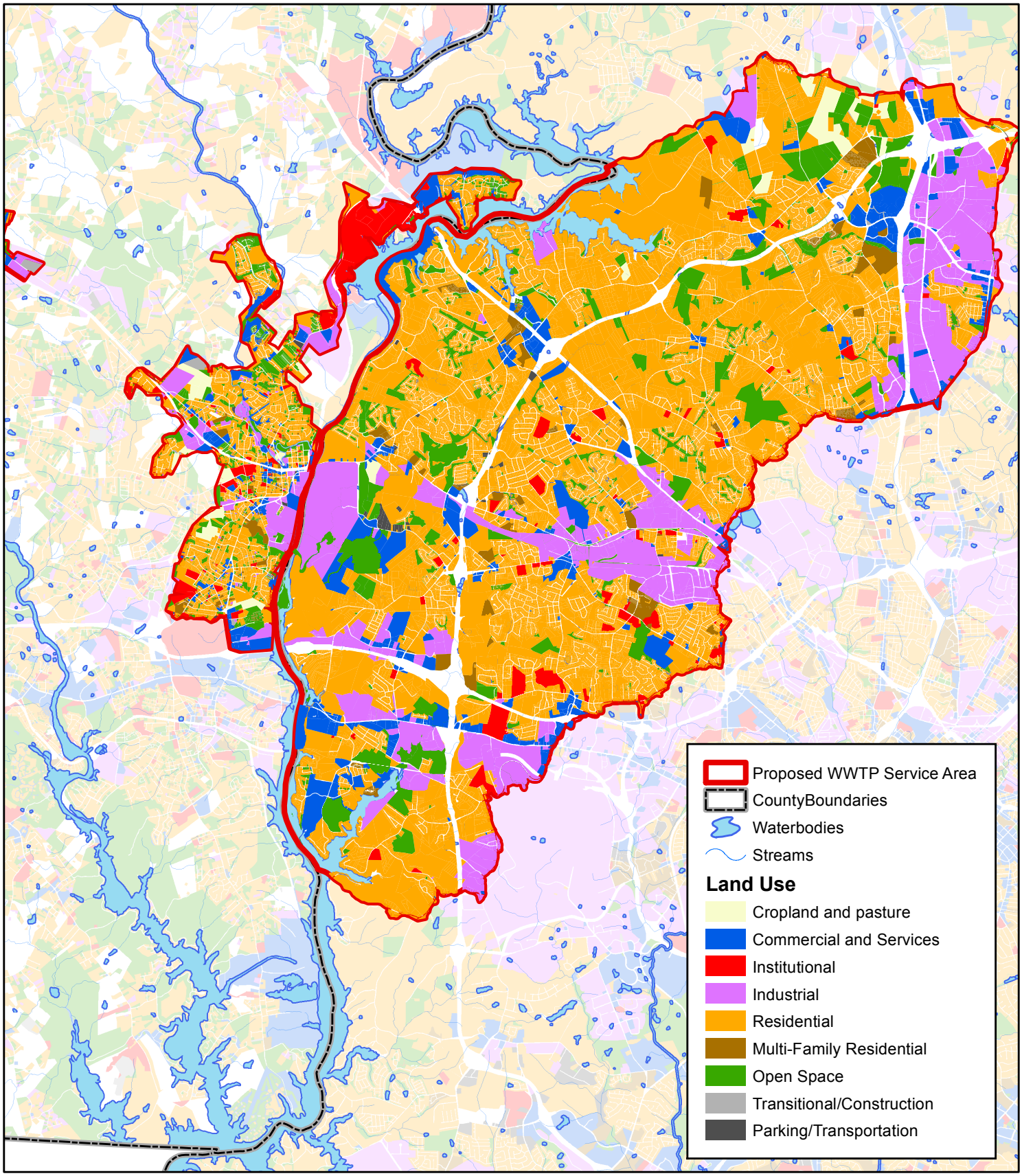

0 10,000 20,000 Feet

0 3,100 6,200 Meters

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Figure 5.3e. Service Area Current Land Use

Proposed Regional WWTP

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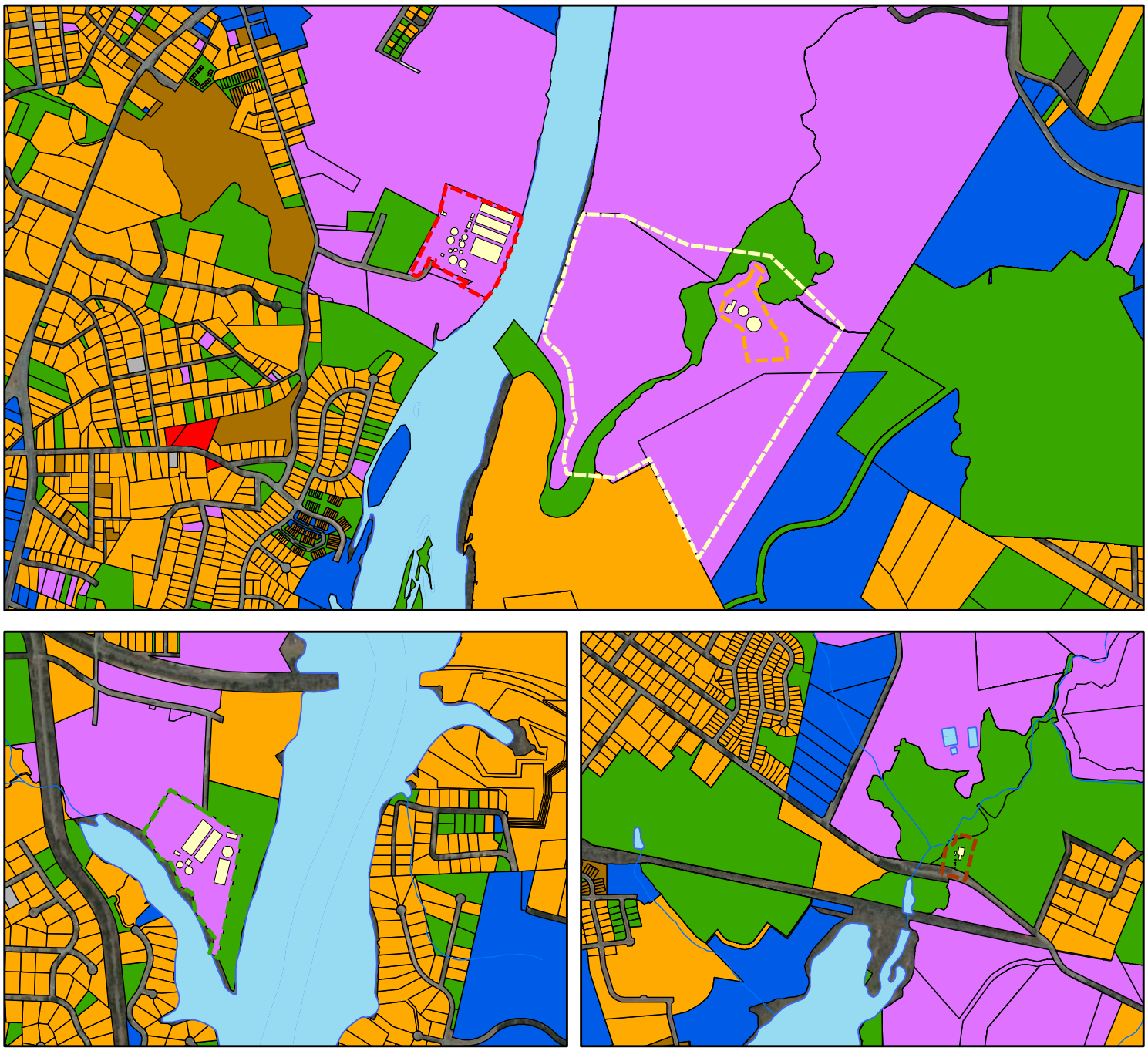

Mount Holly WWTP Parcel
Long Creek Pumping Station
Belmont WWTP Parcel
Paw Creek PS Parcel
Utilities Property Boundary
Existing Facilities
Waterbodies
Streams

Land Use

Commercial and Services
Institutional
Industrial
Residential
Multi-Family Residential
Open Space
Transitional/Construction
Parking/Transportation

0 1,300 2,600 Feet
0 440 880 Meters

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Figure 5.3f
No Action Alternative
Land Use adjacent to Existing Facilities

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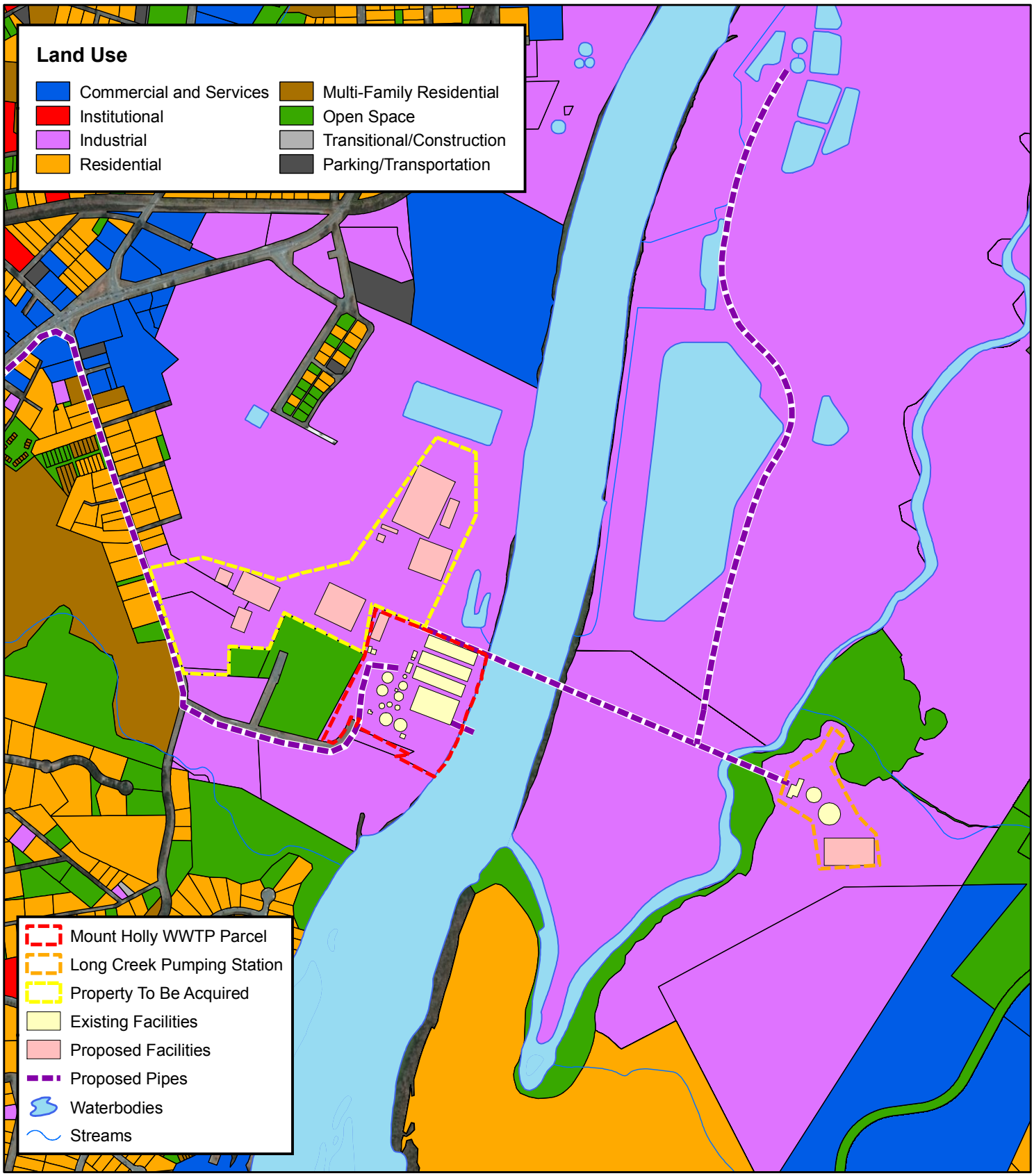

0 850 1,700 Feet
0 270 540 Meters

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Figure 5.3g
Alternative 1: Proposed Mount Holly WWTP
Land Use adjacent to
Existing and Proposed Facilities

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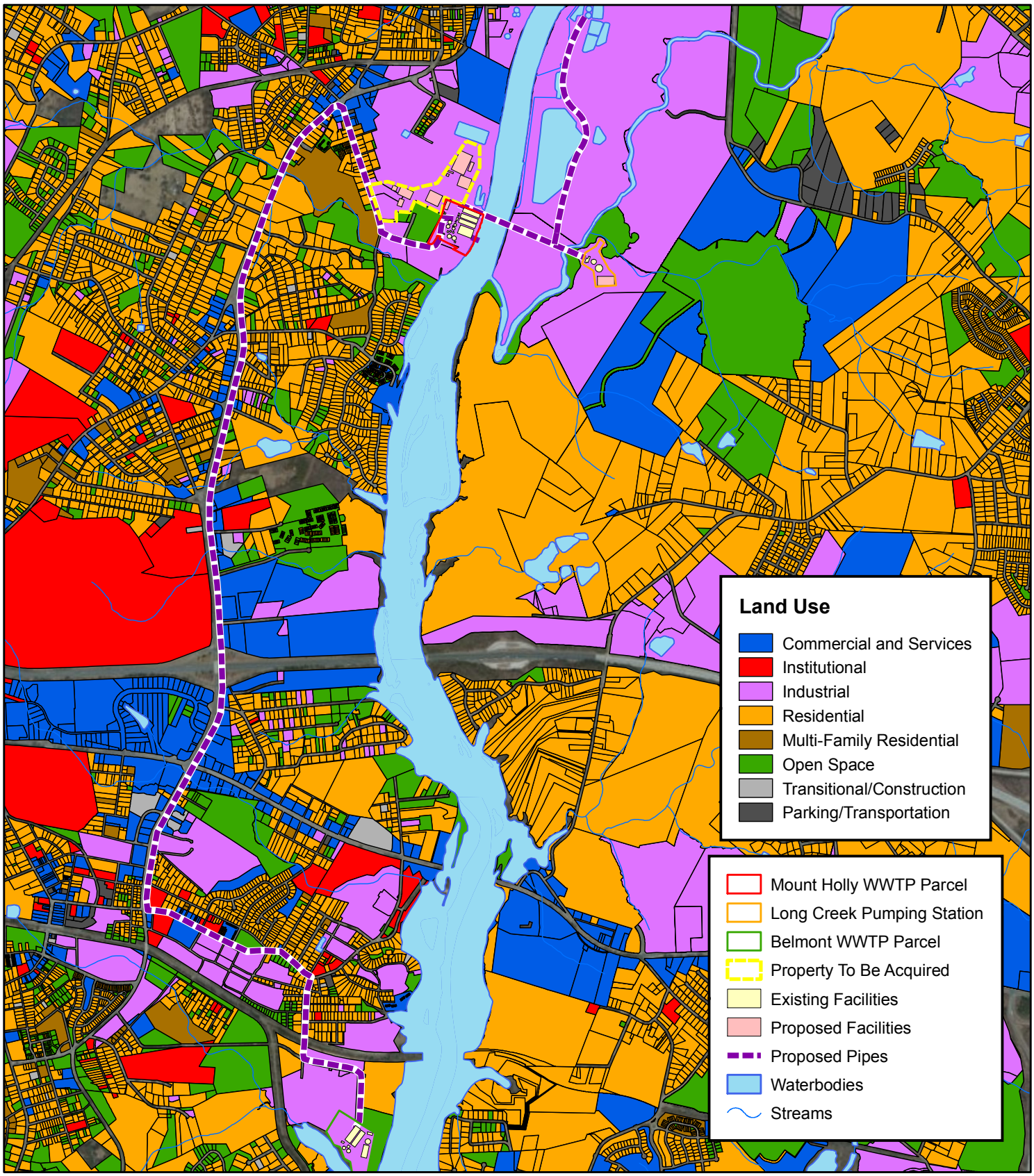

0 2,500 5,000 Feet

0 790 1,580 Meters

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Figure 5.3h

Alternative 1: Proposed Mount Holly WWTP Land Use along Belmont to Mount Holly Forcemain Route

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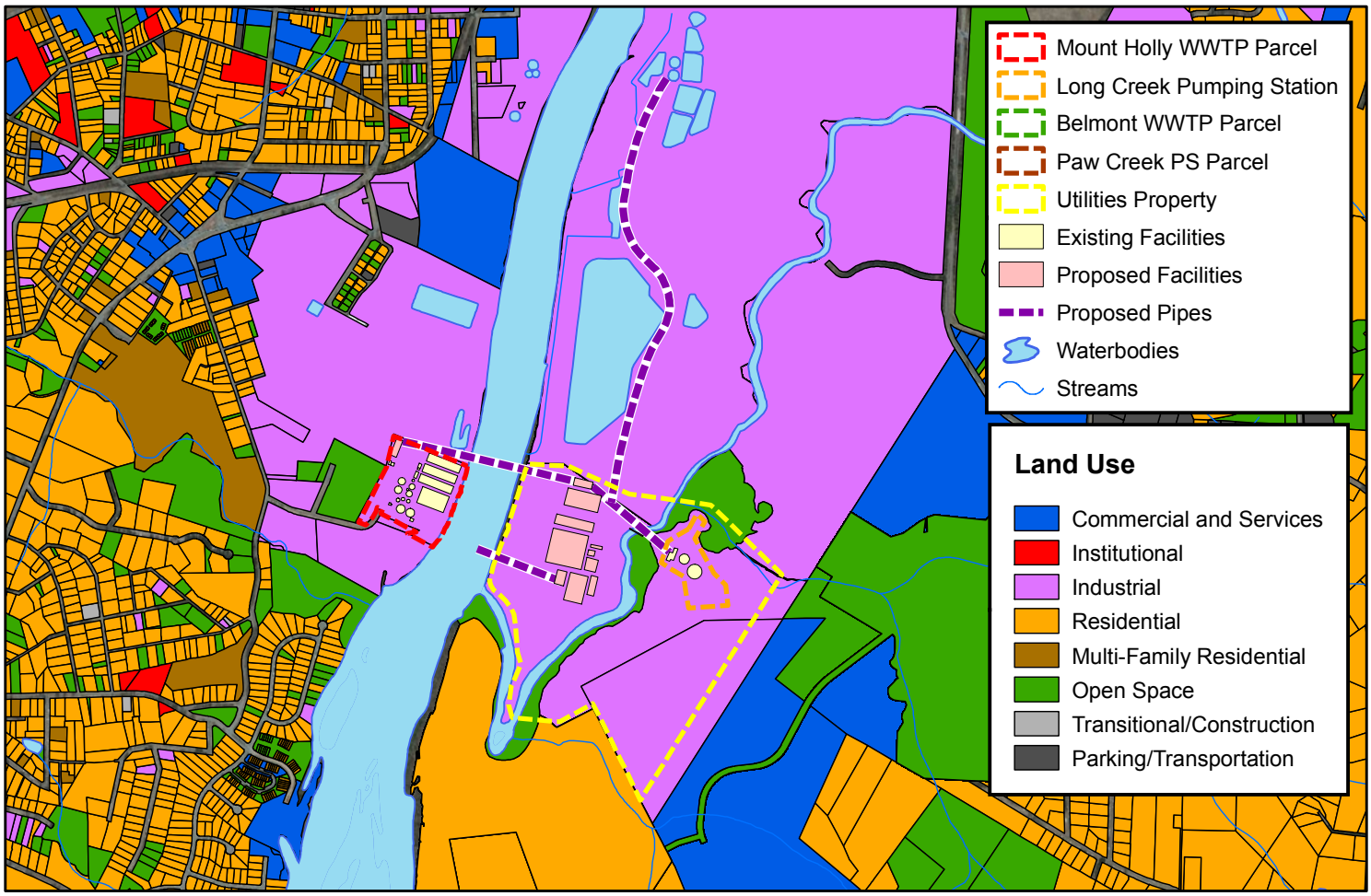

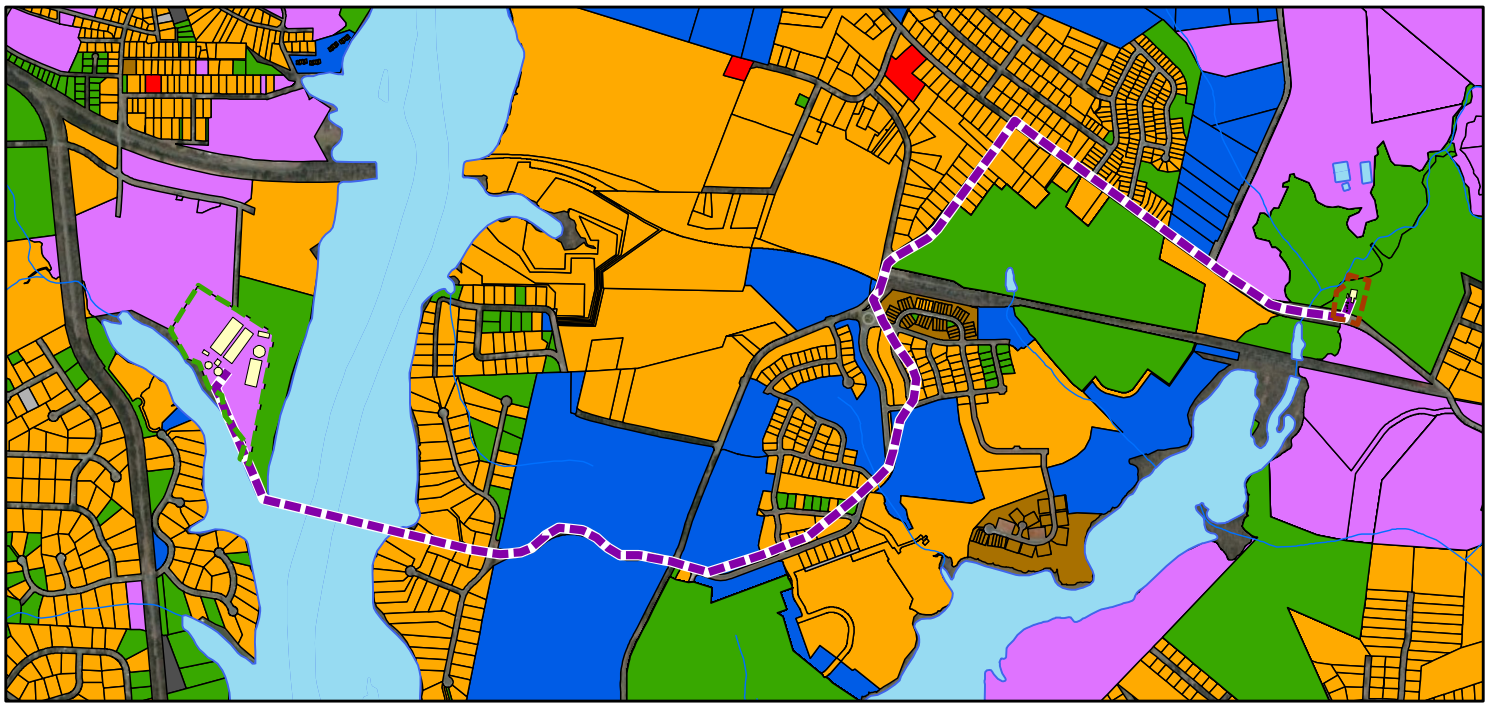

0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.3i
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Land Use adjacent to Facilities

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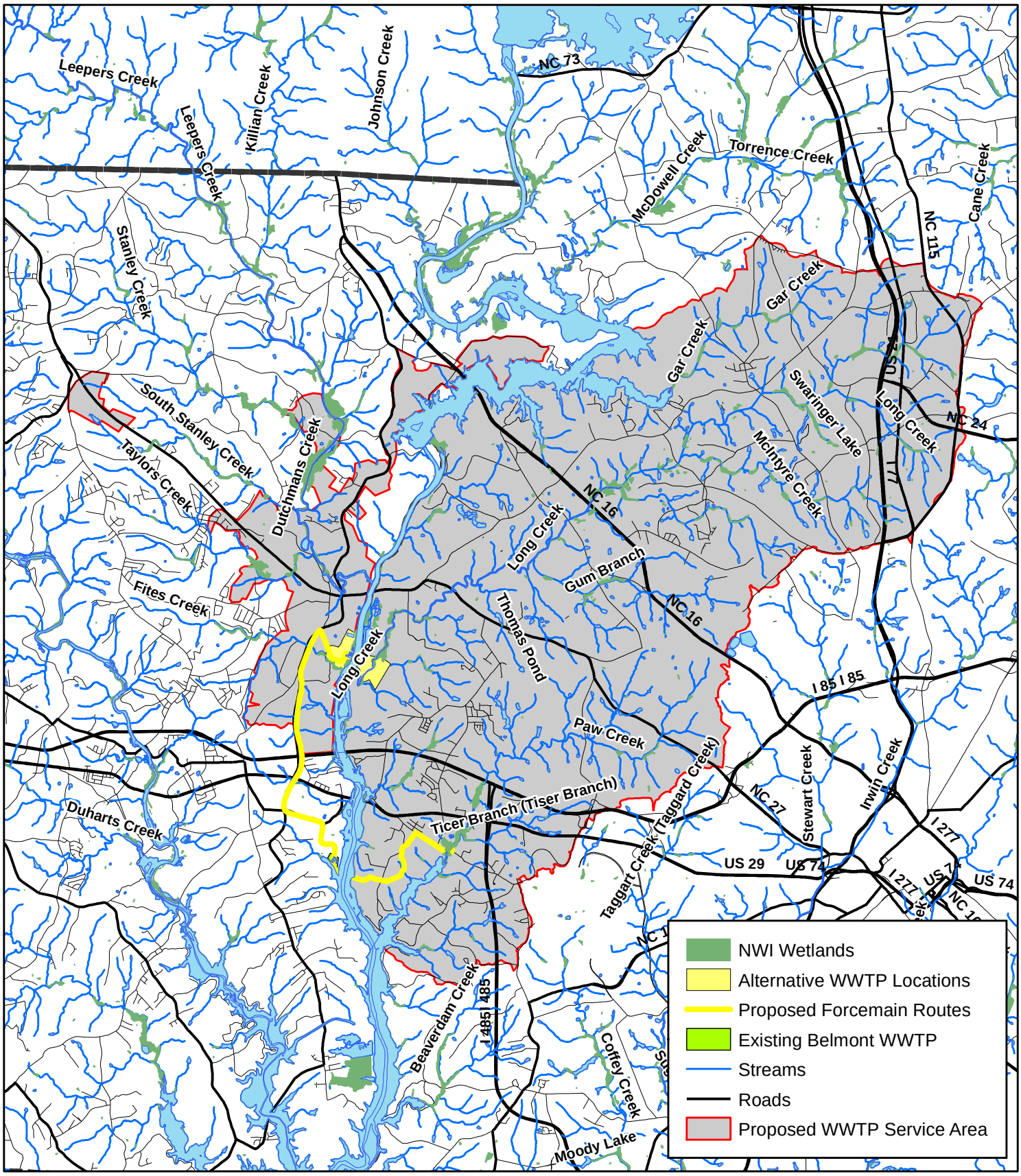

0 12,000 24,000 Feet

0 3,600 7,200 Meters

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Figure 5.4a. NWI Wetlands

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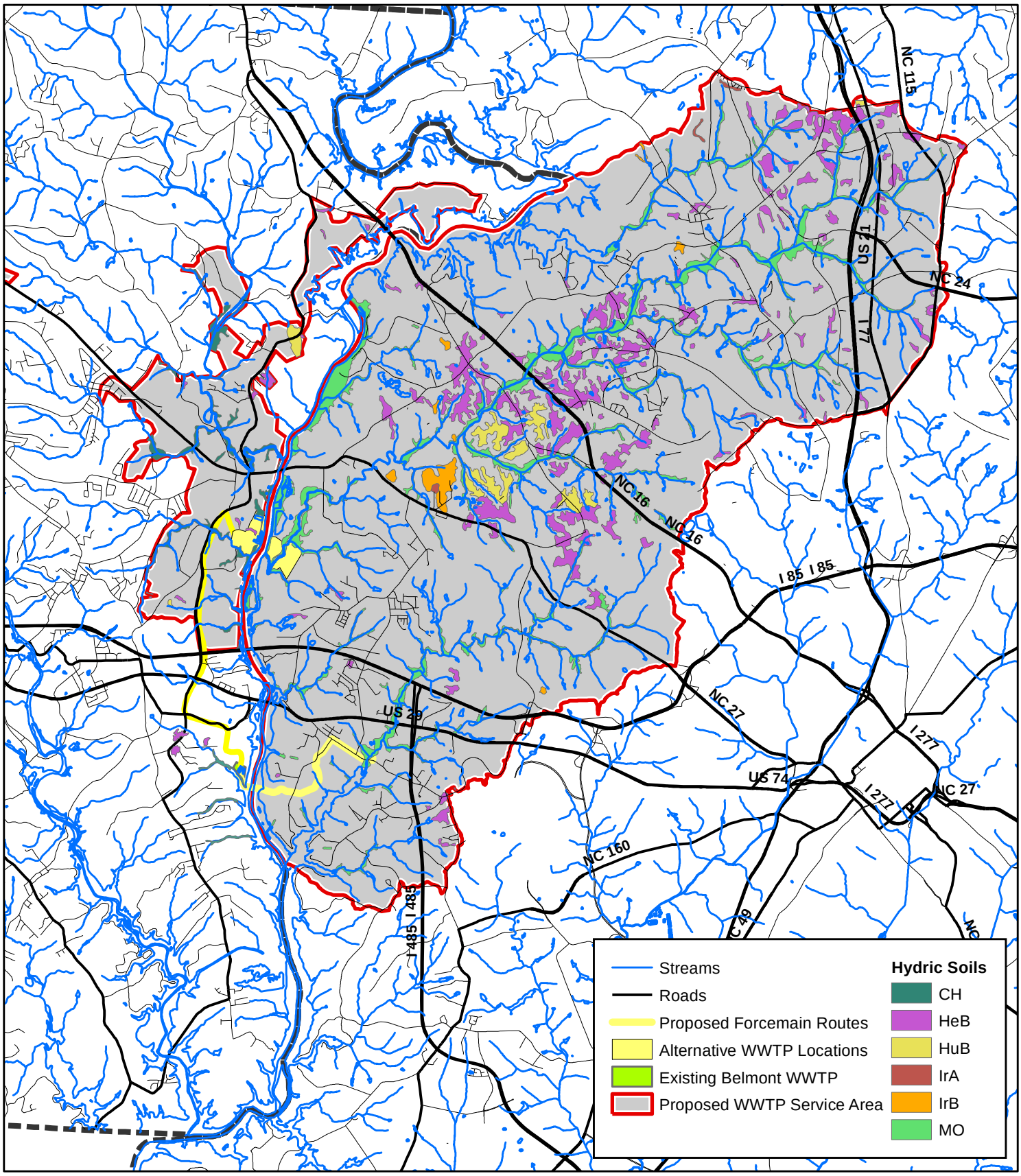

0 11,000 22,000 Feet

0 3,200 6,400 Meters

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Figure 5.4b. Hydric Soils

Proposed Regional WWTP

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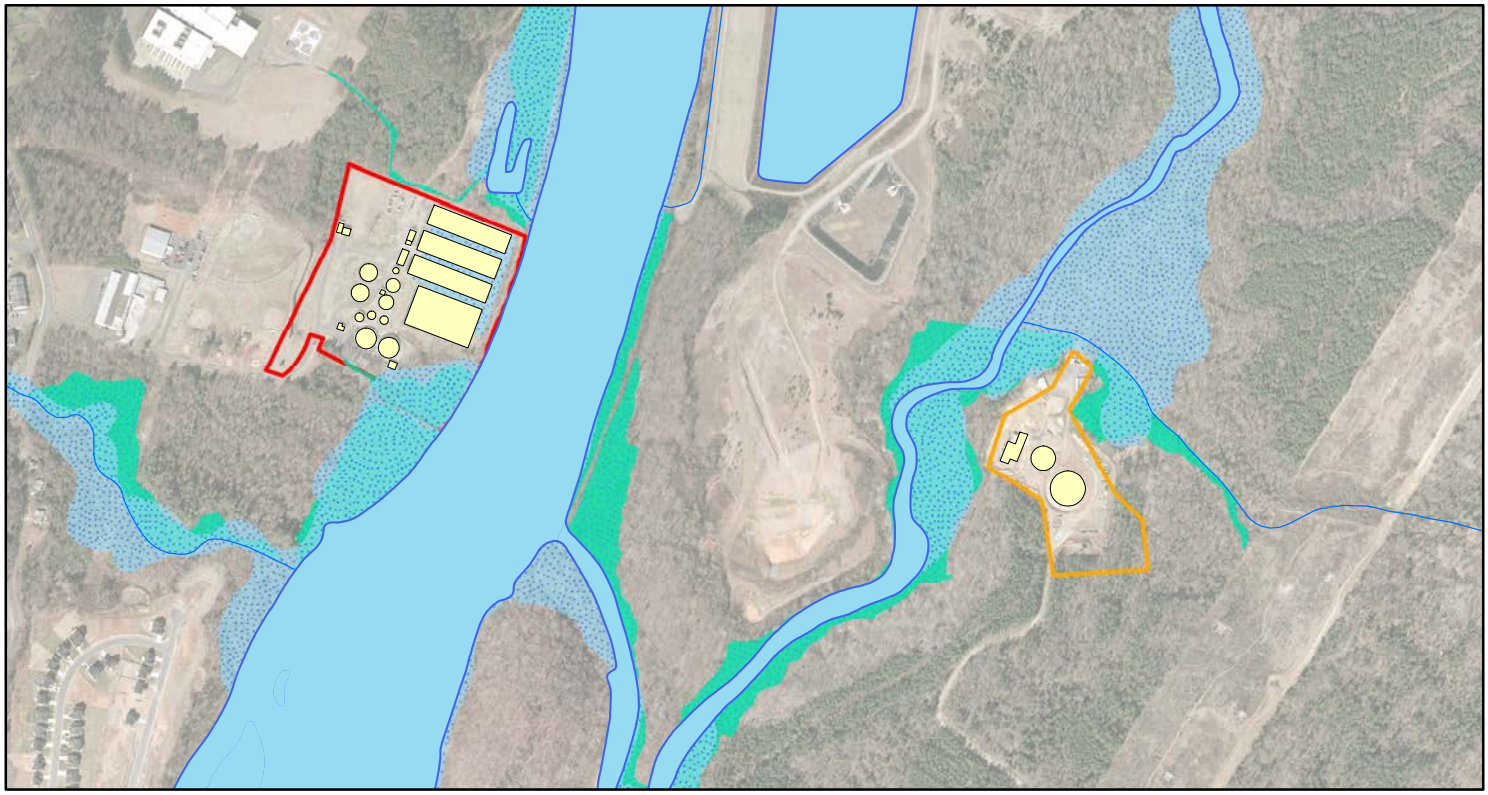

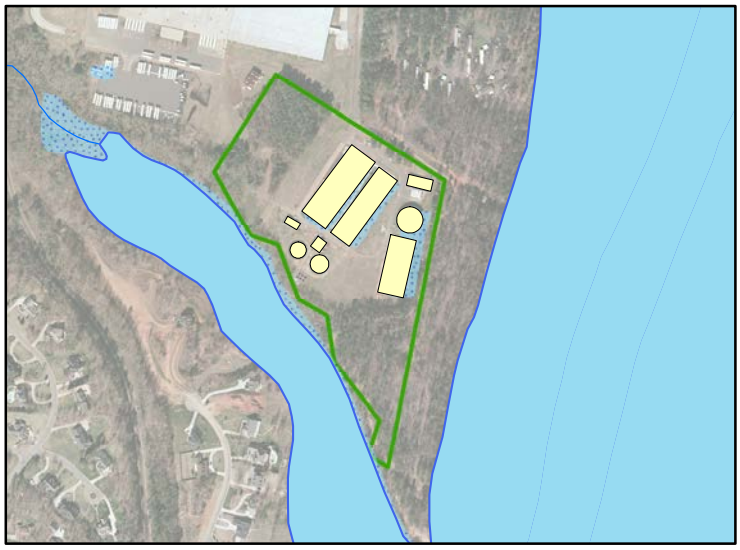

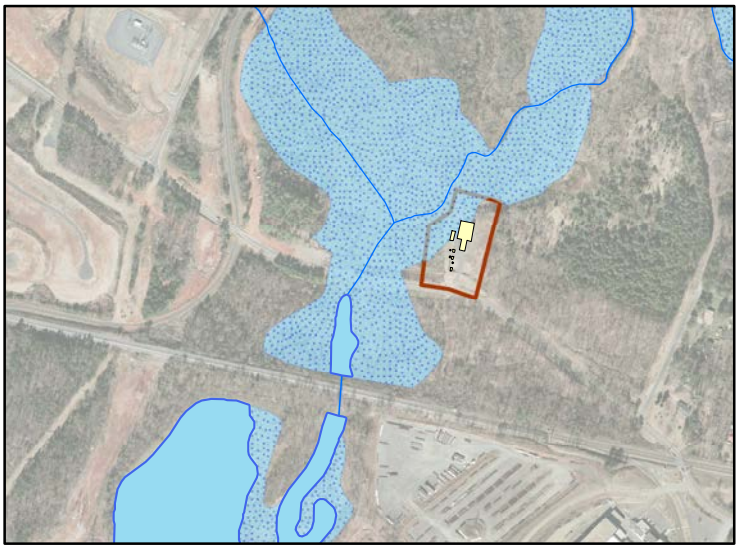

Mount Holly WWTP Parcel
Long Creek PS Parcel
Belmont WWTP Parcel
Paw Creek PS Parcel
Existing Facilities
Field Delineated Wetlands
NWI Wetlands
Waterbodies
Streams

0 770 1,540 Feet
0 240 480 Meters

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Figure 5.4c
No Action Alternative
Wetlands at Existing Facilities

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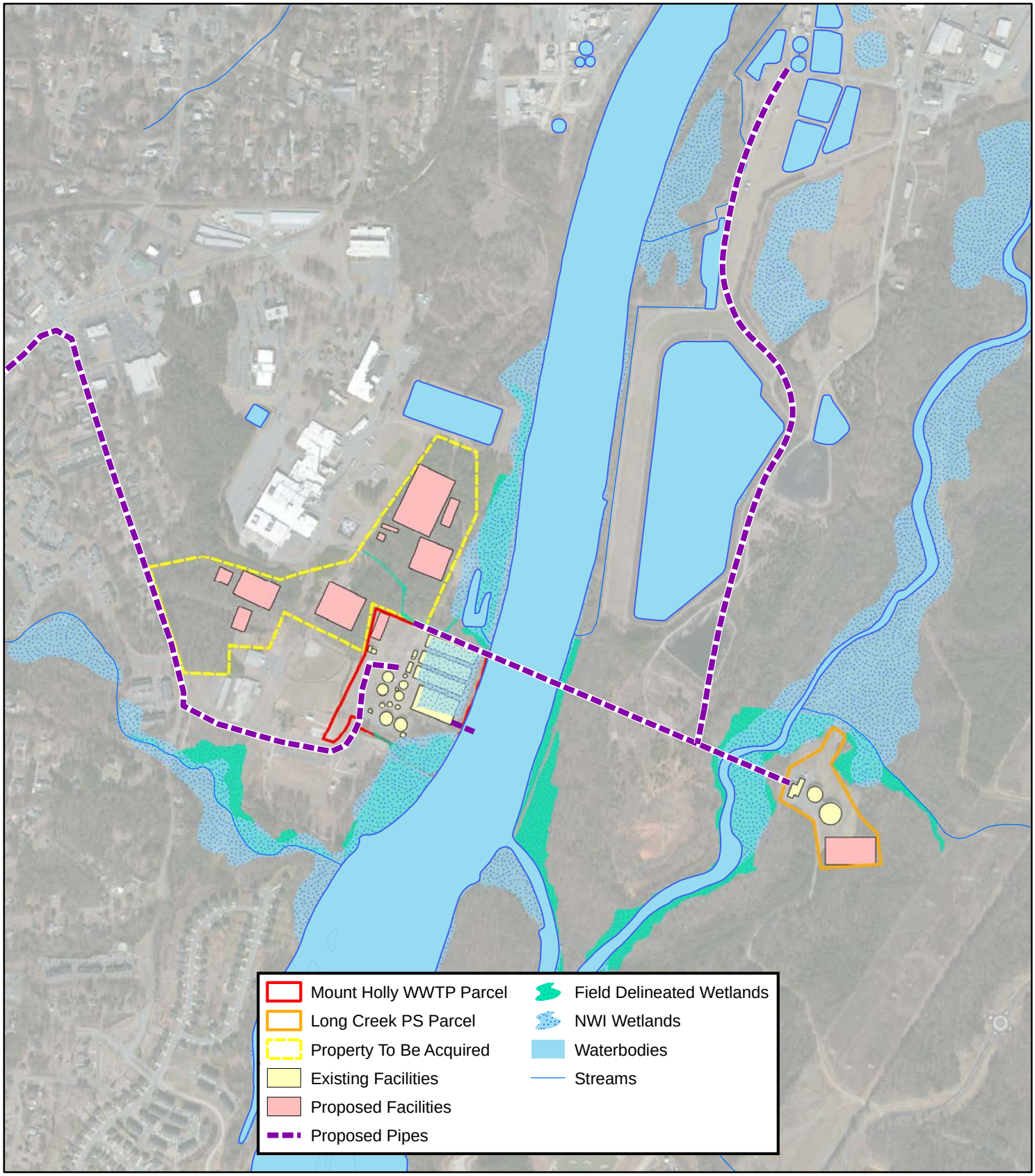

0 850 1,700 Feet
0 270 540 Meters

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Figure 5.4d
Alternative 1: Proposed Mount Holly WWTP
Wetlands at Existing and Proposed Facilities

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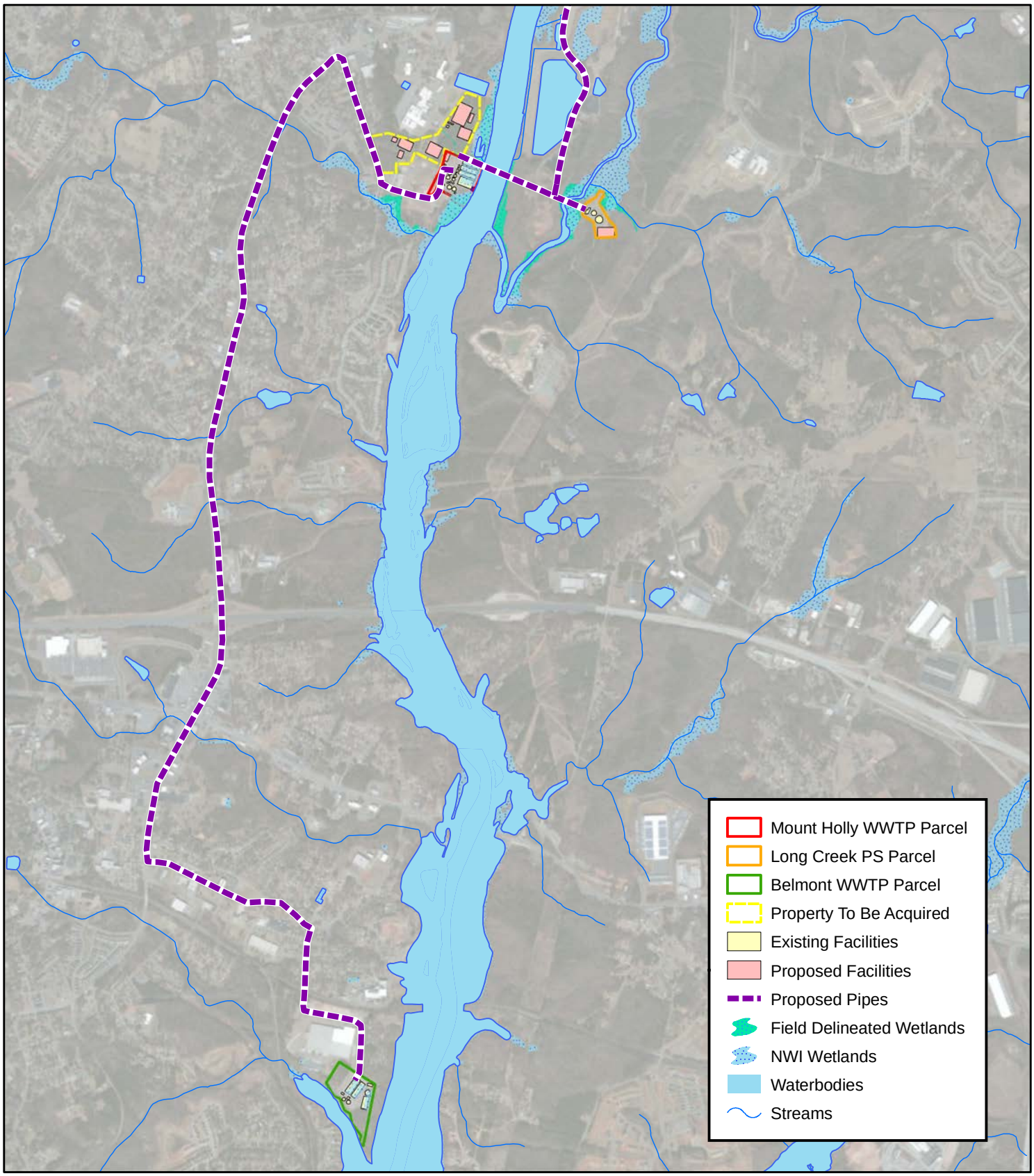
Date: 11/1/2013; PM: LE; Author: mcv; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_October2013\Fig5.4d_Wetlands_A1a_mcv.mxd



0 2,500 5,000 Feet
0 790 1,580 Meters

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Figure 5.4e
Alternative 1: Proposed Mount Holly WWTP Wetlands along Belmont to Mount Holly Forcemain Route

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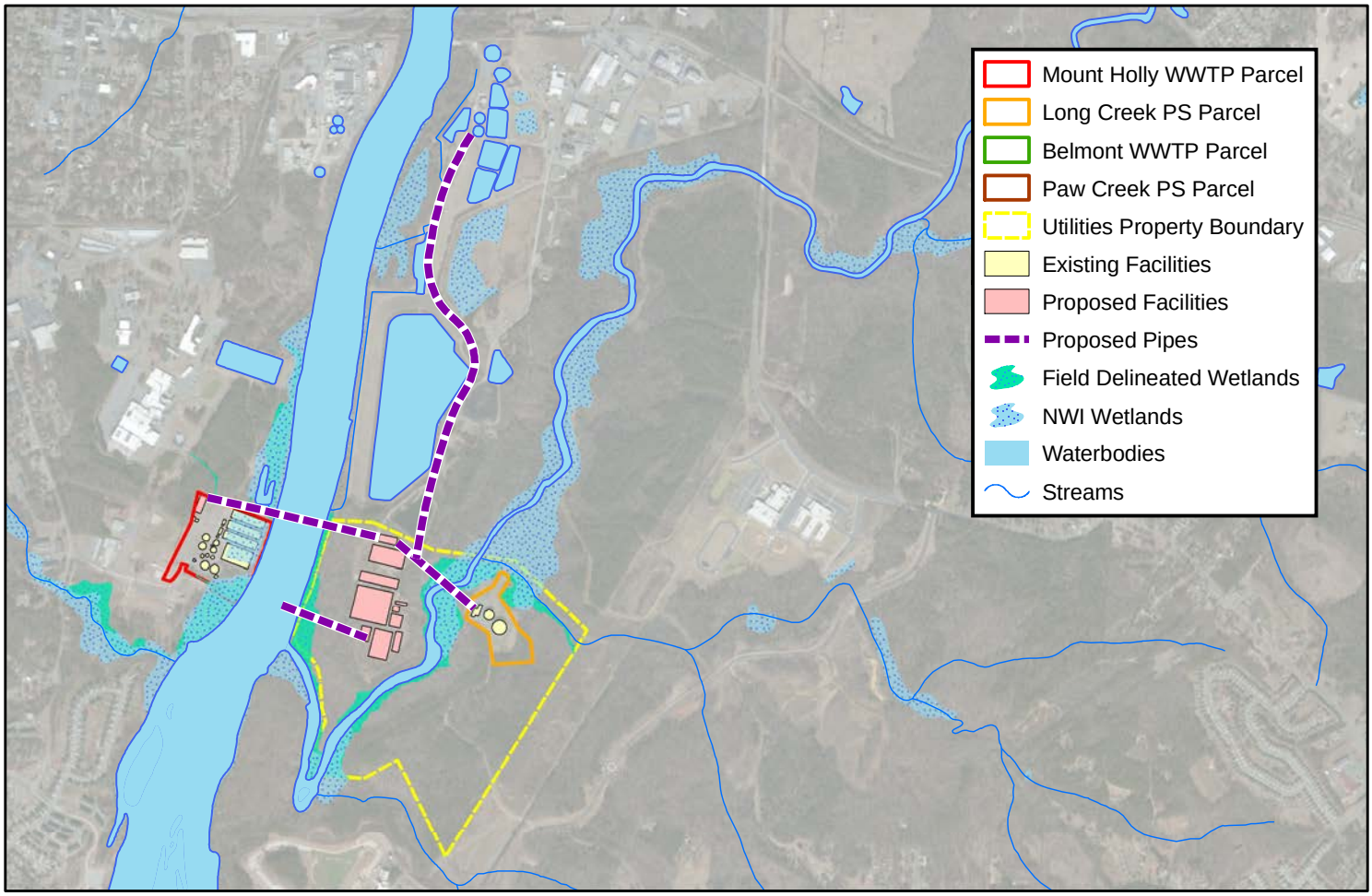

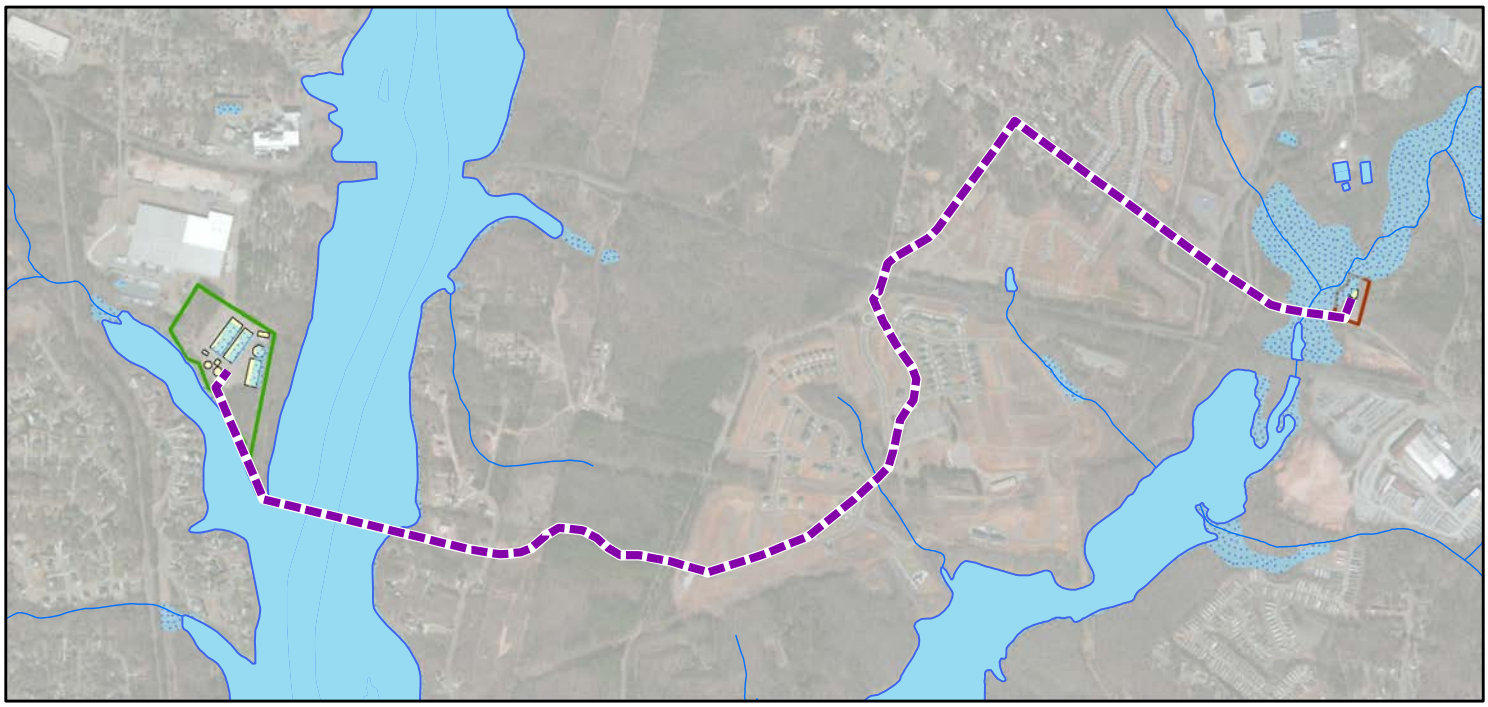

0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.4f
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain Wetlands

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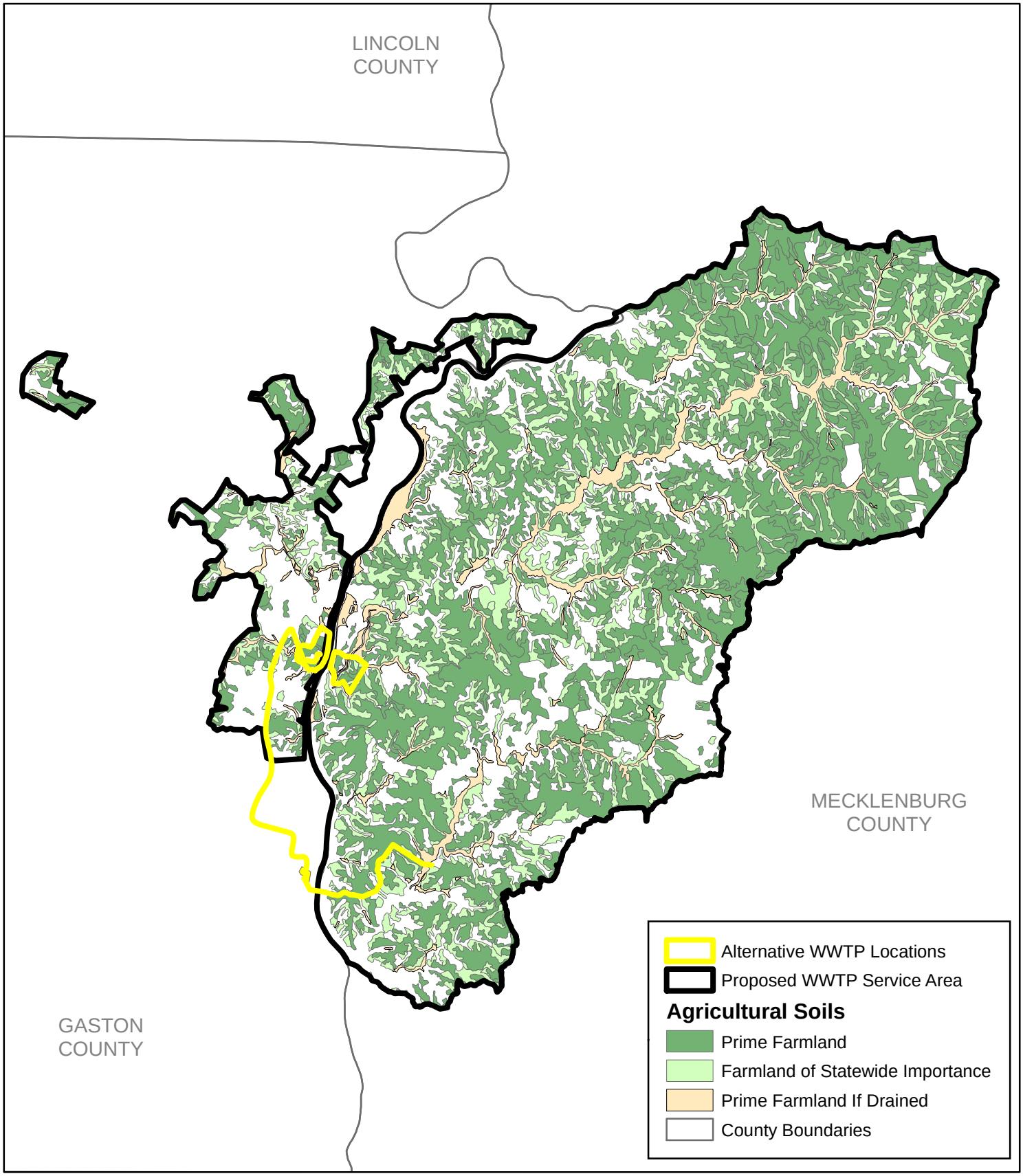
Date: 11/02/2013; PM: LE; Author: MV; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_October2013\Fig5.4f_Wetlands_A2_mcv.mxd



0 11,000 22,000 Feet
0 3,300 6,600 Meters

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Figure 5.5a. Service Area
Agricultural Soil Designations

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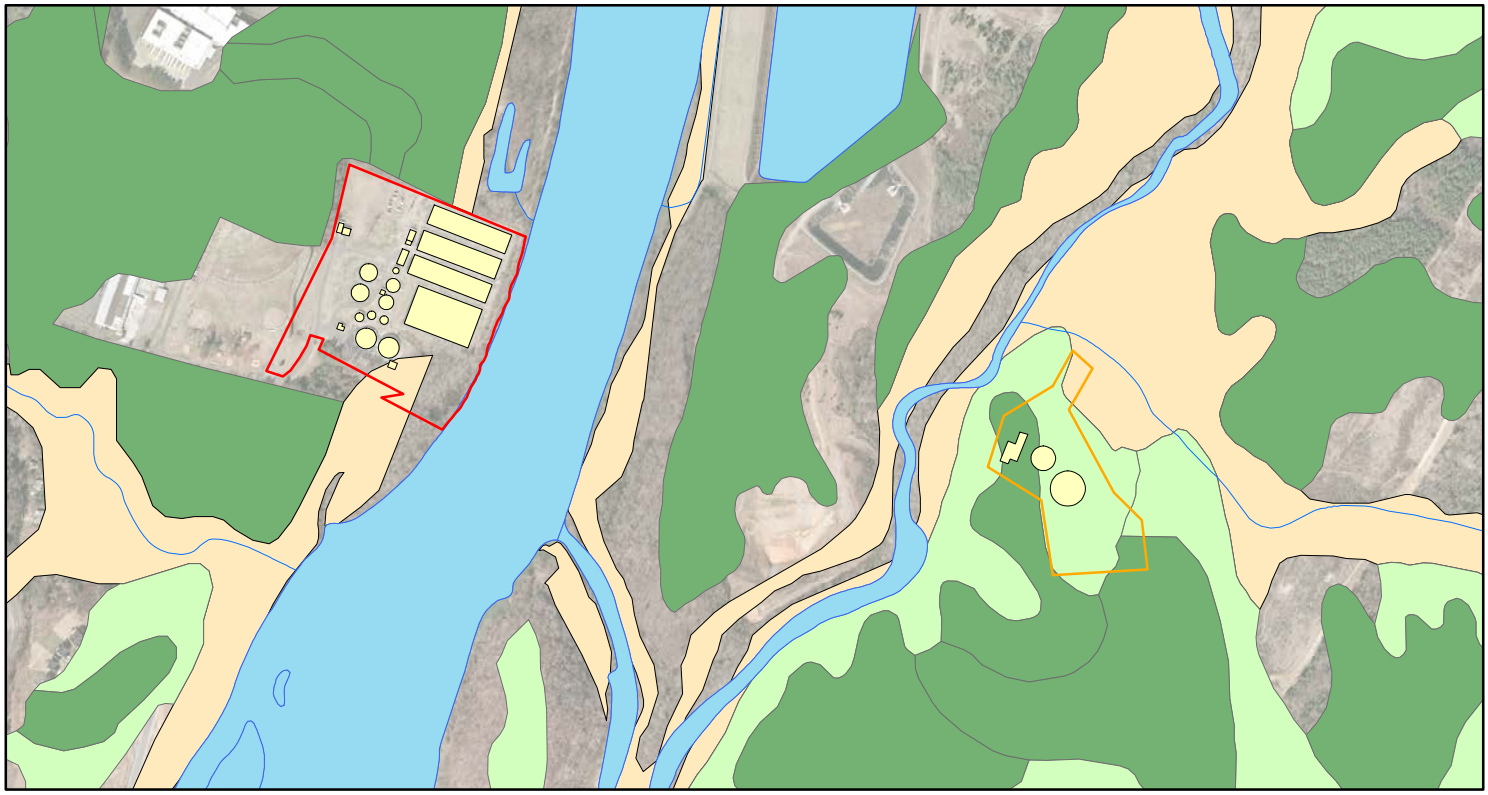

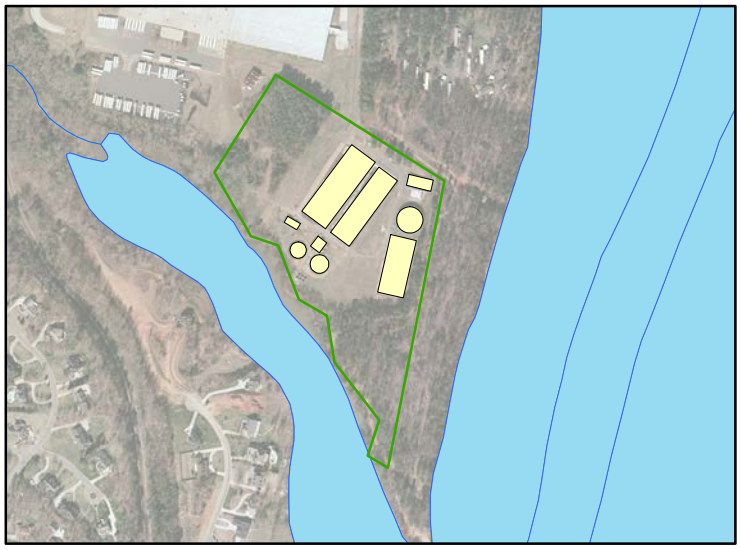

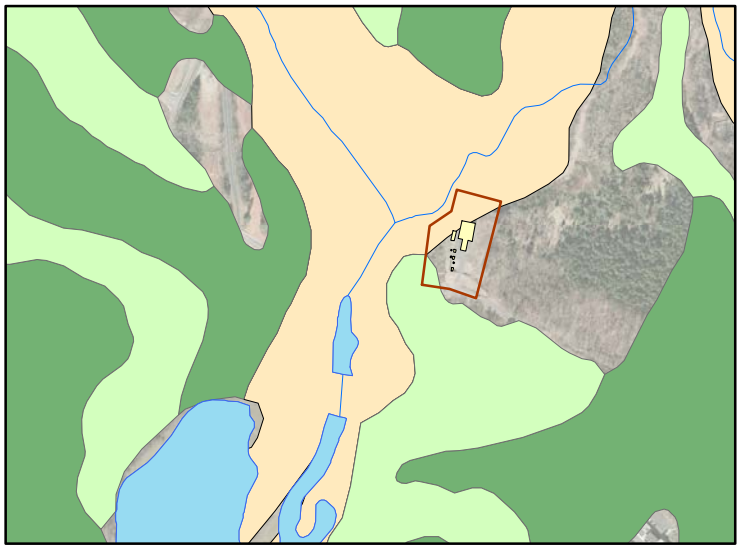

Mount Holly WWTP Parcel
Long Creek PS Parcel
Belmont WWTP Parcel
Paw Creek PS Parcel
Existing Facilities
Waterbodies
Streams

Agricultural Soils
Prime Farmland
Farmland of Statewide Importance
Prime Farmland If Drained

0 760 1,520 Feet
0 240 480 Meters

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Figure 5.5b
No Action Alternative
Agricultural Soils at Existing Facilities

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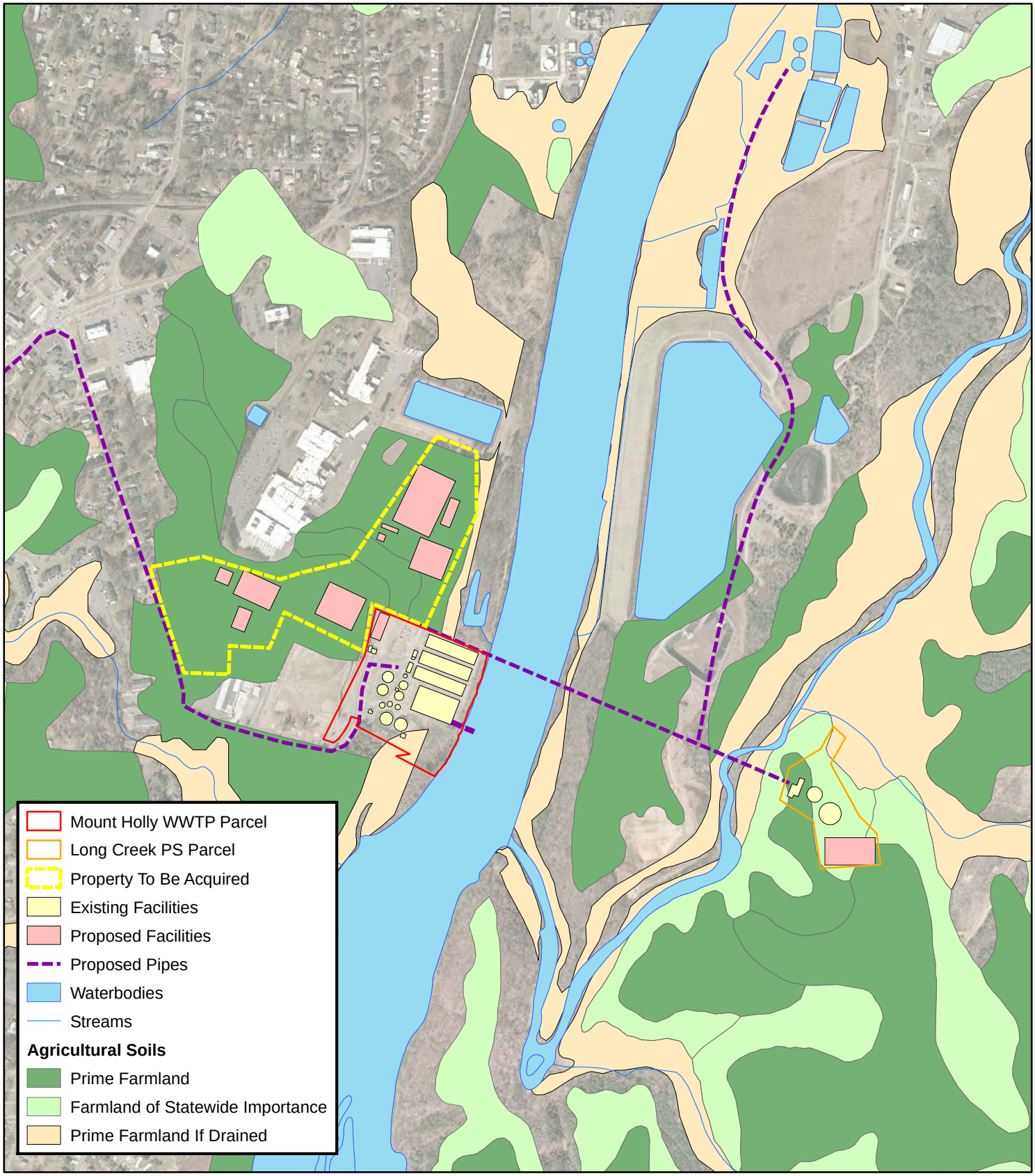

0 840 1,680 Feet
0 260 520 Meters

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Figure 5.5c
Alternative 1: Proposed Mount Holly WWTP
Agricultural Soils at Existing and Proposed Facilities

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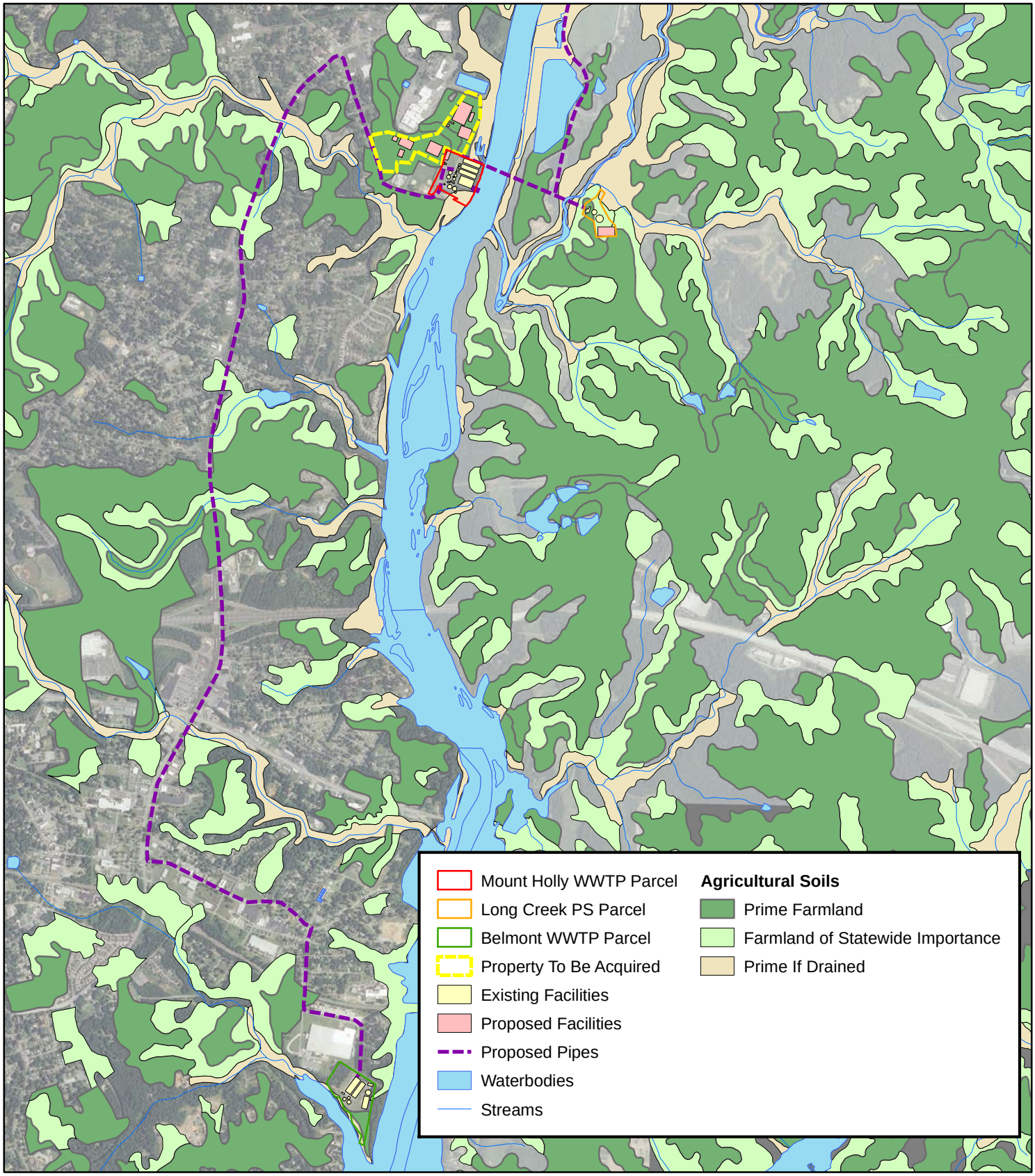

0 2,500 5,000 Feet
0 790 1,580 Meters

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Figure 5.5d
Alternative 1: Proposed Mount Holly WWTP Agricultural Soils along Belmont to Mount Holly Forcemain Route

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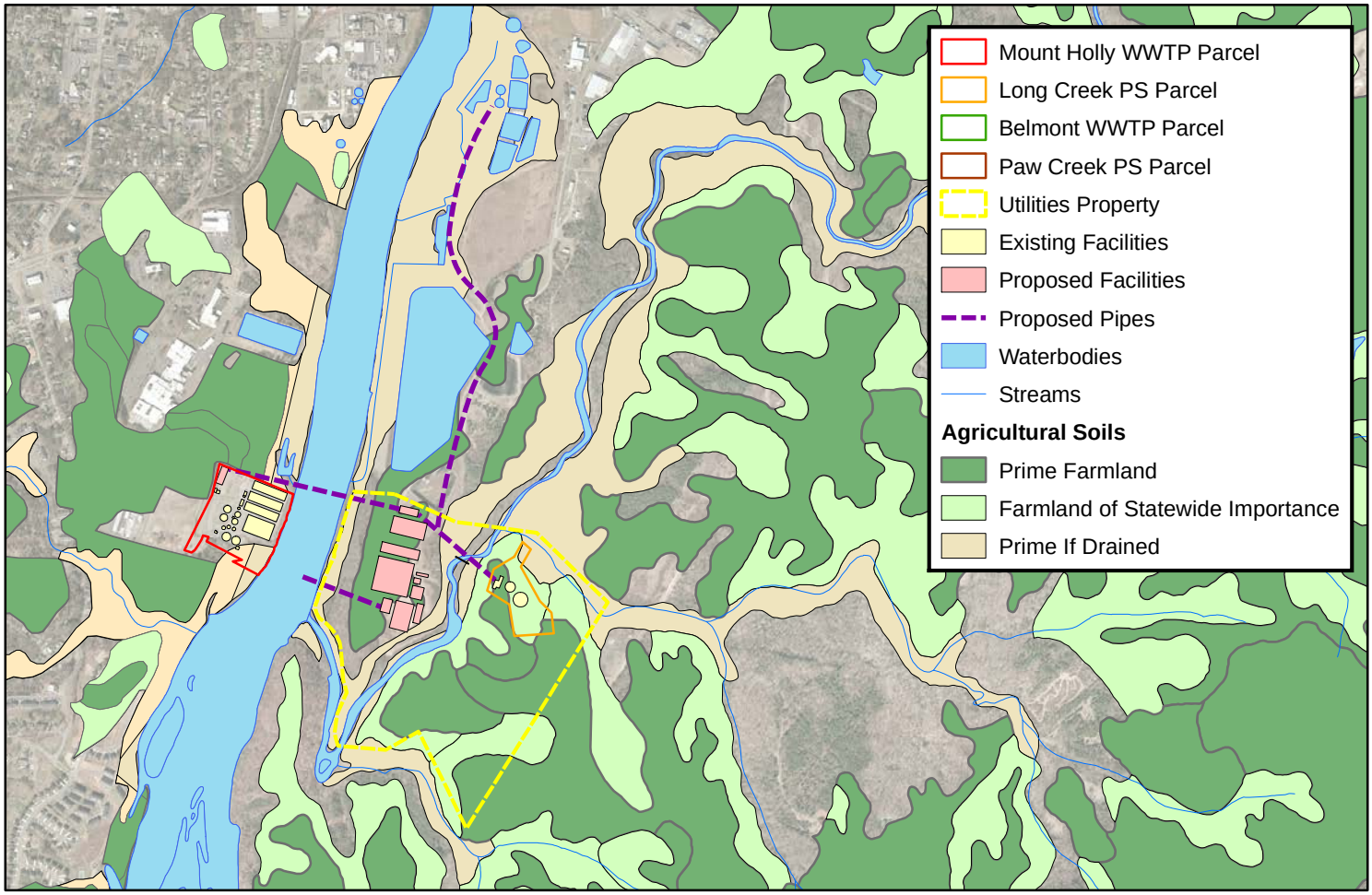

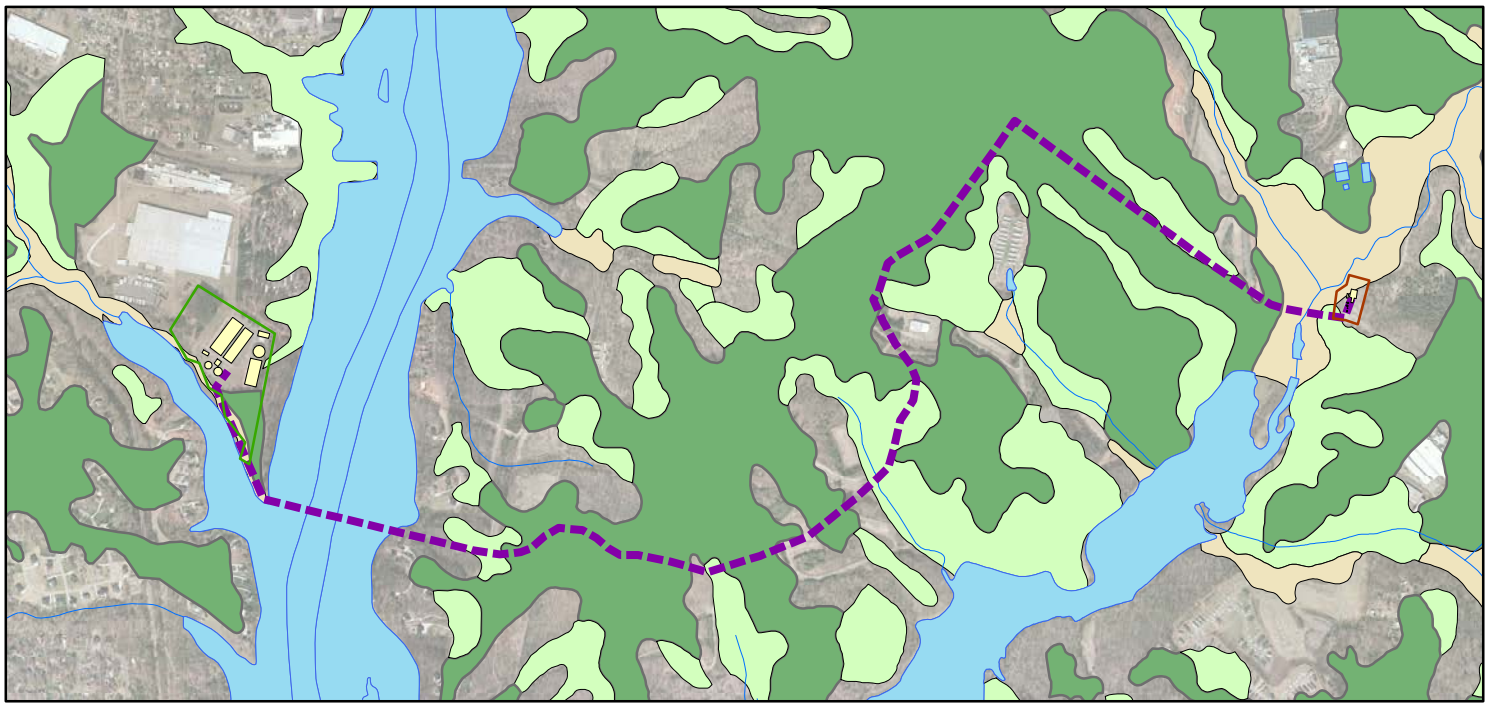

0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.5e
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Agricultural Soils

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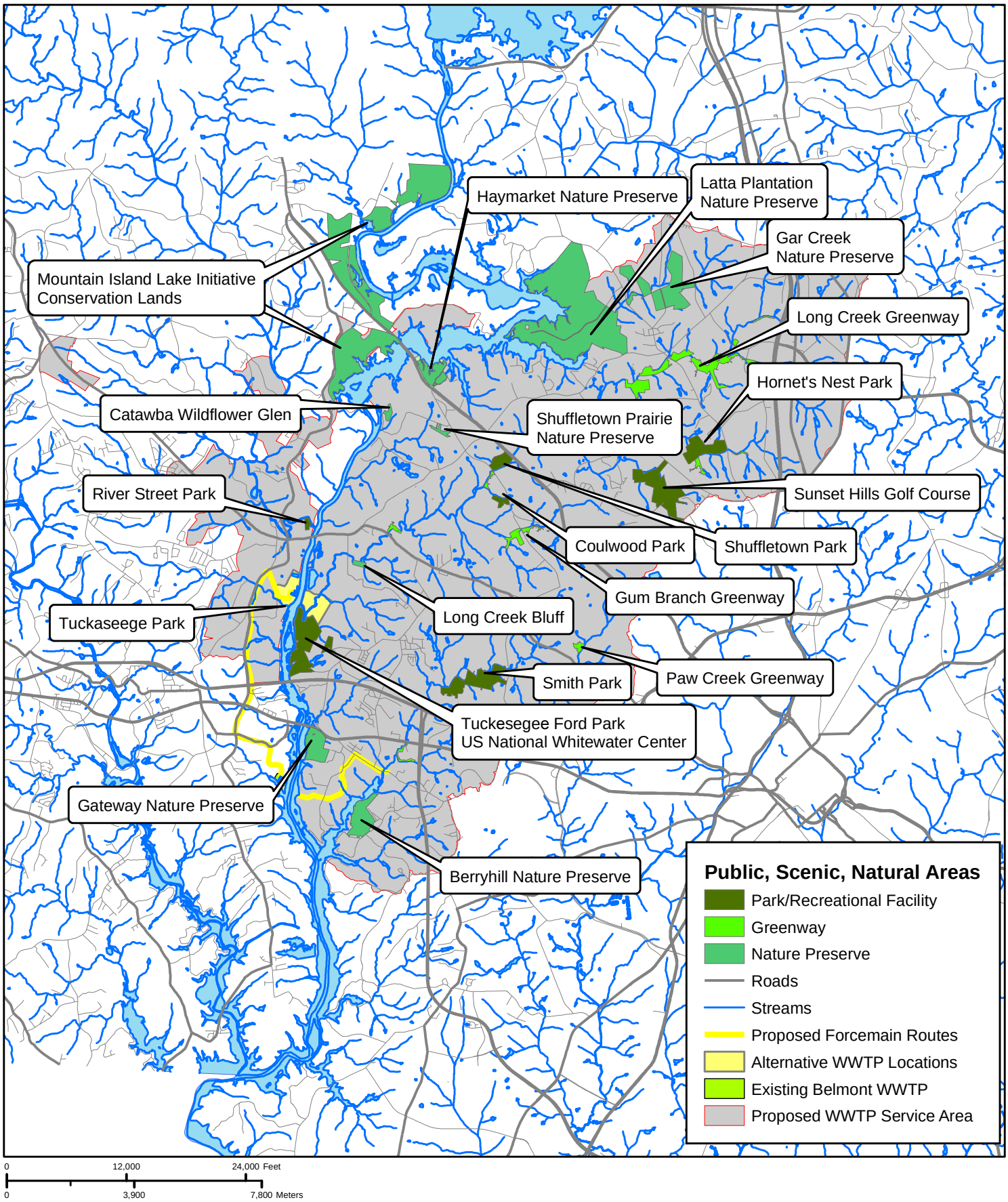

0 12,000 24,000 Feet

0 3,900 7,800 Meters

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Figure 5.6a. Service Area Public Land, Scenic and Recreational Areas

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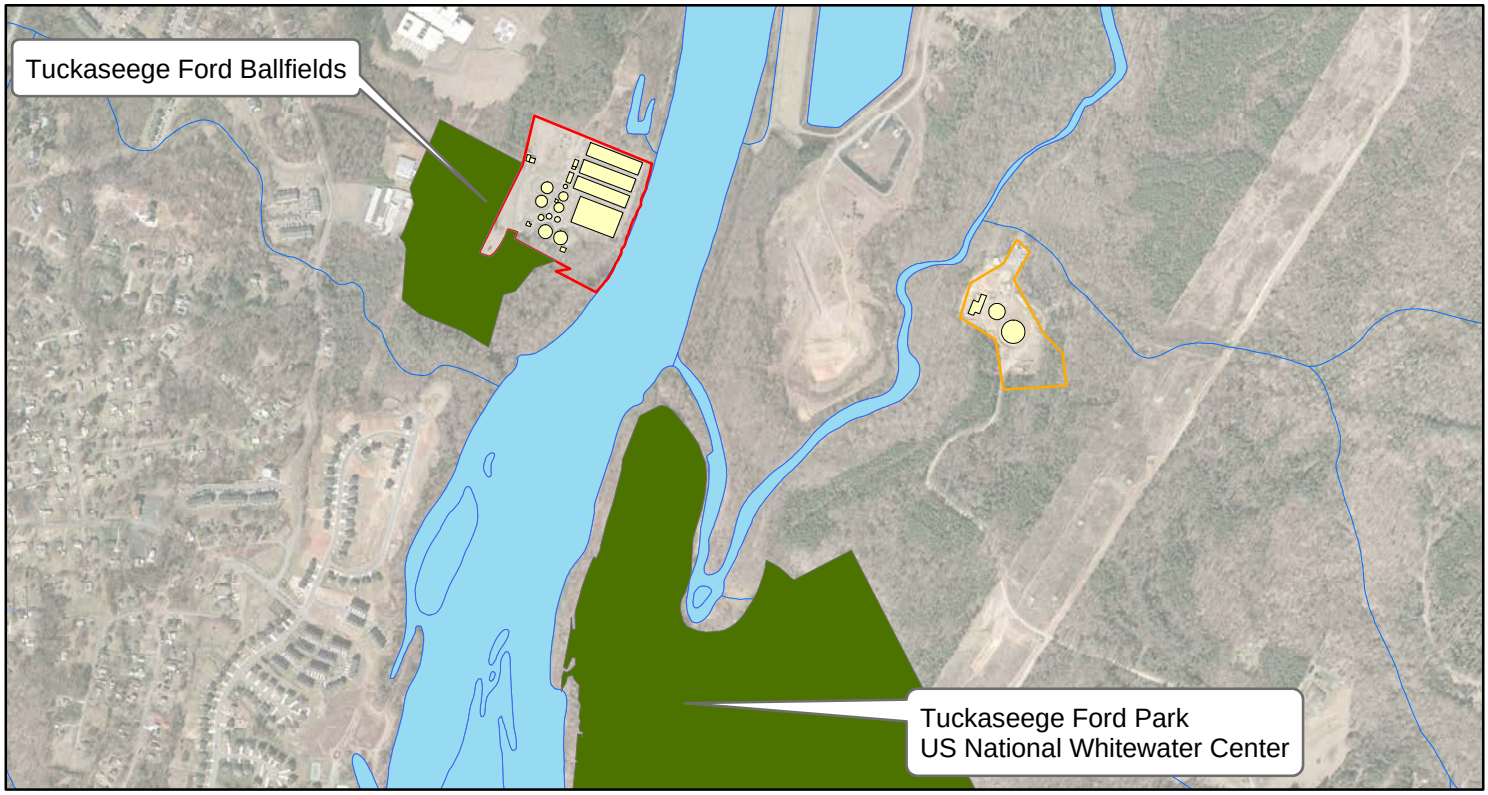

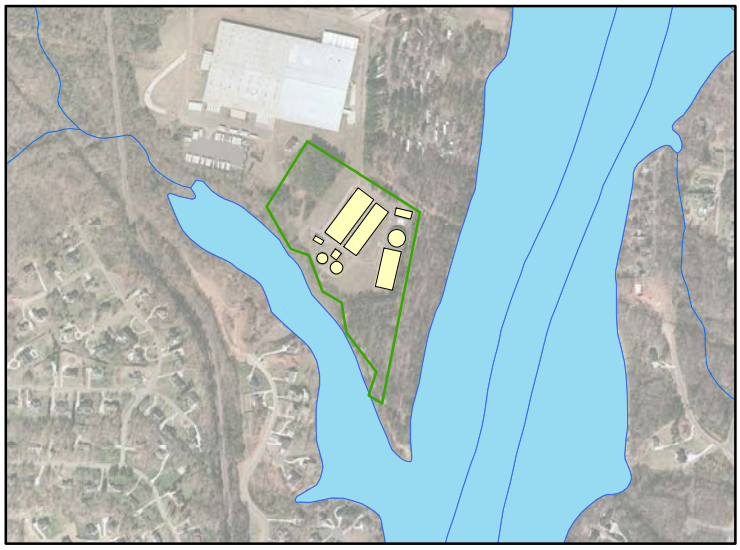

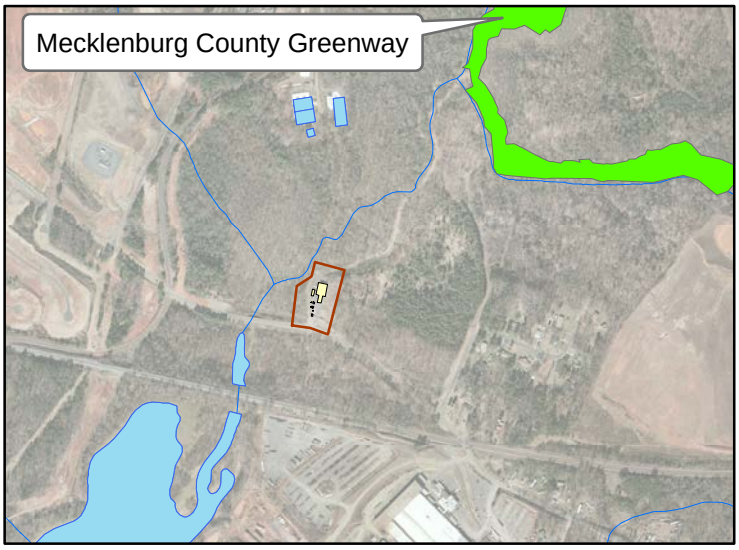

Mount Holly WWTP Parcel	**Public, Scenic, Natural Areas**
Long Creek PS Parcel	Park/Recreational Facility
Belmont WWTP Parcel	Greenway
Paw Creek PS Parcel	Nature Preserve
Existing Facilities	
Waterbodies	
Streams	

0 1,100 2,200 Feet
0 370 740 Meters

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Figure 5.6b
No Action Alternative
Public Land, Scenic and Recreational Areas
Existing Facilities

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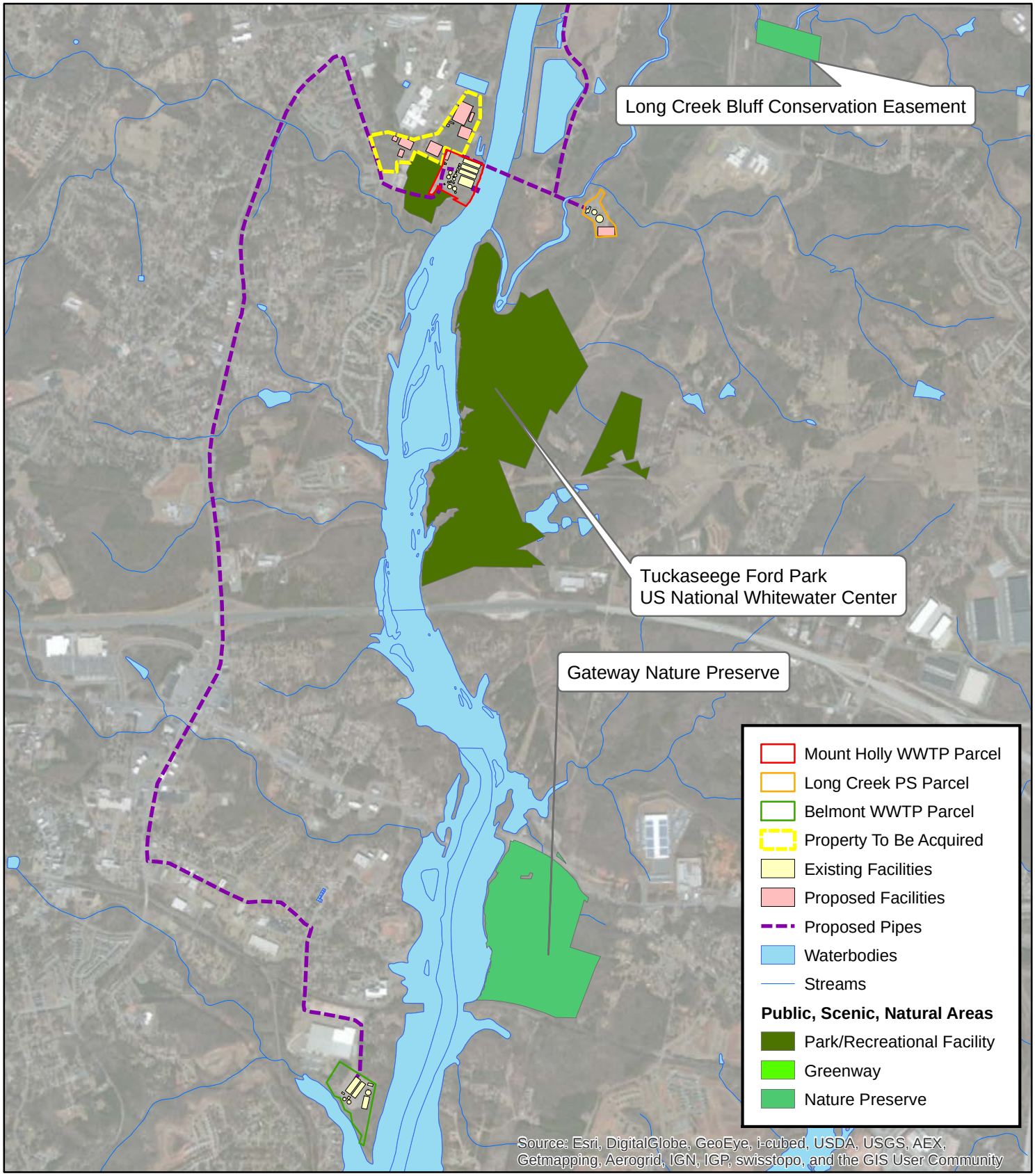

0 2,500 5,000 Feet
0 780 1,560 Meters

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Figure 5.6c
Alternative 1: Proposed Mount Holly WWTP
Public Lands, Scenic and Recreational Areas
along Belmont to Mount Holly
Forcemain Route

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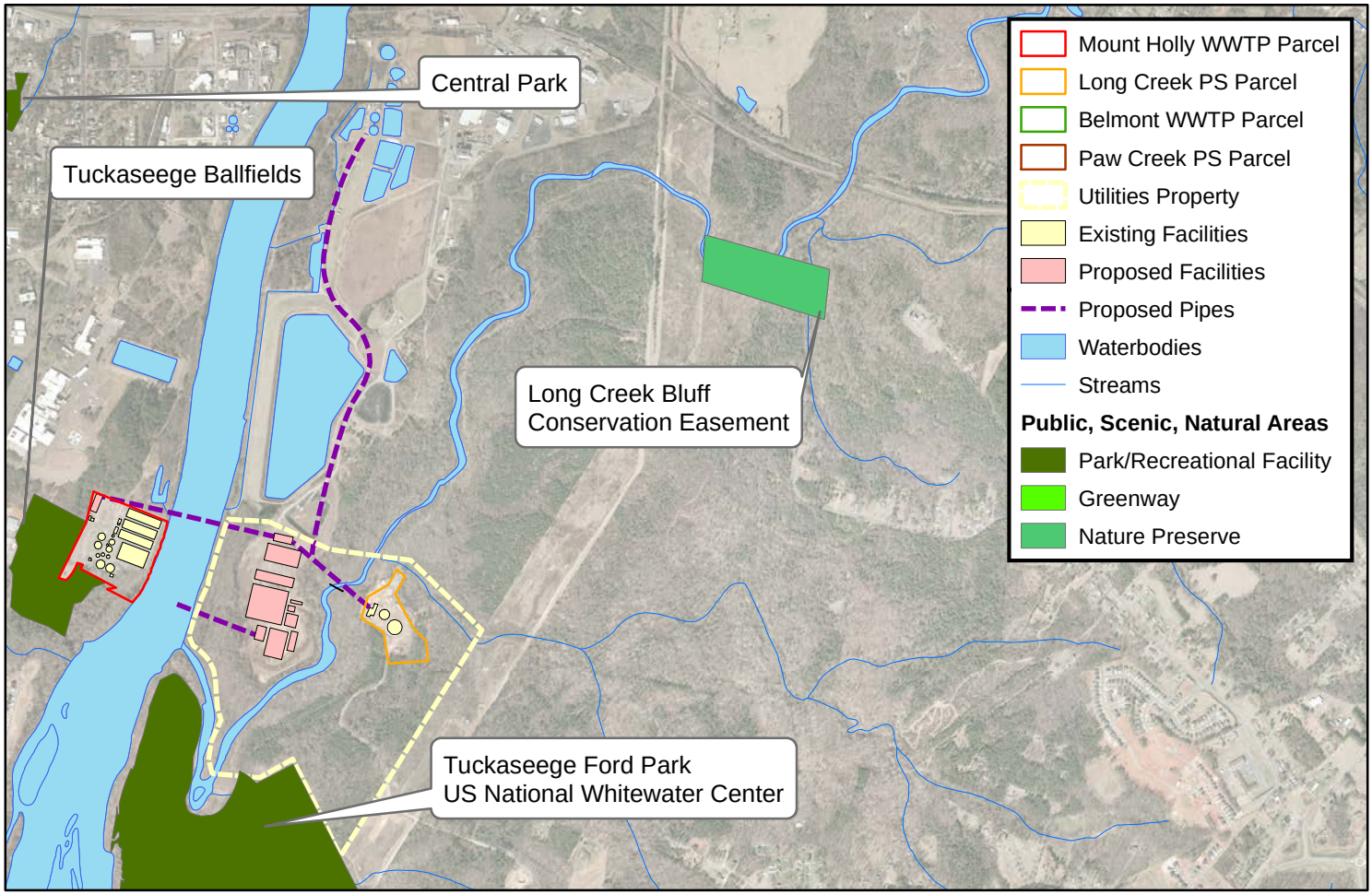

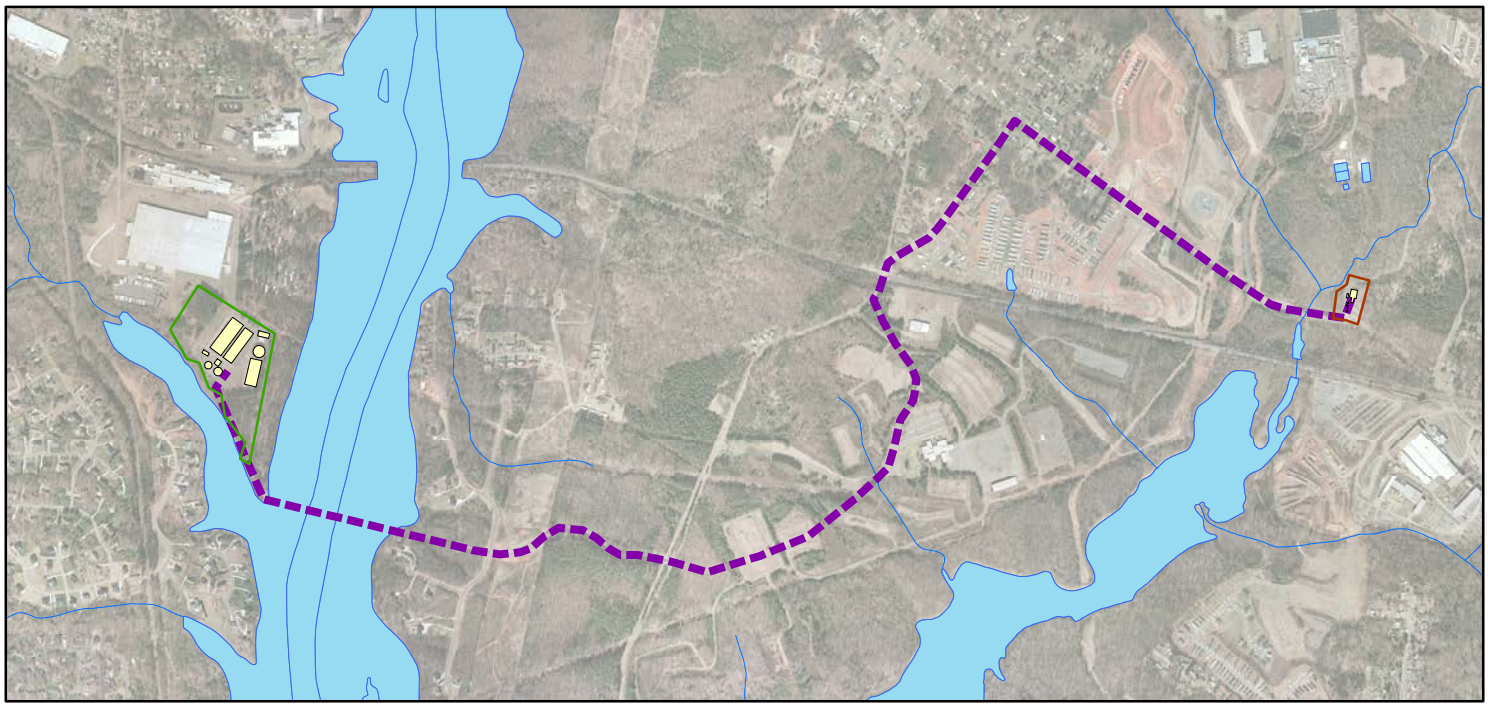

0 1,600 3,200 Feet
0 525 1,050 Meters

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Figure 5.6d
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Public Lands, Scenic and Recreational Areas

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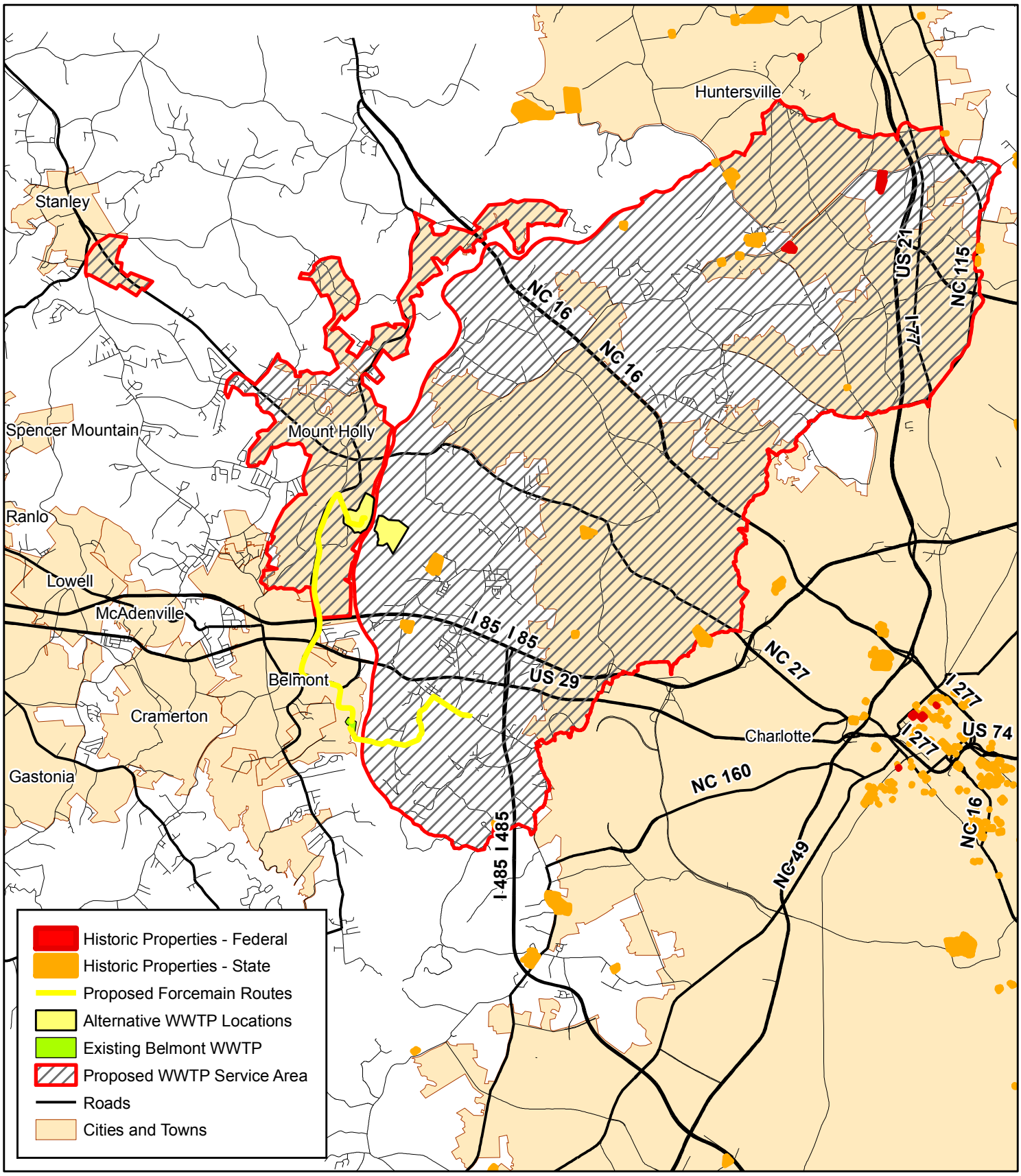

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Figure 5.7a. Historic Properties

Proposed Regional WWTP

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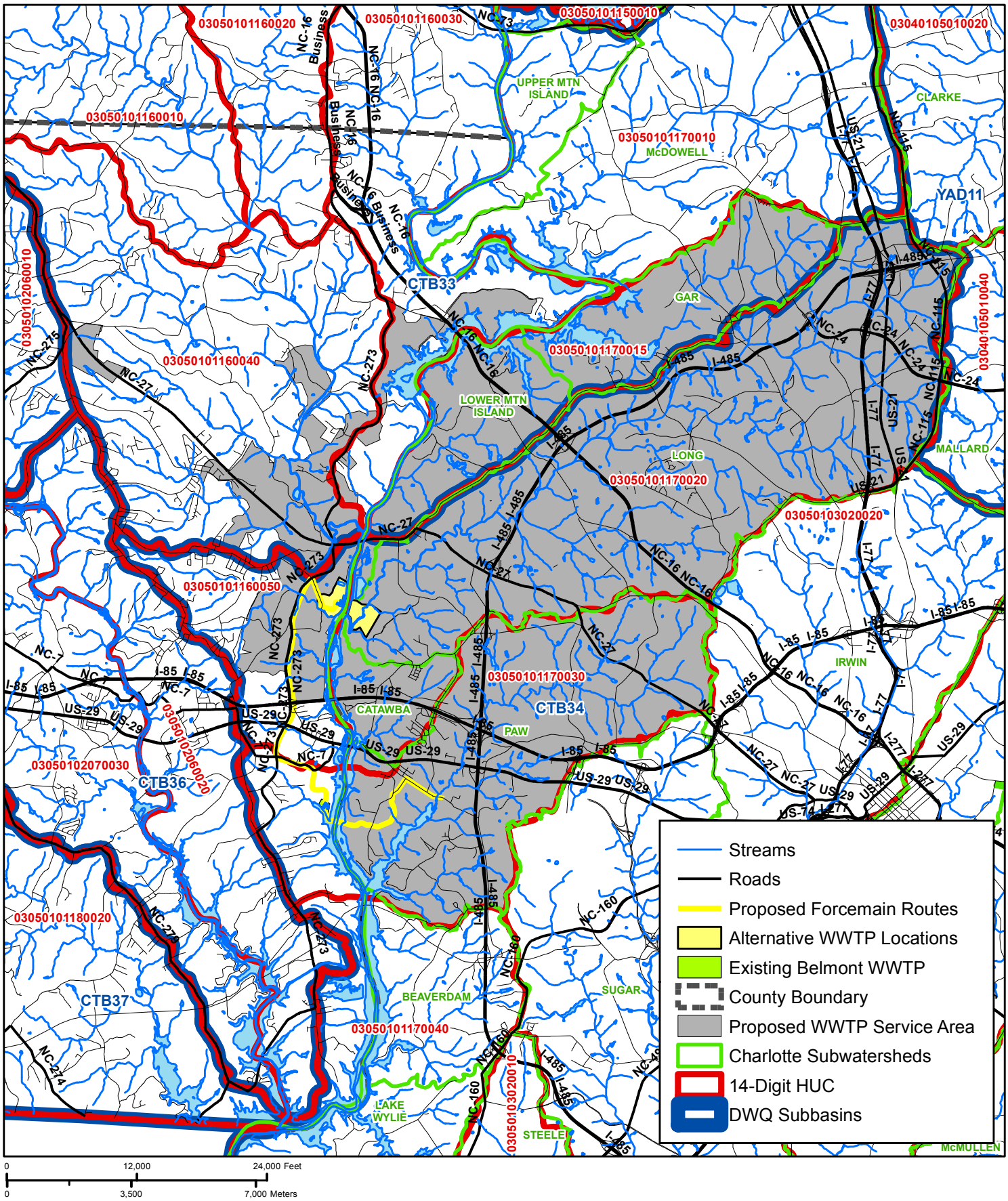

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Figure 5.10a. Watershed Map

Proposed Regional WWTP

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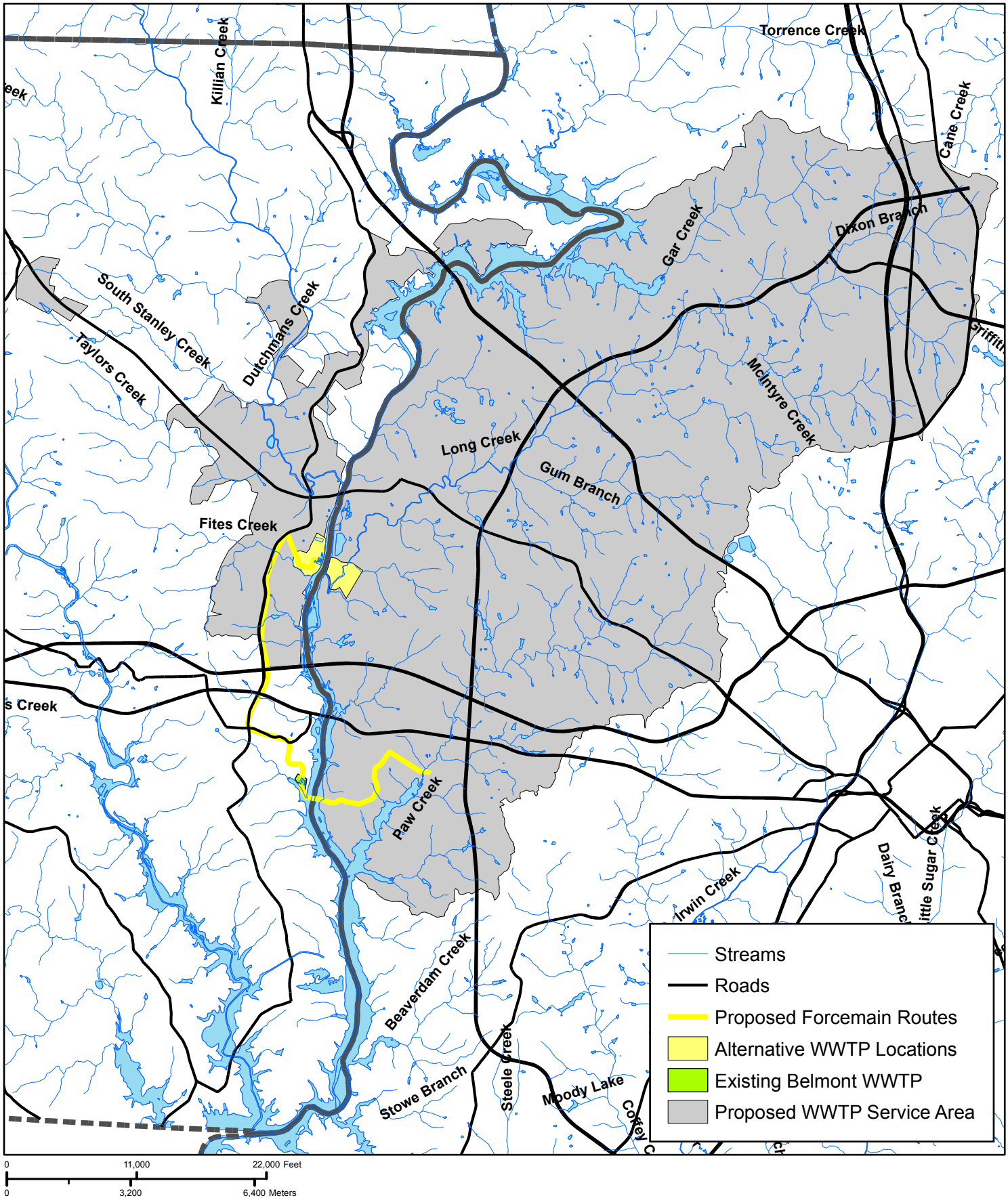

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Figure 5.10b. Service Area Streams

Proposed Regional WWTP

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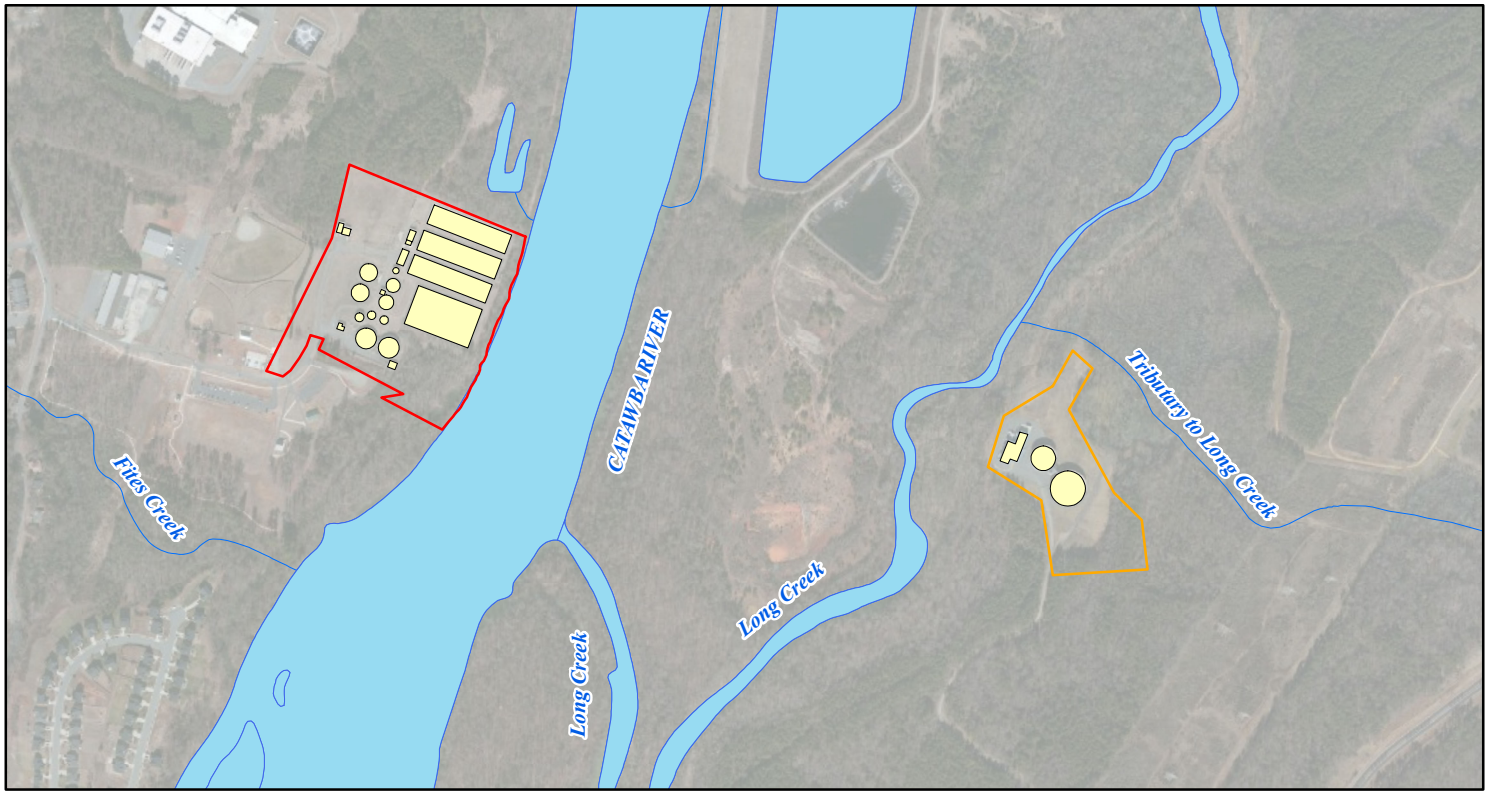

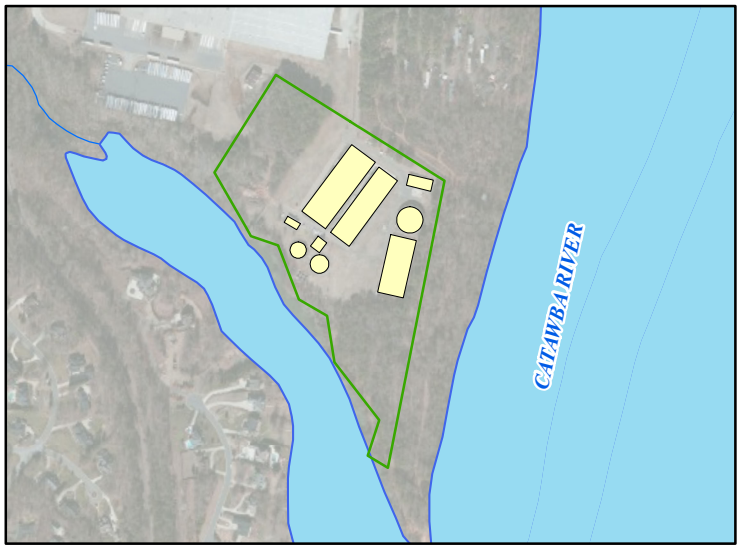

- Mount Holly WWTP Parcel
- Long Creek PS Parcel
- Belmont WWTP Parcel
- Paw Creek PS Parcel
- Existing Facilities
- Waterbodies
- Streams

0 770 1,540 Feet
0 240 480 Meters

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Figure 5.10c
No Action Alternative
Streams near Existing Facilities

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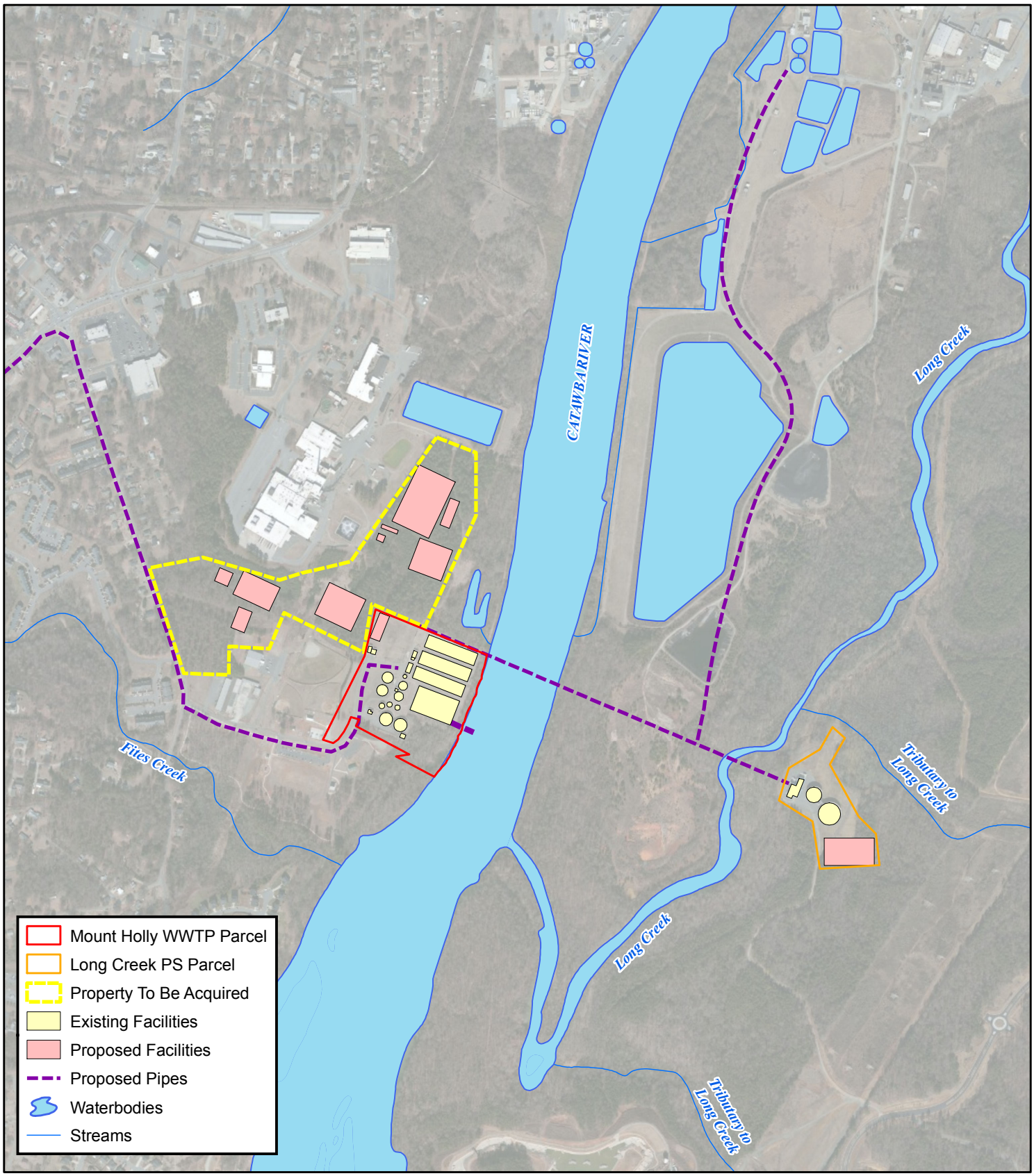

0 850 1,700 Feet
0 270 540 Meters

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Figure 5.10d
Alternative 1: Proposed Mount Holly WWTP
Streams at Existing and Proposed Facilities

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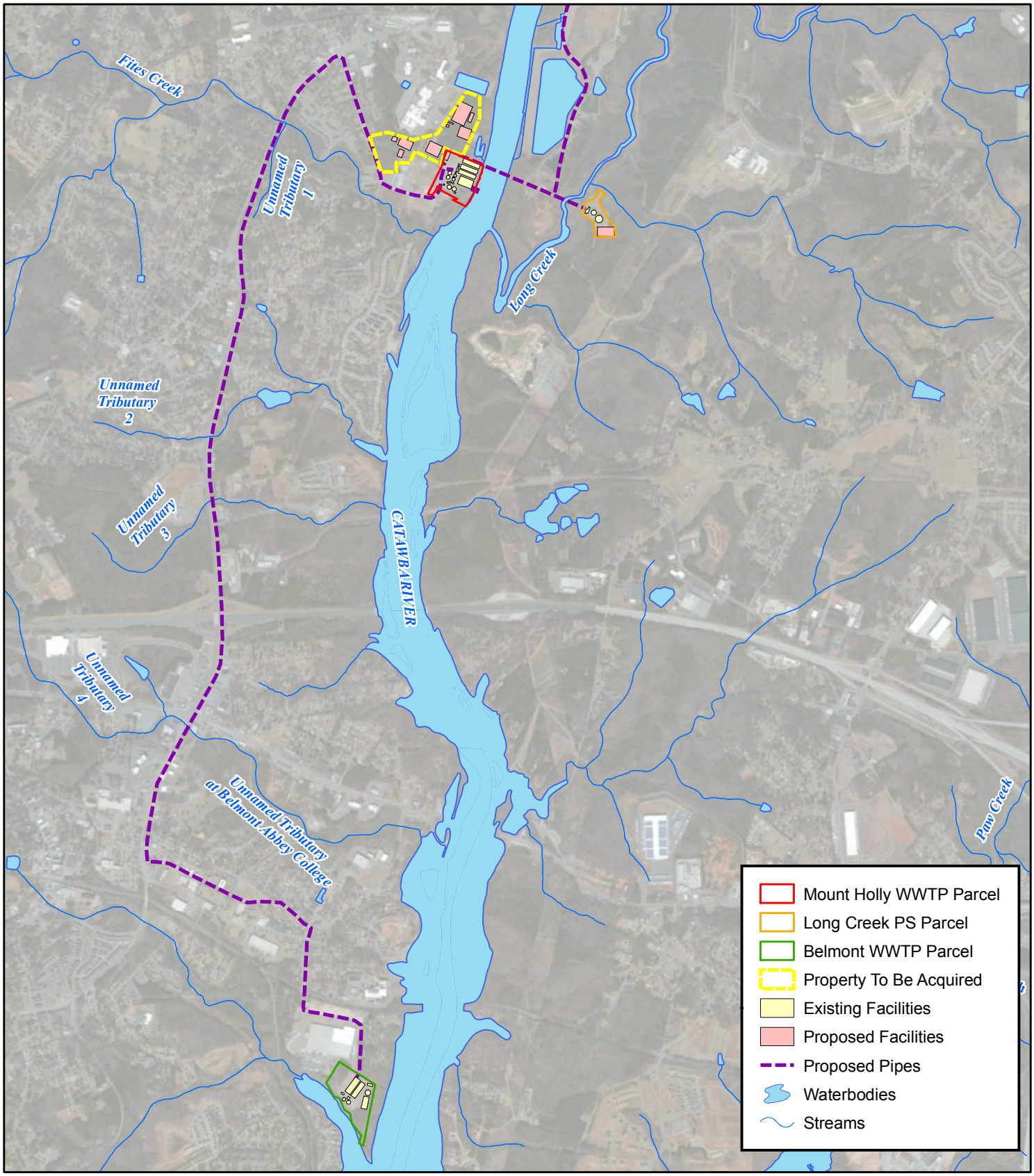

0 2,500 5,000 Feet
0 775 1,550 Meters

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Figure 5.10e
Alternative 1: Proposed Mount Holly WWTP Streams along Belmont to Mount Holly Forcemain Route

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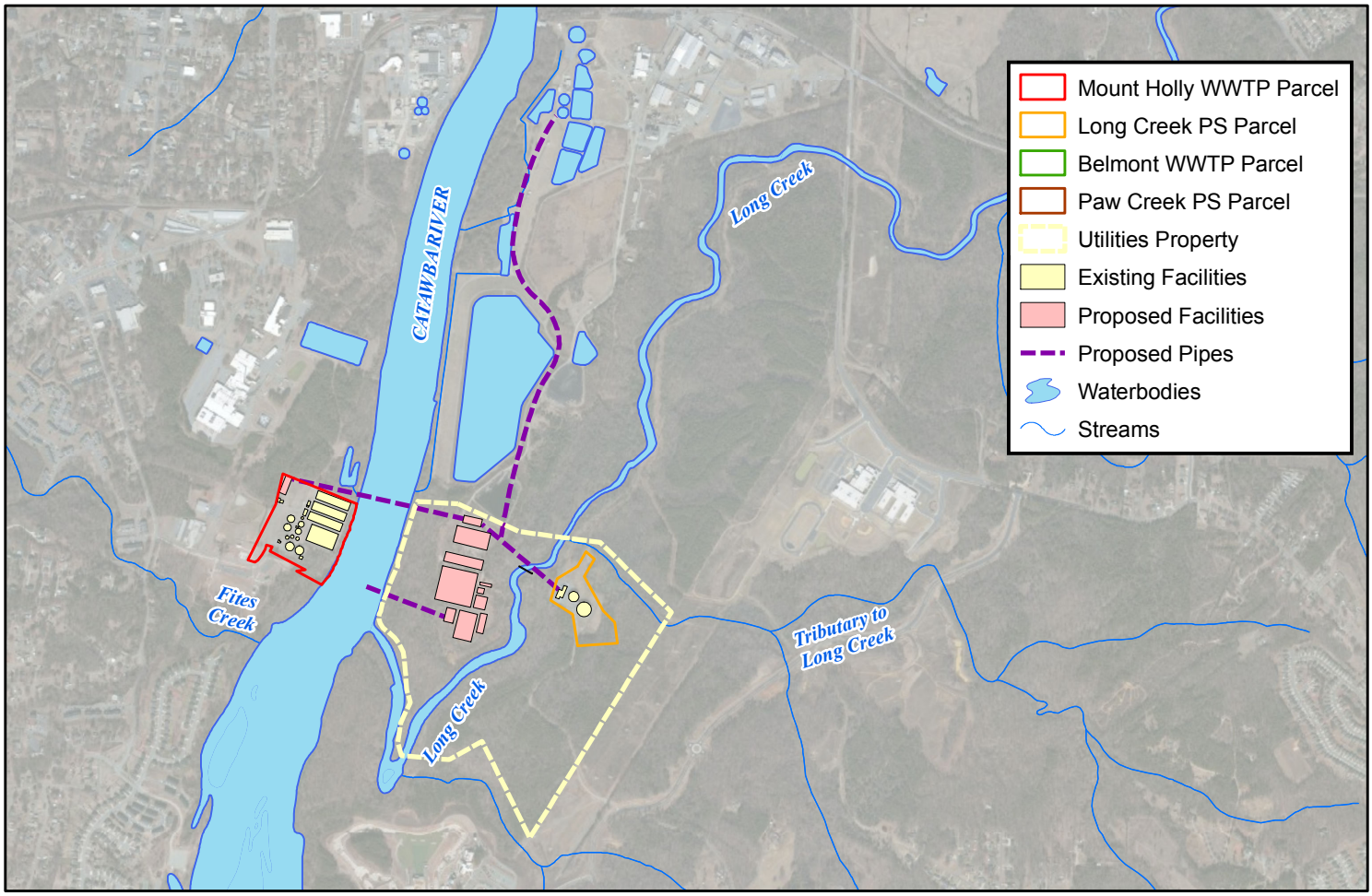

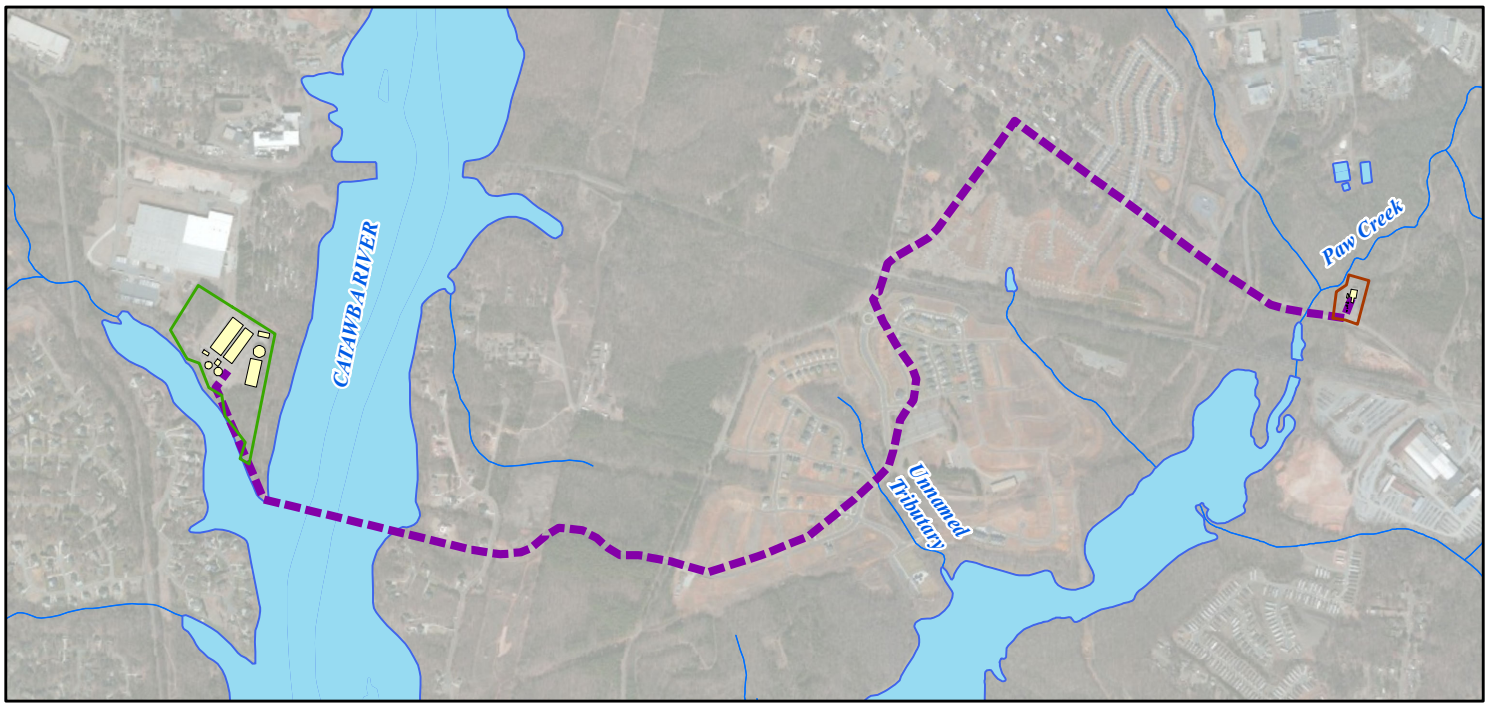

0 1,700 3,400 Feet
0 530 1,060 Meters

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Figure 5.10f
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Streams

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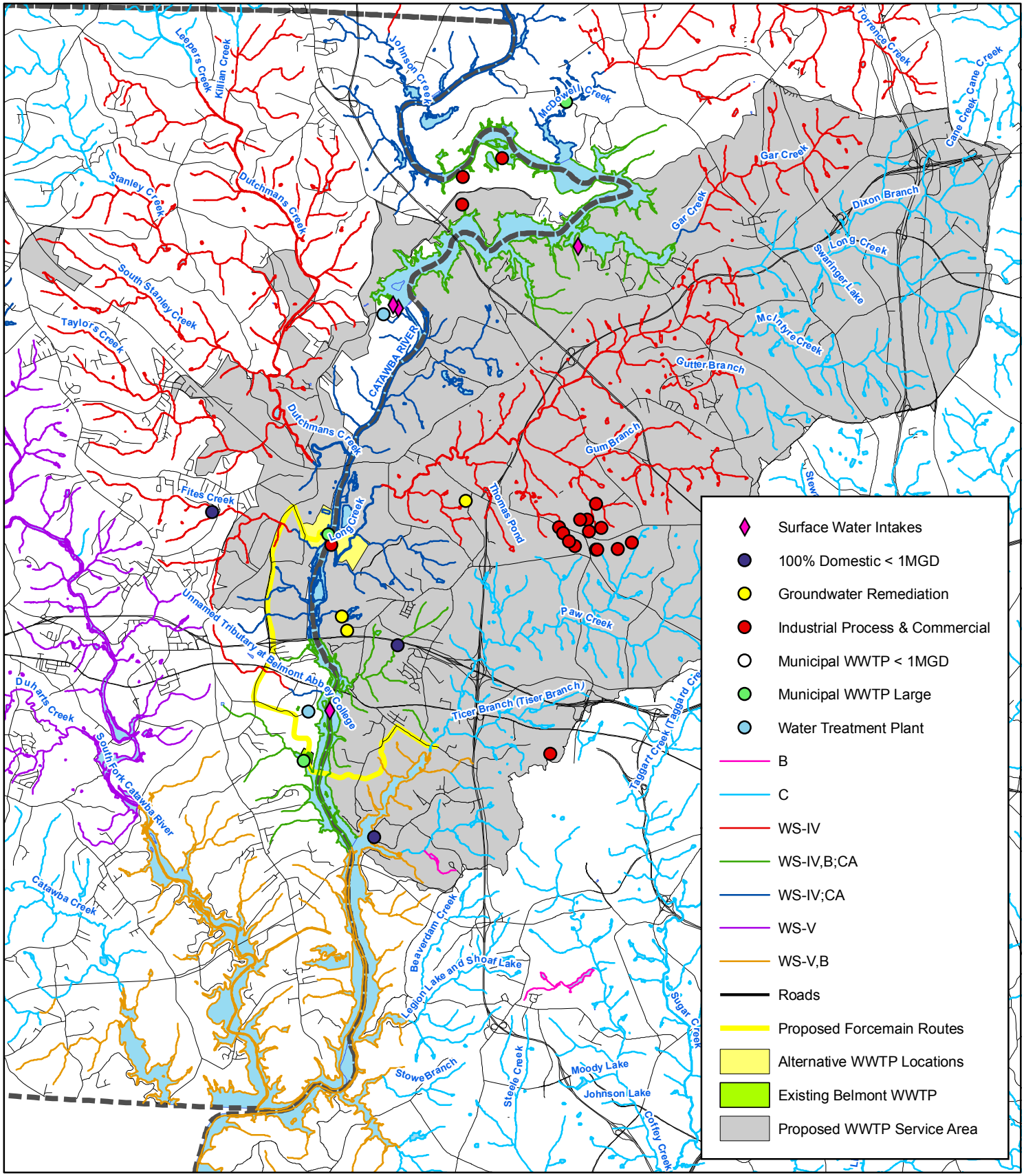

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Figure 5.10g. DWQ Water Classification for Service Area Streams

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Date: 4/25/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_July_2013\Fig5.10f_Stream classification map.mxd

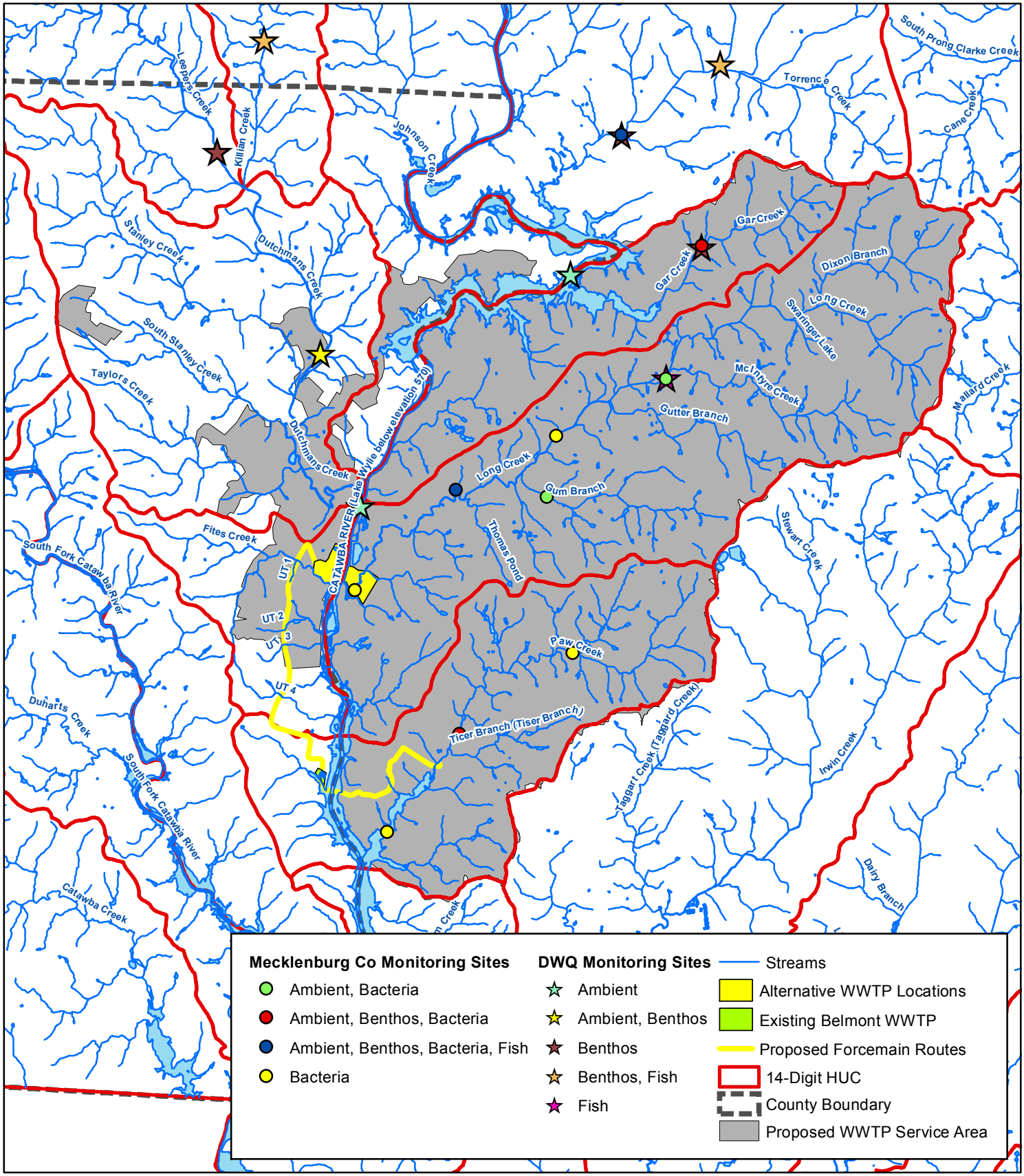

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Figure 5.10h. Surface Water Monitoring Sites

Proposed Regional WWTP

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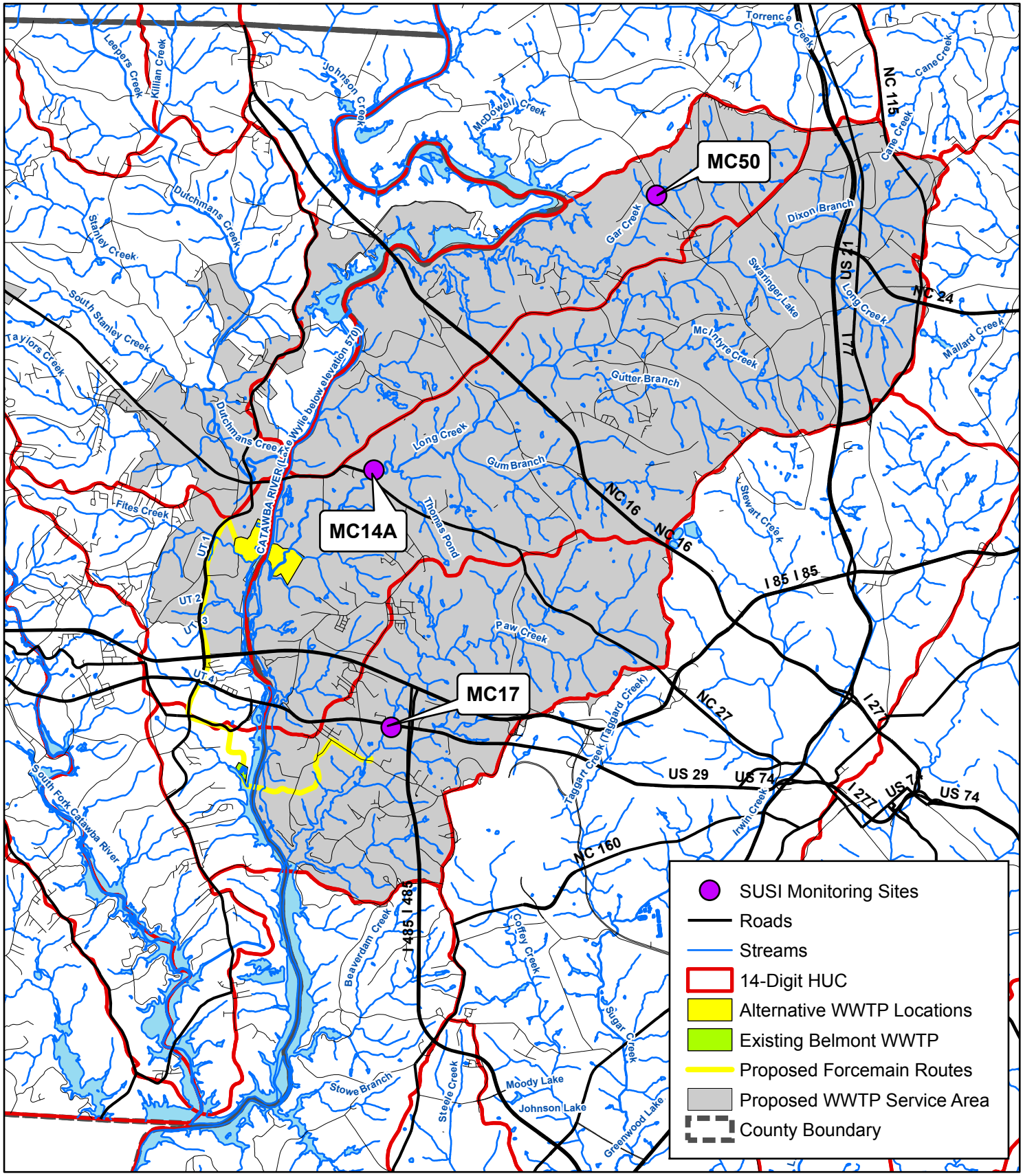

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Figure 5.10i. SUSI Monitoring Sites

Proposed Regional WWTP

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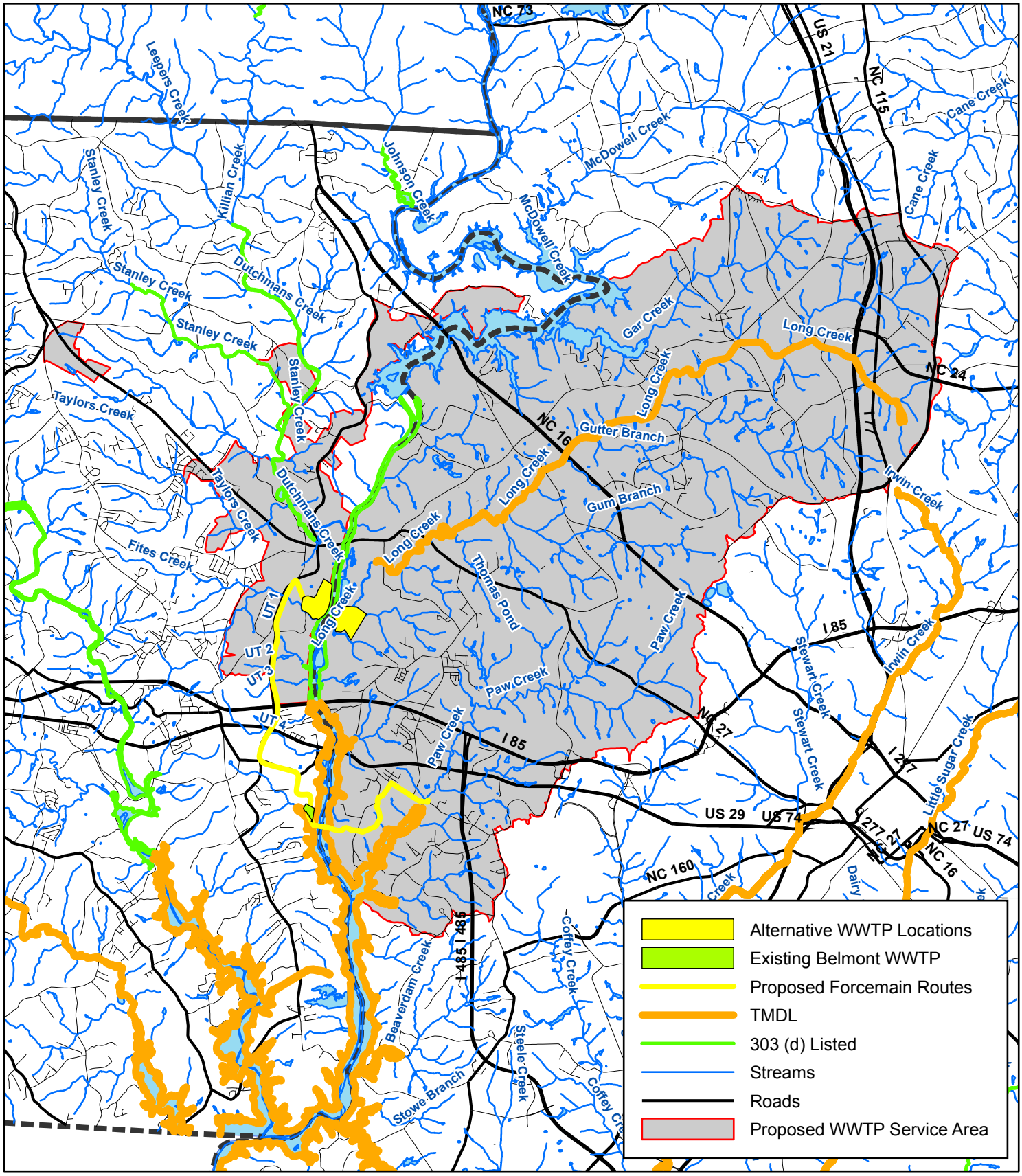

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Figure 5.10j. Impaired Streams and TMDLs

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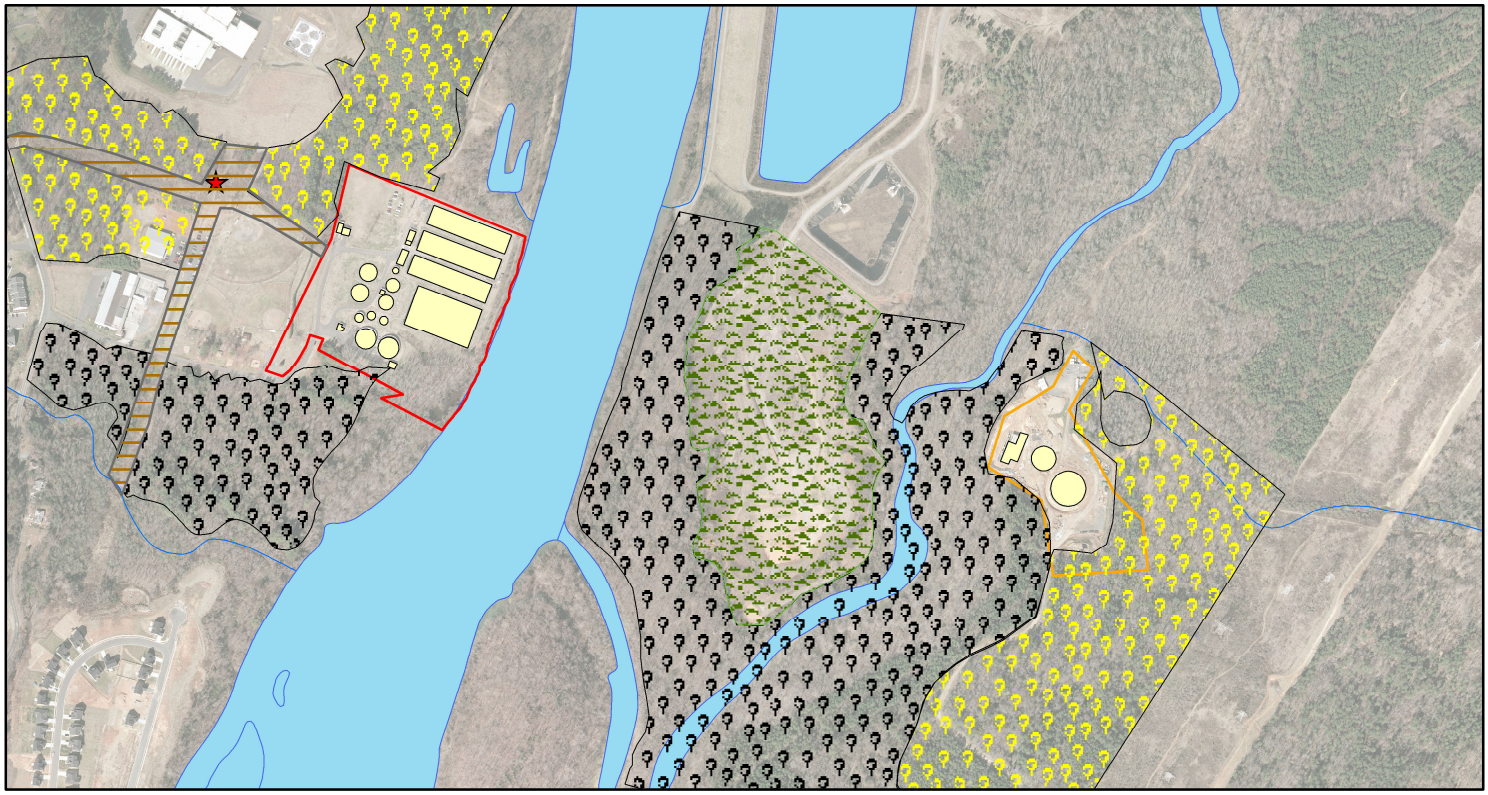

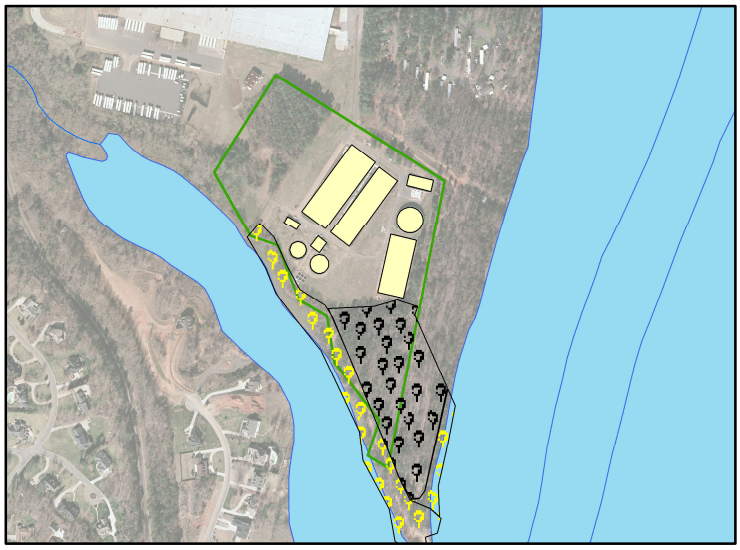

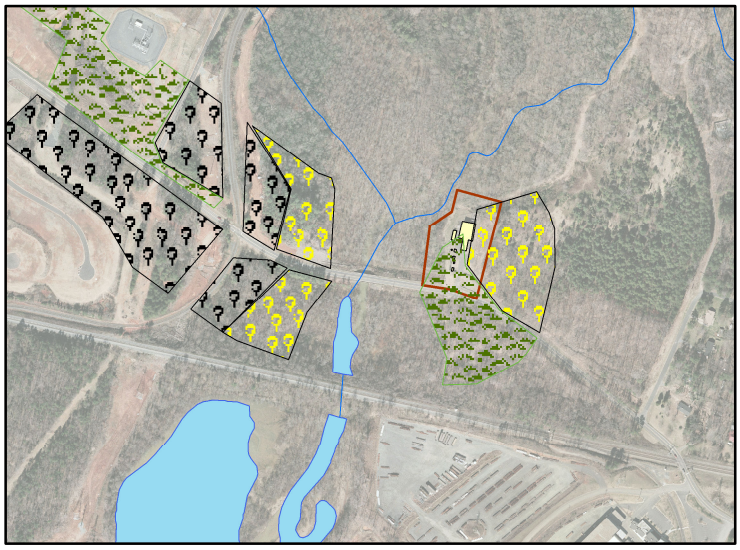

- Mount Holly WWTP Parcel
- Long Creek PS Parcel
- Belmont WWTP Parcel
- Paw Creek PS Parcel
- Existing Facilities
- Waterbodies
- Streams
- Power Easement
- Schweinitz's Sunflower
- Early Field Successional
- Dry Mesic Oak Hickory Forest
- Mixed Mesic Hardwood Forest (PS)

0 770 1,540 Feet

0 240 480 Meters

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Figure 5.11a
No Action Alternative
Plant Communities Existing Facilities

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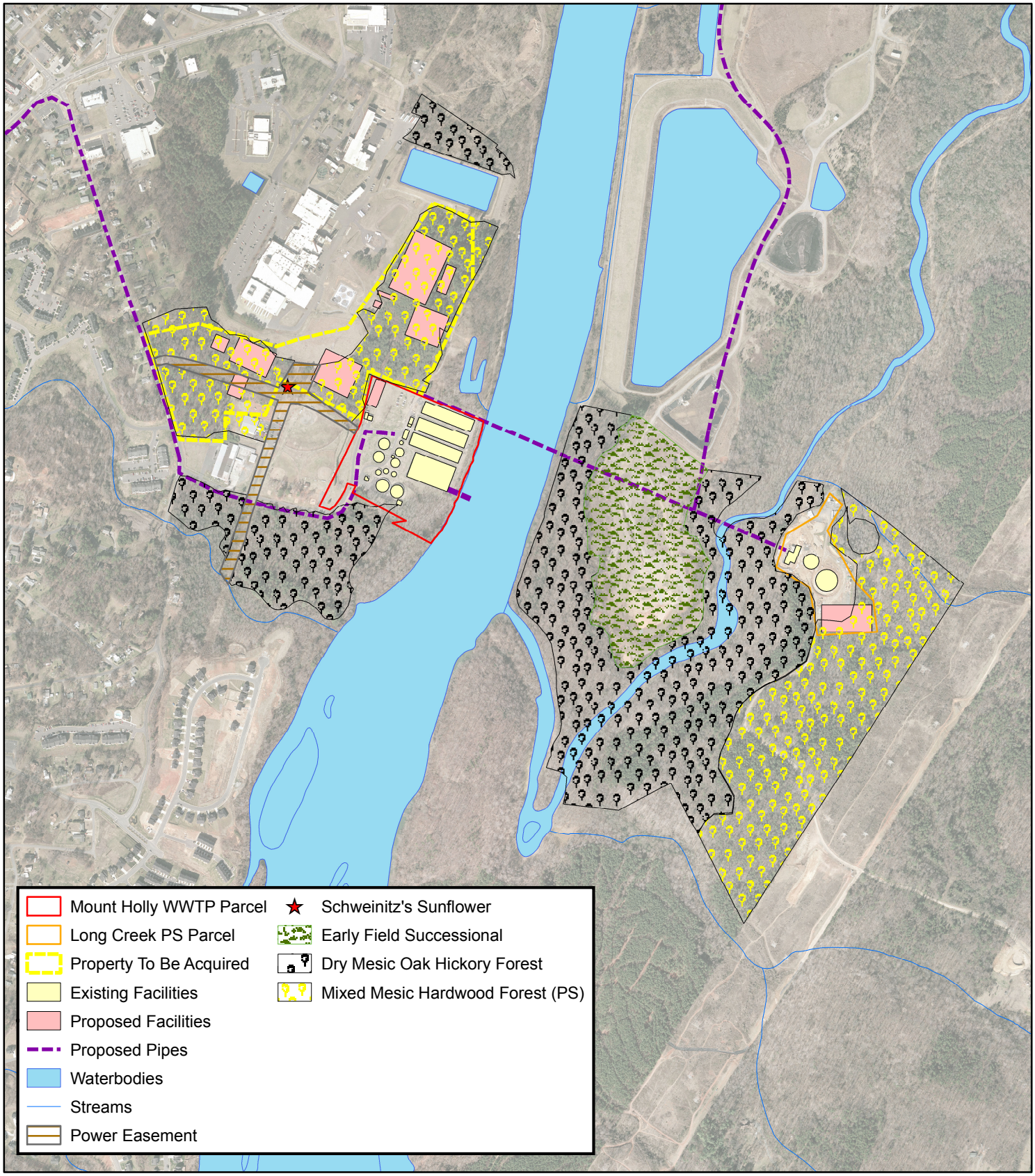

0 850 1,700 Feet
0 270 540 Meters

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Figure 5.11b
Alternative 1: Proposed Mount Holly WWTP
Plant Communities at
Existing and Proposed Facilities

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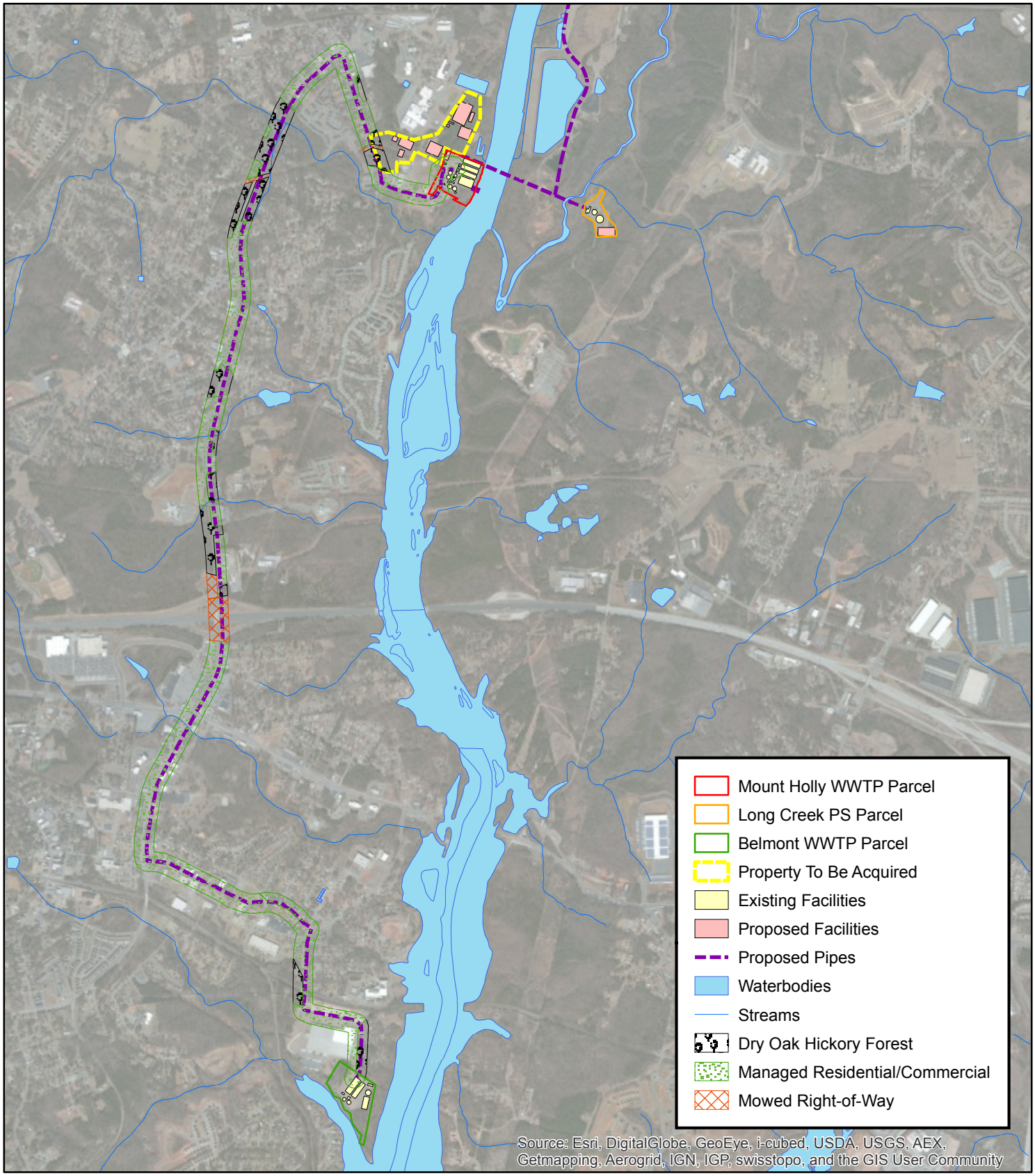

0 2,500 5,000 Feet
0 790 1,580 Meters

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Figure 5.11c
Alternative 1: Proposed Mount Holly WWTP Plant Communities along Belmont to Mount Holly Forcemain Route

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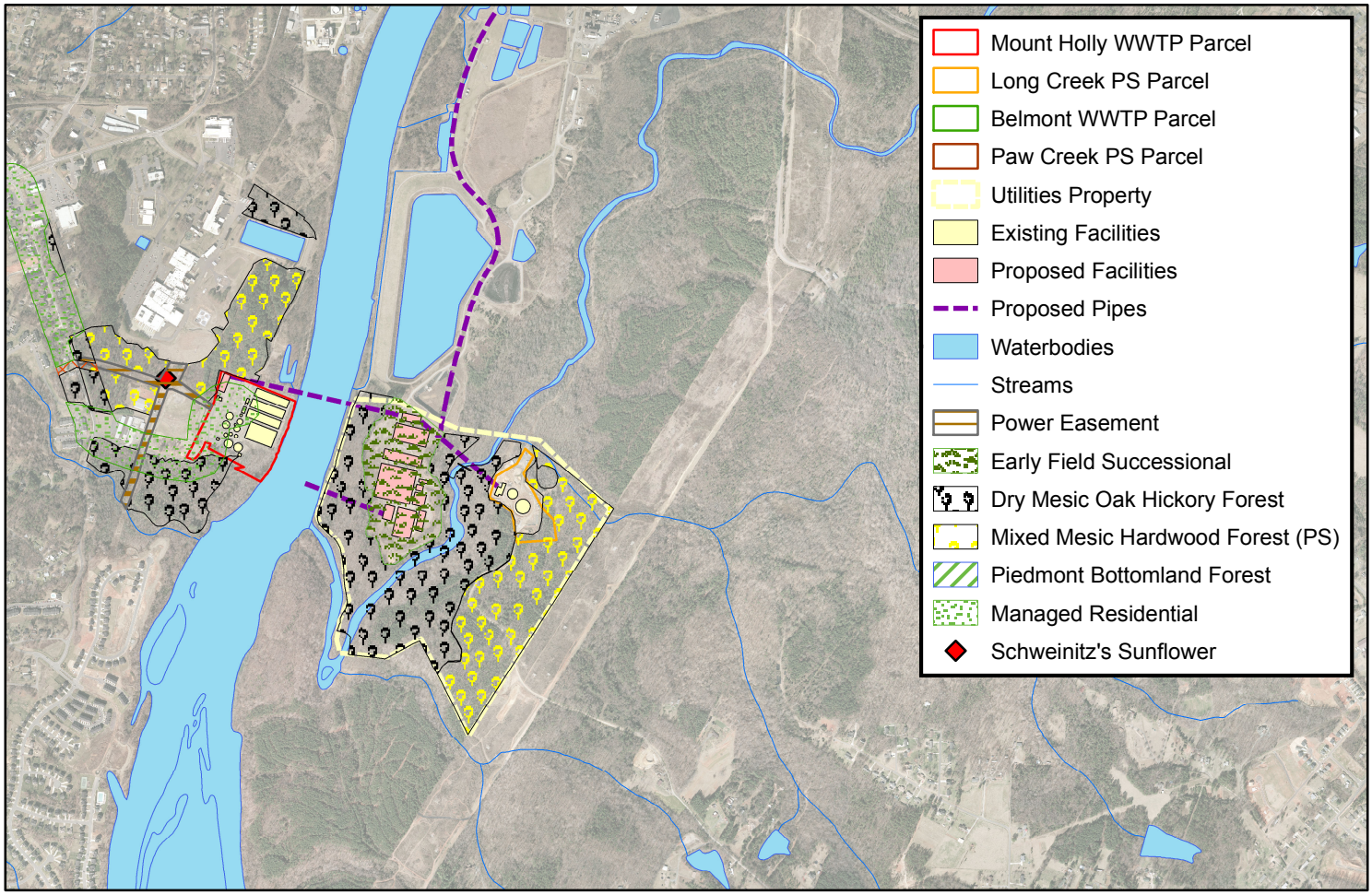

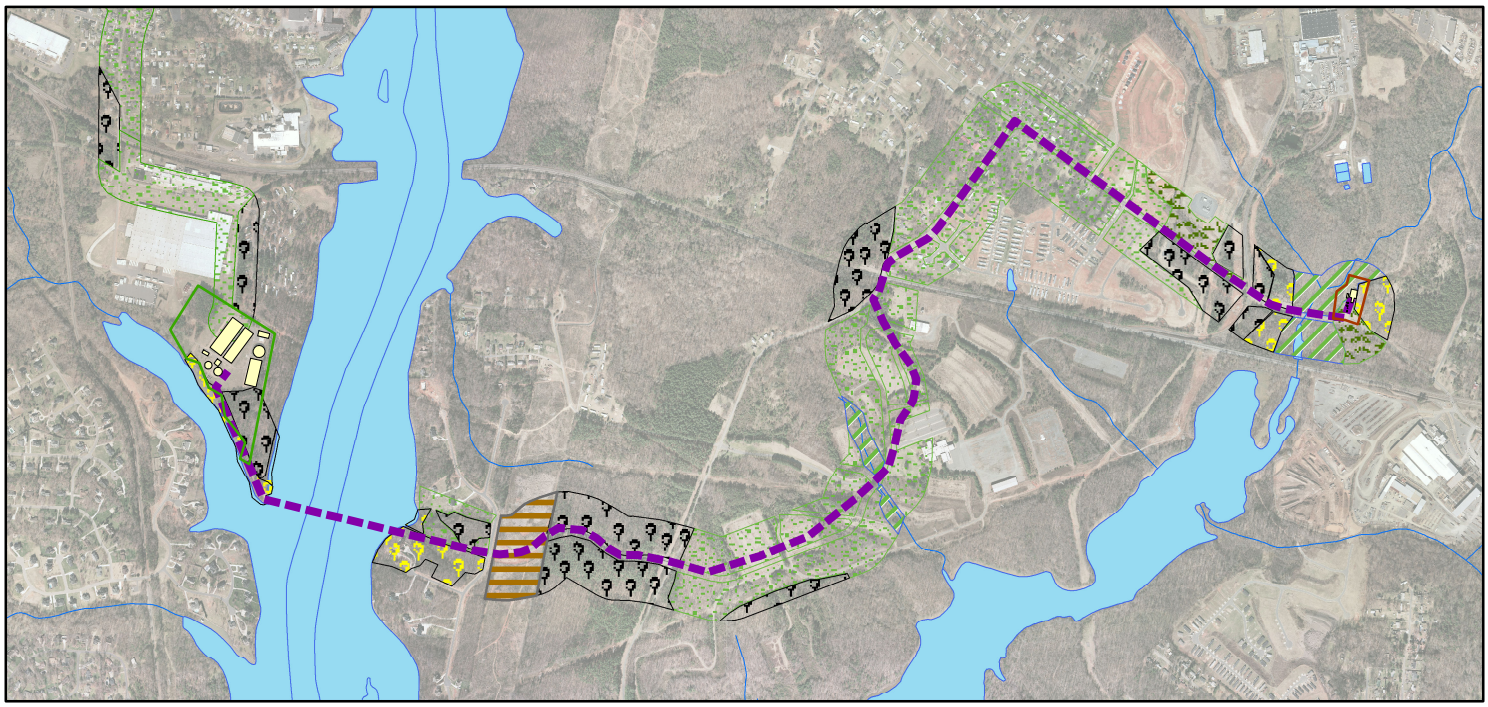

0 1,600 3,200 Feet
0 525 1,050 Meters

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Figure 5.11d
Alternative 2: Proposed Long Creek WWTP and Belmont to Paw Creek PS Forcemain
Plant Communities

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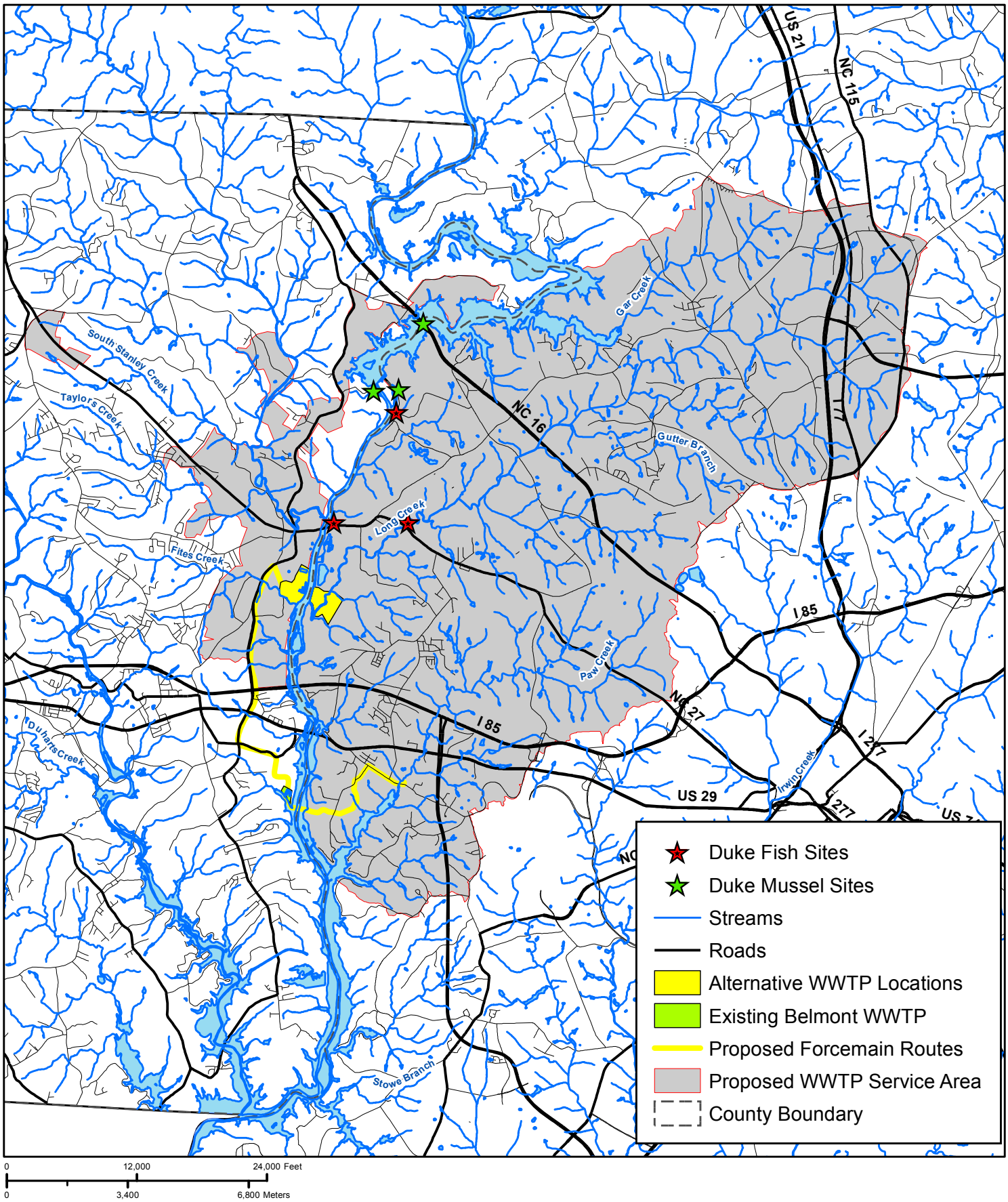

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Figure 5.12a. Duke Mussel and Fish Sites

Proposed Regional WWTP

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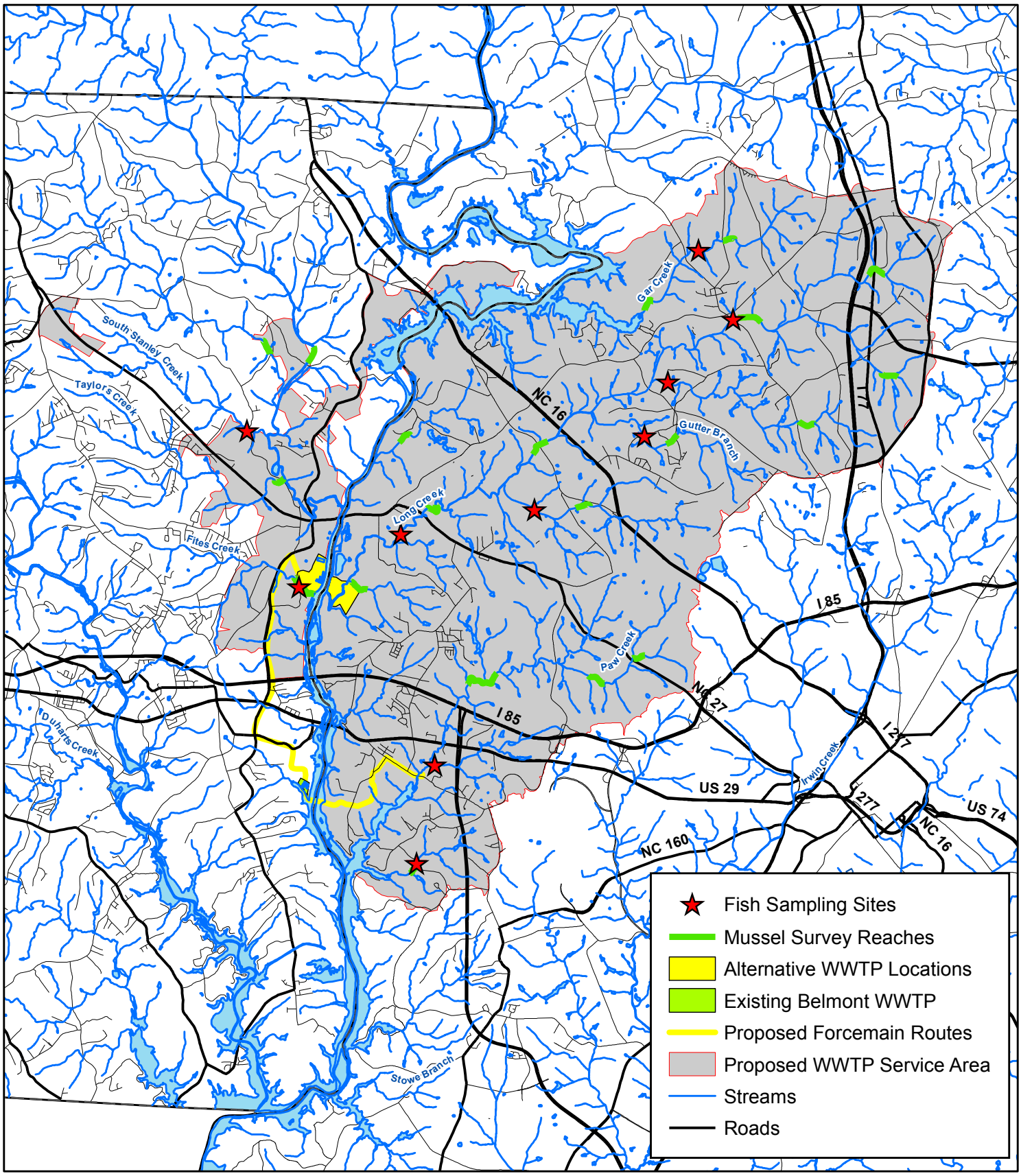
Date: 4/22/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_April2011\Fig5.7c_Duke Mussel and Fish Sites.mxd



0 11,000 22,000 Feet

0 3,600 7,200 Meters

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Figure 5.12b. 2008 Mussel and Fish Survey Locations

Proposed Regional WWTP

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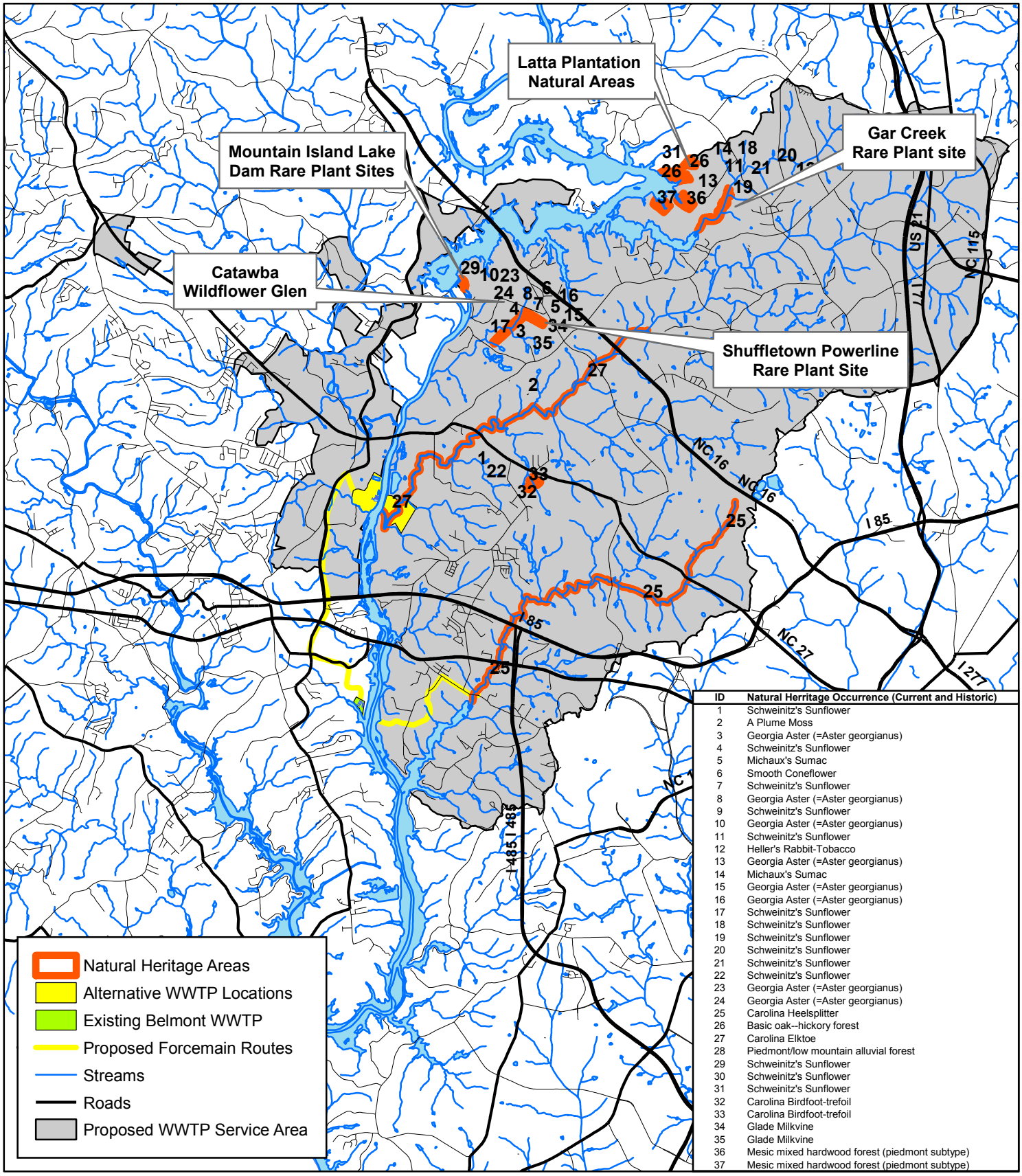
Date: 4/22/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_April2011\Fig5.7d_2008 Mussel and Fish Surveys.mxd



ID	Natural Herritage Occurrence (Current and Historic)
1	Schweinitz's Sunflower
2	A Plume Moss
3	Georgia Aster (=Aster georgianus)
4	Schweinitz's Sunflower
5	Michaux's Sumac
6	Smooth Coneflower
7	Schweinitz's Sunflower
8	Georgia Aster (=Aster georgianus)
9	Schweinitz's Sunflower
10	Georgia Aster (=Aster georgianus)
11	Schweinitz's Sunflower
12	Heller's Rabbit-Tobacco
13	Georgia Aster (=Aster georgianus)
14	Michaux's Sumac
15	Georgia Aster (=Aster georgianus)
16	Georgia Aster (=Aster georgianus)
17	Schweinitz's Sunflower
18	Schweinitz's Sunflower
19	Schweinitz's Sunflower
20	Schweinitz's Sunflower
21	Schweinitz's Sunflower
22	Schweinitz's Sunflower
23	Georgia Aster (=Aster georgianus)
24	Georgia Aster (=Aster georgianus)
25	Carolina Heelsplitter
26	Basic oak--hickory forest
27	Carolina Elktoe
28	Piedmont/low mountain alluvial forest
29	Schweinitz's Sunflower
30	Schweinitz's Sunflower
31	Schweinitz's Sunflower
32	Carolina Birdfoot-trefoil
33	Carolina Birdfoot-trefoil
34	Glade Milkvine
35	Glade Milkvine
36	Mesic mixed hardwood forest (piedmont subtype)
37	Mesic mixed hardwood forest (piedmont subtype)

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Figure 5.12c Natural Heritage Element Occurences and Listed Species

Proposed Regional WWTP

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Date: 4/22/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_April2011\Fig5.8a_NHEO and Listed Species.mxd

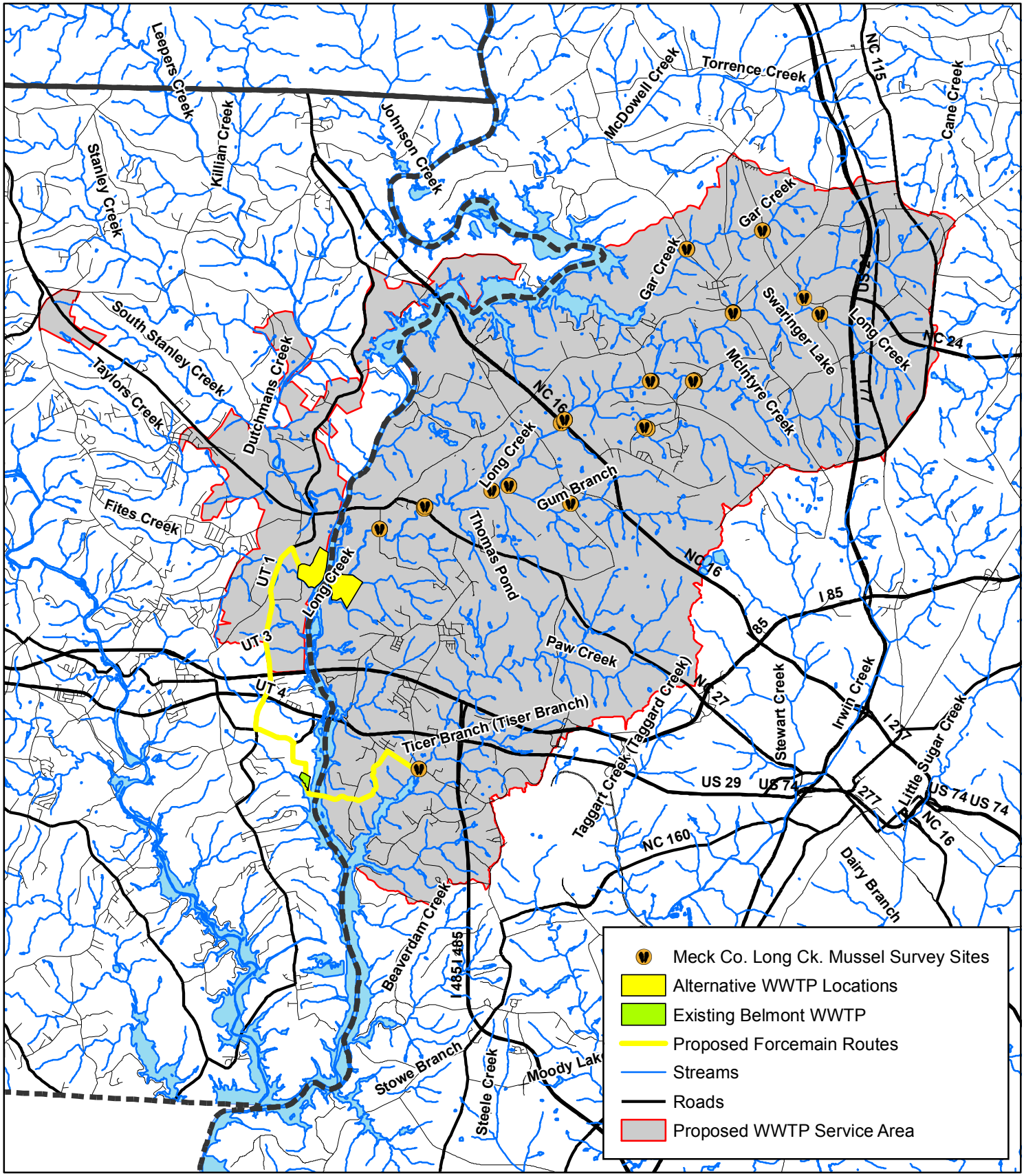

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Figure 5.12d. NHP Mussel Survey Data Sites

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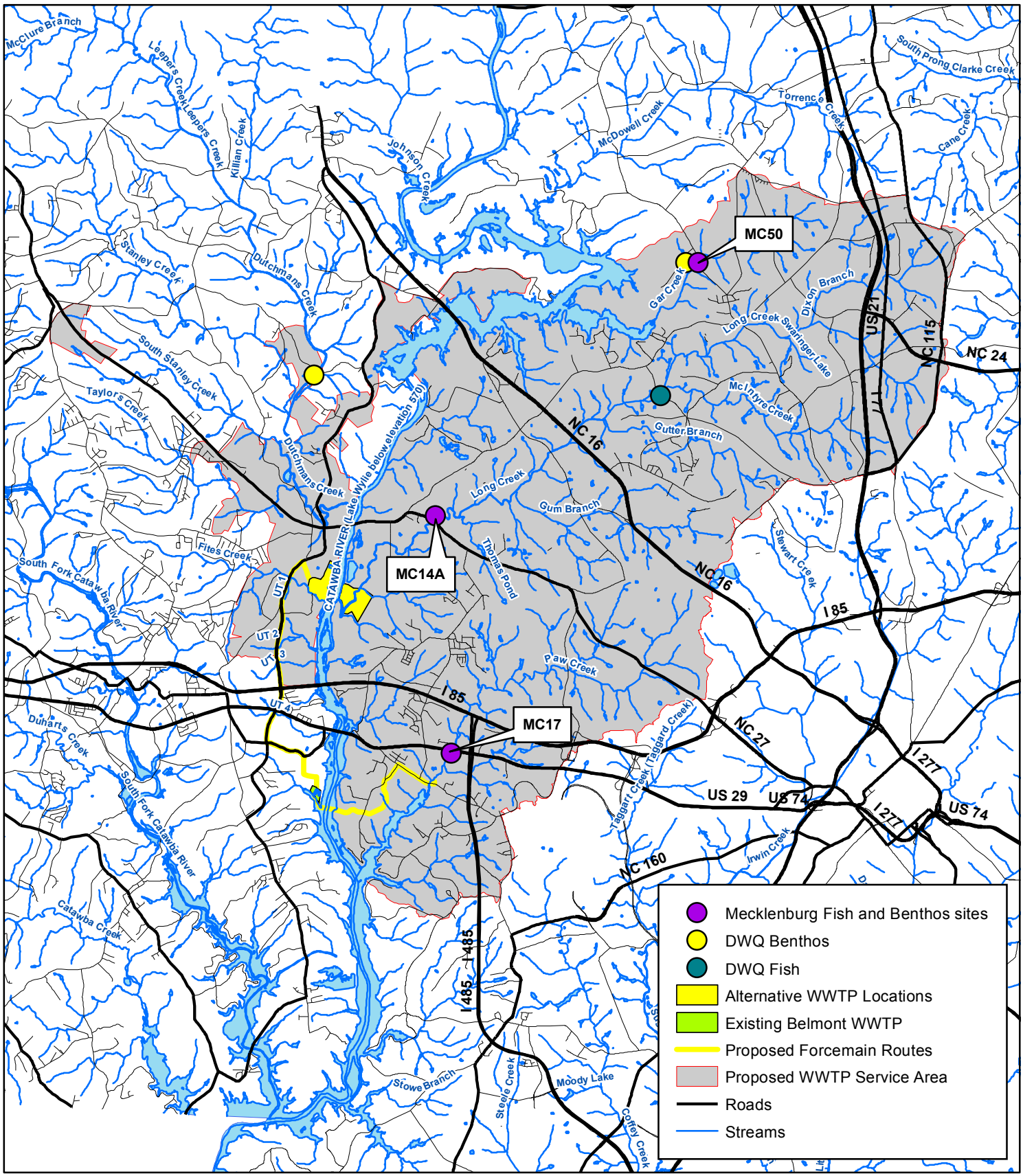

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Figure 5.12e. Macroinvertebrate and Fish Monitoring Sites

Proposed Regional WWTP

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Date: 5/2/2011; PM: LE; Author: FM; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 5\Revised_July2013\Fig5.12e_Macroinvertebrate and Fish Sites.mxd

Section 6. Predicted Environmental Effects of Alternatives

This section describes potential environmental consequences (direct, secondary, and cumulative) associated with three project alternatives: Alternative 1 (new regional facility in Mount Holly), Alternative 2 (new regional facility in western Mecklenburg County), and the No Action Alternative (NAA). While Alternative 2 was identified as the preferred alternative in Section 4, an evaluation of the other alternatives' impact on the existing environment is provided for comparison. Alternative 2 was selected due to its potential value as a centralized, regional facility and the benefits it would bring stakeholders. The NAA is also evaluated to provide a baseline from which to compare the predicted effects on environmental resources.

This section describes the potential environmental consequences (direct, secondary and cumulative) associated with the No Action Alternative, Alternative 1 (new facility in Mount Holly), and Alternative 2 (new facility near Long Creek Pump Station). This analysis includes evaluation of impacts to the following resource areas:

- Topography and Floodplains
- Soils
- Land Use and Land Cover
- Wetlands
- Prime and Unique Farmland
- Public Lands, Scenic, and Recreational Areas
- Areas of Archaeological or Historical Value
- Air Quality
- Noise Levels
- Water Resources
- Forest Resources
- Shellfish, Fish, and their Habitats
- Wildlife and Natural Vegetation
- Introduction of Toxic Substances

Information used for this assessment was gathered from a variety of sources including the City of Charlotte, Mecklenburg County, the City of Mount Holly, the Town of Stanley, the City of Belmont, Gaston County, State and Federal agencies, interviews, and field visits and surveys.

In an effort to avoid and minimize impacts on natural and cultural resources to the extent possible, this DEIS evaluates several alternatives including No Action. The direct, secondary, and cumulative environmental consequences for all alternatives are discussed in this section.

Impacts from alternatives are considered to be direct if they occur at the same time and place as the alternative. Those impacts that may occur at another time or place are considered to be indirect or secondary and cumulative. As a baseline for the direct impacts discussion, Table 6-1 identifies the amount of land occupied by existing wastewater treatment infrastructure (No Action Alternative), which provides the context for the new potential direct impacts listed in the table such as the amount of new land disturbance for each alternative in both Mecklenburg and Gaston Counties and the number of stream crossings and new outfalls required.

Table 6-1 Existing and Proposed Facilities by Alternative

	No Action	**Alternative 1**	**Alternative 2**
Existing Facilities* (Gaston acres/Mecklenburg acres)	19.1/6.7		
New Facilities* (Gaston acres/Mecklenburg acres)	0	22.5/3.6	0.5/15.0
New Pumping Stations	0	1	2
New Forcemains (total length)	0 (>20 miles of existing forcemain)	3 (7.1 miles)	4 (4.5 miles)
Lake Wylie Outfall	2 existing	1 new New outfall on Mount Holly side. Old Mount Holly, and Belmont, outfalls abandoned	1 new New outfall on Mecklenburg side. Mount Holly, and Belmont outfalls abandoned
River and Major Stream Crossings	0	3 (Catawba R., Fites Creek, & Long Ck.)	4 (2 Catawba R., Long Ck., & Paw Ck.)

* The acreages provided include facility footprint, roads and parking associated with each facility.

6.1 Topography and Floodplains

6.1.1 Direct Impacts

6.1.1.1 Topography

Under Alternatives 1 and 2, the project would have a direct effect on topography in the project area. Leveling, grading, and excavation associated with construction may create impacts on topography. Temporary soil loss and erosion may occur due to the excavation, leveling, and grading activities associated with construction. Excavated soil would be reused as backfill on-site during construction to the greatest extent practical. Any excess soil would be moved offsite at the direction of the contractor who would be responsible for determining where it would be utilized. Impacts to the site topography would be the greatest under Alternative 1 which has the largest construction footprint which also includes the most disturbance to forested land (over 26.1 acres). Under Alternative 2, construction would occur primarily on previously disturbed and graded property (over 15.5 acres). The No Action Alternative would provide the least impact to topography due to limited site construction. Table 6-1 provides new and existing footprint areas for each alternative.

6.1.1.1.1 No Action Alternative

Direct impacts to topography would occur under the NAA only during the construction associated with the future addition of nutrient removal at the existing Belmont and Mount Holly WWTPs. This construction would occur within the existing footprints of each facility.

6.1.1.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

- **Regional WWTP Construction near Mount Holly WWTP:** Would involve construction on 22.2 acres of forested land that would be cleared and graded.
- **Belmont pump station and Forcemain to new Regional Facility:** Would involve construction on 0.3 acres at the WWTP and soil disturbance along 5.7 miles of forcemain.
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** Would involve construction on 3.6 acres to create the new equalization basin. Directional boring would be used to install the 0.3 miles of forcemain between the existing pump station and the new Regional Facility in Gaston County across the Catawba River.
- **Clariant Forcemain to Long Creek Forcemain:** Would involve soil disturbance along 0.9 miles of forcemain between the existing Clariant WWTP and the Long Creek Forcemain.
- **New Discharge:** Would disturb soil along 170 feet (0.03 miles) of discharge pipe.

6.1.1.1.3 Alternative 2 Regional Facility near Long Creek Pump Station

- **Regional WWTP Construction near Long Creek**: Would disturb 15.0 acres of soil on partially forested land that would be cleared and graded.
- **Belmont pump station and Forcemain to Paw Creek**: Would disturb 0.3 acres of soil at the WWTP and along 3.0 miles of forcemain.

- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain disturb 0.2 miles of forcemain between the existing pump station and the new Regional Facility across Long Creek.
- **Clariant Forcemain to Regional WWTP:** Would involve soil disturbance along 0.9 miles of forcemain between the existing Clariant WWTP and the new Regional Facility.
- **New Discharge:** Would disturb soil along 941 feet (0.2 miles) of discharge pipe.

6.1.1.2 Floodplains

FEMA regulates 100-year floodplains across the United States and requires compliance with federal and/or more stringent local floodplain ordinances for construction within the 100-year (regulatory) floodplain. Mecklenburg was the first county in the nation to include future conditions (community) floodplains on its flood maps. Community 100-year floodplains are delineated based on future, potential built-out conditions of the watershed, while the regulatory floodplains are based on current land use conditions. Mecklenburg County requires compliance with floodplain ordinances for any new construction or substantial improvements to existing construction, within both the regulatory and the community floodplain. The current 100-year floodplains for the NAA are illustrated in Figure 5.1c. Figures 5.1d and 5.1e illustrate the current 100-year floodplain for Alternative 1. Figure 5.1f identifies the 100-year floodplain associated with Alternative 2. Figure 6.1a illustrates areas where the community floodplain is larger than the regulatory floodplain (primarily near the existing Paw Creek pump station).

For both Alternative 1 and Alternative 2, forcemains would cross the 100-year floodplain associated with the Catawba River, Long Creek, and Paw Creek or Fites Creek (Figures 5.1d to 5.1f). No impacts to floodplains would occur under the No Action Alternative (Figure 5.1c).

New wastewater outfall structures on the Catawba River would be constructed within the floodway under Alternatives 1 and 2. Despite the presence of these structures in the floodplain, the use of directional drilling would allow the forcemains and outfall structure corridors to be under the river and stream beds and would prevent an increase in the 100-year base-flood elevation (BFE). No facility construction would occur within the 100-year floodplain under the No Action Alternative. The existing Mount Holly WWTP and the Long Creek and Paw Creek pump stations are located within the current 100-year floodplain.

6.1.1.2.1 No Action Alternative

No direct impacts to floodplains would occur under the NAA. Construction associated with the future addition of nutrient removal at the existing Belmont and Mount Holly WWTPs would occur within the existing footprints of each facility, but outside of the 100-year floodplain.

6.1.1.2.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

The use of directional drilling would allow the forcemains and outfall structure corridors to be under the river and stream beds. This will prevent an increase in the 100-year base-flood elevation (BFE). Therefore, no direct impacts to the floodplain are expected from Alternative 1.

- **Regional WWTP Construction near Mount Holly WWTP:** The new Regional Facility would be located outside of the 100-year floodplain.
- **Belmont pump station and Forcemain to new Regional Facility:** The new pump station would be completely outside the 100-year floodplain. The forcemain crosses 30 feet of floodplain at UT4 and between 10 and 150 feet of floodplain at Fites Creek (Figure 5.1e).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The new forcemain would be installed using directional drilling under 620 feet of the Long Creek floodplain and 960 feet of Catawba River floodplain. The new equalization basin would be constructed outside of both the regulatory and community floodplain.
- **Clariant Forcemain to Long Creek Forcemain:** The forcemain route is within the 100-year floodplain of the Catawba River for 1900 feet near the Clariant WWTP.
- **New Discharge:** Would be installed in the Catawba River (Lake Wylie) under 120 feet of the Catawba River floodplain.

6.1.1.2.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

The use of directional drilling would allow the forcemains and outfall structure corridors to be under the river and stream beds. This will prevent an increase in the 100-year base-flood elevation (BFE). Therefore, no direct impacts to the floodplain are expected from Alternative 2.

- **Regional WWTP Construction near Long Creek**: All of the new Long Creek Regional Facility would be located outside both the regulatory and community flood plains.
- **Forcemain from Mount Holly Pump Station to Regional WWTP across Catawba River:** The new forcemain would be installed using directional drilling under 983 feet of the Catawba River floodplain.
- **Belmont pump station and Forcemain to Paw Creek**: This forcemain crosses under 2500 feet of Catawba River floodplain and 930 feet of Paw Creek floodplain (Figure 5.1f). The forcemain crosses an additional 200 feet of floodplain under the future community floodplain layer (Figure 6.1a).
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain would be installed using directional drilling under 615 feet of the Long Creek floodplain.
- **Clariant Forcemain to Regional WWTP:** The forcemain route is within the 100-year floodplain of the Catawba River for 1900 feet near the Clariant WWTP.
- **New Discharge:** Would be installed in the Catawba River (Lake Wylie) under 350 feet of the Catawba River floodplain.

6.1.2 Secondary and Cumulative Impacts

There would be no anticipated difference in the amount of growth and resulting secondary and cumulative impacts facilitated by Alternative 1 or Alternative 2. Therefore, the indirect, secondary and cumulative impacts to floodplains produced by either Alternative 1 or 2 should be similar and influenced primarily by

local regulations and enforcement actions. The growth within the Service Area would be lower (and associated lower secondary and cumulative impacts produced) under the No Action Alternative compared to Alternatives 1 and 2.

6.1.2.1 Topography

Continued growth and development patterns associated with the addition of public wastewater infrastructure and continued residential and commercial development would result in localized changes to topography. Alternatives 1 and 2 are anticipated to produce a larger amount of secondary and cumulative impacts than the No Action Alternative.

Growth would occur under all alternatives and would include grading and clearing activities that could alter site level topography, disturb and compact local soils, and increase the potential for soil erosion. These effects would be reduced by enforcement of local and state regulations.

6.1.2.2 Floodplains

Continued growth would result in secondary and cumulative impacts to floodplains under all alternatives. The secondary and cumulative impacts to floodplains are potentially higher under Alternatives 1 and 2 than the NAA due to the higher development densities that would be supported by these alternatives. However, floodplains within the service area are protected under floodplain building regulations that would limit development within the floodplain and add stormwater detention to new development.

Other effects of increased watershed impervious area include alteration of the natural hydrograph (particularly increased stream flows and velocities during storm events), increased frequency of high storm flows, and lower and more frequent low flow conditions. Altered hydrographs produce changes in channel morphology (channel straightening, bed scouring and stream back erosion) and subsequent degradation of instream and floodplain habitat. Figure 6.1a shows that future floodplain predictions are not different than mapped 100-year floodplain areas in Mecklenburg County except near the existing Paw Creek pump station and proposed Paw Creek forcemain crossing (under Alternative 2), where the floodplain is about two acres larger than the existing 100-year floodplain (Figure 6.1a).

6.2 Soils

6.2.1 Direct Impacts

Soil loss and erosion may occur due to the excavation, leveling, and grading activities associated with construction. Excavated soil would be reused as backfill on-site during construction to the greatest extent practical. Any excess soil would be moved offsite at the direction of the contractor who would be responsible for determining where it would be utilized.

Soil loss during the construction phase of the project would be minimized with the implementation of erosion control best management practices (BMPs) as outlined in the project's Erosion and Sediment Control Plan, which would be filed in accordance with the NC Sediment Pollution Control Act. Silt fencing would enclose the construction work areas, and all construction corridors would be seeded with herbaceous, native seed mixes within 5 to 10 days of ground disturbance activities. After completion of construction activities, any

continuing erosion would be minimized through revegetation and implementation of post-construction stormwater BMPs and other controls as discussed in Section 6.10.

6.2.1.1 No Action Alternative

There would be no direct impacts to soils except for the construction needed to install nutrient removal at both the Belmont and Mount Holly WWTPs.

6.2.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

- **Regional WWTP Construction near Mount Holly WWTP:** Would involve construction on 22.2 acres of forested land that would be cleared and graded.
- **Belmont pump station and Forcemain to new Regional Facility:** Would involve construction on 0.3 acres at the WWTP and soil disturbance along 5.7 miles of forcemain.
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** Would involve construction on 3.6 acres to create the new equalization basin. Directional boring would be used to install the 0.3 miles of forcemain between the existing pump station and the new Regional Facility in Gaston County across the Catawba River.
- **Clariant Forcemain to Long Creek Forcemain:** Would involve soil disturbance along 0.9 miles of forcemain between the existing Clariant WWTP and the Long Creek Forcemain.
- **New Discharge:** Would disturb soil along 170 feet (0.03 miles) of discharge pipe.

6.2.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

- **Regional WWTP Construction near Long Creek**: Would disturb 15.0 acres of soil on partially forested land that would be cleared and graded.
- **Belmont pump station and Forcemain to Paw Creek**: Would disturb 0.3 acres of soil at the WWTP and along 3.0 miles of forcemain.
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain disturb 0.2 miles of forcemain between the existing pump station and the new Regional Facility across Long Creek.
- **Clariant Forcemain to Regional WWTP:** Would involve soil disturbance along 0.9 miles of forcemain between the existing Clariant WWTP and the new Regional Facility.
- **New Discharge:** Would disturb soil along 941 feet (0.2 miles) of discharge pipe.

6.2.2 Secondary and Cumulative Impacts

6.2.2.1 No Action Alternative

Development within the service area and the resulting soil disturbances would still occur under the No Action Alternative, but would occur at a lower density than what is possible without the increased treatment capacity

provided by a regional facility under Alternatives 1 and 2. The impacts to soils under the No Action Alternative would be less than what would occur under Alternatives 1 and 2.

6.2.2.2 Secondary and Cumulative Impacts Common to Alternatives 1 and 2

Grading and clearing activities would disturb and compact local soils and increase the potential for soil erosion. Further, development would cover soils with impervious surfaces. These effects would be mitigated by enforcement of local and state regulations.

Soil erosion and disturbance impacts are limited by current local and state sedimentation and erosion control rules and inspection programs. Construction and stormwater BMPs would control stormwater runoff and the resulting soil erosion during and after construction. All municipalities within the service area have a construction inspection program and require stormwater BMP implementation as part of their NPDES stormwater discharge permit. Section 7 identifies the specific development restrictions, programs, and ordinances in place within the service area.

6.3 Land Use and Land Cover

6.3.1 Direct Impacts

The alternatives vary considerably in terms of: the amount of land disturbance required, the type of land disturbed, existing land cover, consistency with shoreline classification and zoning, and compatibility with existing and future land uses. The land use designations associated with existing infrastructure under the No Action Alternative is illustrated in Figure 5.3f. The approximate locations of new facility construction associated with Alternative 1 and their existing land use are illustrated in Figures 5.3g and 5.3h. Figure 5.3i identifies the facilities proposed for Alternative 2 and their existing land use. The quantity of new land disturbance associated with each alternative is provided in Table 6-1. Proposed new facilities except the Belmont forcemains under Alternatives 1 and 2 would be constructed on industrial land.

Figures 6.3a and 6.3b illustrate the Duke Shoreline Management Plan Shoreline Classifications (August 2006) for the Catawba River (Lake Wylie) shoreline area adjacent to the existing and proposed facilities.

6.3.1.1 No Action Alternative

There would be no direct impacts to land use at the existing Belmont and Mount Holly WWTPs and Long Creek and Paw Creek pump stations. Under the No Action Alternative, the proposed regional WWTP sites on the Mecklenburg and Gaston sides would become available for sale and development, consistent with their zoned designations (industrial). Under the No Action Alternative there would be no impacts to current Duke Shoreline Management use or classifications.

6.3.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

The infrastructure proposed under this alternative would be constructed on land that is compatible with its use as wastewater infrastructure. The Duke Shoreline Management Classifications along the Gaston County shoreline is compatible with proposed uses under Alternative1.

- **Regional WWTP Construction near Mount Holly WWTP:** Would involve construction on 22.2 acres of forested land that is zoned industrial which is compatible with a new WWTP. This land is

owned by American & Efird (A&E) who operates a textile manufacturing facility on an adjacent parcel. The Duke Shoreline Management Classification closest to the WWTP is Business/Industrial (Figure 6.3a).

- **Belmont pump station and Forcemain to new Regional Facility:** Would involve construction on 0.3 acres at the WWTP in the portion of the property where the land use is industrial. The forcemain would be constructed on previously disturbed land in road right-of-ways primarily through a mix of commercial, institutional, and residential land uses (Figure 5.3h). The Duke Shoreline Management Classification adjacent to the Belmont WWTP is Public Infrastructure and Future Residential Marina (Figure 6.3b).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The construction of an equalization basin would occur on 3.6 acres of Industrial land next to the existing Long Creek pump station. All of the land crossed by the forcemain is classified as Industrial and owned by either The City of Charlotte (Mecklenburg County) or the City of Mount Holly (Gaston County). The Duke Shoreline Management Classification where the forcemain crosses out of Mecklenburg County is Future Residential Marina and Business/Industrial where it passes into Gaston County (Figure 6.3a).
- **Clariant Forcemain to Long Creek Forcemain:** The land along the entire 0.9 mile forcemain route is classified as Industrial.
- **New Discharge:** The Duke Shoreline Management Classification at the new discharge point is Business/Industrial (Figure 6.3a). The land use is Industrial.

6.3.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

The construction of the infrastructure proposed under this alternative would be constructed on land that is compatible with its use as wastewater infrastructure (classified primarily as Industrial). The proposed construction work area is already disturbed with very little vegetative cover. Alternative 2 is the preferred alternative, in part because it would allow for increased regional wastewater capacity while minimizing land use impacts. The parcel is currently owned by the City of Charlotte.

The Duke Shoreline Management Classifications along the Mecklenburg shoreline may not be compatible with proposed uses under Alternative 2. Under this alternative the shoreline buffer vegetation (along both sides of the Catawba River/Lake Wylie) would remain undisturbed and not be converted to a future residential marina.

- **Regional WWTP Construction near Long Creek:** The land use classification is Industrial. The Duke Shoreline Management Classification along the western edge of the proposed facility is Future Residential Marina (Figure 6.3a). This site is adjacent to a groundwater mitigation effort being conducted by Clariant to remove contaminants including chlorinated compounds from the groundwater, which may make this parcel less attractive for residential development.
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek**: The land use classification along the forcemain is Industrial (Figure 5.3i). The Duke Shoreline

Management Classification where the forcemain leaves Gaston County is Business/Industrial and Future Residential Marina where it passes into Mecklenburg County (Figure 6.3a).

- **Belmont pump station and Forcemain to Paw Creek**: The land use at the Belmont WWTP is industrial and open space along the River. The Duke Shoreline Management Classification adjacent to the Belmont WWTP is Public Infrastructure and Future Residential Marina (Figure 6.3b). The Duke Shoreline Management Classification where the forcemain crosses into Mecklenburg County is Future Residential (Figure 6.3b). The forcemain from the Belmont WWTP to Paw Creek pump station would be constructed on previously disturbed land along road right-of-ways, primarily through a mix of residential, commercial, and open space land uses (Figure 5.3i).
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility across Long Creek crosses land classified as Industrial.
- **Clariant Forcemain to Regional WWTP:** The land along the entire 0.9 mile forcemain route is classified as Industrial.
- **New Discharge:** The Duke Shoreline Classification at this location is Future Residential Marina although the land use classification is Industrial (Figure 6.3a).

6.3.2 Secondary and Cumulative Impacts

The secondary and cumulative impacts associated with a new regional wastewater facility would generally be related to continued urban growth and land use changes associated with population increases in the service area. Growth within the service area is anticipated regardless of the alternative selected including the No Action Alternative. The selection of an alternative that provides regional wastewater treatment capacity would help reduce sprawl by facilitating higher density development in areas that are proactively planning for and regulating continued development. This regional wastewater facility has been proposed in response to an anticipated increase in wastewater generated within the service area; the facility itself would not produce this population growth. The proposed regional wastewater facility is part of a long term planning effort conducted by Utilities, the City of Mount Holly, and the City of Belmont to provide cost-effective high quality wastewater treatment for their citizens while being protective of the environment.

None of the alternatives considered include an expansion in the capacity of the Belmont WWTP. Since no expansion is occurring that facilitates growth within Belmont, no secondary and cumulative impacts associated with this proposed project would occur within the City of Belmont service area.

6.3.2.1 No Action Alternative

Development within the service area and the resulting changes in land cover would still occur under the No Action Alternative, but would occur at a lower density than what is possible without the increased treatment capacity provided by a regional facility under Alternatives 1 and 2. Fewer changes in land cover and land use would occur under the No Action Alternative than what would occur under Alternatives 1 and 2.

6.3.2.2 Secondary and Cumulative Impacts Common to Alternatives 1 and 2

Portions of the proposed project service area currently without public sewer service (Gar and Catawba Sub-basins and portions of Mountain Island Lake Sub-basin) have lower land use densities than other portions of the service area. Density in these areas is currently limited by minimum lot size requirements for septic systems. The availability of public sewer service would make it possible to develop these areas more densely than is possible with septic systems. Therefore, these areas could experience relatively more secondary and cumulative impacts from land development than portions of the project service area with public sewer service that are already more densely developed. Areas currently without public sewer service are depicted in Figure 6.3c as unshaded polygons and future land use and zoning for these areas is illustrated in Figure 6.3h.

Given the proximity of the service area to the City of Charlotte, current and future land use plans and comprehensive plans anticipate significant additional growth throughout the entire service area. In order to accommodate this growth, public infrastructure improvements, such as the I-485 loop and planning for a regional wastewater facility, are currently being implemented within the service area. The construction of a regional wastewater facility would be required to meet increased wastewater treatment demands associated with the expected population growth.

Alternatives 1 and 2 would facilitate denser growth than what might occur if the area were forced to utilize only septic systems or package plant wastewater treatment options as would occur under the No Action Alternative. Most indirect impacts associated with continued population growth within the service area would be related to the addition of higher density developed land uses. This higher density growth is consistent with planned growth within the greater Charlotte-Mecklenburg area and may protect areas outside of the service area from unplanned, less desirable forms of development.

Information about anticipated future land use is found in the Charlotte Mecklenburg Planning Department's 2015 Plan and associated GIS data, in the City of Mount Holly's 2001 Future Land Use Plan, and in other documents. Figure 6.3d illustrates the urban development and denser land uses included in future land use projections for the Charlotte-Mecklenburg Planning Department (2015 Plan, associated district plans, and future land use GIS data) and the Town of Huntersville (zoning ordinance). Figure 6.3e illustrates future land use projections in the City of Mount Holly (Land Development Plan Update 2001). Zoning information from the Town of Stanley provides the best available information about future land use projections in that portion of the Service Area. Zoning within the Town of Stanley portion of the service area is illustrated on Figure 6.3f. The currently unserviced areas within the proposed service area are included in these long term plans. The Charlotte-Mecklenburg 2015 Plan cites major development expansion for the Mount Holly Road/NC 16 area, as well as other parts of the service area. The plan states that "much of this development is spurred by the construction of the I-485 Outer Loop." Growth and development are expected to occur as a result of the construction of this major transportation corridor, which passes through the Long Creek and Paw Creek Sub-basins. The highest density future development is projected to occur close to the I-485 corridor.

The portions of the service area that currently receive public sewer service are illustrated in Figure 6.3c. In Gaston County, the minimum lot size for septic systems is 30,000 square feet (ft^2) (0.7 acre). In Mecklenburg County, specific minimum lot sizes are not established; on-site wastewater treatment system permits are issued based on site suitability. However, it is generally not feasible to install a traditional on-site wastewater

treatment system and associated dwelling unit on a parcel smaller than 0.25 acre (Pers comm., Kelly Randall, Charlotte Mecklenburg Environmental Health Department, Jan. 15, 2007).

The Water Supply Watershed Protection areas overlay districts within the service area (Figure 6.3g) which impose certain limitations on development. Cluster development (allowed in Mount Holly with specific restrictions) and privately-owned wastewater treatment facilities are prohibited in critical areas. In currently unsewered areas, the prohibition of privately-owned wastewater treatment facilities requiring a NPDES permit is one of many factors limiting development density under the No Action Alternative. Within the service area, unsewered areas exist only in Mecklenburg County and are located in portions of the Catawba, Long, Lower Mountain Island, and Gar Sub-basins (Figure 6.3c). In all overlay zoning districts, other applicable development restrictions still apply.

With the availability of public sewer, the largest anticipated change in land use would be an increase in the amount of land with residential densities of more than four units per acre. Planned future land use for the portion of the project service area that currently does not receive public sewer services is illustrated in Figure 6.3h. Figure 6.3i illustrates the customer density served by Utilities and Mount Holly in 2000 and 2010, as well as the projected customer density to be served in 2014, 2024, and 2034 in each sub-basin. (These population predictions were introduced in Section 3 of this document). These data indicate that each sub-basin will experience an increase in population served. The largest increases in customer density should be anticipated in the Long Sub-basin, followed by the Lower Mountain Island Sub-basin, then the Mount Holly portion of the service area. Customer density in the Paw, Catawba (Mecklenburg County portion) and Gar Sub-basins by 2034 is anticipated to be similar to that in the Long Sub-basin in 2010. Densities in the Town of Stanley portion of the service area could be relatively higher because of the Town's policy to require new development to connect to a public sewer system. In addition, the Town of Stanley's portion of the service area is not located within a water supply watershed protection area.

Projected 2015 land use data for the Catawba Sub-basin categorizes it as primarily single family residential (42%) and industrial (19 percent) land uses, followed by open water (15%), park and open space (9%), mixed residential (8%), and mixed non-residential (8%) in 2015 (Charlotte Mecklenburg Planning Department GIS, 2007).

About 64% of the Gar Sub-basin is within the Town of Huntersville and is primarily rural land use. Town of Huntersville rural districts "encourage the development of neighborhoods and rural compounds that set aside significant natural vistas and landscape features for permanent conservation" (Huntersville Planning Department, 2008). As these land uses are possible without central WWTP services, the land use changes in the Huntersville portion of the Gar Sub-basin would be expected to be the same under the No Action Alternative and Alternatives 1 and 2. The second most predominant future land uses in the Gar Sub-basin are single family residential (17%), open water (10%), and park (7%) as determined by Charlotte future land use data.

6.4 Wetlands

6.4.1 Direct Impacts

Wetlands identified on field visits and on NWIS GIS layers would not be directly impacted by the construction or operation of new or expanded WWTP facilities under any of the proposed alternatives; however, force main and discharge line construction would cross wetlands. Wetland disturbances would be eliminated or minimized through use of directional drilling, implementation of BMPs, and adherence to regulatory permitting requirements (CWA Section 401 and 404). There would be no direct impacts associated with the operation of facilities proposed under all alternatives.

6.4.1.1 No Action Alternative

No direct impacts to wetlands would occur as a result of the No Action Alternative. Future construction at the existing Belmont and Mount Holly WWTPs to add nutrient removal would occur outside of all wetland areas.

6.4.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

- **Regional WWTP Construction near Mount Holly WWTP:** Construction of the new facility on 22.2 acres of forested land would avoid the small wetland and drainage area identified during field delineations (Figure 5.4d). This area would be protected during construction to prevent damage.
- **Belmont pump station and Forcemain to new Regional Facility:** No wetlands are present on the 0.3 acres at the BelmontWWTP where the pump station would be constructed. The forcemain would be constructed on previously disturbed land in road right-of-ways and would not impact any wetland areas identified by the National Wetland Inventory Layer (Figure 5.4e).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The construction of an equalization basin would occur on 3.6 acres next to the existing Long Creek pump station. This entire area is outside of the wetlands around Long Creek (Figure 5.4d). The forcemain would cross under 340 feet of wetlands adjacent to Long Creek and 60 feet of wetlands at the Mecklenburg side of the Catawba River. The forcemain would cross 0 (zero) feet of wetland areas at the proposed WWTP location in Gaston County (Figure 5.4d).
- **Clariant Forcemain to Long Creek Forcemain:** The entire 0.9 mile forcemain route would not impact or cross any wetland areas.
- **New Discharge:** The new discharge would cross 0 (zero) acres of wetland adjacent to the Catawba River (Figure 5.4d).

6.4.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

- **Regional WWTP Construction near Long Creek**: This facility would be constructed on previously disturbed land that does not contain any field identified or NWI wetland areas.
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek**: The forcemain would cross 200 feet of wetland adjacent to the Catawba River in Gaston County and 70 feet of wetland adjacent to the Catawba River in Mecklenburg County (Figure 5.4f).

- **Belmont pump station and Forcemain to Paw Creek**: The proposed forcemain would cross 0 (zero) feet of wetland near the Belmont WWTP, 0 (zero) feet of wetland adjacent to the Catawba River on the Mecklenburg side, and 340 feet of wetland associated with Paw Creek.
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility across Long Creek crosses 320 feet of wetlands adjacent to Long Creek.
- **Clariant Forcemain to Regional WWTP:** The entire 0.9 mile forcemain route would not impact or cross any wetland areas.
- **New Discharge:** The new discharge would cross 220 feet of wetland adjacent to the Catawba River (Figure 5.4f).

6.4.2 Secondary and Cumulative Impacts Common to All Alternatives including the No Action Alternative

Continued growth would result in secondary and cumulative impacts to wetlands under all alternatives. The secondary and cumulative impacts to wetlands are potentially higher under Alternatives 1 and 2 as compared to the No Action Alternative due to the higher development densities that would be supported by these alternatives.

Urban stormwater flows can physically degrade stream and wetland habitats, alter wetland hydrology, and disturb wetland vegetation. During construction, as land is cleared, erosion and sediment can increase the sediment load in runoff and can have an adverse effect on wetlands and streams. All local governments within the service area enforce riparian buffer protection rules and inspect construction sites for compliance with erosion control and stormwater BMP requirements. All municipalities have also implemented post-construction stormwater ordinances. Implementation of these programs would significantly reduce the impacts associated with stormwater runoff on wetlands and streams. Section 7 of this document provides detailed descriptions of the programs that are being implemented to minimize secondary and cumulative impacts to wetlands, and streams.

The majority of wetlands within the service area are located within riparian zones and floodplains which are currently protected under buffer ordinances and floodplain building regulations. Wetland loss may occur as land use changes; however, ordinances that protect riparian buffers and regulate floodplain development would restrict the direct loss of riparian wetland habitat. It is unlikely that any development would result in the loss of regulated wetlands without the implementation of mitigation required under Federal wetland protection rules (See Section 7).

6.5 Prime and Unique Farmland

6.5.1 Direct Impacts

There would be no direct impacts to lands currently in agricultural use as a result of the proposed project under any Alternative. Prime agricultural soils exist on or near most of the proposed wastewater infrastructure locations although they are not currently used for agricultural purposes.

6.5.1.1 No Action Alternative

No direct impacts to agricultural lands would occur as a result of the No Action Alternative. Future construction at the existing Belmont and Mount Holly WWTPs to add nutrient removal would occur outside of all areas designated as Prime Farmland or Farmland of Statewide Importance.

6.5.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

- **Regional WWTP Construction near Mount Holly WWTP:** Construction of the new facility on 22.2 acres of forested land would almost entirely on prime agricultural land (Figure 5.5c).
- **Belmont pump station and Forcemain to new Regional Facility:** The Belmont pump station would be constructed on land that is not Prime Farmland or Farmland of Statewide Importance. The forcemain would be constructed on previously disturbed land in road right-of-ways and would impact 4100 feet of Prime Farmland soils, 2570 feet of Farmland of Statewide Importance soils, and 380 feet of Prime if Drained soils (Figure 5.5d).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The construction of an equalization basin would occur on 3.6 acres next to the existing Long Creek pump station that is almost entirely Farmland of Statewide Importance (Figure 5.5d) with about a quarter (<1 acre) that is on Prime Farmland. The forcemain would cross 660 feet of Prime Farmland soils, 160 feet of Farmland of Statewide Importance soils, and 730 feet of Prime if Drained soils. This entire area is classified as Industrial land and is not currently used for farming.
- **Clariant Forcemain to Long Creek Forcemain:** The 0.9 mile forcemain route crosses 830 feet of Prime Farmland soils and 2010 feet of Prime if Drained soils.
- **New Discharge:** The new discharge would cross 0 (zero) acres of Prime Farmland adjacent to the existing Mount Holly WWTP (Figure 5.5d).

6.5.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

- **Regional WWTP Construction near Long Creek**: This facility would be constructed on about 15.0 acres of previously disturbed land that includes about 9 acres of Prime Farmland soils and 0.3 acres of Prime Farmland if Drained soils. (Figure 5.5e).
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek**: The forcemain would cross 420 feet of Prime Farmland soils and 330 feet of Prime Farmland if Drained soils (Figure 5.5e).
- **Belmont pump station and Forcemain to Paw Creek**: The proposed forcemain would cross 7780 feet of Prime Farmland soils, 2700 feet of Farmland of Statewide Importance soils, and 1400 feet of Prime if Drained soils (Figure 5.5e).
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility across Long Creek crosses 150 feet of Farmland of Statewide Importance soils, 160 feet of Prime Farmland soils, and 430 feet of Prime if Drained soils

- **Clariant Forcemain to Regional WWTP:** The 0.9 mile forcemain route crosses 830 feet of Prime Farmland soils and 2010 feet of Prime if Drained soils.
- **New Discharge:** The new discharge line would cross 330 feet of Prime Farmland soils and 180 feet of Prime if Drained soils (Figure 5.5e).

6.5.2 Secondary and Cumulative Impacts Common to All Alternatives Including the No Action Alternative

Future land use planning data indicates that only a very small amount of farmland will remain within the service area under future development scenarios. As discussed in Section 5, few areas of agriculture currently remain within the Gaston or Mecklenburg County portions of the Service Area. Most prime farmlands have already been converted to other land uses, including residential, institutional, industrial, and open spaces. As discussed in Section 5.5, a small amount of agricultural land use currently exists in the service area, amounting to approximately 725 acres (1.3% of the service area).

Development and reduction in prime agricultural lands would occur under any of the alternatives, including the No Action Alternative. Impacts to prime farmland could include degradation of agricultural uses through the introduction of adjacent incompatible residential or commercial land uses. Because of the small amount of land currently being used for agricultural purposes in the service area and the lack of future planning for agricultural land use, few, if any, secondary and cumulative impacts to prime agricultural lands are anticipated under any Action Alternative.

6.6 Public Lands, Scenic, and Recreational Areas

6.6.1 Direct Impacts

Under any alternative, including the No Action Alternative, wastewater facilities are located upstream of the U.S. National Whitewater Center, an outdoor recreational resource located on the Catawba River, and the 33 acre Mount Holly Tuckaseegee Park expansion, as shown on Figure 5.6a. Both recreational resources include canoe/kayak access points to the Catawba River. Possible Carolina Thread trail locations pass through all the proposed alternative sites.

The proximity of the National Whitewater Center and the City of Mount Holly's 33 acre river front park expansion (Tuckaseegee Park) to all proposed alternatives (Figure 5.6a) provides the potential for both positive and negative direct impacts to recreational lands. Potential negative direct impacts associated with all alternatives, including the No Action Alternative, could be odors and possible wastewater spills, which could result in the disruption of recreational activities and/or access to recreational sites.

To protect public health, particularly the health of people involved in water-based recreation such as boating or swimming, all new facilities (Alternatives 1 and 2) would be designed to prevent storm flow bypasses and sanitary sewer overflows (SSOs) by installing equalization facilities, backup generators, and redundant facilities. The increased capacity provided by these alternatives would reduce the likelihood of sanitary sewer overflows. Further, odor control technology would be incorporated into the new regional facility and pump station designs under Alternatives 1 and 2. These design strategies would reduce the impact of new wastewater facilities on the enjoyment of adjacent public recreation areas.

6.6.1.1 No Action Alternative

Direct impacts to public lands, scenic or recreational areas could occur under the No Action Alternative due SSOs at the existing Belmont or Mount Holly WWTPs or the existing Long Creek and Paw Creek pumping stations and over 20 miles of forcemain transporting wastewater for treatment at McAlpine WWMF. Future construction at the existing Belmont and Mount Holly WWTPs to add nutrient removal would not impact any of the vegetated buffer areas existing at each site that screen the wastewater facilities from recreational users of the Catawba river (Lake Wylie).

6.6.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

Selection of this Alternative would remove 22.2 forested acres from possible use as recreational and natural open space near the Catawba River. Under Alternative 1 this forested area would no longer screen industrial noise and facilities from recreational users of the Catwba River (Lake Wylie).

- **Regional WWTP Construction near Mount Holly WWTP:** Construction of the new facility would occur on 22.2 acres adjacent to existing and planned City of Mount Holly parks (Figure 5.6c).
- **Belmont pump station and Forcemain to new Regional Facility:** The Belmont pump station would be constructed on land that is adjacent to open space along the Catawba River, but surrounded by an intact vegetated buffer between the facility and the River. The forcemain would be constructed on previously disturbed land in road right-of-ways and would run next to about 1,400 feet of municipal park near the existing Mount Holly WWTP (Figure 5.6c).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The construction of an equalization basin would occur on 3.6 acres next to the existing Long Creek pump station that is next to land that is used by the U.S. Whitewater Center for walking and mountain biking trails. The forcemain would cross the Long Creek trail and then pass through 15 acres of industrial land adjacent to a groundwater remediation facility. Not much public recreation occurs on the portion of this industrial parcel owned by the City of Charlotte that will be crossed by the forcemain route.
- **Clariant Forcemain to Long Creek Forcemain:** The 0.9 mile forcemain route is located entirely on private industrial land.
- **New Discharge:** The new discharge would be located upstream of the mouth of Long Creek and upstream of the US Whitewater Center on the Gaston County side of the Catawba River (Figure 5.6c).

6.6.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

Selection of this alternative would allow over 60 acres of land south and east of the proposed Long Creek WWTP to be preserved as forested open space. This property is owned by the City of Charlotte who would allow the continued use of hiking and mountain biking trails, associated with the U.S. Whitewater Center, on a large portion of the property. Selection of Alternative 2 may also lead to the preservation of over 20 acres of forested land that would be cleared under Alternative 1 for the new Regional WWTP. The selection of this alternative may also facilitate the installation of a new canoe/kayak access point on Long Creek near the existing Long Creek pump station.

- **Regional WWTP Construction near Long Creek:** This facility would be constructed on about 15.0 acres of previously disturbed land next to an existing groundwater remediation site. Not much public recreation currently occurs on the portion of this industrial parcel owned by the City of Charlotte that will be impacted by the construction of the proposed regional WWTP.
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek:** The forcemain would cross under the Catawba River north of the U.S. Whitewater Center (Figure 5.6d).
- **Belmont pump station and Forcemain to Paw Creek:** The proposed forcemain would cross open space adjacent to the existing Paw Creek pump station (Figure 5.6d).
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility will cross the Long Creek Trail.
- **Clariant Forcemain to Regional WWTP:** The 0.9 mile forcemain route is located entirely on private industrial land.
- **New Discharge:** The new discharge would be located upstream of the mouth of Long Creek and upstream of the U.S. Whitewater Center (Figure 5.6d). This area is heavily used by boaters from the U.S. Whitewater Center.

6.6.2 Secondary and Cumulative Impacts

Mecklenburg and Gaston Counties are making considerable efforts to preserve public land and develop recreational facilities along the Catawba River and throughout the service area, which is reflected in their future land use plans. Communities throughout the service area are implementing open space and park planning projects and comprehensive land use planning that should reduce the secondary and cumulative impacts associated with growth in the Service Area under all alternatives, including the No Action Alternative.

Lake Wylie is an excellent recreational fishery that draws large numbers of people throughout the year and has hosted Major Bassmaster and other fishing tournaments, which provide economic benefits to the region. Water supply watershed protection programs and riparian buffer requirements should serve to minimize secondary and cumulative impacts to Lake Wylie's fishery by protecting water quality. New post construction stormwater requirements will further protect aquatic habitat within the lake.

The City of Mount Holly is building a greenway along the Catawba River/Lake Wylie from its river front property near the existing WWTP all the way up to Mountain Island Lake. The City of Mount Holly also has plans to significantly expand and enhance their river front park adjacent to the existing WWTP.

The stakeholder group discussed the possibility of building a foot bridge across the Catawba to connect Mount Holly's river front park and greenway with the Whitewater Center. Mecklenburg County strategic land use planning for the southern portion of the service area has identified additional public resources for recreation and conservation. In addition, two non-profit groups, the Catawba Lands Conservancy and the Trust for Public Lands, continue to engage in land conservation efforts that would result in the obtainment of easements that protect valuable ecological resources in the area.

6.6.2.1 No Action Alternative

The No Action Alternative would not facilitate the creation of additional recreational facilities or opportunities.

6.6.2.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

The Alternative 1 could create additional park space along the Catawba River that would be associated with the removal of the existing Mount Holly and Belmont WWTPs.

6.6.2.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

Alternative 2 provides the opportunity to preserve over 60 acres of open space with opportunities for hiking or biking trails and possibly a new canoe launch on Long Creek. Alternative 2 could also provide a new public meeting space at the new regional facility. This could also lead to the preservation of over 20 acres of forest land adjacent to the existing Mount Holly WWTP. This alternative would also create additional park space along the Catawba River that would be associated with the removal of the existing Mount Holly and Belmont WWTPs.

6.7 Areas of Archaeological or Historical Value

6.7.1 Direct Impacts Common to All Alternatives

There are no properties registered on the National or State Register of Historic Places present on any of the project sites; therefore, there would be no direct impacts on historical resources. The State Historic Preservation Office (SHPO) was formally asked for comments on the proposed project. The consultant met with SHPO staff twice to discuss the project and review SHPO maps. Documented archaeological sites exist just south of the proposed locations of Long Creek Regional WWTP under Alternative 2 and SHPO would require archaeological surveys to be conducted on previously undisturbed areas outside of the 100-year floodplain prior to initiation of any construction activities. Due to the previous level of disturbance on the Gaston portion of Alternative 1, (Mount Holly and Belmont WWTP locations), SHPO would not require archeological surveys. Direct impacts to historic resources, even under the No Action Alternative, would be assessed individually during the planning of future projects in the service area.

6.7.2 Secondary and Cumulative Impacts Common to All Alternatives

Existing State and Federal policies should sufficiently protect areas of archaeological or historical value from secondary and cumulative impacts. Any large-scale development activity in the service area would likely require an archeological and historical investigation, in accordance with current regulations (discussed in Section 7). There is some chance that historic resources could be inadvertently lost or impaired during development activities such as the destruction of an unknown cemetery, but there are regulations in place to reduce the likelihood of this occurring. The low density of cultural and historic resources within the service area (Figure 5.7a) suggests few secondary and cumulative impacts to these resources would occur under Alternative 1, 2, or the No Action Alternative (no difference in secondary and cumulative impacts between alternatives).

6.8 Air Quality

6.8.1 Direct Impacts

Minor and temporary impacts to air quality may occur during construction activities due to increased amounts of dust or engine exhaust. There will be no burning of cleared vegetation or construction related debris. Dust control measures would be employed to limit dust exposure during the construction phase.

Operation of the facility would not produce any regulated air quality contaminants, and nearby residents and public access areas would be buffered from facility-generated odors by surrounding and undeveloped wooded lands. Odor control facilities would be installed at the headworks, preliminary treatment, and pumping stations. These odor control facilities would minimize any odors that might be generated from untreated wastewater through the initial screening, grit removal, and pumping operations. The new regional facility under Alternatives 1 and 2 would have diesel generators on-site that could be run in the case of a power failure. An air quality permit would be obtained to operate the generators. Methane gas generated at the regional facility would be used to offset energy consumption by using the gas to heat the anaerobic digesters.

6.8.2 Secondary and Cumulative Impacts Common to All Alternatives

As development increases, particularly associated with the I-485 expansion, traffic volumes will increase within the service area. The additional vehicle miles traveled would result in increased air pollutant emissions such as carbon monoxide, fine particulates, and ozone producing compounds, such as nitrogen and sulfur oxides. The secondary and cumulative impacts to air quality would likely be the same under all alternatives including the No Action Alternative. The lower density development associated with the No Action Alternative could create sprawled development patterns, which would increase vehicle travel distances and associated increases in air emissions. Existing air quality protection programs and efforts to bring the area into compliance with the eight-hour ozone standard would continue to be implemented (See Section 7).

6.9 Noise

6.9.1 Direct Impacts Common to All Alternatives

Construction would typically occur only during normal daylight working hours. Equipment that could generate significant noise levels would be enclosed in buildings, which reduces noise pollution. Buildings that enclose blowers, pumps, or other noise-generating equipment would contain installed noise attenuation. A buffer around the facility site, particularly under Alternative 2, and pumping stations would aid in minimizing facility construction and normal operation noise. Construction activities will take place during weekdays and during daylight hours to minimize noise impacts on surrounding areas.

6.9.2 Secondary and Cumulative Impacts Common to All Alternatives

Development within the service area would increase noise levels through the introduction of additional domestic and commercial traffic. Noise would be generated from new residences, businesses, and industries in the area. The increased noises associated with development would increase ambient noise levels, which could impact wildlife behavior. Local noise ordinances would be in effect to limit extreme noise producing activities.

6.10 Water Resources

6.10.1 Direct Impacts

Direct impacts could occur associated with the construction and operation of new or existing wastewater infrastructure. Under Alternatives 1, 2 and the No Action Alternative there could be direct impacts to surface water and water quality which may include increased stormwater runoff, stream buffer impacts, SSOs, and wastewater effluent associated with growth within the Service Area.

6.10.2 Direct Impacts No Action Alternative

Under the No Action Alternative, streams would not be crossed or otherwise impacted. Water quality could still be impacted from SSOs or effluent from existing wastewater infrastructure.

6.10.3 Direct Impacts Common to Alternatives 1 and 2

Direct impacts to surface water and water quality may include increased stormwater runoff, stream buffer impacts, and wastewater effluent associated with growth within the Service Area and construction at the proposed wastewater facilities. The location of infrastructure related to Alternatives 1 and 2 have been planned to minimize impacts to waterways and riparian buffers. Although pipelines would cross perennial waterways at up to four locations, the use of directional drilling would eliminate impacts to instream and riparian habitats and water quality. The proposed regional facility under both Alternative 1 and 2 is located 100 feet or more from all perennial streams. This meets minimum buffer requirements for the Catawba River in Mecklenburg County and exceeds required buffer widths for Long Creek (50 ft) and the Gaston County side of the Catawba River (50 ft).

6.10.3.1 Stormwater Quality and Volume

Stormwater impacts are anticipated during and after construction for all alternatives. The total areas of new construction under each alternative are presented in Table 6-1. During construction, cleared land is more prone to erosion. Soil disturbance during construction may cause temporary sediment loadings into the Catawba River, Long Creek, and smaller streams at project sites. However, required sediment and erosion control measures would be implemented and would reduce impacts to water quality.

Under the No Action Alternative, properties would be available for development pursuant to current stormwater regulations. The use of stormwater controls such as low impact development (LID) practices would be explored for Alternatives 1 and 2 in order to minimize increases in stormwater volume.

New wastewater facilities would increase impervious cover on the sites, causing additional stormwater runoff. This increased runoff would potentially erode stream channels and carry more pollutants compared to pre-development conditions. However, regulatory requirements would limit impacts. Both Mount Holly and Charlotte Mecklenburg municipalities are required by EPA to obtain a permit for discharge of stormwater into Waters of the State (NPDES Stormwater Permit). The NPDES Stormwater permit requires that a Stormwater Pollution Prevention Plan (SWPPP) be developed and implemented. The steps to develop a Plan have been grouped into five general phases, which are (1) planning and organization; (2) assessment; (3) BMP identification; (4) implementation; (5) evaluation of the Plan. The objectives are to minimize the number and amounts of pollutants in storm water runoff leaving the site. In response to potential water quality problems,

several BMPs would be implemented to control potential pollutant runoff from the facility site. These BMPs will include source reduction controls as well as containment and diversion structures.

Mount Holly meets most post-construction stormwater discharge requirements through its Water Supply Watershed Protection ordinance. Charlotte-Mecklenburg Stormwater Services maintains one of the most stringent stormwater quality programs in the State, with requirements that exceed the State's minimum standards. Charlotte-Mecklenburg Utilities would require that State stormwater quality and quantity requirements be met through the use of LID practices at the facility sites (Alternatives 1 and 2). LID practices provide for post-development hydrology that mimics pre-development conditions through implementation of specialized BMPs. These BMPs could include practices such as the use of green roofs, rain gardens, and infiltration devices.

While every effort would be made to minimize impervious surface runoff from new facilities through the use of BMPs, increased runoff may result in direct impacts to aquatic resources. These direct impacts could arise from minor increases in stormwater pollutants such as nutrients, total suspended solids, hydrocarbons, and bacteria.

6.10.3.2 Lake Wylie Water Quality and Wastewater Effluent

All alternatives, except for the No Action Alternative, would increase the discharge of treated wastewater effluent into Lake Wylie. As described in Section 5.10, Lake Wylie exceeded water quality standards for chlorophyll-*a* concentrations in the past. Nitrogen and phosphorus levels in wastewater could contribute to algal growth, which could produce higher chlorophyll-*a* concentrations in Lake Wylie. Compliance with NPDES permits, which would limit the discharge of nitrogen and phosphorus, would reduce the impact of the increased wastewater discharge. Alternatives 1 and 2 would involve the construction of a regional wastewater facility that would be designed to achieve significant nutrient removal from wastewater. Under the No Action Alternative the existing Mount Holly and Belmont WWTPs would have to add nutrient removal. The existing Belmont WWTP and Mount Holly WWTPs would be decommissioned under Alternatives 1 and 2.

Currently, wastewater generated in the Long Creek basin on the Mecklenburg County side of the service area is pumped over 20 miles to McAlpine Creek WWMF for treatment. Alternatives 1 and 2 would treat existing and future flows at a new regional facility and eliminate this need for pumping long distances. The McAlpine Creek WWMF is currently permitted for a capacity of 64 mgd with the Long Creek basin contributing approximately 5-7 mgd, which is just over 10% of the total flow. Taking typical diurnal and wet weather variations into account, removing flow from the Long Creek basin would not have a significant impact on the water quality or quantity of discharge from McAlpine Creek WWMF.

6.10.3.3 Groundwater Quality

No direct impacts to groundwater quality or volume are expected as a result of the construction and operation of new facilities under Alternatives 1 or 2 or the No Action Alternative. The ongoing groundwater remediation on Clariant property adjacent to the Long Creek forcemain under Alternative 1 and the new Regional WWTP near Long Creek under Alternative 2 will continue.

6.10.3.4 Water Supply

All alternatives except the No Action Alternative will increase the quantity of treated wastewater effluent and associated nutrients discharged to Lake Wylie. The combined nutrient discharges of existing, upgraded and new facilities will be less than the nutrient cap established by the Lake Wylie TMDL. Any new discharge will be required to obtain an NPDES permit which would establish minimum effluent quality standards that are protective of the quality of drinking water in Lake Wylie.

6.10.4 Secondary and Cumulative Impacts Common to All Alternatives

Overall, the construction of a regional wastewater facility would provide a number of beneficial secondary and cumulative impacts. Discharging the treated wastewater generated in the Long Creek basin into Lake Wylie as opposed to pumping wastewater over 20 miles to the McAlpine Creek WWMF and discharging south of the lake would increase the water volume in the lake and decrease energy used for pumping. Increased water volume would be available in Lake Wylie for power generation, cooling water, and water supply. The proposed regional wastewater facility under Alternatives 1 and 2 would produce high quality treated wastewater effluent with low nutrient concentrations and could also increase the amount of water available in Lake Wylie to protect water quality, support aquatic life and provide recreational opportunities. These beneficial impacts would not be achieved under the No Action Alternative.

Several local and State regulations are in place throughout the project service area that will minimize negative secondary and cumulative impacts. Public sewer extension projects would be required to apply for and obtain the necessary permits and evaluate, avoid, and minimize environmental impacts. Water supply watershed protection rules, which limit land use densities and apply other development restrictions to protect water quality, apply to a large portion of the project service area in both Gaston and Mecklenburg Counties. These areas include the limits of the City of Mount Holly and a large portion of the project service area that is not currently serviced by public wastewater treatment service. Figure 6.3g identifies water supply watershed protection areas within the entire project service area. In addition to the water supply watershed protection areas, a number of local policies and ordinances are in place (discussed in Section 7) that would further limit negative secondary and cumulative impacts from any of the Alternatives 1, 2, and the No Action Alternative within the service area.

The No Action Alternative would limit continued growth in the Mount Holly portion of the service area. Much of the existing Mount Holly WWTP capacity has been committed to known development projects. Under the No Action Alternative, Mount Holly would be forced to limit construction within its portion of the service area or find another way to increase wastewater treatment capacity.

In the Mecklenburg portion of the service area, under the No Action Alternative, wastewater would continue to be treated at the McAlpine Creek WWMF. Although growth would continue to occur in the Mecklenburg portion of the service area, densities in areas that currently do not receive centralized wastewater services would be limited by septic system space requirements and watershed overlay restrictions on new private package WWTPs in critical watershed areas. These areas without centralized wastewater services are illustrated in Figure 6.3c and are generally located in the Mecklenburg portion of the Catawba Sub-basin, the Gar Sub-basin, and a small portion of the Lower Mountain Island Sub-basin. The Mecklenburg County portion of the project service area is part of a much larger service area managed by Utilities. Figure 6.10a

identifies the existing Utility facilities and service areas within the entire Utility service area. If the No Action Alternative is chosen, wastewater from the Mecklenburg side of the service area would continue to be treated at the McAlpine Creek WWMF and would continue to be unavailable for use in Lake Wylie. In the future, the McAlpine Creek WWMF or other wastewater facilities within the greater Charlotte-Mecklenburg area might be expanded to meet the growing wastewater demands, which would result in similar secondary and cumulative effects as those under the proposed project. Any expansions of these facilities would be handled by a separate permitting and SEPA process.

6.10.4.1 Stream Conditions and Stormwater

As discussed in Section 6.2, sediment loads in runoff can increase due to construction activities. This could degrade water quality and stream habitats. Sediment control ordinances are currently in place within the entire service area. These ordinances require permitting and inspection of sediment and erosion control measures during construction (See Section 7). These programs can reduce the amount of sediment entering waterways during future construction activity associated with increased development.

Future increases in land use development and density increases within the service area were discussed in Section 6.3. As the amount of impervious surface area within a sub-basin increases, the water quality and aquatic habitat quality generally decline due to changes in the source, volume, frequency, and duration of stormwater flows. Pollutants associated with stormwater runoff from impervious surfaces that may enter surface waters include total suspended solids (TSS), total nitrogen (TN), total phosphorus (TP), fecal coliforms, hydrocarbons, and heavy metals. Other effects of increased watershed impervious area include alteration of the natural hydrograph (particularly increased stream flows and velocities during storm events), increased frequency of high storm flows, and lower and more frequent low flow conditions. Altered hydrographs produce changes in channel morphology (channel straightening, bed scouring and stream back erosion) and subsequent degradation of instream and floodplain habitat.

Without the implementation of stormwater BMPs, researchers have suggested that watersheds with impervious cover greater than 12% generally results in declines in water quality, habitat quality, and aquatic organism diversity and abundance (Schueler 1994). Post-construction stormwater detention and stormwater treatment requirements would be implemented throughout the service area as required by post-construction ordinances and water supply watershed protection requirements to help minimize these impacts. Measures such as stream buffer requirements and stormwater detention BMPs would be utilized to minimize impacts to water quality and water resources within the service area. These measures protect natural stream hydrology and riparian buffers, which in turn minimize streambank erosion, water quality impairments, and aquatic habitat degradation.

Most water bodies and streams within the service area are meeting water quality standards and designated uses, but current biological sampling results indicate that development has adversely impacted streams. Post-construction stormwater BMP requirements were adopted in 2007 by almost all municipalities within the service area. These new rules, along with the other programs discussed in 6.2 and Section 7 would help minimize impacts associated with continued development. All municipalities within the project service area enforce minimum riparian buffer widths along perennial streams. The Mecklenburg County and City of

Charlotte portions of the service area adopted riparian protection rules that require wider riparian buffers for both perennial and intermittent streams than what is required by the State.

All Alternatives would result in some adverse secondary and cumulative impacts to surface water and water quality within the service area. Continued growth and development would occur under the No Action Alternative as well causing impacts to surface water and water quality. The secondary and cumulative impacts to surface waters are potentially greater under Alternatives 1 and 2 than the No Action Alternative due to the higher land use densities supported by these alternatives. These adverse impacts to water quality would be minimized through riparian protection, erosion control, and stormwater management requirements already established in the service area.

6.10.4.2 Lake Wylie Water Quality

Lake Wylie has had problems in the past with excess nutrients and eutrophication (1992 303d list) which resulted in the development of a TMDL for chlorophyll-*a* that was approved in 1996 and fully implemented in 2001. This TMDL established point and non-point source limits for total nitrogen and total phosphorus entering the lake. The combined nutrient discharges of new facilities under Alternatives 1 and 2 will be less than the nutrient cap established by the Lake Wylie TMDL. Water quality data indicate that conditions in Lake Wylie have been improving since implementation of the TMDL.

6.10.4.3 Groundwater Quality

Alternatives 1and 2 would allow future development to utilize public sewer systems rather than septic systems or package wastewater treatment plants. The use of public sewer systems would reduce the probability of groundwater contamination from leaking or failing septic systems, which would be a beneficial secondary impact. Under the No Action Alternative much of the new growth within the service area would be supported by septic systems and package wastewater treatment plants whose performance can be less reliable than regional WWTPs.

Under Alternatives 1 and 2, future development facilitated by the existence of public sewer systems may degrade groundwater quality if contaminants common to urban activities (such as fertilizers, petroleum products, metals and bacteria) reach groundwater. Groundwater volume may be affected by the increase in impervious surfaces associated with development which may slow the rate of groundwater infiltration and recharge from precipitation, and could reduce the yield of existing groundwater wells and stream recharge rates. Impervious surfaces would be limited by the water supply watershed protection rules in place in the Mount Holly portion of the service area, as well as in a large percentage of the Gar, Lower Mountain Island, Paw, and Catawba, and portions of the Long Sub-basins (Figures 6.3g).

6.10.4.4 Water Supply

As discussed in Section 5.10, Lake Wylie and Mountain Island Lake supply drinking water to municipalities around the Charlotte-Mecklenburg Metropolitan area. Mountain Island Lake is the source of drinking water for the City of Charlotte, the City of Gastonia, the City of Mount Holly, and much of Mecklenburg County. Lake Wylie is the source of drinking water for the City of Belmont and downstream communities, including the Cities of York and Rock Hill, South Carolina.

Water supply watershed protection rules in place within the service area would reduce the secondary and cumulative impacts to water supply quality associated with continued growth. The rules include limitations on the percentage impervious surface within the watershed, the establishment of minimum buffer requirements and density restrictions. Approximately 78% of the service area falls within water supply watershed protection areas, as illustrated in Figure 5.10g. Land within critical water supply areas on the Mecklenburg side of the service area is subject to a 100 foot water supply watershed protection riparian buffer. The State's Catawba buffer rules require the protection of a 50 foot riparian buffer along the mainstem of the Catawba River (Lake Wylie and Mountain Island Lake are included).

As the population in the service area and the region grows, additional water would be removed from Lake Wylie to supply the increasing water demand. Larger water withdrawals from Mountain Island Lake could reduce the volume of water released to Lake Wylie under Alternatives 1, 2 and the No Action Alternative. Alternatives 1 and 2 would re-introduce water into Lake Wylie instead of continuing to remove almost all of this water entirely from the Lake as supported by the No Action Alternative. Alternatives1 and 2 would increase the amount of water available in Lake Wylie and supplement low flows during future drought conditions. Water reuse possibilities associated with Alternatives 1 and 2 may also increase the quantity of water available in Lake Wylie for recreation, water supply, cooling water supply, and power generation purposes.

6.11 Forest Resources

6.11.1 Direct Impacts

Direct impacts to forest resources under Alternatives 1 and 2 are summarized in Table 6-2. Forest resources impacted by the proposed facilities are illustrated for the No Action Alternative as well as Alternatives 1 and 2 in Figures 5.11a through 5.11d. Direct impacts to terrestrial wildlife species are expected to be associated with habitat loss and/or creation. As discussed in Section 5.11 and listed in Table 6-3, any alternatives that require clearing of areas that are currently forested may cause direct impacts to the terrestrial species that use this habitat.

6.11.1.1 No Action Alternative

No direct impacts to forested land would occur as a result of the No Action Alternative (Figure 5.11a). Future construction at the existing Belmont and Mount Holly WWTPs to add nutrient removal would not impact any of the vegetated buffer areas existing at each site that screen the wastewater facilities from the Catawba river (Lake Wylie).

6.11.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

Selection of this Alternative would remove 22.2 forested acres from possible use as recreational and natural open space near the Catawba River. Under Alternative 1 this forested area would no longer screen industrial noise and facilities from recreational users of the Catawba River (Lake Wylie).

- **Regional WWTP Construction near Mount Holly WWTP:** Construction of the new facility would require the clearing of about 22.2 acres of land forested with mixed mesic hardwood forest adjacent to existing and planned City of Mount Holly parks and the Mount Holly WWTP (Figure 5.11b).

- **Belmont pump station and Forcemain to new Regional Facility:** The Belmont pump station would be constructed on land that is already in use as a WWTP. The 5.7 mile forcemain would be constructed on previously disturbed land in road right-of-ways that are primarily managed turf grasses (Figure 5.11c).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The 3.6 acre construction of an equalization basin would impact 2.5 acres of mixed mesic hardwood forest. The forcemain would cross through 60 feet of forested wetland along Long Creek and 790 feet of dry mesic oak-hickory forest (Figure 5.11b).
- **Clariant Forcemain to Long Creek Forcemain:** The 0.9 mile forcemain route is located almost entirely in previously disturbed and road right of ways that are primarily managed turf grasses (Figure 5.11b).
- **New Discharge:** The 0.03 mile (170 foot) discharge would be located upstream of the mouth of Fites Creek and directional drilling will be used to avoid direct impacts to 60 feet of riparian vegetation along the Catawba River (Figure 5.11b).

6.11.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

The proposed new regional facility under Alternative 2, would utilize previously-disturbed land to the maximum extent possible (Figure 5.11d). Selection of this alternative would allow over 60 acres of land south and east of the proposed Long Creek WWTP to be preserved as forested open space. This property is owned by the City of Charlotte who would allow the continued use of hiking and mountain biking trails, associated with the U.S. Whitewater Center, on a large portion of the property. The selection of this alternative may also facilitate the installation of a new canoe/kayak access point to Long Creek near the existing Long Creek pump station. If Alternative 2 is not chosen, these forested acres, zoned industrial, may be sold and converted to another use.

Selection of Alternative 2 may also facilitate the preservation of the over 20 forested acres next to the Mount Holly WWTP that would be used to construct the Regional WWTP under Alternative 1.

- **Regional WWTP Construction near Long Creek:** This facility would be constructed on about 15.0 acres of previously disturbed land next to an existing groundwater remediation site (Figure 5.11d). The construction would require the clearing of nearly 15 acres of early field successional vegetation.
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek:** The forcemain would cross through 350 feet of dry mesic oak-hickory forest. (Figure 5.11d).
- **Belmont pump station and Forcemain to Paw Creek:** The proposed forcemain would cross 1,890 feet of forested land primarily in the floodplain adjacent to the Paw Creek pump station and another 3,240 feet near the Catawba River (Figure 5.11d).
- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility will cross 620 feet of forested land, primarily forested wetland adjacent to Long Creek (Figure 5.11d).

- **Clariant Forcemain to Regional WWTP:** The 0.9 mile forcemain route is located almost entirely in previously disturbed and road right of ways that consist primarily of managed turf grasses.
- **New Discharge:** The new discharge would be located upstream of the mouth of Long Creek and the line would pass through 500 feet of riparian vegetation along the Catawba River. Directional drilling will be used to avoid impacts to the required riparian buffer vegetation.

Table 6-2 Direct Forest Resources Impacts

Alt	Gaston Co	Mecklenburg Co.
NAA	No direct impacts.	No direct impacts
1	Significant direct impacts. New construction would require the clearing of approximately 22.2 acres of mature mesic hardwood forest.	Minor direct impacts. Clearing (about 2.5 acres) of mature mixed mesic hardwood forests and dry-mesic oak-hickory forest are expected.
2	Minor direct impacts. New construction would require the clearing of 1 acre of forested area.	No direct impacts. New construction on 15.0 acres of previously cleared land, which would allow about 60 acres of forested area to remain undisturbed.

6.11.2 Secondary and Cumulative Impacts

Increased development within the service area will have impacts on forest resources, regardless of whether the No Action Alternative or Alternatives 1 or 2 are exercised. Local growth and development, including the completion of I-485, within the service area will drive land use changes that will impact the amount of open space and the types of forest communities that remain post development.

6.12 Shellfish, Fish, and Their Habitats

6.12.1 Direct Impacts

Direct impacts to aquatic organisms are expected to be minimal due to stormwater controls and stringent effluent discharge limits. Minor increases of instream pollutant concentrations, such as nutrients, total suspended solids, hydrocarbons, and bacteria, may occur from increased stormwater runoff. Increased nutrient loadings may lead to lower dissolved oxygen concentrations. Stringent nutrient discharge limits would be established for Alternatives 1 and 2 that would limit the effect of the discharge on dissolved oxygen levels in the Catawba River and Lake Wylie. As the amount of impervious surface area within a sub-basin increases, aquatic habitat quality generally declines due to changes in the source, volume, frequency, and duration of stormwater flows.

Without the implementation of stormwater BMPs, researchers have suggested that watersheds with impervious cover greater than 12% generally results in declines in water quality, habitat quality, and aquatic organism diversity and abundance (Schueler 1994). Post-construction stormwater detention and stormwater treatment requirements would be implemented throughout the service area as required by post-construction ordinances and water supply watershed protection requirements to help minimize these impacts. Measures such as stream buffer requirements and stormwater detention BMPs would be utilized to minimize impacts to water quality and aquatic habitats; these measures protect natural stream hydrology and riparian buffers, which in turn minimize streambank erosion, water quality impairments, and aquatic habitat degradation.

6.12.2 Secondary and Cumulative Impacts

Increases in stormwater runoff from developing areas typically results in a significant decrease in water quality, stream habitat, and a subsequent decrease in diversity and abundance of aquatic organisms. Septic

system failure can result in excess nutrient and bacterial loadings in streams. Alternatives 1 and 2 may reduce impacts associated with septic systems in areas that are not currently serviced by a public sewer system. Figure 6.3c identifies the portions of the service area that are currently not served by public sewer. Approximately 80% of the service area is currently served by public sewer service and the remainder would be expected to obtain public sewer service according to future land use plans. As described in Section 6.12.1, stormwater ordinances and/or buffer requirements adopted by all municipalities within the service area should reduce secondary and cumulative impacts to aquatic habitats.

There is no recent evidence that Carolina elktoe or Carolina heelsplitter continue to occur with the service area or near any of the proposed infrastructure under Alternatives 1, 2, or the No Action Alternative, although records for the state threatened creeper and state significantly rare Eastern creekshell exist in the Mountain Island Lake Quadrangle. Fish and mussel surveys conducted in early 2008 did not find evidence of any endangered fish or mussels in streams within the service area. The NHP has a record for the state significantly rare seagreen darter in Fites Creek. No critical habitat has been designated for any of these species within the service area. Because of the existing stormwater treatment and control rules and water supply watershed protection rules in place, continued development would not be expected to significantly impact these species.

6.13 Wildlife and Natural Vegetation

6.13.1 Direct Impacts

Direct impacts to terrestrial wildlife species are expected to be associated with habitat loss and/or creation. As discussed in Section 5.13 and listed in Table 5-25, any alternatives that require clearing of areas that are currently forested would cause direct impacts to the terrestrial species that use this habitat. Direct impacts to wildlife and terrestrial habitats for all alternatives are summarized in Table 6-3. Terrestrial habitats impacted by the proposed facilities are illustrated for each of the alternatives in Figures 5.11a-5.11d. Impacts to habitat associated with the proposed Belmont Forcemain are illustrated in Figure 5.11c. There would be no known direct impacts to any areas with natural heritage element occurrences or the presence of listed species except for the area with Schweinitz's sunflower which would be impacted under Alternative 1.

6.13.1.1 No Action Alternative

Under the No Action Alternative, there would be no direct impacts to wildlife habitats or changes in land cover at existing wastewater facilities. Future construction at the existing Belmont and Mount Holly WWTPs to add nutrient removal would not impact any of the forested buffer areas at each site that provide a wildlife corridor along the Catawba river (Lake Wylie).

6.13.1.2 Alternative 1 New Regional Facility near Existing Mount Holly WWTP

Selection of this Alternative would remove or alter the habitat value of 22.2 acres by converting the land from forested to regional WWTP facility. Under Alternative 1 this forested area would no longer provide a wildlife corridor along the Catawba River (Lake Wylie).

- **Regional WWTP Construction near Mount Holly WWTP:** Construction of the new facility would require the clearing of about 22.2 acres of land forested with mixed mesic hardwood forest adjacent to existing and planned City of Mount Holly parks, the Mount Holly WWTP and the Catawba River

(Figure 5.11b). Construction at this site would impact the area where Schweinitz's sunflower was found in the utility corridor during site vegetation surveys.

- **Belmont pump station and Forcemain to new Regional Facility:** Few direct impacts to wildlife habitat would be produced. The Belmont pump station would be constructed on land that is already in use as a WWTP. The 5.7 mile forcemain would be constructed on previously disturbed land in road right-of-ways that are primarily managed turf grasses (Figure 5.11c).
- **Long Creek Pump Station, Equalization Basin, and Forcemain to new Regional Facility:** The 3.6 acre construction of an equalization basin would impact 2.5 acres of mixed mesic hardwood forest. The forcemain would cross through 60 feet of forested wetland along Long Creek and 790 feet of dry mesic oak-hickory forest (Figure 5.11b).
- **Clariant Forcemain to Long Creek Forcemain:** The 0.9 mile forcemain route is located almost entirely in previously disturbed and road right of ways that are primarily managed turf grasses (Figure 5.11b).
- **New Discharge:** The 0.03 mile (170 foot) discharge would be located upstream of the mouth of Fites Creek and directional drilling will be used to avoid direct impacts to 60 feet of riparian vegetation along the Catawba River (Figure 5.11b) protecting the existing forested wildlife corridor.

6.13.1.3 Alternative 2 New Regional Facility near Existing Long Creek Pump Station

The proposed new regional facility under Alternative 2, would utilize previously-disturbed land to the maximum extent possible (Figure 5.11d). Selection of this alternative would allow over 60 acres of land south and east of the proposed Long Creek WWTP to be preserved as forested open space. This property is owned by the City of Charlotte who would allow the continued use of hiking and mountain biking trails, associated with the U.S. Whitewater Center, on a large portion of the property. The selection of this alternative may also facilitate the installation of a new canoe/kayak access point to Long Creek near the existing Long Creek pump station. If Alternative 2is not chosen, these forested acres, zoned industrial, may be sold and converted to another use.

Selection of Alternative 2 may also facilitate the preservation of the over 20 forested acres next to the Mount Holly WWTP that would be used to construct the Regional WWTP under Alternative 1.

- **Regional WWTP Construction near Long Creek:** This facility would be constructed on about 15.0 acres of previously disturbed land next to an existing groundwater remediation site (Figure 5.11d). The construction would require the clearing of nearly 15 acres of early field successional vegetation.
- **Forcemain from existing Mount Holly WWTP to new Regional WWTP near Long Creek:** The forcemain would cross through 350 feet of dry mesic oak-hickory forest. (Figure 5.11d). The utility corridor where the Schweinitz's sunflower was found would not be disturbed.
- **Belmont pump station and Forcemain to Paw Creek:** The proposed forcemain would cross 1,890 feet of forested land primarily in the floodplain adjacent to the Paw Creek pump station and another 3,240 feet near the Catawba River (Figure 5.11d).

- **Long Creek Pump Station and Forcemain to Regional WWTP across Long Creek:** The new forcemain between the existing pump station and the new Regional Facility will cross 620 feet of forested land, primarily forested wetland adjacent to Long Creek (Figure 5.11d).
- **Clariant Forcemain to Regional WWTP:** The 0.9 mile forcemain route is located almost entirely in previously disturbed and road right of ways that consist primarily of managed turf grasses.
- **New Discharge:** The new discharge would be located upstream of the mouth of Long Creek and the line would pass through 500 feet of riparian vegetation along the Catawba River. Directional drilling will be used to avoid impacts to the required riparian buffer vegetation.

Table 6-3 Direct Wildlife and Terrestrial Habitat Impacts

Alt	Gaston Co	Mecklenburg Co.
1	Significant direct impacts. New construction would require the clearing of about 22.2 acres of mature mesic hardwood forest. This area serves as a wildlife corridor along the Catawba River. Clearing this land would result in permanent irreversible impacts to wildlife habitat and the species that currently inhabit the area. This area also includes the presence of multiple stems of Schweinitz's sunflower in an existing utility corridor.	Minor direct impacts. Clearing of about 2.5 acres of forested habitat. Limited wildlife impacts. Impacted individuals may be able to move into adjacent forested area.
2	Minor direct impacts. New construction would require the clearing of 1 acre of terrestrial habitat. Very limited wildlife impacts. Impacted individuals may be able to move into adjacent forested area.	Moderate direct impacts. Clearing of about 15 acres of early field successional vegetation. Some impacted individuals may be able to move into mature forested land or managed turf grass areas adjacent to cleared area.

6.13.1.4 Rare and Protected Species and Habitats

During field surveys of the proposed alternatives locations, six stems of Schweinitz's sunflower were observed east of the existing Mount Holly WWTP in a power line ROW. The population is within the proposed footprint for Alternative 1 (Figure 5.11b). Any clearing or new construction near this existing population would require consultation with the USFWS and a plan for relocation. This has been done for other projects in the area, and a relocation site for Schweinitz's sunflower has already been established. Any vegetation clearing during construction would result in temporary habitat losses, and new facility construction under Alternatives 1 and 2 would result in permanent habitat losses. No other endangered species exist within the proposed sites, and no other direct impacts to endangered species are anticipated.

6.13.2 Secondary and Cumulative Impacts

Increased development within the service area would adversely impact wildlife and habitat resources. It is unlikely that impacts would be avoided regardless of which alternative, including the No Action Alternative, is implemented. Areas of open space could be lost or decrease in size, which would likely result in increased habitat fragmentation. A loss of mature forests and increased habitat fragmentation due to development would result in the loss of animal species assemblages that use these habitats and require large undisturbed areas. Species that tolerate fragmented habitat (edge species) such as cow birds and deer, plant species that rely on disturbance, and invasive, non-native plants, would likely continue to inhabit the service area and their populations may even increase.

Cumulatively, land use changes would fragment the landscape and make wildlife movement more difficult. Over time, a decrease in wildlife species abundance may occur as suitable habitat declines. This impacts the sustainability of wildlife populations and may decrease species and genetic diversity. An increase in edge habitats and subsequent loss of refuge habitat can result in an increase in wildlife fatalities.

All of the five federally listed plant species that currently exist within the service area inhabit disturbed and maintained areas such as road and utility right of ways (ROWs). These are: Schweinitz's sunflower, Michaux's sumac, smooth coneflower, Georgia aster, and Carolina Birdsfoot-trefoil. As development increases the amount of early successional habitat would increase in ROWs and more habitat would potentially be created for these plant species.

Other sensitive species within the service area that are not federally listed but are listed as State Species of Concern could be adversely impacted by future development through the loss and degradation of critical habitat. These impacts are expected to be minimized or mitigated by open space preservation actions and existing development regulations described in Section 7.

6.14 Introduction of Toxic Substances

6.14.1 Direct Impacts

6.14.1.1 Associated with the No Action Alternative

There would be no direct addition of toxic substances in use at existing facilities except possibly as part of the nutrient removal processes that will be added to the Belmont and Mount Holly WWTPs under this alternative.

6.14.1.2 Common to Alternatives 1 and 2

Toxic substances would not be introduced to the environment during construction of the proposed facilities. Construction equipment would be inspected and maintained to avoid spills. Construction specifications would include measures to protect the environment from introduction of toxic substances or raw wasterwater during construction activities.

Possible wastewater spills during routine operation would be minimized by installing equalization facilities, backup generators, and redundant facilities as discussed in Section 6.6.1. Chemical storage and feed facilities would be provided for chemicals used in the treatment process. Diesel storage tanks would be located on the facility site for standby diesel generators, boilers, and fuel dispensing. All chemical storage and feed areas at new facilities would be provided with secondary containment. These areas would be provided with all safety features required by the NC building codes. Diesel tanks are provided with secondary containment and leak detection systems.

6.14.2 Secondary and Cumulative Impacts Common to All Alternatives (1, 2 and the No Action Alternative)

Toxic substances can be introduced into the environment through agricultural activities, new construction, households, vehicles and machinery use. Typical agricultural substances used include fertilizers and pesticides. Construction activities can introduce glues, solvents, and paints into the area. Typical household wastes include oils, cleaners, solvents, paints, herbicides, and fertilizers. The operation of vehicles and machinery can result in the release of fluids such as hydrocarbons and cooling fluid that would be contained within soils or could be conveyed through stormwater runoff. Fewer toxic substances could be introduced under the No Action Alternative because of the lower development densities and overall population supported by this Alternative as compared to Alternatives 1 and 2.

6.15 Comparison of Impacts from Each Alternative

6.15.1 Direct Impacts Summary

Table 6-4 lists the potential impacts of construction, operation and maintenance on each resource area by alternative. The resource area impact type and magnitude would vary between each of the alternatives considered.

Table 6-4 Summary of Possible Direct Impacts by Resource Area

Resource Area	Construction	Operation and Maintenance	Minimization Measure
Topography and Floodplains	Minor changes in topography for all alternatives associated with construction. Alternatives 1 and 2 provide for the removal of the existing Mount Holly WWTP facilities that are currently located within the 100-year floodplain. Forcemains would cross 100-year floodplain in all alternatives.	No ongoing impacts.	Any work, including substantial improvements, within regulatory 100-year floodplain must be done in compliance with Gaston County/Mount Holly Floodplain Ordinance and would require elevating or floodproofing structures. Use of directional drilling for forcemains prevents increase in 100-year base flood elevation (BFE)
Soils	Minor erosion and soil loss would occur due to excavation, grading, and compaction for Alternatives 1 and 2.	No ongoing impacts.	Erosion and soil loss would be minimized through the implementation of erosion control BMPs (including LID BMPs) outlined in the Erosion and Sediment Control Plan.
Land Use and Land Cover	Depending on alternative chosen the existing land cover would be changed to WWTP infrastructure. About 15.5 acres of primarily disturbed land would be altered under Alternative 1. About 26.2 acres of primarily mature forest would be altered under Alternative 2. There would be between 0 and 2 acres of change to existing land cover under the No Action Alternative.	No ongoing impacts.	Alternative chosen would also determine the extent of previously-disturbed land to be used, the amount of disturbed land to be reused, and land compatibility.
Wetlands	No alternatives impact wetlands.	No ongoing impacts.	Facilities associated with Alternatives 1 and 2 have been relocated to eliminate impacts to wetlands. Directional borings would be used to cross the Catawba River, Long Creek, Fites Creek, and Paw Creek to prevent wetland impacts.

Prime and Unique Farmlands	No impacts to lands currently in agricultural use are anticipated.	No ongoing impacts.	None required.
Public Lands, Scenic, and Recreational Areas	Alternative 2 would create opportunities for additional public lands and a possible new canoe access to Long Creek. Alternative 2 could allow a partnership with National Whitewater Center to expand its trail network. Visual impacts at the Mount Holly site for Alternative 1 due to minimal vegetated buffer surrounding the existing WWTP site. Visual buffer can be maintained under Alternative 2.	Odors associated with the operation of WWTP and/or associated infrastructure such as pump stations or equalization basins. SSO or wastewater spill could temporarily impact recreation in Long Creek, Paw Creek, or Catawba River.	Odor control will be installed. Equalization facilities, backup generators, and redundant facilities (Alternatives 1 and 2) would minimize probability of spills. Under Alternatives 1 and 2, the eventual elimination of over 20 miles of force main and multiple pumping stations would reduce the potential for SSOs in Mecklenburg County. Emergency response plans would be developed to manage any wastewater spills and alert the public to any increased recreational risk.
Areas of Archeological or Historical Value	Any NRHP archeological resources found in the archeological survey would be avoided. No historical resources have been identified within proposed construction areas for any Alternative.	No ongoing impacts.	An archeological survey would be conducted prior to construction if the selected alternative includes any areas identified by SHPO as requiring investigation. For any alternative if construction activities uncover evidence of historical or archaeological resources, site activity would stop in that area while the appropriate investigation is performed.

Air Quality	Temporary, minor impacts associated with construction activities such as dust and engine exhaust would occur (Alternatives 1 and 2).	Minimal impacts to air quality may result from operation of diesel generators for backup power. Other facility operations would have a negligible impact on air quality. Minimal impacts due to odors generated from the wastewater treatment process would occur. All alternatives (including the No Action Alternative) would occasionally produce detectable odors due to operation of existing facilities (pump stations and WWTPs).	Control measures for construction-related air pollution will be included in the construction specifications and will be enforced. Air quality permit for operation of generators. Odor control measures (such as carbon adsorption, removable grating, and plate covers) would be employed to control odors at all new facilities (Alternatives 1 and 2).
Noise Levels	Temporary nuisance noise may occur with construction (Alternatives 1 and 2).	Minimal ongoing impacts.	Equipment will be enclosed in buildings which will reduce noise pollution (Alternatives 1 and 2). Buildings that enclose blowers, pumps or other noise generating equipment will be constructed with noise attenuation features (Alternatives 1 and 2). The vegetated buffer around Alternative 2 will minimize noise impacts outside the new facility. Weekday only construction will occur during daylight hours.

Water Resources	Minor temporary impacts to surface water during construction (runoff and erosion) and after construction (increased impervious surfaces and urban runoff). No alternatives impact streams due to use of directional drilling.	Additional discharge of treated wastewater to Lake Wylie under Alternatives 1 and 2. Minor increase in site stormwater runoff. Minor changes to water quality in Lake Wylie. No increase in total amount of nutrients discharged to Lake Wylie as a result of any Alternative.	Post-construction controls are in place to reduce impact of increased impervious surfaces by requiring stormwater treatment and detention and total suspended solids removal. Post-construction regulations in Charlotte/Mecklenburg are stricter than required by the State. LID and other stormwater best management practices would be used at project site under Alternatives 1 and 2. Alternative 2 provides the most opportunity for LID utilization. Compliance with nutrient limits in NPDES permit would minimize impacts to water quality in Lake Wylie. Construction of new facilities under Alternatives 1 and 2 would decrease the potential for wastewater spills and sanitary sewer overflows (SSOs). Implementation of Fats, Oil and Grease (FOG) reduction programs reduce number of SSOs. Advanced treatment processes at new WWTP will maintain high quality effluent, which will prevent impact to water supplies in Lake Wylie. Facilities associated with Alternatives 1 and 2 have been relocated to reduce or eliminate impacts to streams. Directional borings would be used to cross the Catawba River, Fites Creek, Long Creek and Paw Creek to prevent stream impacts. Minimum buffer requirements for perennial streams will be met or exceeded.

Forest Resources	Alternative 1 results in the most loss of forest cover/use (about 25 acres). Alternative 2 disturbs about 15 acres of early successional forest land cover.	No ongoing impacts.	Alternative chosen would also determine the extent of previously-disturbed land to be used, the amount of disturbed land to be reused, and land compatibility. Facilities associated with Alternative 2 have been relocated to reduce or eliminate impacts to forested land cover (are located on previously disturbed land).
Fish, Shellfish, and Their Habitats	Increased stormwater runoff can elevate instream pollutants and cause minor impact.	Minor impact to aquatic habitat associated with treated wastewater discharge to Lake Wylie. Potential improvements in low flow habitat volume (higher minimum flows) under Alternatives 1 and 2.	Stormwater BMPs and stringent effluent discharge limits will minimize impacts to aquatic habitats
Wildlife and Natural Vegetation	Most loss of wildlife habitat (mixed mesic hardwood forest) under Alternative 1. Alternative 1 would impact individual Schweinitz's sunflowers.	Schweinitz's sunflower habitat could be both produced and impacted under all alternatives.	Forested open space preservation opportunities possible for Alternative 2 would provide wildlife resource benefits (between 60 and 80 acres). Relocation of individual Schweinitz's sunflower plants and development of a mitigation plan in consultation with the USFWS. Alternative 2 would not impact individual Schweinitz's sunflowers.
Toxic Substances	Construction vehicles may release small amounts of oils or grease into the area (Alternatives 1 and 2).	Chemical storage and feed facilities will be provided for chemicals used in the treatment process (All Alternatives including No Action Alternative). Diesel storage tanks will be located on the facility site for standby generators, boilers, and fuel dispensing (All Alternatives including No Action Alternative).	All chemical storage and feed areas will be provided with secondary containment (Alternatives 1 and 2) and comply with all safety features required by NC building codes. Diesel tanks would be provided with secondary containment and leak detection systems (Alternatives 1 and 2).

6.15.2 Secondary and Cumulative Impacts Summary

Alternatives 1 and 2 would generate almost identical secondary and cumulative impacts within the service area. As such, secondary and cumulative impacts associated with Alternatives 1 and 2 will be summarized together and compared to the No Action Alternative. Depending on the alternative chosen, secondary and cumulative impacts could occur as one of two general scenarios:

1. A new regional wastewater facility would be built at the proposed locations, as discussed in Alternatives 1 and 2.
2. The No Action Alternative is chosen. Under the No Action Alternative, both Mount Holly and Belmont's WWTPs would be upgraded to meet nutrient limits; however, wastewater services would not be expanded for the City of Mount Holly, the City of Belmont, or Utilities. If this were to occur, Utilities would be forced to explore other options for its increasing wastewater treatment demands. Additional wastewater could be treated at either the McAlpine Creek WWMF or Irwin Creek WWTP since the Charlotte-Mecklenburg Utilities collection system has interconnections to maintain flexibility and ensure high levels of treatment. Mount Holly would not expand and additional wastewater needs would be met through septic systems or smaller package WWTPs, where allowed by zoning and overlay districts.

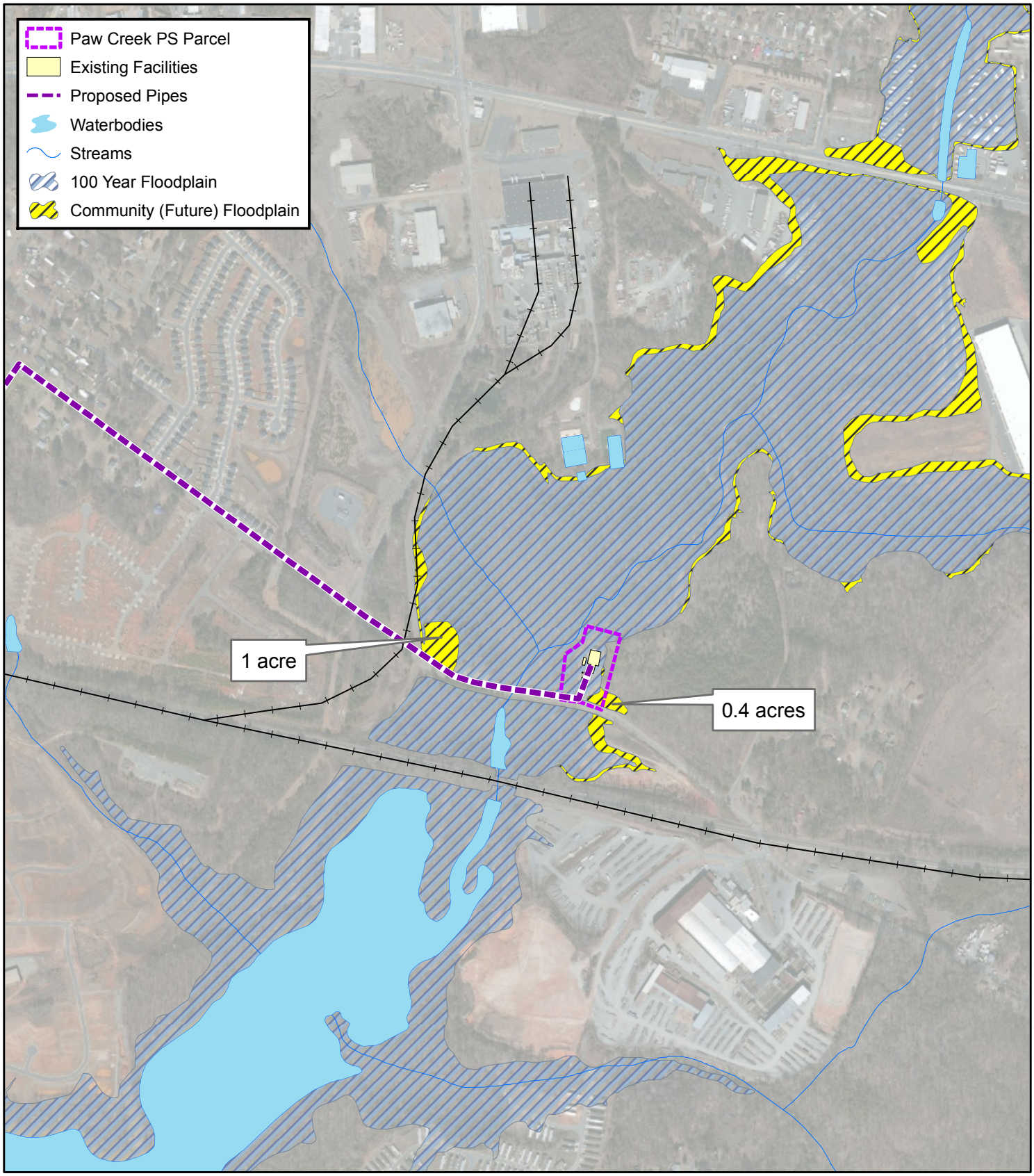
The expected secondary and cumulative impacts associated with these scenarios are compared generally in Table 6-5.

Table 6-5 General Secondary and Cumulative Impacts by Alternative

Alternative	Secondary and Cumulative Impacts
New Wastewater Facility Alternatives (Alternatives 1 and 2)	Where allowed by existing rules and ordinances, Alternatives 1 and 2 enable more dense development patterns, along with associated increases in impervious surfaces, which may have negative impacts on surface water quality, groundwater recharge, wildlife habitat, and wetlands. Proximity of facility to the National Whitewater Center may have positive (increased access, additional preserved areas) effects on recreation (Alternative 2 only). Consistent with land use master plans. Consistent with regional wastewater study for entire Charlotte-Mecklenburg area. Reduces energy use and greenhouse gas generation by ultimately eliminating long-distance wastewater pumping to the McAlpine Creek WWMF. Increases power production capability at Lake Wylie dam. Provides additional water volume to supplement low flows in Lake Wylie. Continuing growth and development is facilitated within both Utilities' and Mount Holly's service areas. Eliminates existing Belmont NPDES permitted discharge to the River.
No Action Alternative	Inconsistent with land use master plans. New development density would be limited, promoting sprawl inside and outside of service area. Additional growth serviced by utilizing septic systems and package WWTPs. Multiple wastewater discharges with less regulatory control of effluent quality or consistency. Potential Mount Holly and Utilities expansion at other locations.

Most of the potential secondary and cumulative impacts that would occur under Alternatives 1 and 2 would also be expected to occur with the No Action Alternative. Differences will be seen primarily in the geographic distribution of secondary and cumulative impacts and in the location where the treated wastewater enters the Catawba River system.

Under the No Action Alternative, a large quantity of water will be introduced back into the Catawba system in South Carolina downstream of Lake Wylie. Under Alternatives 1 and 2, this water will be introduced to Lake Wylie where it could be used for power generation, recreational use, cooling water, reuse, and low flow supplementation.



0 700 1,400 Feet
0 220 440 Meters

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Figure 6.1a
Mecklenburg County
Extent of Community (Future) Floodplains
near Paw Creek Pumping Station

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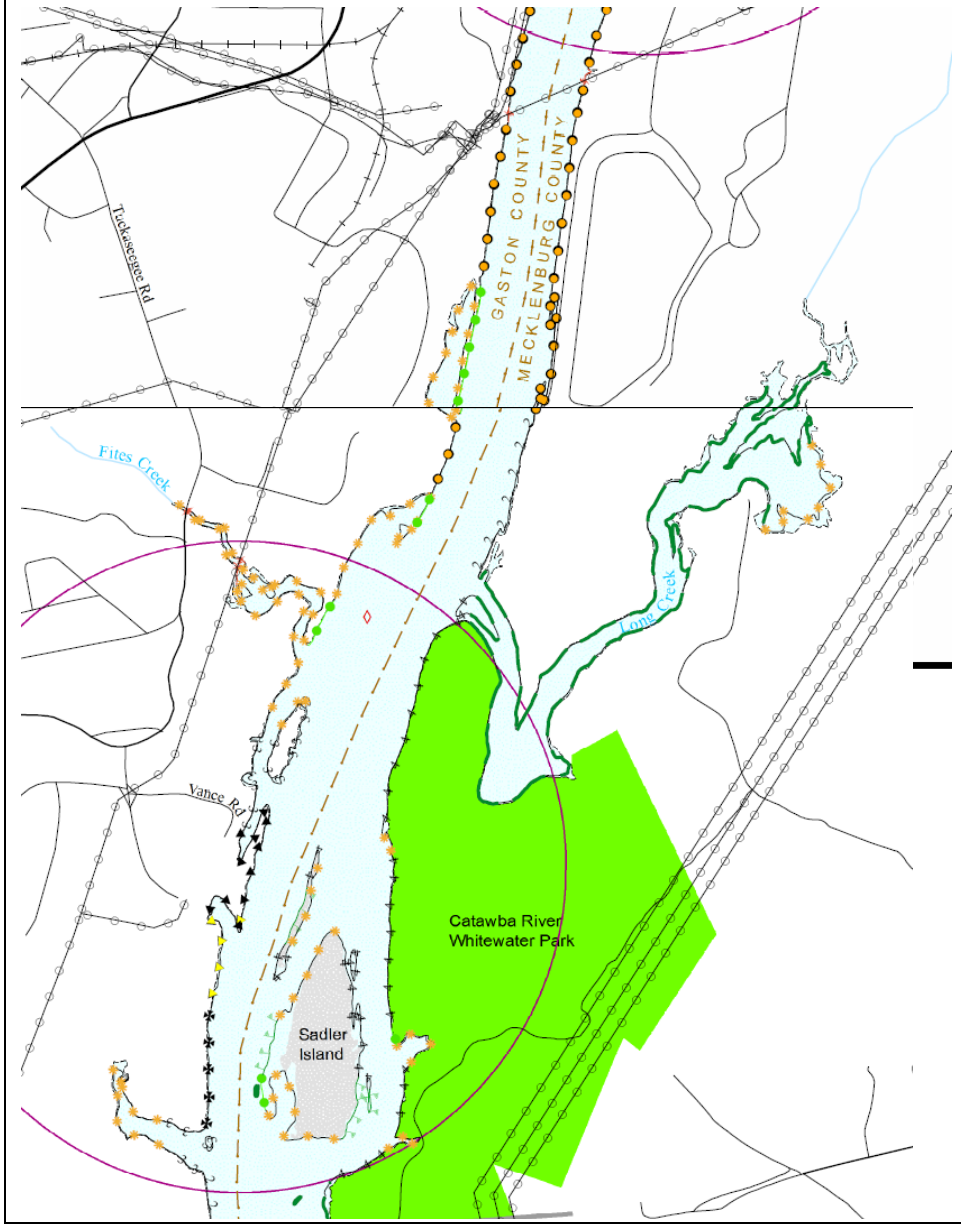
Date: 11/02/2013; PM: LE; Author: MV; Project #: 1126005; File: T:_PROJECTS\07CMU_EIS\MXD\Section 6\Revised_October2013\Fig6.1_CommunityFutureFloodplains_PCPS.mxd



Commercial Marina	7.0 Miles	2.0 %
Residential Marina	3.3 Miles	1.0 %
Residential	138.4 Miles	40.7 %
Business / Industrial	3.4 Miles	1.0 %
Public Recreation	3.0 Miles	0.9 %
Public Infrastructure	18.9 Miles	5.6 %
Project Operations	1.7 Miles	0.5 %
Natural	23.3 Miles	6.8 %
Natural: Isolated Berm	0.5 Miles	0.2 %
Bottomland Hardwood Area	0.3 Miles	0.1 %
Future Commercial Marina	5.1 Miles	1.5 %
Future Residential Marina	9.2 Miles	2.7 %
Future Residential	28.8 Miles	8.4 %
Future Public Recreation	10.1 Miles	3.0 %
Impact Minimization Zone (IMZ)	9.1 Miles	2.6 %
IMZ Developed	1.1 Miles	0.3 %
Environmental	77.1 Miles	22.7 %
Shoreline Classification Totals	**340.3 Miles**	**100 %**
Full Pond Shoreline Total	**348.5 Miles**	

SHORELINE MANAGEMENT PLAN
CATAWBA-WATEREE PROJECT
WYLIE DEVELOPMENT

Lake Wylie FERC Project No. 2232
Gaston (NC), Mecklenburg (NC) and York (SC) Counties
Sheet 7 of 7

0 0.25 0.5 0.75 1
Miles

- FERC Hydro Plant Property
- FERC Project Public Access Area
- Public Parks (e.g. city, regional, etc.)
- Licensee-owned Islands
- Downstream Clear Zone (DCZ)
- Project Water
- Project Boundary
- Bouys (Location provided by State Wildlife Resource Mgmt. Agencies)
- Electric Transmission Line

N W E S

August 2006

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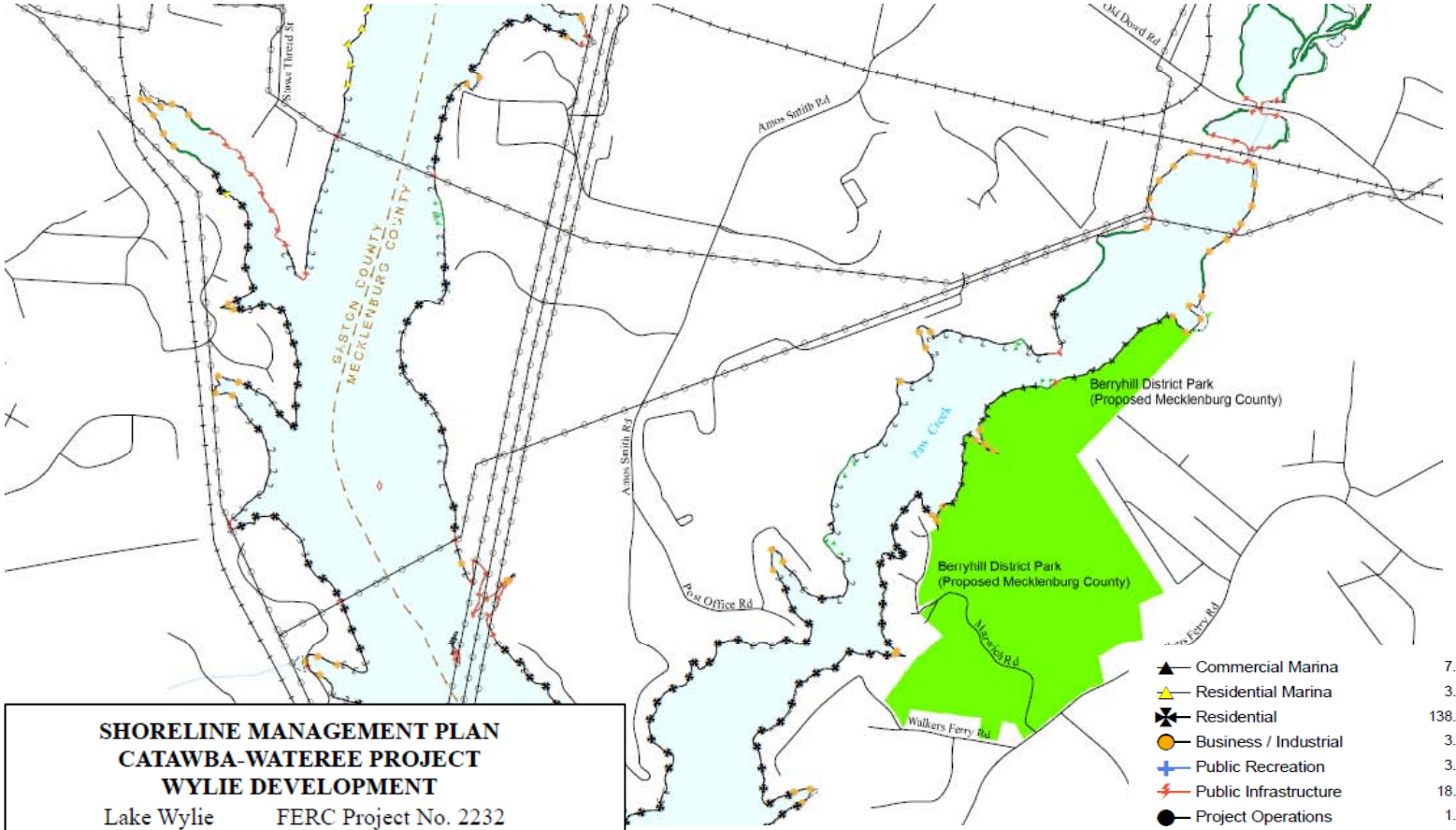
Proposed Regional WWTP EIS
Figure 6.3a– Duke SMP Classification



SHORELINE MANAGEMENT PLAN
CATAWBA-WATEREE PROJECT
WYLIE DEVELOPMENT

Lake Wylie FERC Project No. 2232

Gaston (NC), Mecklenburg (NC) and York (SC) Counties

Sheet 5 of 7

0 0.25 0.5 0.75 1 Miles

- FERC Hydro Plant Property
- FERC Project Public Access Area
- Public Parks (e.g. city, regional, etc.)
- Licensee-owned Islands
- Downstream Clear Zone (DCZ)
- Project Water
- Project Boundary
- Bouys (Location provided by State Wildlife Resource Mgmt. Agencies)
- Electric Transmission Line

N W E S

August 2006

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Commercial Marina	7.0 Miles	2.0 %
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Public Infrastructure	18.9 Miles	5.6 %
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Future Commercial Marina	5.1 Miles	1.5 %
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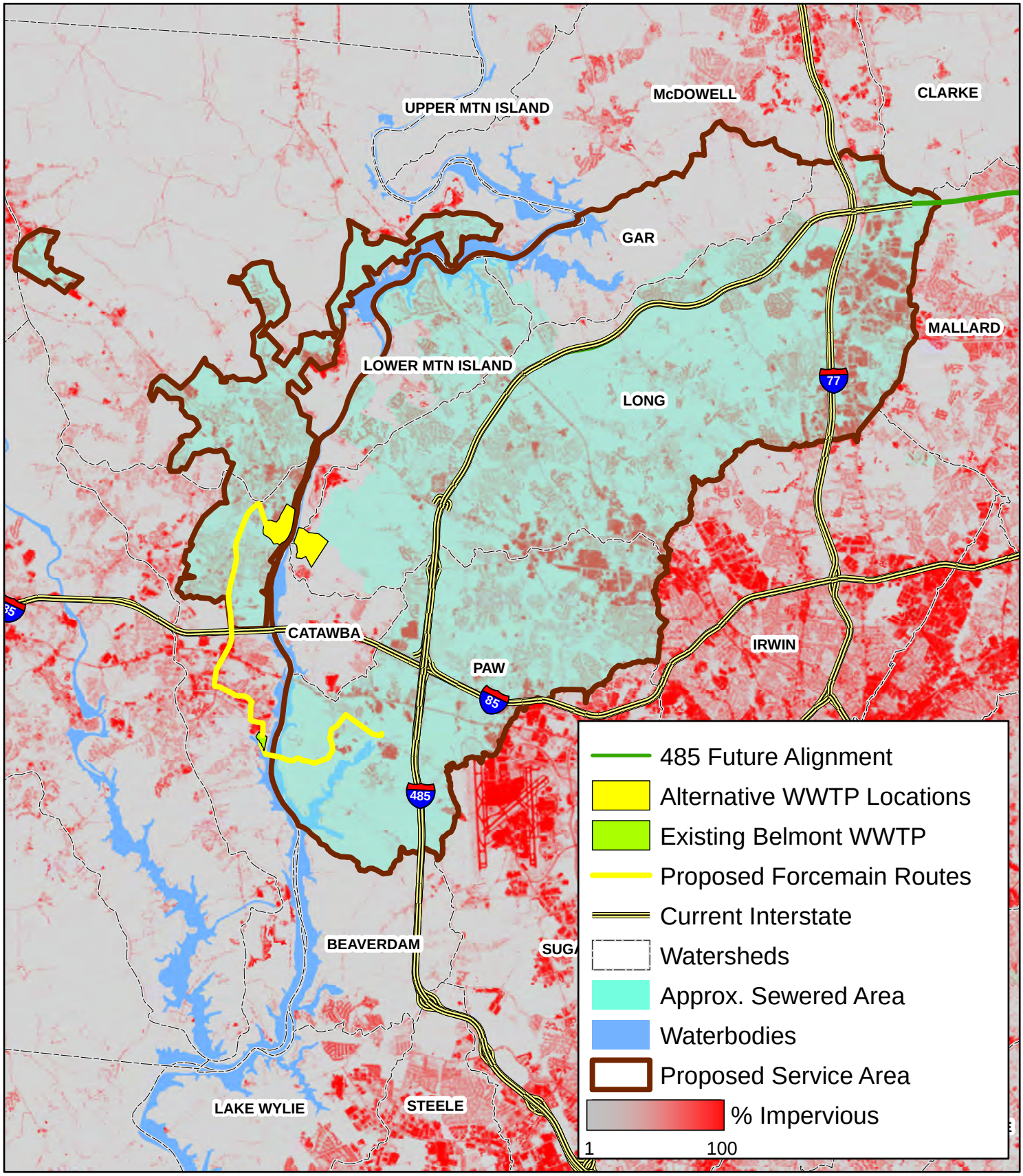
Future Residential	28.8 Miles	8.4 %
Future Public Recreation	10.1 Miles	3.0 %
Impact Minimization Zone (IMZ)	9.1 Miles	2.6 %
IMZ Developed	1.1 Miles	0.3 %
Environmental	77.1 Miles	22.7 %
Shoreline Classification Totals	**340.3 Miles**	**100 %**
Full Pond Shoreline Total	**348.5 Miles**	

Proposed Regional WWTP EIS
Figure 6.3b– Duke SMP Classification



0 10,000 20,000 Feet

0 3,200 6,400 Meters

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Figure 6.3c

Impervious and Sewered Areas

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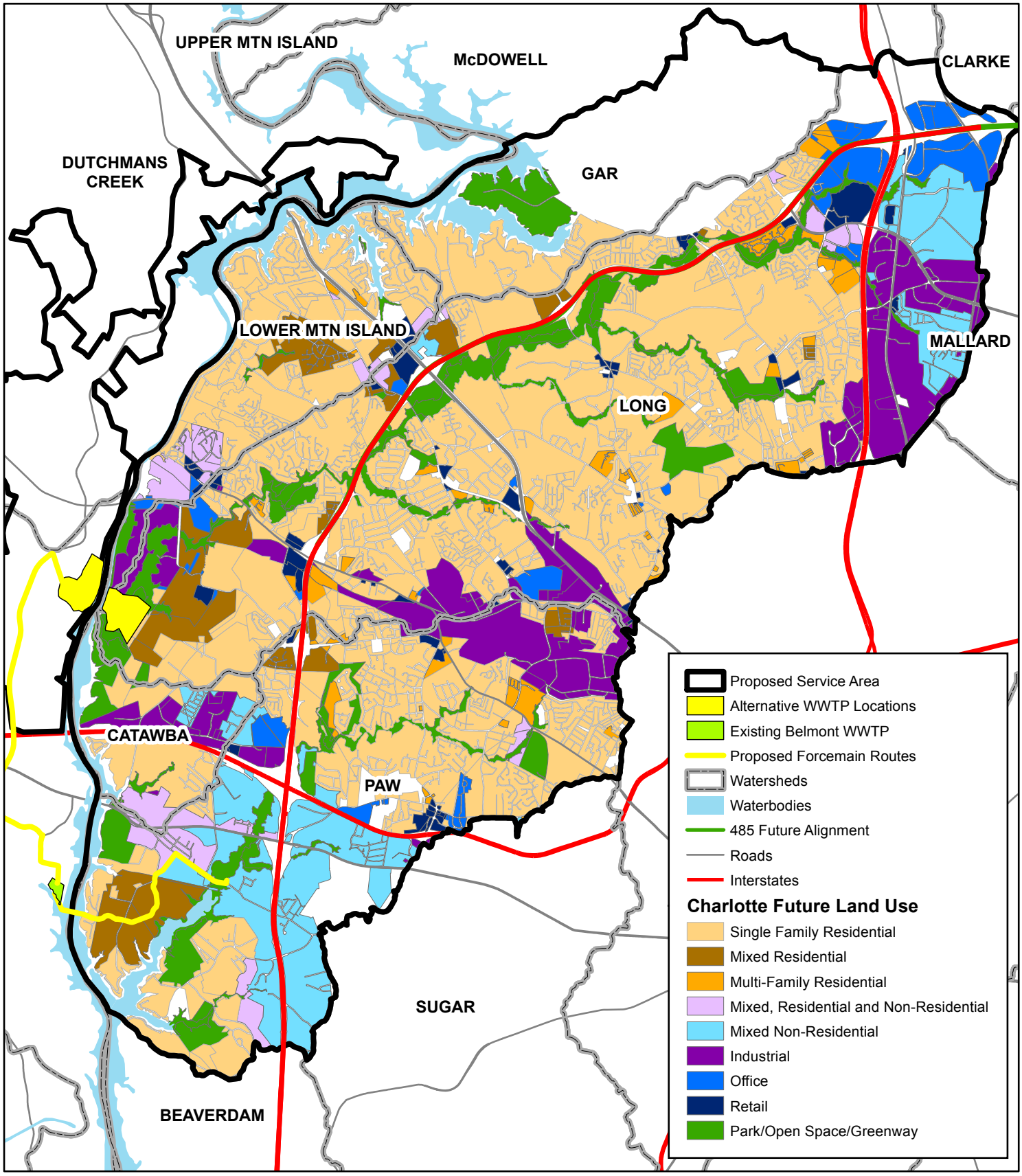

0 8,000 16,000 Feet

0 2,500 5,000 Meters

Source: Charlotte-Mecklenburg GIS, NCDOT, NCDENR

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Figure 6.3d
Charlotte Future Land Use

Proposed Regional WWTP

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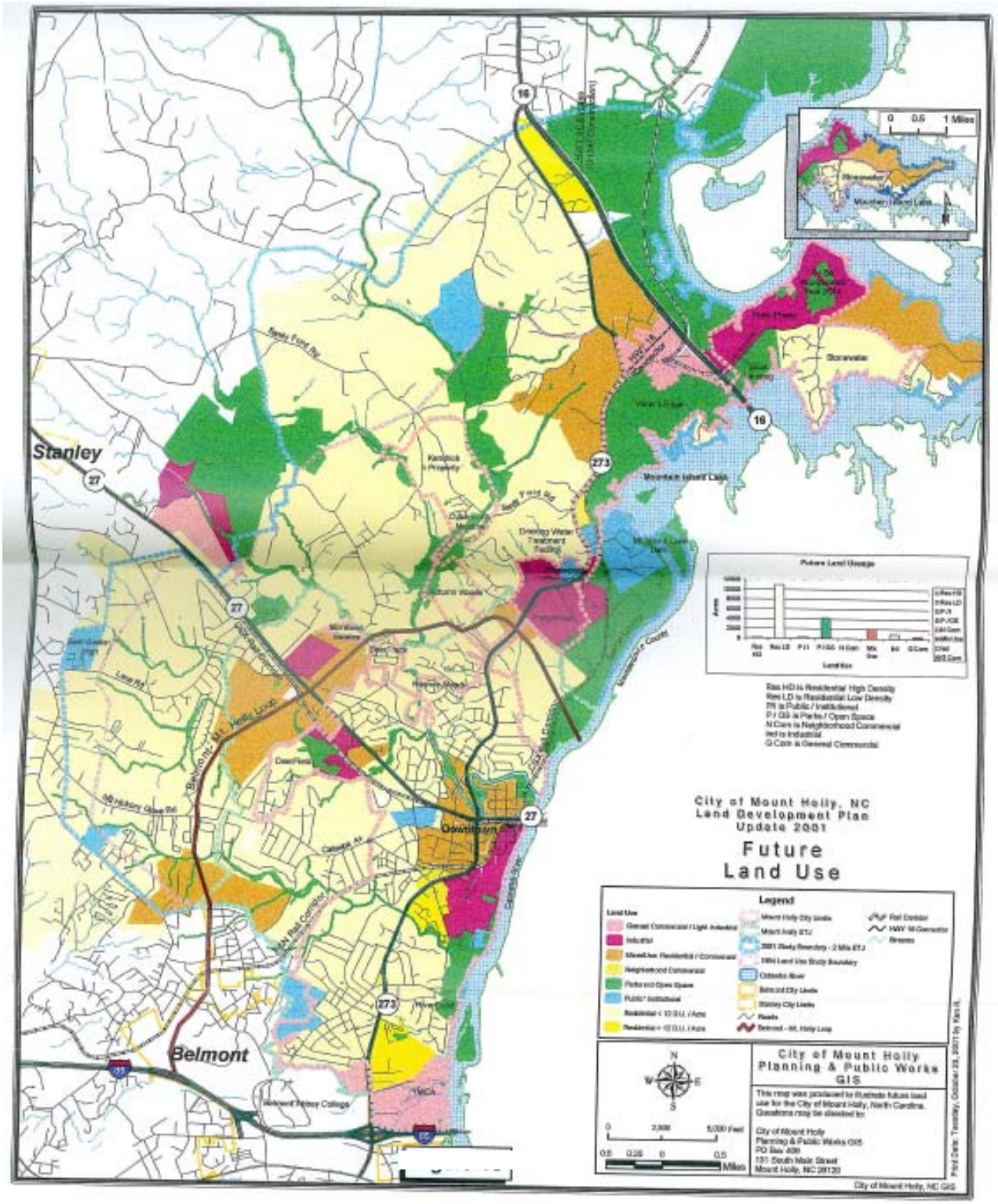
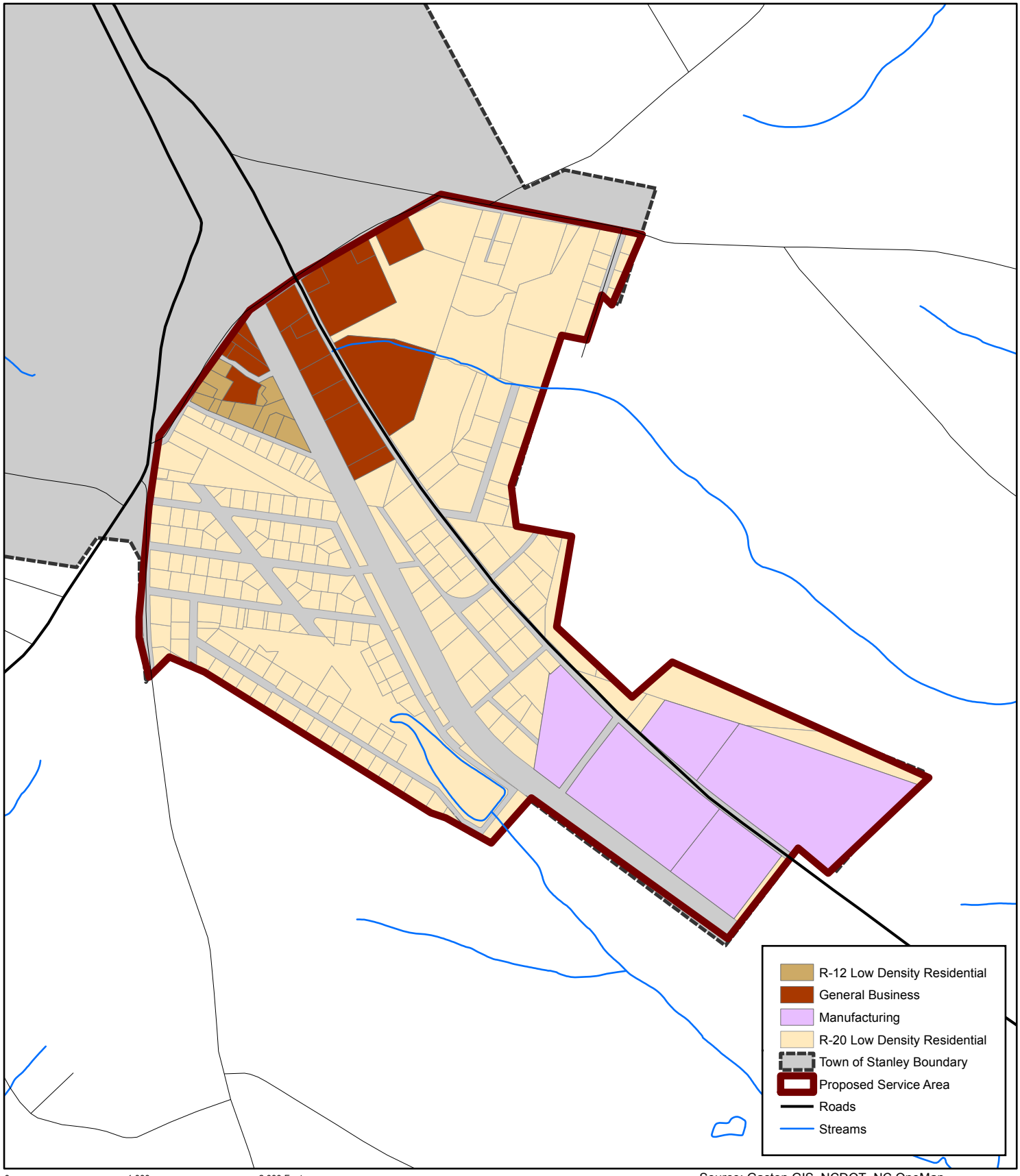


Figure 6.3e
Gaston County Future Land Use



0 1,000 2,000 Feet
0 325 650 Meters

Source: Gaston GIS, NCDOT, NC OneMap

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Figure 6.3f
Town of Stanley Zoning

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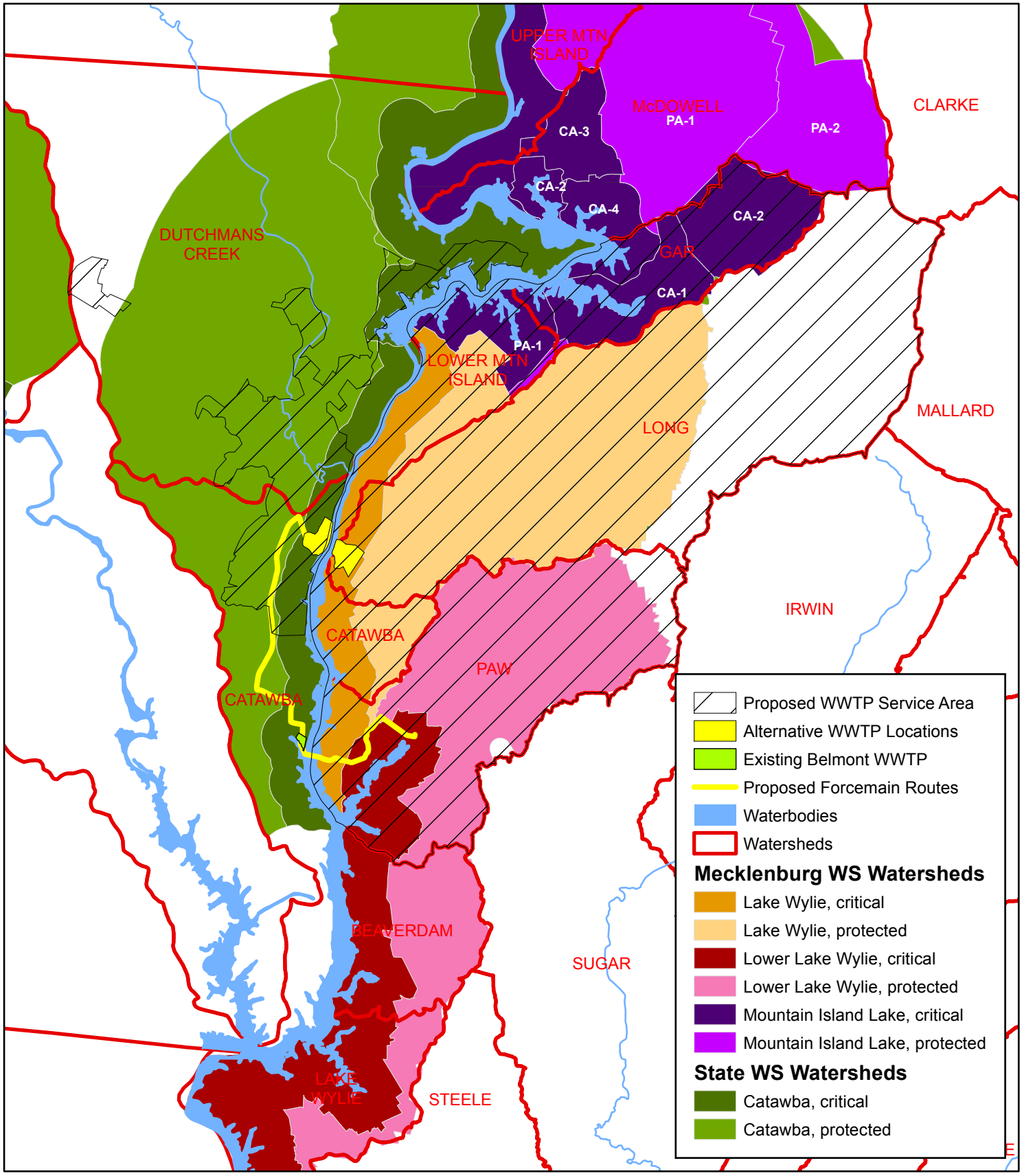

0 12,000 24,000 Feet

0 3,500 7,000 Meters

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Figure 6.3g
Water Supply Watershed Types

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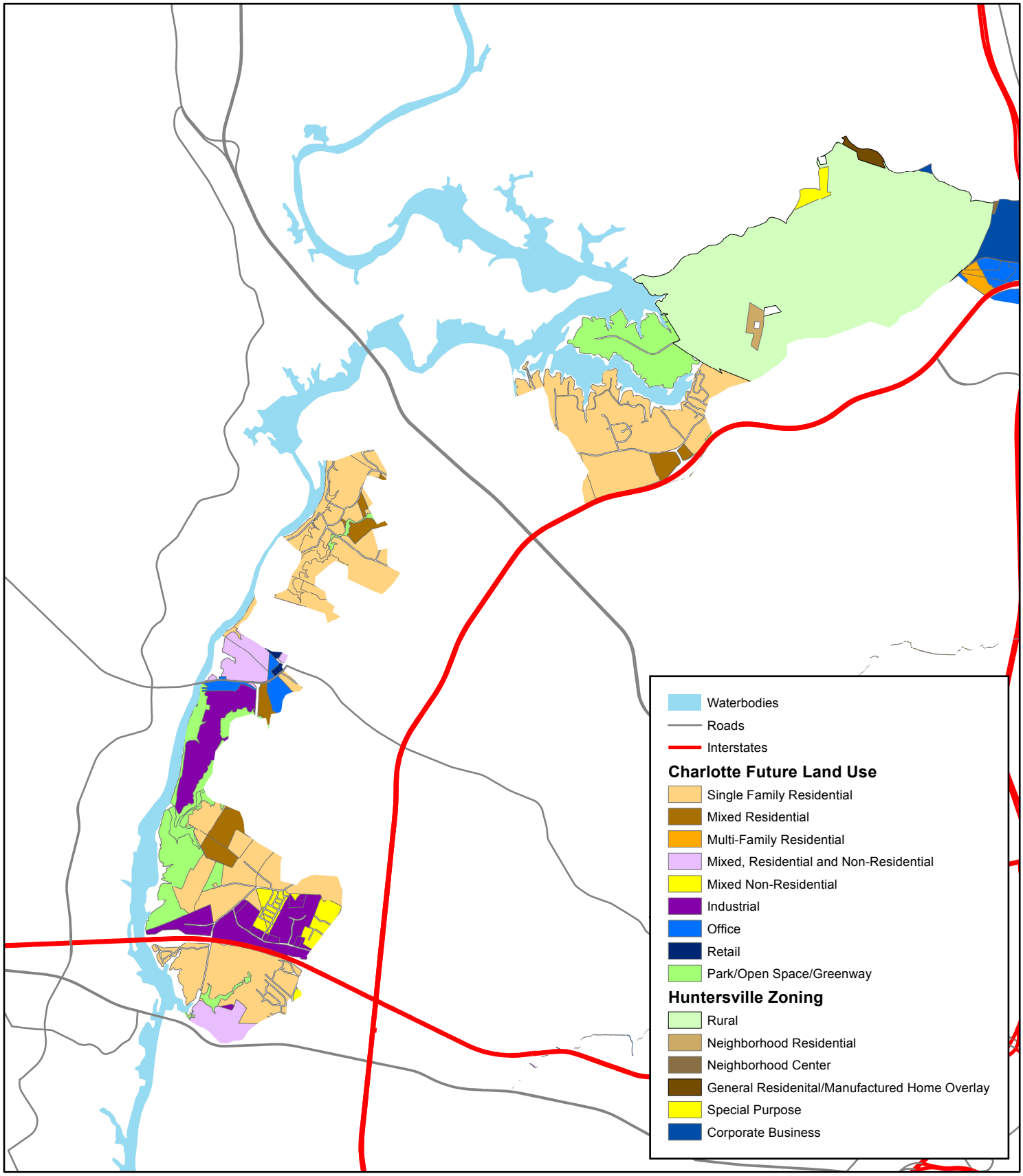

0 8,000 16,000 Feet

0 2,500 5,000 Meters

Source: Charlotte-Mecklenburg GIS, NCDOT, NCDENR

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Figure 6.3h
Future Land Use and Zoning
in Unsewered Areas
Proposed Regional WWTP

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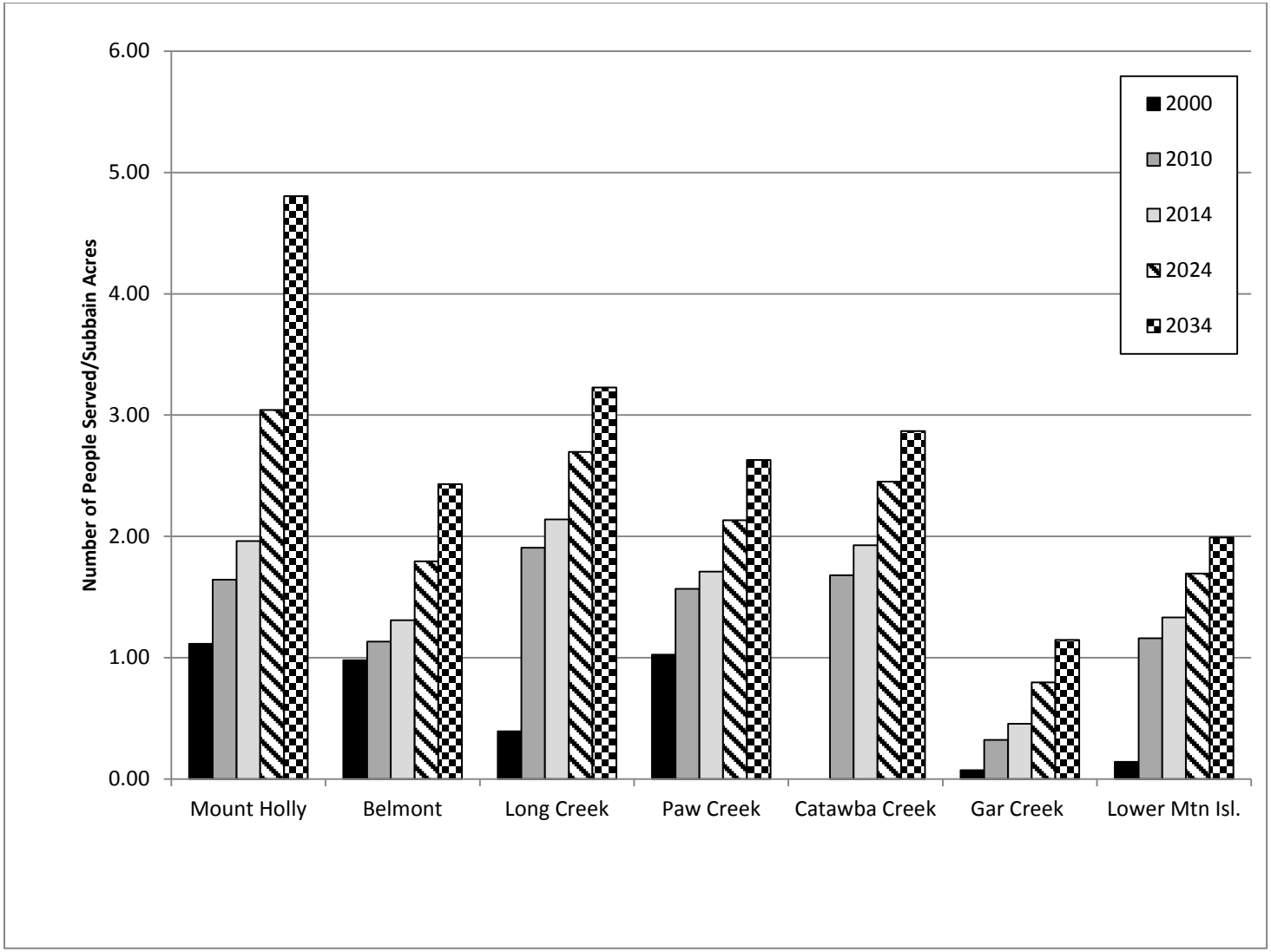
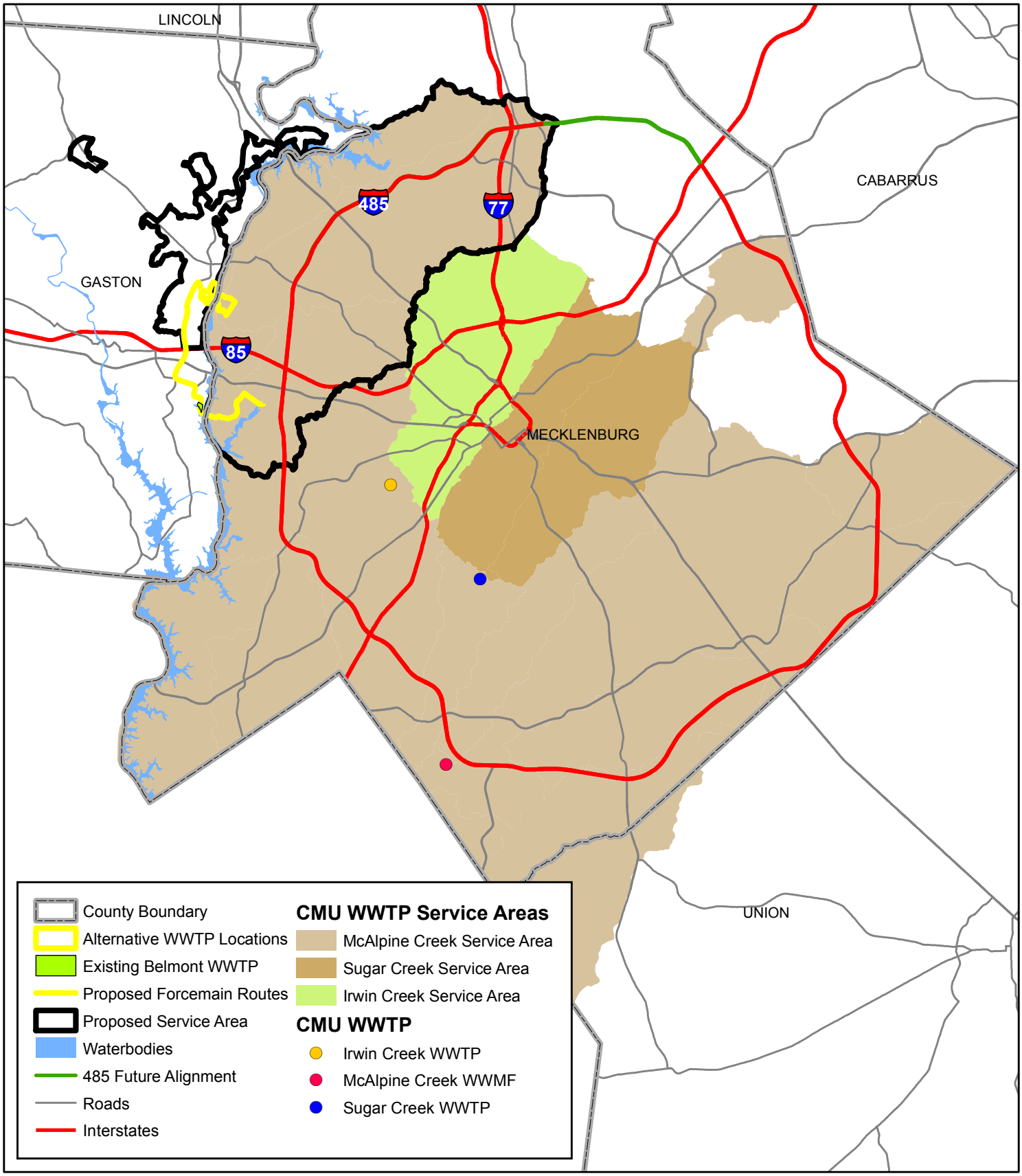


Figure 6.3i
Future Wastewater Customer Density by Sub-basin



0 20,000 40,000 Feet
0 6,000 12,000 Meters

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Figure 6.10a. CMU Service Areas

Proposed Regional WWTP

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Section 7. Mitigative Measures

Some direct and secondary and cumulative impacts would occur as a result of any of Alternatives 1, 2 or the No Action Alternative. The potential direct environmental consequences of the proposed action at the project sites have been considerably reduced as a result of avoidance and minimization during the site selection process. A substantial number of programs (local, state, and federal) currently in place would further serve to minimize and mitigate direct impacts on the site as well as secondary and cumulative impacts throughout the service area. A summary of these programs, policies, and regulations is discussed in Section 7.15. Impact minimization and mitigation measures are discussed in detail in this section. A list of the individual ordinances and policies referred to in this section are presented on a CD included in Appendix J..

Site/Facility Minimization and Mitigation Measures

Utilities, City of Mount Holly, and City of Belmont would use site and facility construction techniques and compliance with local regulations to ensure that direct and secondary impacts at the site would be minimized to the extent practicable. Enhancements to site design, construction, and operation that would minimize impacts include:

- **Leadership in Energy and Environmental Design (LEED)** – A new regional facility would be designed, constructed and maintained using LEED standards for sustainability, water efficiency, energy and emissions, materials and resources, indoor environmental quality, and innovation in the design process where feasible.
- **Low Impact Development (LID)** – A new regional facility would use LID methods to control and treat stormwater by using innovative techniques. The project team is considering green roofs, rain gardens, and/or infiltration trenches.
- **Landscaping** – Native plants would be used as much as practicable in facility landscaping to provide habitat.
- **Site Recreational Enhancements and Opportunities** – A new regional facility would capitalize on its proximity to the U.S. National Whitewater Center, existing open space, and plans for development of a regional greenway to provide complementary open space and recreational opportunities.
- **Advanced Wastewater Treatment** – A new regional facility would be designed to provide advanced wastewater treatment including nutrient removal, ultraviolet light (UV) disinfection (reduces the use of chlorine), spill prevention and containment features, odor control, noise and lighting reduction components.

7.1 Topography and Floodplains

Impacts to floodplains in the service area would be minimized by compliance with programs, policies, and rules established by the DWR, the Duke Energy Shoreline Management Plan, Mecklenburg County Stormwater Services, Gaston County, the City of Mount Holly, and the United States Army Corps of Engineers (ACOE).

The Federal Emergency Management Agency (FEMA) regulates 100-year floodplains and floodways across the United States through community participation in the National Flood Insurance Program (NFIP). To participate in the NFIP, communities are required to comply with federal and/or more stringent local floodplain ordinances, providing protections within the floodway and the 100-year (or "regulatory") floodplain. Floodways and floodplains are delineated and recorded on Flood Insurance Rate Maps (FIRMs). The most recent revisions to FIRMs in North Carolina include a digital version (DFIRMs). The participation in the NFIP by communities within the service area is discussed below. A summary of Floodplain Protection measures is provided in Table 7-1.

7.1.1 Mecklenburg County Portion of Service Area

Local floodplain ordinances within the City of Charlotte and Mecklenburg County are more stringent than required by FEMA for participation in the NFIP. Specific areas where federal standards are exceeded by these communities' ordinances include:

- Wider floodways are protected under the Mecklenburg County ordinance. Digital Flood Insurance Rate Maps (DFIRMs) for Mecklenburg County communities include both a standard FEMA floodway and a "community encroachment area." The standard FEMA floodway allows 1 foot of rise above the Base Flood Elevation (BFE); the community encroachment area allows only 0.2 feet of rise. Floodway regulations are applied to the wider area encompassed by the community encroachment area.
- Mecklenburg County was the first county in the nation to include future conditions (or "community") 100-year floodplains on its floodmaps. Community 100-year floodplains are delineated based on the future, potential built-out conditions of the watershed; standard regulatory floodplains are based on current land use conditions. Mecklenburg County requires compliance with floodplain ordinances for any new construction and/or substantial improvements to existing construction within both the 100-year regulatory and the 100-year community floodplain. Studies completed in 2000 showed that if only existing conditions land use was used in Mecklenburg County (as required minimally by FEMA), base flood elevations (BFEs)would be under-predicted by an average of about 2.2 feet.
- Dryland access during flood conditions to habitable buildings is required.
- Substantial damages and improvements are calculated cumulatively over a 10-year period.
- The lowest space in any new parking lot is required to be 6 inches below the Community BFE or higher.
- Two feet of freeboard above the BFE is required for development in both the regulatory and community floodplains along the Catawba River. In all other locations, one foot of freeboard above the BFE or Community BFE is required. In all locations within the special flood hazard area where a BFE is not established, structures must be elevated 2 feet above the highest adjacent grade.
- Levee standards are required.

Table 7-1 Floodplain Protection

Municipality	Protected Areas	Development Limitations	Legal Authority
Town of Huntersville	Special Flood Hazard Areas (FEMA and future conditions 100-year floodplain, including the FEMA floodway and Community Encroachment area.) 500-year floodplain also receives some protections.	Floodlands development permit required. 1-foot of freeboard required (2-feet along the Catawba River including Lake Wylie and Mountain Island Lake). Nonresidential structures may floodproof in lieu of elevation. No encroachment or fill in the floodway is allowed that would result in a rise in flood elevation without a letter of map revision from FEMA.	Floodplain Regulations of Huntersville North Carolina. The Town of Huntersville designated Mecklenburg County as Floodplain Administrator to implement its floodplain ordinance.
Mecklenburg County	Special Flood Hazard Areas (FEMA and future conditions 100-year floodplain, including the FEMA floodway and Community Encroachment area.) 500-year floodplain also receives some protections.	Floodlands Development Permit required. 1-foot of freeboard required (2-feet along the Catawba River including Lake Wylie and Mountain Island Lake). Nonresidential structures may floodproof in lieu of elevation. No encroachment or fill in the floodway is allowed that would result in a rise in flood elevation without a letter of map revision from FEMA.	Mecklenburg County Floodplain Regulations, December 19, 2000
City of Charlotte	Special Flood Hazard Areas (FEMA and future conditions 100-year floodplain, including the FEMA floodway and Community Encroachment area.) 500-year floodplain also receives some protections.	Floodplain Development Permit and FEMA elevation or floodproofing certificate required. The City has a General Floodplain Development Permit and an Individual Floodplain Development Permit. 1-foot of freeboard required (2-feet along the Catawba River including Lake Wylie and Mountain Island Lake). Nonresidential structures may floodproof in lieu of elevation. In areas where no BFE is established, must elevate to 2-feet above highest adjacent grade. Flood hazard reduction required in special flood hazard areas. No encroachment or fill in the floodway is allowed that would result in a rise in flood elevation without a letter of map revision from FEMA.	Code of the City of Charlotte, Chapter 9 Floodplain Regulations, July 1, 2007 Mecklenburg County reviews all floodplain development permits and inspects construction.

City of Mount Holly	Special flood hazard areas (100-year floodplain and floodway)	New construction or substantial improvements must be elevated to 2 feet above the BFE or highest adjacent grade where there is no BFE. Floodproofing is allowed in lieu of elevation for non-residential structures. No encroachment or fill in the floodway is allowed that would result in a rise in flood elevation without a letter of map revision from FEMA.	Article XVI Flood Plain Management of Chapter 20 Zoning Ordinance
Town of Stanley	See Gaston County Floodplain Ordinance.	See Gaston County Floodplain Ordinance.	See Gaston County Floodplain Ordinance.
Gaston County	Special Flood Hazard Areas established by FEMA (100-year floodplain)	New construction or substantial improvements must be elevated to 3 feet above the BFE. Floodproofing is allowed in lieu of elevation for nonresidential structures. No encroachment or fill in the floodway is allowed that would result in a rise in flood elevation without a letter of map revision from FEMA.	Flood Damage Prevention Regulations (effective 01/22/09), Chapter 16 of Gaston County Unified Development Ordinance; Unincorporated areas of the County and areas where the municipality is not providing review.

7.1.2 Gaston County Portion of Service Area

The Gaston County Flood Damage Prevention Ordinance (Adopted January 22, 2009 as Chapter 16 of the unified development ordinance (UDO)) adopted current DFIRMs as the County's flood maps and established floodplain development standards that are more restrictive than required by FEMA. The County requires three feet of freeboard above the 100 year BFE, or for structures to be elevated 3 feet above the highest adjacent grade in 100 year floodplains without BFEs. This may be achieved by elevation for residential structures or floodproofing in lieu of elevation for non-residential structures. Additionally, no hazardous chemical or waste sites or variances for them are allowed in the 100 year floodplain.

The City of Mount Holly's Floodplain Management Ordinance (Section XVI of Zoning Ordinance) also provides protections in addition to minimum NFIP requirements. The City requires two feet of freeboard above the 100 year BFE. This may be achieved by elevation for residential structures or floodproofing in lieu of elevation for non-residential structures. Gaston County provides flood damage prevention administration for the County and the Town of Stanley.

7.2 Soils

Soil erosion and sediment control measures are determined by county and local ordinances as outlined in Table 7-2 and described below.

7.2.1 Mecklenburg County Portion of Service Area

Soil Erosion and Sediment control ordinances in Charlotte and Mecklenburg County require that a certified individual be on-site to conduct weekly site inspections when land is being disturbed or developed. These ordinances specify that any activity disturbing more than one acre of land must have an erosion and sediment control plan and take all reasonable measures to protect all public and private property from damage caused by disturbance activities and associated sedimentation. Mandatory standards to which land-disturbing activities must comply include:

- Wetland protection, and
- Graded slopes and fills must be at an angle that can be retained by vegetated cover and must be planted within 15 working days or 30 calendar days.

7.2.2 Gaston County Portion of Service Area

Gaston County provides erosion and sediment control permitting and inspection services for the City of Mount Holly, the Town of Stanley and unincorporated areas within the County. Gaston County's Soil Erosion and Sedimentation Control Ordinance (adopted April 2003 and revised June 28, 2007) specifies minimum stream buffer widths, erosion control practices, and sediment and erosion control plan requirements. An Erosion and Sediment Control Plan is required for all activities that disturb one or more acres of land. Erosion and sediment control measures are designed to provide protection from the ten year storm. Additional controls are required in high quality water zones (HQW); however, there are no HQWs within the service area.

Table 7-2 Soil Erosion and Sedimentation Control Ordinances

Municipality	Plan Required	Standards	Applicability and Legal Authority
Town of Huntersville	Same as Mecklenburg Co.	Same as Mecklenburg Co.	Adopted Mecklenburg County's Soil Erosion and Sedimentation Control Ordinance. Mecklenburg County provides plan review and inspection services.
Mecklenburg County	≥ 1 acre but all land disturbing activities required to provide adequate erosion control measures	Design protection for 10 year storm. Wetland and buffer protection Establish permanent ground cover 21 days after completion of construction; Weekly monitoring record Pre-construction conference; Encourage keeping uncovered area to <20 acres	Soil Erosion and Sedimentation Control Ordinance, amended October 2008. Unincorporated areas of County with exemptions for agriculture and forestry.
City of Charlotte	Same as Mecklenburg Co.	Same as Mecklenburg Co.	Soil Erosion and Sedimentation Control Ordinance applies to City of Charlotte, unincorporated Mecklenburg Co., and Charlotte's ETJ.
City of Mount Holly	Same as Gaston Co.	Same as Gaston Co.	Gaston County enforces the County's Soil Erosion and Sedimentation Control Ordinance within Mount Holly.
Town of Stanley	Same as Gaston Co.	Same as Gaston Co.	Gaston County enforces the County's Soil Erosion and Sedimentation Control Ordinance within Stanley.
Gaston County	≥1 acre	Lake and watercourse buffers of at least 10 feet; visible siltation must not discharge through the buffer zone. Design protection for 10 year storm High Quality Water Zones (15A NCAC 2B.0101(e)(5): uncovered areas limited to 20 acres; design protection for the 25 year storm; additional sediment basin settling requirements; slope restrictions on open channels; permanent land cover established within 60 days of completion.	Soil Erosion and Sedimentation Control Ordinance (revised 6/28/07). Applies to unincorporated areas of the County with exemptions for agriculture and forestry.

7.3 Land Use and Land Cover

Impacts associated with land use and land cover, generally expressed as changes in stormwater quality and volume, and water quality, would be minimized and mitigated through compliance with National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer systems (MS4) permit requirements, riparian buffer rules, floodplain protection ordinances, stormwater ordinances, permitting and inspection programs, and local planning programs. Local planning processes seek to preserve existing open space and direct the development of new recreational areas. Zoning and subdivision ordinances and local planning efforts establish complementary land uses, control impacts, and direct growth.

7.3.1 Charlotte-Mecklenburg 2015 Plan

The 2015 Plan, "Planning for Our Future" was adopted by the Charlotte-Mecklenburg Planning Commission in 1997. Unlike its precursor (the 2005 Plan), the 2015 Plan is not a land use plan. Instead, the 2015 Plan establishes a number of priority areas on which focus is placed to ensure that Charlotte-Mecklenburg remains economically viable and continues to offer a high quality of life. Future land use GIS data for the Charlotte-Mecklenburg area was developed by the Mecklenburg Planning department using multiple planning documents.

Growth is anticipated by the 2015 Plan. It predicts that between 1998 and 2015, Charlotte-Mecklenburg will be home to 250,000 more people, have 250,000 more cars on its roadways, 120,000 more housing units, and will host 200,000 more jobs.

The 2015 Plan applies to the entire Mecklenburg County side of the service area. Two key goals of the 2015 Plan are directly facilitated by the new regional facility. These are to:

- "Provide the infrastructure and facilities that support economic growth," and
- "Build regional and local concurrence to coordinate land use, transportation, utility and environmental planning, and public service delivery in the metro region."

The 2015 Plan has the following objectives:

- Assess growth assumptions set forth in 2005 Plan and extend projections into 2015.
- Identify and clarify key community issues.
- Establish goals to achieve Charlotte-Mecklenburg's long-term vision of a successful community.
- Provide direction for staff in developing work programs and identifying priority projects.
- Link City and County initiatives to the community's long term goals and objectives.

7.3.2 Charlotte – Mecklenburg General Development Policies

Charlotte-Mecklenburg's General Development Policies (GDP) provide guidance regarding the location, intensity, and form of future development and redevelopment throughout the area. The GDP are broad policies used when updating zoning and subdivision ordinances, as well as integrating land use planning with

capital facilities planning, particularly transportation planning. The Environment and Infrastructure chapters of the GDP are most relevant to the Regional Wastewater Treatment Plant project.

7.3.2.1 GDP Environmental Chapter

The Environmental Chapter of the GDP identifies a key development focus: encourage a more compact, multi-use development pattern, including appropriate infill and redevelopment, to enable people to live, work and shop in close proximity. This type of a development pattern is only possible with the availability of off-site wastewater treatment.

GDP strategies for reducing the impact of non-point pollution on water quality include:

- Minimizing impervious surface area.
- Improving the quality of stormwater run-off.
- Reducing erosion and sedimentation.

The GDP establishes the following principles to guide future growth and development:

- Make the protection of our natural environment a priority in land use and development decisions.
- Facilitate a land use pattern that accommodates growth while respecting the natural environment.
- Promote and enable environmentally sensitive site designs.
- Consider the environmental impacts of land use and development comprehensively.
- Strive to reconcile various environmental concerns with each other and balance them with other land and economic development considerations.

7.3.2.2 GDP Infrastructure Chapter

The purpose of the GDP Infrastructure Chapter, adopted November 2007, is to more closely link land development decisions to the availability of the public infrastructure needed to serve them. This chapter is intended to help guide the consideration of potential environmental impacts of the development of infrastructure, including water and wastewater facilities.

Key goals of the Infrastructure Chapter are to:

- Create well-designed communities that… are appropriately served by public infrastructure.
- Ensure that the availability of public infrastructure is considered when making land use and development decisions.

Many policies in the Infrastructure Chapter are relevant to the proposed Regional Wastewater Treatment Plant, particularly Policy 6a, which states, “Encourage regional partners to be engaged in collaborative problem-solving to identify creative regional solutions to infrastructure issues. Infrastructure solutions might be found in the development of partnerships with organizations beyond the boundaries of the City of Charlotte. Many transportation, stormwater and utilities infrastructure issues can be more effectively

addressed with regional infrastructure investment solutions. Additionally, it is important to ensure that local decisions do not have unintended impacts regionally. Enhanced communication on infrastructure issues with regional partners is one means of achieving this."

7.3.3 Gaston County Planning

Long range planning in Gaston County is conducted by the Planning Department. The planning department completes special area plans and has developed a UDO, and comprehensive plans for Gaston County. The most recent Gaston County Comprehensive Plan (2002) is currently being updated by the County. This document is used as a decision-making tool for the Planning Department and the community, and provides a means to prioritize the timing and placement of public infrastructure. In terms of public utilities, the plan encourages regional coordination with water and sewer provisions to maximize investments, allow for flexibility in the provision of services, and for better preparedness for growth in the long term.

Gaston County's Natural Resources Department is actively pursuing stream restoration and open space preservation. For example, one project within the proposed service area established a 60 acre conservation easement along Stanley Creek which flows into Dutchman's Creek. The County uses programs such as the North Carolina Wildlife Partners Project, Wildlife Habitat Incentives Program, Environmental Quality Incentives Program, and others to encourage stream, wetland, and riparian restoration and open space preservation.

7.3.4 City of Mount Holly Planning

The City of Mount Holly's Zoning Ordinance and Land Use Plans including lot size specifications were based on the assumption that adequate water supply and wastewater treatment would be available to each lot. The City of Mount Holly's Subdivision Ordinance and Zoning Ordinance identify the following general development guidelines:

- Provide for the dedication or reservation of adequate spaces for open space, public lands, and buildings.
- Protect and enhance environmental quality.
- Provide for the dedication or provision of facilities for adequate storm drainage.
- Subdivision Plans shall be drawn in consideration of the suitability of the land and its capability to support and maintain the proposed development. Due consideration shall be given to such factors as water supply, watershed requirements, topography, rock outcrops, flood damage prevention, erosion control, wetland preservation, stormwater management, solar energy, tree preservation, noise and pollution control, habitat for endangered species, areas of historical, archaeological, or architectural significance, and land use relationships.
- Lot boundaries shall be made to coincide with natural and preexisting man-made drainage ways to the extent practicable to avoid the creation of lots that can be built upon only by altering such drainage ways.
- Lot arrangements shall be made with due consideration given to not disturbing wetlands and other such natural features.

The City's policy is to preserve about twenty (20) acres per one thousand people (1,000) for use as open space and/or recreation. Subdivisions are required to donate land that can be used for parks, natural areas, or recreation. The Subdivision Ordinance notes that the preferred land would be centrally located relative to the subdivision and neighborhood and/or is in conformance with the Land Development Plan. The preferred land would have easy, direct access to the public street system and be accessible by both vehicular and pedestrian traffic. Lakes or ponds may count as meeting the requirement provided such areas do not exceed 25% of the overall requirement.

The City of Mount Holly recently adopted Design Guidelines for Voluntary Residential Annexations as an amendment to their Annexation Policy. The policy includes the follow requirements for all new development:

- Reflect Mount Holly's neighborhood DNA by including specific architectural guidelines such as front porches, crawl spaces, no aluminum or vinyl siding.
- Protect and preserve Mount Holly's natural amenities while also providing usable open space.
- Built around great streets that have trees, sidewalks, underground utilities and garages that are not visible from the street.
- Connect with Mount Holly's existing street and trail network.

As part of a strategy to preserve and connect the City's parks and open spaces, the Mount Holly Community Development Foundation (MHCDF) developed a citywide greenprint. Mount Holly's Community Greenprint is a plan to promote activities that emphasize land conservation to ensure quality of life, clean air and water, recreation, and economic health. It identifies potential types of greenspace to be protected, as well as strategies to enhance the city's overall sustainability. The MHCDF also developed a master plan for a Catawba River Greenway, which would span an eight-mile stretch from Mountain Island Lake along the Catawba River to Mount Holly. With community input, the City developed a greenway plan that provided a vision for the trail design, funding and construction information and implementation strategies to make the greenway a reality.

7.4 Wetlands

Impacts to wetlands in the service area would be minimized by compliance with programs, policies, and rules established by the DWR, the Duke Energy Shoreline Management Plan, Mecklenburg County Stormwater Services, Gaston County, the City of Mount Holly, and the United States Army Corps of Engineers (ACOE). Water supply protection and stormwater ordinances protect riparian buffers on waterways throughout the service area. The widths of riparian buffers required within the service area vary depending on factors including agency jurisdiction, watershed size, water supply classification, and development density. Mecklenburg County and City of Charlotte buffer rules are more stringent than required by the State and include wider buffers and protection of intermittent streams. Wetlands within the service area are regulated by the ACOE and the DWR and any impacts to jurisdictional wetlands would be mitigated under current Federal and State laws.

7.5 Prime and Unique Farmland

No mitigative measures will be in effect since no significant impacts to any agricultural land or prime or unique farmland are expected.

7.6 Public Lands and Scenic, Recreational, and Natural Areas

Multiple counties and municipalities within the service area have policies and ordinances that protect and maintain open space for recreation, habitat protection, and public use. Table 7-3 identifies the policies in place that protect open space and/or provide public lands for multiple uses.

Table 7-3 Open Space Requirements

Municipality	Undisturbed Open Space Requirements	Exemptions	Legal Authority
Town of Huntersville	Contiguous open space maintenance and preservation is encouraged and evaluated during subdivision plan review. Planned urban open space is required for all major subdivisions and multi-building developments not in districts zoned rural. The ordinance identifies conservation of interconnected areas with productive soils for continued agricultural and forestry use, maintenance and enhancement of wildlife habitat, and protection of unique and sensitive environmental and historic features. All these areas required by the Town to be maintained as open space would be protected with a permanent conservation easement.		Zoning Ordinance, amended July 18, 2007
Mecklenburg County	<24% BUA[1] then 25% of site set aside >24% and <50% BUA then 17.5% of project site set aside >50% BUA then 10% of site set aside Mountain Island Lake (MIL) and Upper Lake Wylie (ULW) Watershed Overlays: MIL Critical Areas (CA) 1 – 4: CA1 BUA ≤6%, CA2 BUA ≤12%, CA4 BUA ≤24%(no CA3 areas within service area)	Mitigation allowed	Post-Construction Ordinance, June 30, 2007; Revised January 10, 2008 and Charlotte-Mecklenburg Zoning Ordinances: Watershed Overlays

Municipality	Undisturbed Open Space Requirements	Exemptions	Legal Authority
City of Charlotte	Natural Area Criteria: <24% BUA then 25% of site set aside ≥24% and <50% BUA then 17.5% of project site set aside >50% BUA then 10% of site set aside Upper Lake Wylie Watershed Overlay: same requirements as Mecklenburg County Lower Lake Wylie Watershed Overlay: CA low density BUA ≤20%, CA high density BUA ≤50% PA low density BUA ≤24%, PA high density BUA ≤70%	Mitigation allowed I-1[2] and I-2[3] Development and redevelopment exempt from Natural Area requirement	Post-Construction Ordinance, effective July 1, 2008 And Charlotte-Mecklenburg Zoning Ordinances: Watershed Overlays
City of Mount Holly	• Zoning is in place that slows conversion of agricultural and low density residential land to other uses. • Development within Mount Holly is limited by the State's water supply protection rules that limit development to 2 dwelling units per acre or a maximum of 24% BUA in critical watershed areas and a maximum of 36% BUA in protected watershed areas if curb and gutter are not used. • High Density Option within the Lake Wylie and Mountain Island Lake Watershed Protected Area Overlay Districts requires 100-foot undisturbed buffers along all perennial streams • For cluster developments, non-built upon areas are to be kept in a vegetated or natural state		Chapter 20 Zoning Ordinance, Watershed Overlay District
	• Provide 1 acre of usable open space (recreational) for every 20 homes • If wooded: retain 10% of the entire site in pre-construction condition; if open fields, plant 16 additional 3" or larger trees on the site per acre developed • Preserve at least 1/3 of mature trees (18" caliber or greater) • No clear cutting allowed	Applies to voluntary residential annexation only	Design Guidelines: Addendum to the existing Annexation Policy, adopted April 2007
Town of Stanley	See Gaston County		Gaston County Watershed Protection Ordinance

Municipality	Undisturbed Open Space Requirements	Exemptions	Legal Authority
Gaston County	Within service area development is limited to 2 dwelling units per acre or a maximum of 24% BUA in critical watershed areas and a maximum of 36% BUA in protected watershed areas if curb and gutter are not used. In protected watershed areas up to a maximum of 3 dwelling units per acre or 36% BUA is allowed if curb and gutter are not used.		Gaston County Watershed Protection Ordinance

1. BUA – Built Upon Area
2. I-1 – Light Industrial
3. I-2 – General Industrial

7.7 Areas of Archaeological and Historical Value

Protection of historic properties is provided through the National Historic Preservation Act as well as North Carolina State Law (GS 121-12(a)). The State law is patterned after the Federal Act, which creates a register of historic places and encourages planning for preservation of these places. While these do not provide absolute protection for historic properties, they do provide a means for eliminating or minimizing the effects of State or Federal actions on properties that are either listed on the National or State Register of Historic Places. The Federal law also provides some protections for properties that are eligible for, but have not actually been listed in, the National Register of Historic Places.

Protection of archaeological resources is provided under a variety of Federal and State regulations and programs. Federal protections include the Federal Archaeological Resources Protection Act and Executive Order 11593 Protection and Enhancement of the Cultural Environment. State protections include the Archaeological Resources Protection Act, the North Carolina Archaeological Record Program, and Executive Order XVI Protection and Enhancement of the Historical and Cultural Heritage of North Carolina. Under these laws, the State Historic Preservation Officer is responsible for the review of development projects funded, licensed, or permitted by federal or state governments to ensure that archaeological sites are considered during the planning stages of these projects. Since only a small fraction of the State has been systematically surveyed for archaeological sites, the review generally includes a prediction of whether sites are likely to occur in a project area.

7.8 Air Quality

A number of Federal programs have been implemented under the Clean Air Act to control and reduce the emission of air quality pollutants from mobile sources: Tier 1 and 2 Vehicle Standards, Large Non-road Diesel Engines Rule, Non-road Spark-Ignition Engines and Recreational Engines Standard, and Clean Air Interstate Rule. The Tier 1 and 2 vehicle standards require new passenger vehicles, light-duty trucks, larger pickup trucks, and sport utility vehicles (SUVs) to meet more stringent emission control standards. Tier 2 also reduces the allowed sulfur content of gasoline in order to reduce nitrogen oxide (NOx) emissions. The Large Non-road Diesel Engines rule were phased in starting in 2008 and establish sulfur content limits for diesel fuel and sets emissions standards for non-road diesel engines, such as those used in construction. The Non-

road Spark-ignition Engines and Recreational Engines standard, effective in 2003, regulates NOx, hydrocarbon (HC) and carbon monoxide (CO) for previously unregulated non-road engines such as all-terrain vehicles, marine diesel engines, and forklifts. The Clean Air Interstate Rule establishes state caps for NOx and sulfur dioxide (SO2) starting in 2009 and will impact stationary fossil-fuel-fired boilers and combustion turbines such as Duke's Allen Steam Station and Riverbend facilities in Gaston County. These facilities have already reduced their NOx emissions (DAQ, April 2007).

The State of North Carolina is implementing a number of measures to reduce the air pollution generated by mobile sources (cars, trucks, buses, etc.) within Gaston and Mecklenburg Counties. Vehicles registered in Gaston and Mecklenburg County are subject to the State's annual emissions testing and maintenance inspection program. This program evaluates vehicle CO, volatile organic compound (VOC) and NOx emissions and requires repairs for vehicles that do not meet emissions standards for these chemicals. The North Carolina Environmental Management Commission has revised the open burning regulation to prohibit open burning in Gaston and Mecklenburg Counties on days when the air quality is forecasted to be poor (code orange and higher action days).

7.9 Noise Levels

Construction would typically occur only during normal daylight working hours. Equipment that could generate significant noise levels would be enclosed in buildings, which reduces noise pollution. Buildings that enclose blowers, pumps, or other noise-generating equipment would contain installed noise attenuation. A buffer around the facility site would aid in minimizing construction and normal operation noise. Local noise ordinances would be in effect to limit extreme noise producing activities during construction and operation.

7.10 Water Resources

Direct impacts to water quality associated with the nutrients in discharged wastewater would be minimized through adherence with NPDES permitting requirements established by DWR in consultation with DWR's Public Water Supply Section.

The Clean Water Act (CWA) is the primary federal law in the United States governing water pollution and protection of water quality. In North Carolina, the Clean Water Act is administered primarily by DWR, except Section 404, which is administered by the Army Corps of Engineers (ACOE). Sections of this law and associated programs that would influence development within the service area are discussed in this section.

7.10.1 Water Quality Protection

7.10.1.1 National Pollutant Discharge Elimination System (NPDES) Stormwater and Individual Discharge Permits

The National Pollutant Discharge Elimination System (NPDES) permit program was established by the Environmental Protection Agency (EPA), as authorized by the Clean Water Act (CWA), to track and control point source discharges of pollutants. The EPA has delegated authority to states (DWR) to issue permits controlling the discharge of pollutants. The NPDES program was expanded to permit municipal stormwater discharge (municipal separate storm sewer systems; MS4) in 1990 (Phase I) and was further expanded in 1999 (Phase II). Large and medium municipalities with populations over 100,000 are covered under the

NPDES Phase I stormwater program. Smaller communities are permitted under the NPDES Phase II stormwater program. The local MS4 program specifics are described in Section 7.10.1.4.

Minimum design criteria have been established for wastewater collection systems including pump stations and forcemains. The implementation of these rules (15A NCAC 2T .305(h)(1)(D)) would reduce the potential occurrences of sanitary sewer overflows (SSOs). The rules require pump stations and forcemains to install backup power equipment. Stations managing over 15,000 gallons per day would install a permanent generator and those serving less flow would be fitted with a portable generator receptacle. In order to quickly detect problems or spills, all pump stations would install an automatic alert system and audible and visual alarms. These increased design requirements would serve to reduce SSOs within the service area. A new regional facility will include flow equalization facilities that allow the storage of high wastewater flows for later treatment and backup generators. The construction of a new regional facility would also lower the probability of SSOs by reducing wastewater flow in about 20 miles of force mains and sewers.

According to DENR Division of Pollution Prevention and Environmental Assistance about 20% of SSOs in 1998 were due to pipes being blocked by fats, oil, and/or grease. Fats, oil, and grease reduction programs are in place throughout the service area that provide public education, training for commercial operations and inspection and cleaning programs. Charlotte-Mecklenburg Utilities has developed its own Sewer Use Ordinance which provides legal authority to enforce compliance with oil and grease reduction requirements. The City of Mount Holly has passed a Sewer Ordinance that requires all new and existing food service establishments that discharge fats, oils, and grease into the sewer system to permit and install a grease trap or grease interceptor.

7.10.1.2 Clean Water Act Section 303(d)

Section 303(d) of the CWA requires that states develop a list of all waters not meeting water quality standards. This is done in North Carolina by the Division of Water Quality (DWR). Water quality standards are established to protect different designated uses such as drinking water supply, contact recreation, and aquatic life support. Waters listed as not meeting their designated use and/or the associated water quality standards require the development of a total maximum daily load (TMDL). A TMDL specifies the maximum amount of pollutant (from both point and non-point sources) that a waterway can assimilate while still meeting water quality standards. Further, the TMDL includes an allocation of specified pollutants to each contributing source identified within the watershed. TMDLs that provide additional controls on development have been implemented in the service area for Long Creek and Lake Wylie. Improvements to treatment technologies and implementation of non-point source controls within the Lake Wylie watershed have resulted in improved water quality. Phosphorus concentrations have decreased significantly. Compliance with post-construction stormwater rules, sediment and erosion control requirements, and State and local rules that protect the riparian buffers along Lake Wylie and the Catawba River and limit development densities in critical and protected areas of the watershed would further improve water quality and help achieve compliance with TMDLs.

7.10.1.3 Clean Water Act Sections 401/404

Sections 401 and 404 regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and mining projects. Under Section 401, states are delegated authority to issue 401 Water Quality Certificates for all activities requiring a federal Section 404 permit. This is done in North Carolina by the DWR. Under Section 404, the US Army Corps of Engineers (ACOE) has regulatory permitting authority over the dredging or filling of these waters. Nationwide permits that identify predetermined minimization and mitigation activities are available for utility line construction (Nationwide permit 12). Section 404 permits and Section 401 certification are typically processed by the ACOE and DWR at the same time and stipulate general impact avoidance, minimization, and mitigation measures. Jurisdictional waters must be identified and avoided when possible. Unavoidable impacts are permitted but must be minimized to the extent possible. Remaining impacts require compensatory mitigation at approved ratios. Mitigation is accomplished by restoring, enhancing, and preserving streams and wetlands off site.

7.10.1.4 Local MS4 Programs

Owners of Municipal Separate Storm Sewer Systems (MS4s) are required by the Clean Water Act to obtain NPDES permits for the discharge of stormwater into Waters of the State. All MS4s within the service area have either a Phase I or Phase II MS4 stormwater discharge NPDES permit. Phase I stormwater programs were initiated in 1990 for cities with populations greater than 100,000; Phase II was initiated in 2003 for communities with populations from 10,000 and 100,000. The City of Charlotte has a Phase I permit. Mecklenburg County, Gaston County, City of Mount Holly, Town of Stanley, and Town of Huntersville fall under the Phase II requirements. Compliance with these stormwater discharge permits includes six minimum

measures: public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control, and pollution prevention/good housekeeping.

7.10.1.4.1 MS4 Post-Construction Stormwater Programs

Post-construction stormwater minimum measure programs are intended to mitigate the effects of continuing development. These requirements are met in the service area through a combination of ordinances, local permitting and inspection programs, and use of BMP Design Manuals. The goal of post-construction programs is to produce effective stormwater management that reduces stormwater volume and velocity, minimizes pollutant inputs, and attenuates downstream flooding.

In North Carolina, MS4 stormwater discharge permit holders have the option of adopting the State Post-Construction Model Ordinance, adopting their own equivalent or more stringent ordinance, or meeting the post-construction requirements by compliance with another approved regulatory program with similar requirements. The communities in the service area comply with their MS4 post-construction stormwater requirements as follows:

- **Mecklenburg County** and the **Towns of Cornelius, Huntersville, Matthews, Mint Hill**, and **Pineville** worked together to adopt a Post-Construction Ordinance that applies to all these communities, effective June 1, 2007, and revised January 10, 2008.The Post-Construction Administrative Manual was updated in June of 2013.
- The **City of Charlotte** adopted its Post-Construction Stormwater Ordinance November 26, 2007 which took effect July 1, 2008 (Revised October 2011). The City's Post-Construction Administrative Manual was updated in July of 2012.
- The **Gaston County** Stormwater Ordinance, effective July 2007, was also adopted by the **Town of Stanley**.
- The **City of Mount Holly** is using its compliance with State Water Supply Watershed Protection rules and agreements with Gaston County to meet its MS4 Post-Construction stormwater control requirements.

The Post-Construction Model Ordinance prescribes post-construction standards for low density and high density developments. The State minimum standards are:

- For low density projects, vegetated stormwater conveyances must be used.
- For high density projects, the first inch of runoff from the 1-year, 24-hour storm must be controlled and treated and stormwater must be treated for 85% TSS removal.
- For all projects, a minimum of 30-foot buffers around intermittent and perennial streams are required and stormwater development restrictions must run with the deed of the property. Streams are deemed present if they are approximately shown on either the most recent version of the USDA soil survey map or USGS topographic quadrangle map, unless proven otherwise by field delineation.

Specific BMP requirements, development thresholds, and treatment volume requirements for each MS4 in the service area are described in Tables 7-4 and 7-5. Buffer requirements for perennial and intermittent streams established by the post-construction or other ordinances and are described in Table 7-6. Post-construction programs for each MS4 in the service area are also described in greater detail as follows.

7.10.1.4.2 Mecklenburg County, City of Charlotte, and Town of Huntersville

The City of Charlotte, Mecklenburg County, and the Town of Huntersville adopted post-construction stormwater control ordinances that are more stringent than State requirements with the goal of creating positive environmental benefits. Additional requirements include increased stream buffer widths, buffers on more streams, enhanced volume and peak discharge controls, and low impact development options. As a minimum standard the State requires that streams be protected (intermittent and perennial) if they are shown on the USGS topographic quadrangle or USDA soil survey map, unless proven otherwise by field delineation. Mecklenburg County, Huntersville, and Charlotte post-construction ordinances require that streams be delineated using ACOE and DWR methodology, regardless of whether they are shown on a USDA or USGS map. This could potentially include more streams, and therefore require more riparian buffer protection. According to the Mecklenburg County BMP Design Manual, July 2007, the objectives of the post-construction ordinances are:

- Achieve compliance with the Phase I and Phase II NPDES Stormwater Permit requirements for post-construction pollution control, as applied to the respective jurisdictions
- Satisfactorily address the guidelines to mitigate the cumulative and secondary impacts to aquatic and terrestrial wildlife resources and water quality specified by the N.C. Wildlife Resources Commission and the U.S. Fish and Wildlife Service for Goose Creek and the Yadkin River Watershed.
- Satisfactorily address the causes of impairment identified in the N.C. 2002 Integrated 305(b) and 303(d) Report for surface waters in Mecklenburg County when the potential sources of water quality impairment are identified as urban runoff/storm sewers.
- Satisfactorily address detention measures for the control of stormwater volumes and peaks associated with new construction.

The Town of Huntersville's post-construction ordinance and the Huntersville Water Quality Design Manual require the use of Low Impact Development (LID) practices in order to further reduce the environmental impact of development. LID practices use BMPs such as green roofs, rain gardens, and infiltration trenches, to maintain pre-development hydrologic conditions after development. Huntersville was one of the first municipalities in the State to require LID practices. Minimizing stormwater quantity significantly reduces pollutant loadings and decreases the magnitude of peak storm flows which can damage stream and river systems.

7.10.1.4.3 Gaston County and Town of Stanley

Gaston County adopted a Stormwater Ordinance July 26, 2007 in compliance with Federal requirements. Additionally, this ordinance requires that residential high density development within unincorporated parts of

the County cannot be approved until a variance is received from the Gaston County Planning Board. The stormwater permit requirement applies to all development and redevelopment that disturbs more than one acre. Land disturbance or development cannot be initiated until a written stormwater control permit is issued. The Town of Stanley has adopted Gaston County's Stormwater Ordinance and entered into an inter-local agreement with Gaston County to provide stormwater inspection services within their jurisdictional area.

7.10.1.4.4 City of Mount Holly

The City of Mount Holly is using its compliance with State Water Supply Watershed Protection rules and agreements with Gaston County to meet its NPDES Phase II post-construction requirements.

7.10.1.5 Riparian Buffer Rules

7.10.1.5.1 Mecklenburg County Portion of Service Area

The post-construction stormwater ordinances for Mecklenburg County, City of Charlotte and Town of Huntersville identify the minimum riparian buffer requirements for their jurisdictional areas. Riparian buffers are required for streams with drainage areas as small as 50 acres. This protects more intermittent streams than the older SWIM buffers. Table 7-6 identifies the riparian buffer sizes that would be required for development occurring within the City of Charlotte and Mecklenburg County. These ordinances require field verification of the presence or absence of intermittent streams on the property where development has been proposed. More intermittent streams would be identified and protected with riparian buffers in the Mecklenburg County portion of service area under the post-construction buffer rules than required by State policy.

Even wider riparian buffers are required within certain portions of watershed overlays. Three different watershed overlays are present in the Mecklenburg County portion of the service area: Mountain Island Lake, Upper Lake Wylie, and Lower Lake Wylie. Figure 6.3g illustrates the different watershed overlays present in the service area. Each watershed overlay district contains critical areas (CA) and protected areas (PA). CA and PA districts have specific development density restrictions and riparian buffer preservation requirements. The Mountain Island Lake (MIL) watershed overlay district contains four different critical areas (CA) and three different protected areas (PA). The MIL CAs present within the service area include: CA1, CA2, and CA4. No MIL PAs are present in the service area. The Upper Lake Wylie and Lower Lake Wylie watershed overlay district is divided into critical and protected areas. The State water supply watershed protection rules do not address the Lower Lake Wylie because no communities in North Carolina withdraw drinking water from this area. Charlotte-Mecklenburg stormwater services adopted a watershed overlay district in this area to provide additional protection to water supplies used by communities in South Carolina.

7.10.1.5.2 Gaston County Portion of Service Area

The minimum riparian buffer width (10 ft) for development within unincorporated Gaston County is specified in their Erosion and Sedimentation Control Ordinance. The Gaston County Watershed Protection Ordinance establishes riparian buffer requirements of 30 to 100 ft (see Table 7-6). The Town of Stanley has an inter-local agreement with Gaston County to enforce erosion and sedimentation control rules within the limits of the Town of Stanley. The City of Mount Holly's Watershed Overlay Districts in their Zoning Ordinance

specify the minimum riparian buffer widths (30 ft) to be used within their jurisdictional area. Table 7-6 identifies the specific buffer widths required by these ordinances.

Table 7-4 Post-Construction Stormwater Control Requirements – Structural BMP Performance

Municipality	Threshold for BMP Implementation	Required Treatment	Treatment Volume	Legal Authority
Town of Huntersville	>20,000 ft^2 redevelopment >6% Built Upon Area (BUA), >1 acre of residential dev., >1/2 acre of non-residential dev.	LID[1] Required	Runoff from first inch of rainfall Use vegetated stormwater conveyance to MEP.	Post-Construction Ordinance applies to all land within City limits and ETJ[2]. Effective June 30, 2007, revised January 10, 2008.
Mecklenburg County	>24% BUA	85% TSS removal with optional LID	Runoff from first inch of rainfall	Post-Construction Ordinance applies to all unincorporated areas. Effective June 30, 2007, revised January 10, 2008.
City of Charlotte	Residential development and redevelopment ≥1 acre and >12% BUA or lot size ≥20,000 ft^2; non-residential dev. and redev. ≥1 acre and creates >20,000 ft^2 BUA.	85% TSS[3] 70% TP[4] (Zone I-1 and I-2 developments exempt) Optional LID	Runoff from entire 1-yr storm volume and first inch of rainfall for development >12% BUA. Use of vegetated conveyances encouraged for development <12% BUA.	Post-Construction Ordinance, November, 2007, revised October 2011. Applies to all land within City limits and ETJ.
City of Mount Holly	Residential development ≥ 1 acre and ≥24% BUA or 1 dwelling unit per 20,000 ft^2; non-residential development ≥1 acre and ≥24% BUA.		Water supply watershed Low density option: no detention or treatment High density option: runoff from first inch of rainfall	Chapter 20 Zoning Ordinance, Watershed Overlay District.
Town of Stanley	Stormwater management and permitting provided by Gaston County	Same as Gaston County	Same as Gaston County	Adopted Gaston County stormwater ordinance and have inter-local agreement with Gaston Co.
Gaston County	≥1 acre Residential or Commercial development and redevelopment	85% TSS	Treat the first inch of runoff (48 to120 hour drawdown time) BMPs cannot be located within 30 ft of any perennial or intermittent surface waters.	Gaston County Stormwater Ordinance, July 26, 2007. Applies to all portions of County except those within water supply watersheds or city limits of municipalities in Gaston County.

1. LID – Low Impact Development
2. ETJ – Extra Territorial Jurisdiction
3. TSS – Total suspended solids
4. TP – Total Phosphorus

Table 7-5 Stormwater Detention Requirements

Municipality	BUA Threshold	Detention Volume	Peak Control	Legal Authority
Town of Huntersville	>12%	Increase in volume for 1-year 24-hour storm or 2-year 24-hour storm based on zoning district	Peak storm runoff controlled for development >12% impervious; peak release not to exceed 2-year and 10-year 24 hour storm events.	Post-Construction Ordinance, June 30, 2007, revised January 10, 2008.
Mecklenburg County	>24%	Entire volume for 1-year, 24-hour storm; Volume drawdown time will be between 24 and 120 hours.	Residential: 10-yr & 25-yr, 6-hr storms or conduct downstream analysis Commercial: 10-yr & 25-yr, 6-hr storms or 10-yr, 6 hr storm and perform downstream analysis	Post-Construction Ordinance, June 30, 2007, revised January 10, 2008.
City of Charlotte	>12%	Post-development 1 year, 24-hour storm. Volume drawdown time shall be between 48 and 120 hours. I-1[1] and I-2[2] developments are exempt but shall prepare pesticide and nutrient management plans.	>12% BUA[3]: 10 and 25 yr, 6hr storms or appropriate storm frequency as determined by downstream flood analysis.	Post-Construction Ordinance, July, 2008, revised October 2011.
City of Mount Holly		Development density limited to 24% BUA or 36% BUA with vegetative stormwater conveyances within water supply areas (entire Mount Holly jurisdiction).	Development within water supply watersheds using the low density option does not require stormwater treatment or detention.	Chapter 20 Zoning Ordinance, Watershed Overlay District.
Town of Stanley	≥1 acre	Same as Gaston County	Same as Gaston County	Has adopted Gaston Co.'s stormwater ordinance.
Gaston County	≥1 acre	Discharge associated with 1 year 24 hour storm prior to development. For redevelopment detention of any additional stormwater flow is required.	None	Gaston County Stormwater Ordinance, July 26, 2007.

1. I-1 – Light Industrial
2. I-2. – General Industrial
3. BUA – Built Upon Area

Table 7-6 Riparian Buffer Requirements

Municipality	Total Buffer Width (in feet)	Stream Zone (ft)	Managed Zone (ft)	Upland Zone (ft)	Perennial and/or Intermittent	Buffer Delineation Method	Legal Authority
Town of Huntersville	Specific Buffer widths by Watershed size: <50 acres = 30 ft ≥50 and <300 acres = 35 ft ≥300 and <640 acres = 50 ft ≥640 acres = 100 ft or entire floodplain, whichever is greater	10 20 20 30	NA NA 20 45	20 15 10 25	Both	GIS – Mecklenburg County System (currently POLARIS)	Post Construction Stormwater Ordinance, June 30, 2007, revised January 10, 2008 and Charlotte-Mecklenburg Zoning Ordinances: Watershed Overlay Districts.
	For additional Buffer requirements see Mountain Island Lake Watershed Overlay requirements for Mecklenburg County				Perennial		
Mecklenburg County	Specific Buffer widths by Watershed size: <50 acres = 30 ft ≥50 and <300 acres = 35 ft ≥300 and <640 acres = 50 ft ≥640 acres = 100 ft or entire floodplain, whichever is greater	10 20 20 30	NA NA 20 45	20 15 10 25	Both	GIS – Mecklenburg County System (currently POLARIS)	Post Construction Stormwater Ordinance, June 30, 2007, revised January 10, 2008 and Charlotte-Mecklenburg Zoning Ordinances: Watershed Overlay Districts.
	Mountain Island Lake Watershed Overlay CAs:100 ft along MIL and perennial streams Catawba River/Lake Wylie Watershed Overlay CAs: 100 ft Catawba River/Lake Wylie Watershed Overlay PAs: 40 ft low density, 100 ft high density				Perennial		

Municipality	Total Buffer Width (in feet)	Stream Zone (ft)	Managed Zone (ft)	Upland Zone (ft)	Perennial and/or Intermittent	Buffer Delineation Method	Legal Authority
City of Charlotte	Specific buffer widths by watershed size and watershed district. Western Catawba District, high and low density development (≤12% BUA[1]): <50 acres = 30 ft ≥50 and <300 acres = 35 ft ≥300 and <640 acres = 50 ft ≥640 acres = 100 ft plus 50% of flood fringe area beyond 100 ft.	10 20 20 30	NA NA 20 45	20 15 10 25	Both	Professional delineation using ACOE[2] and DWR[3] methodology.	Post-Construction Stormwater Ordinance, November, 2007 (revised Oct 2011) and Charlotte-Mecklenburg Zoning Ordinances: Watershed Overlay Districts
	Catawba River/Lake Wylie Watershed Overlay CAs[4] and PAs[5]: same requirements as Mecklenburg County Lower Lake Wylie Watershed Overlay CAs: 50 ft low density and 100 ft high density Lower Lake Wylie Watershed Overlay PAs: 40 ft low density, 100 ft high density				Perennial		
City of Mount Holly	≥30 ft for low density development and ≥100 ft under high density option in watershed overlay districts. Any buffer disturbance activity must provide pre-construction notice to DWR. Ordinance encourages utilization of BMPs[6] to minimize water quality impacts.				Perennial	Most recent USGS Map 1:24,000 scale	Chapter 20 Zoning Ordinance – Watershed Overlay Districts
	100 ft undisturbed buffer for residential annexation ≥ 5 lot subdivision				Not specified		Design Guidelines: Addendum to the existing Annexation Policy, adopted April 2007

Municipality	Total Buffer Width (in feet)	Stream Zone (ft)	Managed Zone (ft)	Upland Zone (ft)	Perennial and/or Intermittent	Buffer Delineation Method	Legal Authority
Town of Stanley	Same as Gaston County						Interlocal agreement in place for Gaston County to enforce Soil Erosion and Sedimentation Control Ordinance and enforce Watershed Protection Ordinance
Gaston County	≥10 ft Allow no visible siltation discharge through buffer zone. Wider buffer required when steep slopes are present. 25% of the buffer strip closest to land-disturbing activity can include natural or artificial siltation control				Not specified	Not specified	Soil Erosion and Sedimentation Control Ordinance (revised 6/28/07)
	Catawba River WS-IV-PA 30 ft within WS-IV Protected Areas for low density and 100 ft for high density				Perennial	Most recent version of USGS1:24,000 scale topographic maps or as determined by local government studies	Watershed Protection Ordinance

1. BUA – Built upon area or amount of impervious surface
2. ACOE – Army Corps of Engineers
3. DWR – North Carolina Division of Water Quality
4. CA Critical Area
5. PA Protected Area
6. BMP – Best Management Practice

7.10.2 Water Supply Protection

The State has established water supply protection classifications and associated water quality criteria and management strategies (51A NCAC 02B .0104) within water supply watersheds. Management strategies include limiting development density, requiring stormwater BMP implementation, and riparian buffer preservation. The State required all local governments having land use jurisdiction within water supply watersheds to adopt and implement water supply watershed protection ordinances, maps, and a management plan by January 1, 1994. Local governments may adopt the State Model Ordinance or their own more stringent water supply protection rules. State water supply watershed requirements allow up to 10% of each jurisdiction's portion of WS-II, WS-III, and WS-IV watersheds outside of the critical area to develop new projects and expansions to existing development at up to 70% built-upon surface area (10%-70% or Special Intensity Allocation (SIA) option).

The City of Mount Holly has adopted a number of watershed overlay districts under their Zoning Ordinance: Lake Wylie Watershed Critical Area (LWWS-CA), Lake Wylie Watershed Protected Area (LWWS-PA), Mountain Island Lake Watershed Critical Area (MILWS-CA), and Mountain Island Lake Watershed Protected Area (MILWS-PA). Development restrictions within these watershed overlay districts meet the State's water supply watershed protection requirements. In August 2005, the City of Mount Holly adopted the High Density option which allows for greater development density within LWWS-CA (24-50%) and LWWS-PA (24-70%). This option requires BMP implementation to manage stormwater runoff when an Erosion and Sediment Control Plan is required (development ≥ 1 acre). The SIA option was removed from the zoning ordinance thereby limiting development densities to a maximum of 50%. The City of Mount Holly uses the low density option as well which limits development to 24% and does not require stormwater BMP implementation.

Gaston County adopted a Watershed Protection Ordinance that applies to the portions of the service area within unincorporated areas of Gaston County and within the Town of Stanley and its extra territorial jurisdiction (ETJ). Within the service area the unincorporated areas of the County and a small portion within the Town of Stanley are classified as Catawba River WS-IV-PA. Gaston County also issued a Unified Development Ordinance which specifies development density requirements, buffer widths and stormwater controls in water supply watersheds as well as open space and floodplain protection requirements.

The City of Charlotte and Mecklenburg County have adopted three different watershed overlay zones within the service area: Mountain Island Lake, Catawba River/Lake Wylie, and Lower Lake Wylie. These watershed overlay districts place more stringent control on development (lower development densities and wider riparian buffers) than the State rules require.

Table 7-7 describes the development restrictions associated with the critical areas (CA) and protected areas (PA) within all jurisdictions in the service area. All of the waters within the service area are WS-IV, WS-IV CA, or WS-IV B CA. For comparison purposes the state minimum water supply watershed protection rule's development restrictions and buffer requirements are included in Table 7-7. Figure 6.3g identifies the state and local watershed overlays in place in the service area.

Table 7-7 Development Restrictions and Buffer Requirements in Watershed Overlay Districts and State Rules for Water Supply IV Waters

Overlay District	Maximum Residential Density (dwelling units/acre)	Minimum Lot Size (acres)	Maximum Built Upon Area	Buffer Width (feet)
State Water Supply Watershed Protection Rules				
Class IV CA Low Density	2 or meet BUA%	0.5	24%	30
Class IV CA High Density	2 or meet BUA%		50%	100
Class IV PA Low Density	2 or met BUA%	0.5 or 0.33 if no curb and gutter	24%	30
Class IV PA High Density	2 or meet BUA%		70%	100
Charlotte-Mecklenburg Mountain Island Lake				
CA 1 Low Density	0.5	2	6%	100
CA 1 High Density	No high density allowed			
CA 2 Low Density	1.0	1	12%	100
CA 2 High Density	No high density allowed			
Charlotte-Mecklenburg Catawba River/Lake Wylie				
CA Low Density			24%	100
CA High Density			50%	100
PA Low Density			24%	40
PA High Density			70%	100
Charlotte-Mecklenburg Lower Lake Wylie				
CA Low Density			20%	50
CA High Density			50%	100
PA Low Density			24%	40
PA High Density			70%	100
City of Mount Holly				
MILWS-CA	2 or meet BUA%		24%	30
MILWS-PA	2 or meet BUA%		24% or 36% if no curb and gutter with option for 10% of watershed overlay area to be developed at 70%	30
LWWSA-CA	2 or meet BUA%		24%	30

LWWSA-PA	2 or meet BUA%		24% or 36% if no curb and gutter with option for 10% of watershed overlay area to be developed at 70%	30
Gaston County Catawba River				
Catawba WS IV PA	2 or meet BUA%	0.5 or 0.33 if no curb and gutter	24% or 36% if no curb and gutter	30/100 (high density)

7.11 Forest Resources

Impacts to forest resources will be minimized by utilizing previously disturbed areas and minimizing future disturbance associated with secondary or cumulative impacts. The state Department of Natural Resources (DENR) and the US Fish and Wildlife Service (USFWS) share responsibility for providing guidance.

7.12 Shellfish, Fish, and Their Habitats

The Endangered Species Act (ESA) of 1973 provides federal protection for species of fish, wildlife, and plants listed as federally threatened or endangered and for the protection of the ecosystems on which they depend. In addition, the Clean Water Act (CWA) sections 401 and 404 protect water resources also have provisions for aquatic resources. The state Division of Water Quality (DWR), US Army Corp of Engineers (USACE) and the US Fish and Wildlife Service (USFWS) are responsible for issuing permits and providing guidance.

7.13 Wildlife, Natural Vegetation, and Endangered Species

The Endangered Species Act (ESA) of 1973 provides federal protection for species of fish, wildlife, and plants listed as federally threatened or endangered and for the protection of the ecosystems on which they depend. The United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries share joint responsibility for implementing measures outlined in the ESA. Under this act, provisions are made for listings, species recovery and habitat conservation planning, designation of listed species critical habitat, and federal interagency and state cooperation and consultation.

7.14 Introduction of Toxic Substances

Prohibiting the release of toxic substances is covered by the Nationwide Permit 12, the sediment and erosions control permit and the MS4 water permit which are administered by the USACE and DENR.

7.15 Summary of Mitigative Measures

The resource areas that would experience direct impacts at the site and secondary and cumulative impacts in the service area include land use and land cover, water quality, wetlands, floodplains, and recreational lands.

Table 7-8 Summary of Minimization and Mitigation Measures

Resource Area	Minimization of Direct Impacts	Minimization of Secondary and Cumulative Impacts	Regulation/Guidance
Topography and Floodplains	No 100-year regulatory or community floodplain impacts by preferred alternative. Community floodplain (Mecklenburg Co. is more stringent than state or federal requirements.)	Mecklenburg County communities' Flood Damage Prevention Ordinances that are more stringent than state standards control and minimize development in floodplains. Future conditions floodplain maps provide protection at estimated build out of watershed. Gaston County and Mount Holly also manage floodplain development for NFIP compliance.	Participation in National Flood Insurance Program. Flood Damage Prevention Ordinances: Gaston Co., Mount Holly, Mecklenburg Co., Charlotte, Huntersville. Future Conditions floodplain maps in Mecklenburg County.
Soils	Avoid areas with high erosion potential; implement erosion control BMPs; use onsite backfill; prompt re-seeding of construction areas.	Use of silt fencing, reseeding, and other erosion and sediment control techniques. Compliance with Erosion and Sediment Control Ordinances.	Mecklenburg Co. and Gaston Co. Erosion and Sediment Control Ordinances (permits and inspection required).
Land Use and Land Cover	The site selection and alternatives evaluation process maximizes the use of previously disturbed areas and/or reuse of existing industrial and municipal infrastructure sites.	Counties and cities have land use plans that direct development into compatible areas and protect other areas.	Zoning and Subdivision Ordinances. Mount Holly Future Land Use Plan 2001 Mecklenburg 2015 Plan and Charlotte-Mecklenburg Future Land Use GIS data. Duke Shoreline Management Plan.
Wetlands	The potential minor direct impacts to wetlands are not anticipated, but would be avoided through construction practices. Maximize width of riparian buffers to minimize impacts to aquatic habitat and water quality.	Impacts avoided as wetlands are protected by State and Federal programs. Riparian buffer protections established. Charlotte-Mecklenburg requires greater buffer protection than required by the State.	Section 404 of Clean Water Act. Riparian buffer protections established by stormwater ordinances and watershed overlay districts. State, local and Duke Energy Shoreline Management Plan buffer protection requirements and Watershed Overlay Districts
Prime and Unique Farmland	No project areas are currently being used for agriculture.	Avoid prime farmlands as much as practical.	NRCS list of Prime Farmlands.

Resource Area	Minimization of Direct Impacts	Minimization of Secondary and Cumulative Impacts	Regulation/Guidance
Public, Scenic and Recreational Areas	The new regional wastewater facility would cooperate with local plans for trails, greenways, and recreational facilities. Facility location is compatible with Duke Shoreline Management Plan classifications. Odor control and SSO prevention measures installed; visual vegetative buffer surrounding the facility.	Counties and cities have land use plans that direct development into compatible areas and protect other areas. Open space preservation requirements.	Zoning, Subdivision, and Stormwater Ordinances and Watershed Overlays.
Resources of Archeological or Historical Value	Maximize use of previously disturbed lands minimizes potential for impacts to cultural resources. No known archaeological or historical resources on project sites. Depending on alternative chosen, archaeological survey would be conducted prior to construction.	Avoidance of NHRP-listed historic sites, archeological sites, or structures.	State Historic Preservation Office Guidance, Section 106 National Historic Preservation Act.
Air Quality	If produced, possible use of methane gas to produce energy at facility instead of flaring the gas. Operation of diesel generators to occur only in cases of emergency or power outages. Incorporate odor control measures into design of facilities.	Continue to enforce existing State and Federal air pollution control measures. Continue to implement local measures such as high occupancy vehicle lane on I-77 in Mecklenburg County, express bus routes, pedestrian and bikeway projects.	NC Emergency Generator General Air Permit. Federal vehicle emission and fuel standards. State emissions testing and vehicle inspection program Collection System Design Rules. Existing Utilities Wastewater Collection System Permit (#WQCS00001)
Noise	Construction would typically occur during normal daylight working hours.	Local noise ordinances will mitigate effects associated with increased development within the service area.	Local Noise Ordinances

Resource Area	Minimization of Direct Impacts	Minimization of Secondary and Cumulative Impacts	Regulation/Guidance
Water Resources	Use of directional boring to cross Catawba River, Long Creek, Fites Creek, and Paw Creek. Preservation of riparian buffers; re-seeding of all disturbed areas. Regional facility would use low impact development (LID) practices to treat and retain stormwater on site such as rain gardens and green roofs. Low nutrient limits (nitrogen and phosphorus) in NPDES discharge permit for Lake Wylie.	NPDES Phase II Post-Construction stormwater ordinances in all local areas are compliant with or more stringent than State requirements. Stormwater treatment and detention required. LID required in Huntersville and encouraged throughout the service area. NPDES Phase II post-construction stormwater ordinances in all local areas are compliant with or more stringent than State requirements. Water supply watershed protection rules apply to 62% of the service area. Density limitations and buffer requirement create opportunities for stormwater infiltration. Minimal use of onsite wastewater treatment and private wastewater facilities. Sanitary sewer overflow (SSO) abatement programs. Increased wastewater treatment capacity could reduce potential for SSOs.	USACE NWP 12; CWA 401/404 WQ Permit; Erosion and Sediment Control Plan; DENR guidance; USFWS guidance. Riparian buffer protections established by stormwater ordinances and watershed overlay districts. MS4 NPDES Phase II post-construction stormwater ordinances. Stormwater ordinances and watershed overlay districts.
Forest Resources	Minimize forest disturbance	Minimize open space and forest disturbances.	DENR guidance; USFWS guidance
Shellfish, Fish, and Their Habitats	Implement stormwater control measures.	Implement stormwater control measures. Surveys of representative streams in the service area were completed to ensure that federally listed mussel and fish populations would be protected. No occurrences of federally listed species were found.	USACE NWP 12; CWA 401/404 WQ Permit; Sediment and Erosion Control Plan; DENR guidance; USFWS guidance

Resource Area	Minimization of Direct Impacts	Minimization of Secondary and Cumulative Impacts	Regulation/Guidance
Wildlife and Natural Vegetation	Surveys were completed and known occurrences of endangered species would be avoided and/or managed in compliance with the Endangered Species Act and in consultation with state and federal agencies.	Open space preservation requirements. Surveys of representative streams in the service area were completed to ensure that federally listed mussel and fish populations would be protected. No occurrences of federally listed species were found.	Endangered Species Act of 1973; DENR; NHP, and USFWS guidance; Watershed Overlays; Zoning and Subdivision Ordinances USACE NWP 12; CWA 401/404 WQ Permit; Sediment and Erosion Control Plan.
Toxic Substances	Prevention of fresh concrete from coming into contact with waterways.	Application of herbicide conducted by a certified applicator. Stormwater pollution prevention plans.	USACE NWP 12; Sediment and Erosion Control Plan; MS4 Permit.

Section 8. List of Preparers

The following Black & Veatch International Company staff members were responsible for the preparation of this Draft Environmental Impact Statement:

Brent M. Reuss, P.E., Project Manager – M.S. in Civil Engineering – Mr. Reuss has over 31 years of experience designing and managing wastewater treatment plant projects. He has been involved in several environmental assessments, public involvement/ stakeholder group activities.

D. Morgan Young, P.E., Project Engineer – M.S. in Civil Engineering – Mr. Young has 7 years of experience in wastewater treatment projects including alternatives evaluations, treatment process modeling and design, NPDES permitting and environmental assessment and environmental impact statement preparation.

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The following Cardno ENTRIX staff members were responsible for the preparation of this Draft Environmental Impact Statement:

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Lauren Elmore, Project Scientist – M.S.P.H., Environmental Science and Engineering – Ms. Elmore has 18 years of experience managing and performing environmental studies with emphasis on water and natural resources projects including water quality assessment and monitoring, NEPA/SEPA documents, stormwater NPDES compliance, water quality trading, TMDL development and implementation, and stakeholder involvement.

Sandy Slayton, CFM, Staff Scientist – M.A. Ecology – Ms. Slayton has 12 years of experience in environmental science focusing on ecological sciences, water quality, floodplain management, and environmental policy. She is skilled with GIS tools and GPS technology, has performed wetland delineations and stream assessments, watershed planning, water quality analysis, habitat conservation and enhancement, and hydrologic and hydraulics studies.

Alan Moore, Staff Scientist – M.S. Biology – Mr. Moore is a biologist with over 10 years of experience focusing on benthic macroinvertebrate and fish taxonomy, vegetation community surveys, disturbance ecology, and ecological restoration design. Before joining Cardno Entrix, Mr. Moore conducted fish and benthic macroinvertebrate surveys, watershed assessments, stream restoration design and monitoring, environmental assessments and environmental impact statements.

Section 9. Literature Cited

Alderman, J. M. 2005, Catawba Wateree Hydro Project: Mussel surveys for Catawba-Wateree relicensing. Aquatics 02 report. Duke Energy. FERC Project No. 2232 (http://www.duke-energy.com/pdfs/Aquatics_06_Report.pdf).

Barden, L. S., 1997, Historic prairies in the Piedmont of North and South Carolina, USA, Natural Areas Journal 17. pp. 149-152.

Burke, Jim. North Carolina State Extension Service, Personal Communication, 23 October, 2007.

Charlotte Mecklenburg Planning Department GIS, 2007, Future Land Use GIS Data.

Coughlan, D. J. Barwick, D. H. Baker, B. K. Rash, W. M. Garner, A. B., and Doby W.R. 2005. Catawba-Wateree Hydro Project: Fish community and assessment in the Catawba and Wateree Rivers: results for the Aquatics 01 study plan. Duke Energy. FERC Project No. 2232 (http://www.duke-energy.com/pdfs/Aquatics_01_Report.pdf).

(DAQ) North Carolina Division of Air Quality, 2007, Pre-Hearing Draft – The North Carolina 8-Hour Ozone Attainment Demonstration for the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour Ozone Nonattainment Area (Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Union Counties and Coddle Creek and Davidson Townships in Iredell County).

(DWR) North Carolina Division of Water Quality, 2003, Basinwide Assessment Report – Catawba River Basin, 2003.

(DWR) North Carolina Division of Water Quality, 2008, Basinwide Assessment Report – Catawba River Basin, 2008.

(DWR) North Carolina Division of Water Quality, 2004, Catawba River Basinwide Water Quality Plan, accessed October 16, 2007 at: http://h2o.enr.state.nc.us/basinwide/Draft2004CatawbaRiverBasinWaterQualityPlan.htm.

(DWR) North Carolina Division of water Quality, 2006, Standard Operating Procedures for Benthic Macroinvertebrates, accessed December 6, 2007 at http://h2o.enr.state.nc.us/esb/BAUwww/benthossop.pdf.

(DWR) North Carolina Division of Water Quality, 2010, Catawba River Basin Plan, accessed at: http://portal.ncdenr.org/web/wq/ps/bpu/basin/catawba.

(DWR) North Carolina Division of Water Quality, 2007a, DWR Primary Surface Water Classifications, accessed October 16, 2007 at: http://h2o.enr.state.nc.us/csu/swc.html.

(DWR) North Carolina Division of Water Quality, 2007b, Basinwide Information Management System (BIMS), accessed October 16, 2007 at: http://h2o.enr.state.nc.us/bims/.

(DWR) North Carolina Division of Water Quality, 2007c, Catawba River Fish Data compiled by the NCDWR Biological Assessment Unit. Viewed on December 3, 2007, reviewed again in October 2013.

(DWR) North Carolina Division of Water Resources website, 2013, www.ncwater.org, (Accessed October 2013).

(ESRI) Environmental Systems Research Institute, 2006, ArcMap (Version 9.2), Redlands, CA.

EPA Region 4 Water Management Division, 1996, TMDL Approval, Lake Wylie Nutrient Management Strategy.

Gaston County Planning Department, 2008. Unified Development Ordinance. Effective July 1, 2008. http://www.co.gaston.nc.us/Planning/UDO/UDO.htm.

Goretti, Andy. Mecklenburg County GIS, Personal Communication, 14 September, 2007.

Huntersville Planning Department, 2008, Town of Huntersville, North Carolina Zoning Ordinance. Amended July 18, 2007.

Isley, Karen. Mecklenburg County GIS, Personal Communication, 25 September, 2007.

Karr, J. R, 1981. Assessment of biotic integrity using fish communities. Fisheries. 6: 21 - 27.

(LUESA) Land Use and Environmental Services Agency, Charlotte-Mecklenburg Storm Water Services Stream Use Support Index, Accessed December 16, 2007, http://www.charmeck.org/Departments/Stormwater/Report+Pollution/Stream+Use-Support+Index+%28SUSI%29.htm.

Masson, R. N., and Stucky, J. M. 2007, *Lotus unifoliatus* var. *helleri* phenology and response to simulated mowing, In press. Jour. NC Acad. Sci.

(MRLC) Multi-Resolution Land Characteristics Consortium, 2001, National Land Cover Dataset 2001, Available online at: www.mrlc.gov. (Accessed December 6, 2007).

(NHP) Natural Heritage Program, 2014, North Carolina Natural Heritage Program Database, Accessed April 1, 2014 at http://www.ncnhp.org/

(NCGS) North Carolina Geological Survey, 1994, Geology of North Carolina Map, Available online at: www.geology.enr.state.nc.us (Accessed 11 December 2007).

(NRCS) Natural Resources conservation Service, 2007, Soil Survey Geographic Database for Mecklenburg County, Fort Worth, Texas.

Radford, A. E., H.E. Ahles, and C.R. Bell, 1968, Manual of the Vascular Flora of the Carolinas, The University of North Carolina Press, Chapel Hill, NC.

Randall, Kelly. 2008. Director, Charlotte Mecklenburg Environmental Health Department, Personal Communication, 15 January 2008.

Roux, T. 2007, 2006 Bioassessment Report: Biological Monitoring, Mecklenburg County Water Quality Program, Program Element IC-S (1.3).

Roux, Tony. Mecklenburg County; Land Use and Environmental Services Agency, Personal Communication, 03 December, 2007.

Schafale, M. P. and A. S. Weakley, 1990, Classification of the Natural Communities of North Carolina: Third Approximation, Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health, and Natural Resources. Raleigh.

Schueler, Thomas, 1994, "The Importance of Imperviousness", Watershed Protection Techniques 1 (Fall 1994): 100.

Stecker, Kathy, North Carolina Division of Water Quality, Personal Communication, 19 October, 2007.

Stecker, Kathy, North Carolina Division of Water Quality, Personal Communication, 19 October, 2007.

(USFS) United States Fish and Wildlife Service, 1999. National Wetlands Inventory, Onemap_prod.SDEADMIN.nwi_poly, Vector Digital Data, St. Petersburg, Florida.

(USFWS) United States Fish and Wildlife Service, 2005, Schweinitz's sunflower (Helianthus schweinitzii), http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=Q2B7, viewed on October 9, 2007.

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Black & Veatch International Company

Charlotte-Mecklenburg Utilities
City of Mount Holly
Regional Wastewater Treatment

B&V Project 148017
B&V File A
June 27, 2007

Ms. Chrys Baggett
Environmental Policy Act Coordinator
North Carolina Department of Administration
State Clearinghouse
1301 Mail Service Center
Raleigh, NC 27699-1301

Subject: Scoping for Environmental Impact Statement for Long Creek Regional Wastewater Treatment

Dear Ms. Baggett:

Charlotte-Mecklenburg Utilities and the City of Mount Holly are working together on a project to evaluate how the growing wastewater demands in both service areas can be met. In 2006, Charlotte-Mecklenburg Utilities and Mount Holly cooperated in a feasibility and preliminary planning study for regional wastewater treatment. The study identified a number of alternatives that could satisfy future wastewater treatment projections. The report found that several regional treatment scenarios are conceptually feasible and favored the construction of a new facility. A new regional wastewater treatment plant could potentially provide a single discharge of high quality effluent that would replace the existing Mount Holly discharge.

Charlotte-Mecklenburg Utilities and Mount Holly have decided to continue this project by evaluating the identified alternatives through an Environmental Impact Statement Process (EIS). We have enclosed 17 copies of the scoping document, which includes a detailed description of the proposed project alternatives and location maps. We are requesting preliminary comments regarding the proposed project from any agencies that would review the Environmental Impact Statement. We understand you will submit this letter for publication in the North Carolina Environmental Bulletin and to the SEPA coordinator for circulation.

Please contact me at (704) 510-8424 if you have any questions.

Ms. Chris Baggett
NC State Clearinghouse

B&V Project 148017
June 27, 2007

Very truly yours,

BLACK & VEATCH
INTERNATIONAL COMPANY

Mary Knosby

Mary Knosby, P.E.

Enclosures
cc: Barry Gullet, CMU
Barry Shearin, CMU
Kit Eller, CMU
Jackie Jarrell, CMU
Ed Munn, City of Mt Holly
James Friday, City of Mt Holly
Brent Reuss, Black & Veatch
Paul Leonard, ENTRIX
Lauren Elmore, ENTRIX

Charlotte Mecklenburg Utilities and the City of Mount Holly Long Creek Regional Wastewater Treatment Plant

Scoping Document for Environmental Impact Statement

1. Introduction

Continued economic development and growth within the Charlotte Metropolitan Area is projected to require additional wastewater treatment capacity in northwest Mecklenburg County and the eastern portion of Gaston County. Charlotte-Mecklenburg Utilities (Utilities) and the City of Mount Holly (Mount Holly) are working together on a project to evaluate how the growing wastewater demands in both service areas can be met. In 2006, Utilities and Mount Holly cooperated in a feasibility and preliminary planning study for regional wastewater treatment (Black & Veatch, 2006). The study identified a number of alternatives that could satisfy future wastewater treatment projections. The report found that several regional treatment scenarios are conceptually feasible and favored the construction of a new facility. Scenarios identified in the study included a new regional wastewater treatment plant (WWTP) adjacent to the existing Long Creek Pump Station in western Mecklenburg County as well as combinations of expansion and new construction on the Gaston side of the Catawba. Mount Holly's existing WWTP is located directly across the Catawba River (Lake Wylie) from the confluence of Long Creek on the Mecklenburg side and the existing Long Creek wastewater lift station as shown in Figure 1. A new regional wastewater treatment plant could potentially provide a single discharge of high quality effluent that would replace the existing discharge.

Utilities and Mount Holly have decided to continue this project by evaluating the identified alternatives through an Environmental Impact Statement Process (EIS). The purpose of this scoping document is to present information related to the proposed project and solicit feedback for preparation of the draft EIS. The EIS will also evaluate the direct, secondary, and cumulative impacts throughout the two service areas related to the construction of a new regional WWTP. The alternatives in the proposed project include construction of a force main across the Catawba River.

2. Purpose and Need

The project area is located in eastern Gaston County and western Mecklenburg County along the Catawba River. The western Mecklenburg County portion of Utilities' service area includes the Long Creek, Gar Creek, Catawba Creek, and Lower Mountain Island Creek watersheds. Utilities will also evaluate the potential to pump wastewater produced in the Paw Creek watershed to a new WWTP in the project area in the future. The Mount Holly service area includes wastewater flows from within Mount Holly, its extraterritorial jurisdiction (ETJ), and a portion of the Town of Stanley. The total service area is shown in Figure 2.

jurisdiction (ETJ), and a portion of the Town of Stanley. The total service area is shown in Figure 2.

For the Utilities service area, including Paw Creek, the population is projected to grow to approximately 75,000 in 2020, increasing to approximately 115,000 by 2030. For the Mount Holly service area, the population is projected to grow to approximately 25,000 in 2020, increasing to approximately 40,000 by 2030. Including industrial wastewater flows, the 2030 maximum month wastewater flow projections are 17 million gallons per day (mgd) and 8 mgd for Utilities and Mount Holly, respectively (Table 1).

Table 1
Long Creek Regional WWTP Project Area
Maximum Month Wastewater Flow Projections

	Population Served				Wastewater Flows (mgd)			
	2000	2010	2020	2030	2000	2010	2020	2030
Utilities Service Area	23,297	43,371	74,098	115,580	3.34	6.47	10.90	16.86
Mt Holly Service Area	9,000	14,515	24,382	39,322	3.32	4.10	5.50	7.62
Total	32,297	57,886	98,480	154,902	6.66	10.57	16.40	24.48

Figure 3 illustrates the flow projections for the combined service areas. The proposed project is a key element in Utilities' plan to provide system-wide municipal wastewater treatment and is compatible with planned and anticipated growth. Based on population growth and wastewater flow projections, the capacity of the existing 4-mgd Mount Holly WWTP will be exceeded by 2020. Utilities' transmission line to the McAlpine WWTP is limited by the capacity of the Coffey Creek interceptor where it crosses Runway 2 at the Charlotte-Douglas International Airport. The Coffey Creek interceptor is currently nearing its maximum capacity.

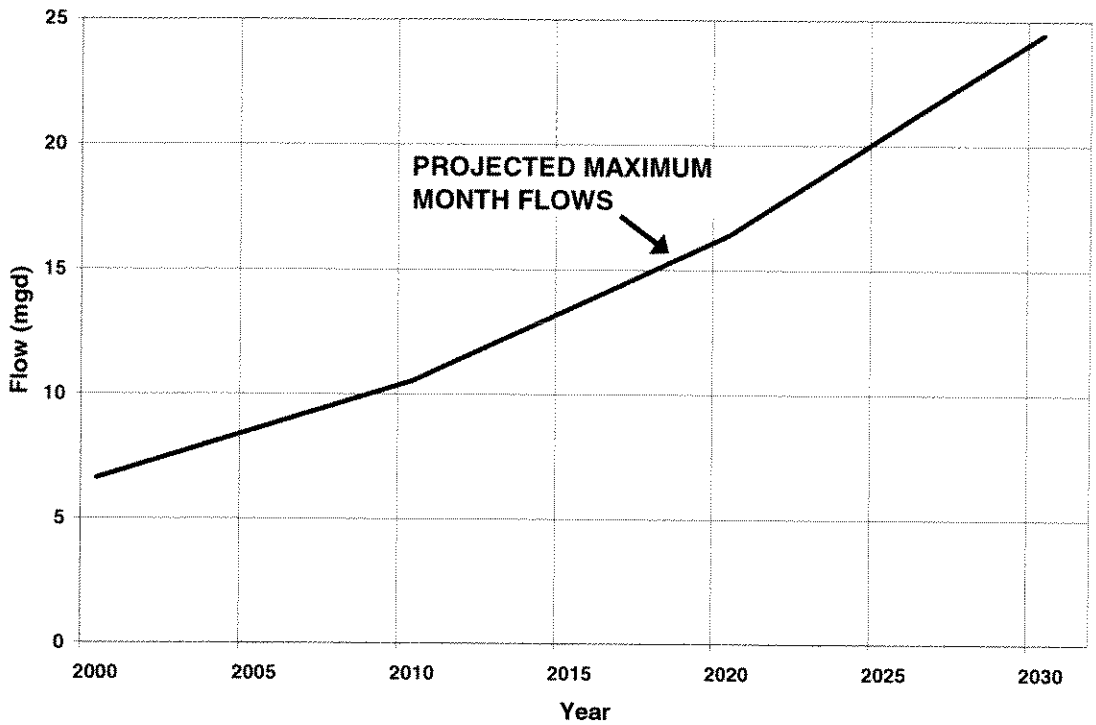


Figure 3. Combined Wastewater Flow Projections

3. Proposed Project and Proposed Project Site

The planning study (Black & Veatch, 2006) describes the initial evaluation of potential alternatives for the municipalities to accommodate their combined wastewater treatment needs, including continuing to operate separately. The study evaluated six possible alternatives (see Section 5 below) and included a preliminary recommended alternative. The preliminary recommended alternative was selected based on the most favorable combination of minimizing environmental impacts and maximizing the cost effectiveness of permitting, construction, and operation. The 2006 study was based on conceptual and high-level analysis. The EIS process will provide more detailed evaluation of these alternatives and could result in the same or a different conclusion.

Portions of several of the potential sites associated with these alternatives involve property along Lake Wylie within the area covered by the Shoreline Management Plan (Catawba Wateree SMP) for Duke Energy's Catawba Wateree Hydro Project (FERC Project No. 2232) and approval through Duke's Catawba Wateree SMP Conveyance Program will be required. The project is consistent with existing zoning and the surrounding land use. The proposed facility would be constructed outside of the 100-year floodplain and aligned on the property to avoid impacting site wetlands and required buffers.

Though the specific details of the proposed project have yet to be determined, Figure 4 provides a conceptual site plan for Alternative 5 described below (at 25 mgd). The facility would be designed to be constructed in phases as flows increase over time. The first phase would be designed for a capacity of 11 to 17 mgd in 2020 followed by expansions in approximately 2030. Site improvements that would be made during construction of the project include earthwork, landscaping, construction of roads, operations and maintenance facilities, and permanent stormwater management facilities.

A new regional WWTP would be expected to consist of the following facilities:

- Headworks (screening and grit removal)
- Flow equalization
- Primary clarifiers
- Biological nutrient removal (BNR) basins
- Secondary clarifiers
- Deep bed denitrification filters
- UV Disinfection
- Reaeration
- Solids Handling
- Influent pumping
- Piping to transport flow across the Catawba River
- Outfall structure in Long Creek or the Catawba River

4. Project Alternatives Considered

Various alternatives for a new regional facility or continuing to operate separate wastewater facilities were considered in the 2006 planning study. The study identified multiple reasons for focusing on a single regional facility. These included:

1) The State of North Carolina and the Division of Water Quality (DWQ, 2004) favor a regional approach to wastewater treatment and may be more supportive of a new regional plant over other alternatives.

2) Placement of a single WWTP is preferable to other alternatives in terms of compatibility with existing and future land uses, establishment and protection of riparian buffers, and minimization of impacts to critical areas such as wetlands.

3) The proposed project provides regional wastewater treatment with a single discharge, efficiency in planning, design, and permitting, minimizes shoreline and wetland impacts, and cost-effectively achieves project goals.

A summary of alternatives considered in the 2006 planning study included:

- Alternative 1 – Continue to operate separately and with existing facilities. This scenario requires Mount Holly to upgrade to and expand their existing plant to 8 mgd and Utilities to provide conveyance and treatment capacity for 17 mgd at McAlpine Creek WWTP and/or at Irwin Creek WWTP.

- Alternative 2 – Continue to operate separately with additional facilities. This scenario requires Mount Holly to upgrade and expand their existing plant to 8 mgd and Utilities to construct a new 17-mgd plant located at Long Creek to treat wastewater from within Mecklenburg County.

- Alternative 3 – Provide treatment for Mount Holly and Utilities flows at the Mount Holly WWTP site by upgrading and expanding the existing plant to 25 mgd. Utilities flows would be pumped across the Catawba River.

- Alternative 4 – Provide treatment for Mount Holly and Utilities flows in Mount Holly by constructing a new 25-mgd WWTP on land adjacent to the existing Mount Holly WWTP. Utilities flows would be pumped across the Catawba River.

- Alternative 5 – Provide treatment for Mount Holly and Utilities flows on the Mecklenburg side of the Catawba River by constructing a new 25 mgd WWTP on vacant land surrounding the Long Creek Pump Station. Mount Holly flows would be pumped across the Catawba River.

- Alternative 6 – Continue to operate the Mount Holly WWTP at 4 mgd. Provide treatment for Mount Holly and Utilities flows on the Mecklenburg side of the Catawba River by constructing a new 21 mgd WWTP on vacant land surrounding the Long Creek Pump Station. Dutchman's Creek (Mount Holly) flows would be pumped across the Catawba River.

These alternatives will be further evaluated and addressed in the EIS, in addition to the Non-Discharge and No Action alternatives. Non-discharge options will also be evaluated according to NC DWQ guidelines. Under the No Action alternative, Utilities and Mount Holly would not expand municipal wastewater treatment capacity to serve the growing population of western Mecklenburg County and Mount Holly. The population of the area would continue to grow necessitating the implementation of on-site wastewater treatment practices such as septic tank systems or smaller package wastewater treatment plants. Such systems would not achieve the level of reliability, advanced treatment levels, or monitoring required of the alternatives being considered.

5. Environmental Analysis & Regulatory Compatibility

The potential environmental effects related to the proposed project include direct and secondary and cumulative impacts (SCI). These impacts will be addressed in the EIS. The categories of potential impacts that will be addressed in the EIS include:

- Topography
- Soils
- Land Use and Land Cover
- Wetlands
- Floodplains
- Prime or Unique Agricultural Lands
- Public lands and Scenic Recreational and Significant Natural Areas
- Areas of Archeological or Historic Value
- Air Quality
- Noise Levels
- Water Resources (Surface Water and Groundwater)
- Forest Resources
- Shellfish or Fish and Their Habitats
- Wildlife and Natural Vegetation
- Introduction of Toxic Substances

The environmental analysis to be conducted during the EIS process will include site-specific surveys, review of existing environmental data and ordinances, water quality monitoring and modeling, consultation with agencies, and other means to evaluate the potential environmental impacts and mitigation. The secondary and cumulative impacts will be analyzed using available information primarily from Mecklenburg County's Land Use and Environmental Services Agency (LUESA), Charlotte Storm Water Services, Mount Holly, and others. Future land use information developed for previous studies will be the basis for the SCI analysis. Specific attention will be directed towards water quality because of the complexity of water quality issues within the Catawba River system.

Water Quality

Water bodies present in the vicinity of the potential regional project sites include the Catawba River downstream of the Mountain Island Lake Dam, and Long Creek near its confluence with the Catawba River. In these areas, both waterbodies are classified as critical areas (CA) within WS-IV water supply waters (WS-IV; CA) (DWQ BIMS Database, May 14, 2007). Water supplies in moderately to highly developed watersheds are classified as WS-IV waters. Watershed areas within one-half mile of a water supply and waters within one-half mile of a water supply intake are designated as critical areas. Discharges are allowed in WS-IV; CA areas, but effluent must meet standards established by the North Carolina Department of Environmental Health (DEH). Expanded wastewater discharges to water supply waters must be approved by NC DEH. Within water supply watersheds, the North Carolina Department of Environment and Natural Resources (NC DENR) also requires minimum buffer widths as well as control of nonpoint sources and stormwater discharges.

As part of this project, water quality modeling will be performed to support the evaluation of water quality effects and the development of speculative NPDES limits by NC DWQ for the plant discharge into Lake Wylie. Already developed for the Catawba River by Duke Energy for the FERC relicensing process, the CE-QUAL-W2 water quality model will be used. DWQ indicated their support of the use of the Duke CE-QUAL-W2 model and provided recommendations for additional sampling for model calibration. Additional water quality monitoring within Lake Wylie and other project areas has already been initiated by Utilities and Mecklenburg County (LUESA). This supplemental water quality data will be used along with existing LUESA, Duke Energy and DWQ data for model calibration. In this area of Lake Wylie, flow conditions, current velocities, and circulation are dependent upon the amount of water being released at the Mountain Island Lake Dam and the elevation of the Lake Wylie.

Endangered or Threatened Species

According to the NC DENR Natural Heritage Inventory Database, May 14 2007, there are records of a few endangered or threatened species currently within the USGS quadrangle areas of Mountain Island Lake and Mount Holly near the proposed regional facility locations. The endangered species include Smooth coneflower (*Echinacea laevigata*), Schweinitz's sunflower (*Helianthus schweinitzii*) and Michaux's sumac (*Rhus michauxii*). These three species are also federally listed endangered species. Threatened species include the Georgia aster (*Symphyotrichum georgianum*).

The United States Fish and Wildlife Service (USFWS) list, May 15, 2007, for Gaston County mentions the following protected species with threatened status, the bald eagle (*Haliaeetus leucocephalus*) and the bog turtle (*Clemmys muhlenbergii*). The USFWS list for Mecklenburg County includes the bald eagle as threatened. Surveys will be performed to confirm the presence or absence of these species on all of the regional wastewater facility alternative sites.

6. Draft EIS Outline

Executive Summary
Section 1 – Proposed Project Description
Section 2 – Project Purpose and Need
Section 3 – Alternatives Evaluation

1. Operate separately with existing facilities
2. Operate separately with new Utilities Long Creek WWTP
3. Regionalize – Upgrade and expand existing Mount Holly WWTP
4. Regionalize – New WWTP adjacent to existing Mount Holly WWTP
5. Regionalize – New WWTP adjacent to existing Long Creek Pump Station
6. Regionalize – Maintain existing Mount Holly WWTP and construct new WWTP adjacent to existing Long Creek Pump Station
7. Non-Discharge Alternatives including reuse and alternative disposal options
8. No Action Alternative

Section 4 – Wastewater Treatment Plant Facilities
Section 5 – Existing Environment
Section 6 – Environmental Consequences
Section 7 – Mitigation
Section 8 – List of Preparers
Section 9 – Literature Cited
Section 10 – Appendices
Appendix A – Supporting Documents
Appendix B – Agency Involvement
Appendix C – Local Ordinances and Information

7. Public Involvement

As part of the EIS process, Utilities and Mount Holly will hold at least two public meetings to discuss the project and EIS with the public. These meetings will provide a forum to receive public comments on the project, discuss alternatives to be considered, environmental issues, and other comments regarding the scope and content of the EIS. To supplement these meetings, Utilities and Mount Holly plan to assemble a Steering Group and a Stakeholders' group that will identify major issues and public values and help to anticipate and address community issues and reaction to the proposed alternatives.

The Stakeholders' group will include members representing local environmental, land, regulatory, and economic development interests. This stakeholder group will meet periodically beginning in August of 2007. There will be a separate effort to provide regular updates and project information to local homeowner associations, Catawba Regional Council of Governments, and media.

The Steering Group will be formed by Utilities and Mount Holly to assist in carrying out the study. It will consist of Utilities staff, Mount Holly staff, and consultants working on

the study. The Steering Group will combine the input of the Stakeholders' Group with the technical data produced by the study to form recommendations.

The Stakeholders' Group is planned to include a wide range of individuals with diverse community visions. The Stakeholders' Group will provide the Steering Group with feedback on the study as it progresses. The feedback or reaction to the information presented will reflect the various visions and thoughts of the group. The Steering Group will incorporate this feedback into its recommendations, balancing community visions, technical feasibility and economic reality.

8. State and Federal Permits Required

Several state and federal permits are required for activities associated with this project. The following permits and actions need to be completed prior to commencement of construction activities:

- State Environmental Policy Act review and Record of Decision (ROD);
- Clean Water Act Section 404 Permit from U. S. Army Corps of Engineers (USACE) Regulatory Branch (required for construction in jurisdictional wetlands and streams);
- Clean Water Act Section 401 Certification from DWQ Wetlands/401 Permitting Unit (required for construction in jurisdictional wetlands and streams);
- Air Emissions Permit from NCDAQ (may be required for emergency generators);
- A Sediment and Erosion Control Plan (must be approved by NCDENR Mooresville Regional Office, Land Quality Supervisor);
- Abandonment of wells, if applicable, (must be in accordance with 15A NCAC2C.0100).
- National Pollutant Discharge Elimination System (NPDES) Permit for new wastewater discharge to state surface waters.
- Land disturbance permits

In addition to state and federal permits, Utilities and Mount Holly need to obtain approval from Duke Energy for non-project use of project lands through Duke's Catawba Wateree SMP Conveyance Program for a new outfall to either Long Creek or the Catawba River, if located within the Catawba Wateree project boundary and a transmission line across the Catawba River.

9. References

Black & Veatch. August 2006. *Mount Holly/ Charlotte-Mecklenburg Utilities. Feasibility and Preliminary Planning Study for Regional Wastewater Treatment.*

Duke, 2001. *Shoreline Management Plan* (SMP). Duke Energy, Lake Management Division, Charlotte, NC.

North Carolina Division of Water Quality (DWQ). May 14, 2007. North Carolina Stream Classification Schedules from BIMS Database. Online database. http://h2o.enr.state.nc.us/bims/reports/reportsWB.html

North Carolina Natural Heritage Program. May 15, 2007. Database of North Carolina's Endangered and Threatened Species. Online Database. http://www.ncnhp.org/Pages/heritagedata.html

United States Fish and Wildlife North Carolina Ecological Services. May 15, 2007. North Carolina's Threatened and Endangered Species. Online database. http://www.fws.gov/nc-es/es/es.html

10. Figures

The following figures are attached.

Figure 1 – Proposed Regional Wastewater Treatment Plant Vicinity Map

Figure 2 – Service Area for Proposed Regional Wastewater Treatment Plant

Figure 4 – Proposed Regional Wastewater Treatment Plant Site Plan

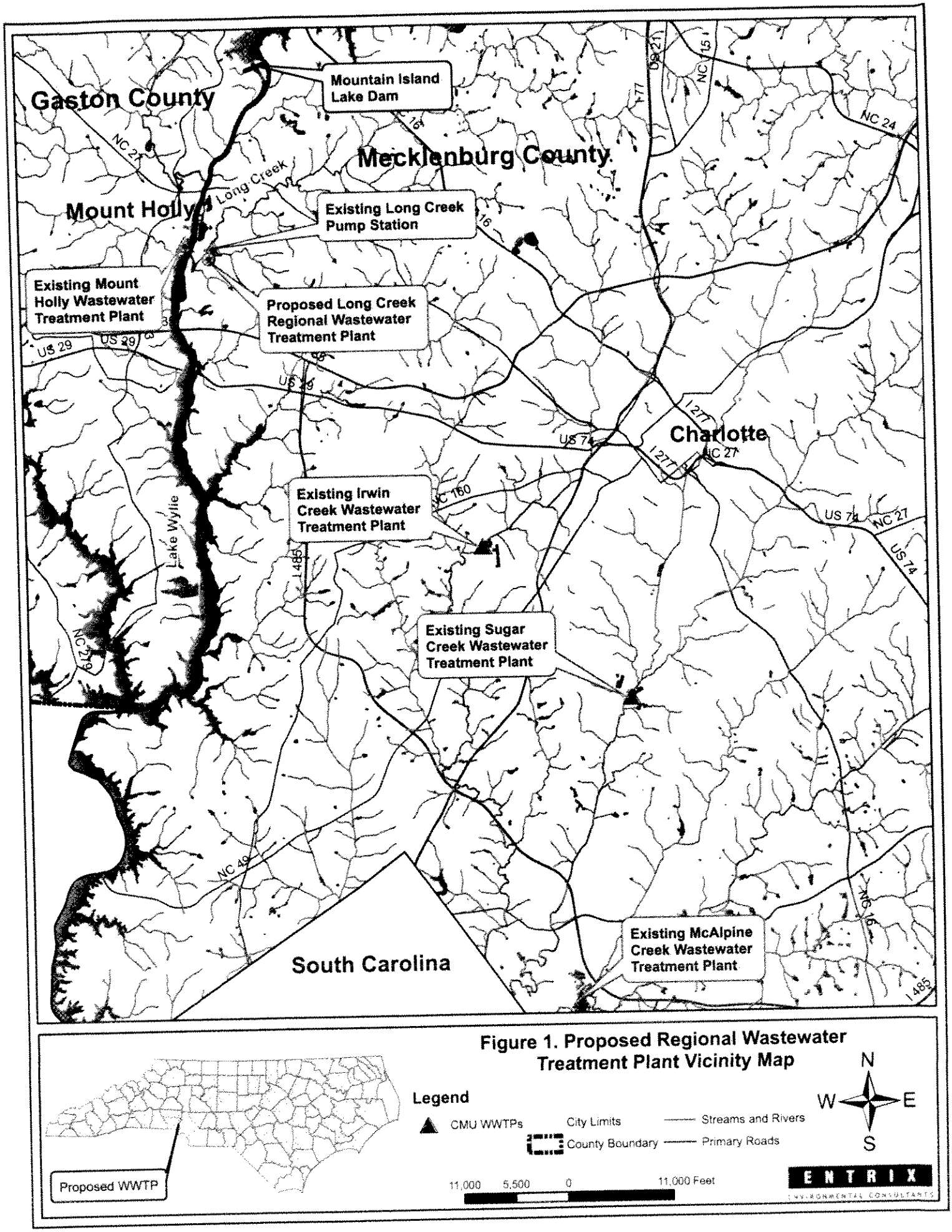


Figure 1. Proposed Regional Wastewater Treatment Plant Vicinity Map

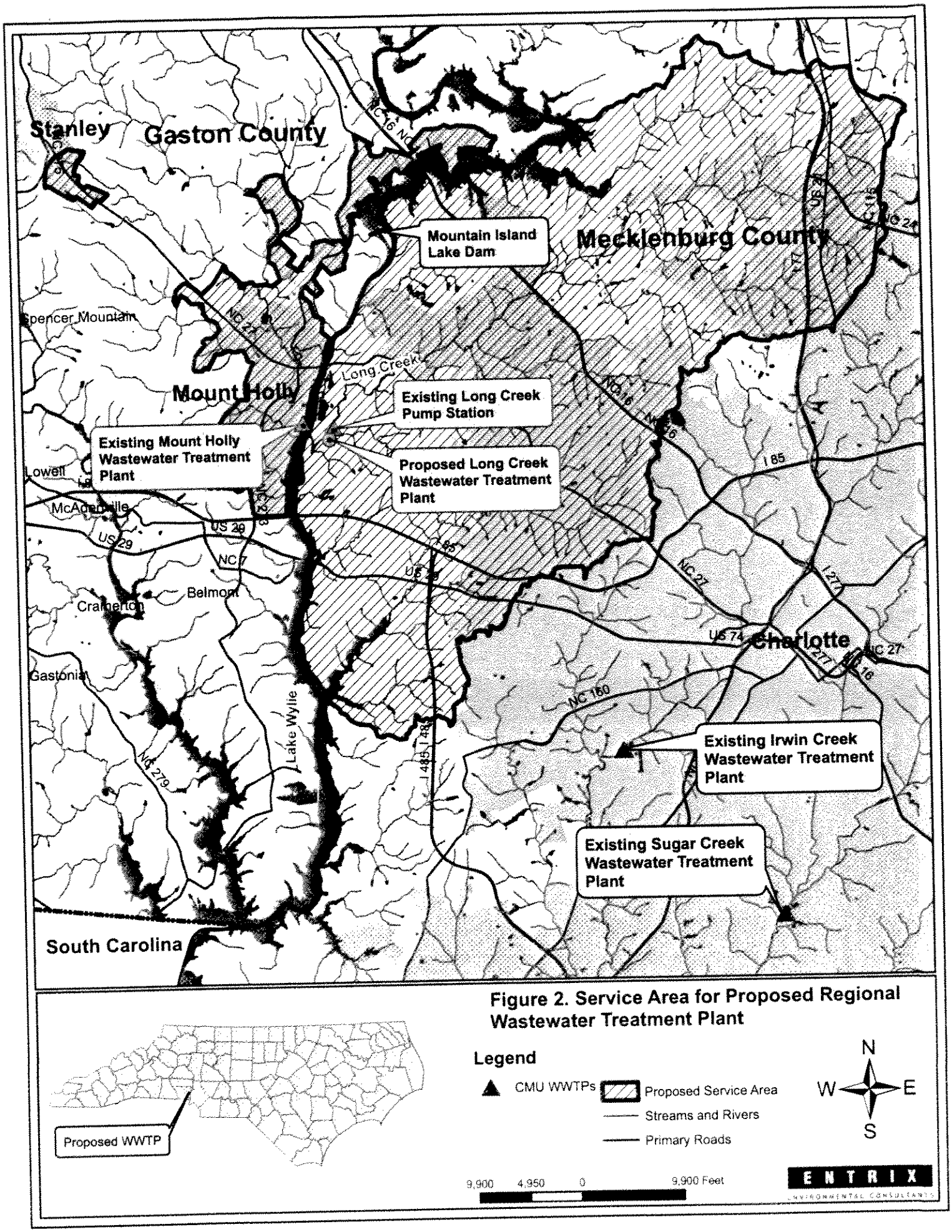


Figure 2. Service Area for Proposed Regional Wastewater Treatment Plant

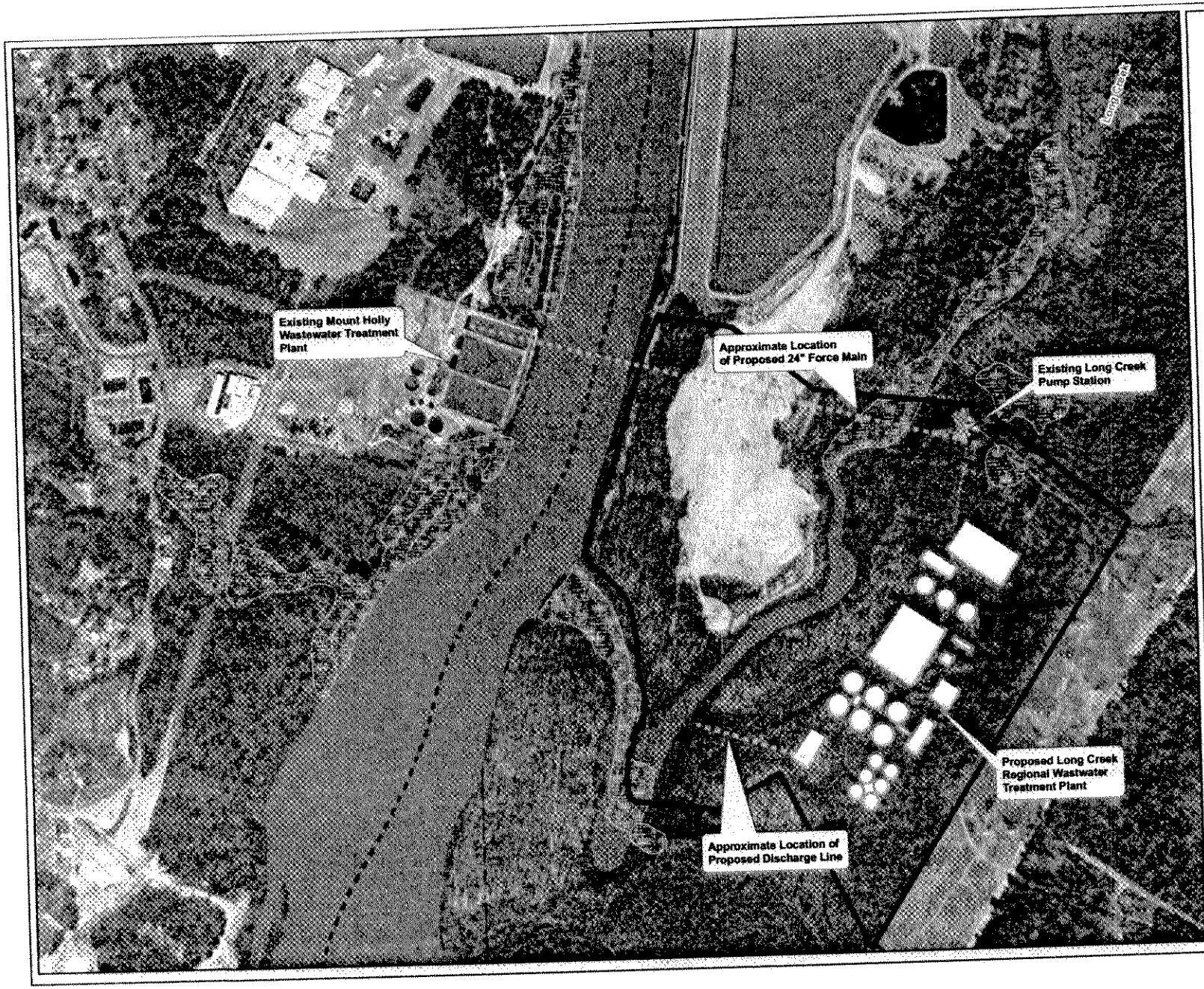


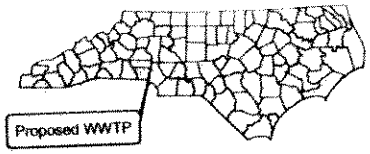
Figure 4. Proposed Regional Wastewater Treatment Plant Site Plan

Legend

- Wetland Areas
- County Boundary
- Streams and Rivers
- Property Boundary

Note: Wetland areas obtained from U.S. Fish and Wildlife Service National Wetlands Inventory.

500 250 0 500 Feet



Charlotte Mecklenburg Utilities / Mount Holly
Proposed Regional Wastewater Facility
Stakeholder Meeting #1
August 23, 2007

Attendance

The following stakeholders attended the initial meeting held at the U.S. National Whitewater Center:

American & Efird—John Bowyer, John Eapen, Craig Stover
Catawba Lands Conservancy—Rich Holmes
Catawba Riverkeeper Foundation—Donna Lisenby
Clariant—Bill Archer
CMUD Advisory Committee—George Beckwith
Crosland—Bill Daleure, Rich Reichle
Duke Energy—Jeff Lineberger
Gaston County Chamber of Commerce—Elyse Hillegass
Gaston County Planning Department—David Williams
Lake Wylie Marine Commission—Pam Beck
Mecklenburg County Park and Recreation—Don Morgan, Jason Pauling
Mecklenburg County LUESA—David Caldwell
Mount Holly Citizen's Group—Will Crist, Mike Legendre
Mount Holly City Council—Jerry Bishop
Mount Holly Community Development Foundation—Carlton Broome
N.C. DENR—Mike Parker
Quality of Natural Resources Commission—Pam Beck
Riverfront Homeowners Association—Marc Soper, Charlotte Soper
Rock Hill Utilities—Bill Yetman
S.C. DHEC—Carol Copeland
U.S. National Whitewater Center—Jeff Wise
York County, S.C.—Mark Kettlewell, Chris Jackson, Becca Bowyer, John Moore

The following representatives from the project Steering Committee attended:

Charlotte-Mecklenburg Utilities—Doug Bean, Barry Gullet, Jackie Jarrell, Barry Shearin, Ron Weathers, Kit Eller, Erin Culbert
City of Mount Holly—Eric Davis, Danny Jackson, James Friday
Black & Veatch—Brent Reuss, Mary Knosby
ENTRIX—Lauren Elmore

The following stakeholder agencies were not able to attend the first meeting:

City of Belmont (has met separately with Charlotte-Mecklenburg Utilities)
N.C. Fish and Wildlife
Sierra Club
Town of Stanley

Meeting Discussion
Charlotte-Mecklenburg Utilities presented general background to the group regarding Mecklenburg County and Mount Holly's need for additional wastewater capacity. The presentation included findings of two studies, one on Mecklenburg County's wastewater capacity needs through 2030 and one exploring the feasibility of a regional wastewater plant that would serve both Mount Holly service area and western Mecklenburg County.

Stakeholders were invited to ask questions or bring up issues that concerned them. Many of these topics and others will be discussed in more detail in subsequent meetings.

- Status of Lake Wylie total maximum daily load (TMDL) for nutrients, including point and non-point sources
- Alternatives Analysis - Pros and cons for each alternative and potential plant location
- Air quality
- Impact/reduction on number of sanitary sewer overflows
- New/expanded discharge impact on water quantity/availability downstream
- Interbasin transfer (IBT): this project keeps all water in the Catawba Basin
- Use of current Mount Holly treatment plant if plant is located in Mecklenburg County
- Water Quality modeling: what model, how we establish a baseline, etc (CE-QUAL-W2 from Duke Energy re-licensing process)
- Proximity to 2,500 residential homes that are planned in the vicinity of Clariant land; use land zoned for industrial use for potential plant site
- Other wastewater plants taken out of service with regional plant
- City of Belmont's status in stakeholder process
- Existing capacity available in Belmont to assist Mount Holly
- Belmont's drinking water intake is located downstream of potential discharge
- Location of discharge – Long Creek vs. Catawba River
- Speculative water quality permit limits (modeling ongoing)
- Project contact for stakeholders – Erin Culbert, CMU
- Water Quality Model – inputs, outputs, discharge location (modeling ongoing)
- Parks and Rec opportunities with project – parks, trails, wetlands, etc.; conservation efforts, mitigation
- 7Q10 Flow for Lake Wylie

The group discussed future meeting dates and determined it would continue to meet the fourth Thursday of the month. Any stakeholders who wish to add questions or concerns to the list of discussion topics may send comments to:

Erin Culbert
Environmental Outreach Coordinator
Charlotte-Mecklenburg Utilities
704.391.4685
eculbert@ci.charlotte.nc.us

Charlotte Mecklenburg Utilities / Mount Holly
Proposed Regional Wastewater Facility
Stakeholder Meeting #2
September 27, 2007

Attendance

The following stakeholders attended the second stakeholder meeting held at the Duke Energy Customer Resource Center:

American & Efird—John Bowyer, John Eapen
Catawba Lands Conservancy—Rich Holmes
Catawba Riverkeeper Foundation—Donna Lisenby
Clariant—Bill Archer
CMUD Advisory Committee—George Beckwith
Crosland—Bill Daleure
Duke Energy—Jeff Lineberger
Gaston County Planning Department—Patrick Armstrong
Hawfield Road residents—Ed Hamer
Lake Wylie Marine Commission—Sandy DuPuy, Bo Ibach
Mecklenburg County LUESA—David Caldwell
Mecklenburg County Park and Recreation—Jason Pauling
Mount Holly Citizen's Group—Will Crist, Mike Legendre
Mount Holly City Council—Jerry Bishop
Mount Holly Community Development Foundation—Mike Legendre
N.C. DENR—Mike Parker
Quality of Natural Resources Commission—Pam Beck
Riverfront Homeowners Association—Marc Soper
Rock Hill Utilities—Nick Stegall
S.C. DHEC—Carol Copeland
Town of Stanley—Wilce Martin
York County, S.C.—Becca Bowyer, John Moore

The following representatives from the project Steering Committee attended:

Charlotte-Mecklenburg Utilities—Doug Bean, Jackie Jarrell, Barry Shearin, Ron Weathers, Kit Eller, Erin Culbert
City of Mount Holly—Eric Davis, Danny Jackson, James Friday
Black & Veatch—Brent Reuss, Mary Knosby
ENTRIX—Lauren Elmore

The following stakeholder agencies were not able to attend this meeting:

City of Belmont
Gaston County Chamber of Commerce
N.C. Wildlife Resources Commission
Sierra Club
U.S. National Whitewater Center

Presentation
Charlotte-Mecklenburg Utilities and the City of Mount Holly reviewed the general background information presented during the first Stakeholder Meeting regarding Mecklenburg County and Mount Holly's need for additional wastewater capacity. Population projections and wastewater flow projections for both the Long Creek basin (western Mecklenburg County) and the Mount Holly service area (Gaston County) were presented. In summary, Mount Holly's capacity needs are 4.5 mgd by 2012 and 7.8 mgd by 2030. Mecklenburg County's capacity needs are 7.0 mgd by 2012 and 16.9 mgd by 2030. A regional solution may be feasible, and six alternatives were identified for further evaluation in the Environmental Impact Statement (EIS) process. Additional alternatives (required as part of the EIS alternatives analysis) are "no action" and "non-discharge" alternatives.

An EIS is an extensive evaluation of the advantages and disadvantages of alternatives that discloses the direct, secondary and cumulative impacts. A project scoping letter was circulated through the Department of Administration's State Environmental Clearinghouse. Comments from agencies with expertise and the public will be addressed in the EIS.

Meeting Discussion
Stakeholders were invited to ask questions or bring up issues that concerned them. Many of these topics and others will be discussed in more detail in subsequent meetings.

- The questions and comments brought up during the first stakeholder meeting will be addressed during the appropriate meeting (see future meeting agenda). We are keeping a running list by topic, and we will set aside additional time if we do not address all of the questions.
- Detailed surveys for the EIS have been conducted for each alternative. More discussion on alternatives analysis in the next meeting.
- Direct Impacts are known environmental consequences as a direct result of the project.
- Secondary and Cumulative Impacts (SCIs) are environmental consequences that occur in the reasonably foreseeable future as a result of the project. Mitigation measures limit impacts of SCIs.
- Surface water and ground water are included as part of the Water Resources evaluation.
- Scoping document was submitted to the State in late June. Comments were received in early August.
- Public meetings will also be conducted. This stakeholder process is in addition to prescribed public notification and public meetings process.
- A request was made to share the scoping document with the stakeholder group. We will e-mail the scoping document.
- The potential location for a new regional wastewater treatment plant will be discussed in detail at the next meeting as part of the alternatives analysis.
- We will explore additional feasible alternatives if any others arise during this stakeholder process.
- All alternatives are evaluated and discussed in one EIS document.
- Concerns that process is moving too quickly. It was necessary for Utilities and Mount Holly to conduct a preliminary study to evaluate feasibility, budgetary options and basis for evaluation. This background information provided the foundation to get to this point in the process.
- Black & Veatch is assisting with the planning and technical portion of this project.

- Concerns regarding the City of Belmont's role in the stakeholder process. Belmont is well aware of the project, is a member of the stakeholder group and receives the same materials other members do.
- The alternatives will be thoroughly discussed in the next meeting. The steering group felt it was necessary to provide background information on the project and EIS process so everyone has a foundation prior to the discussion on alternatives.
- Suggestion that an alternative should include Belmont flow.
- Stakeholder group has diverse interests. We will continue to focus on all topics.
- Agendas are flexible to allow time to thoroughly address all topics. We are open to holding additional meetings if deemed necessary by the group.
- Water quality modeling is required for any of the discharge alternatives.
- Alternatives information will be provided prior to the next meeting.

The next meeting will be held October 25, 2007, 6:30 to 8:00, at the Duke Energy Customer Resource Center at 3201 International Airport Drive, Charlotte. Alternate dates for our November meeting will be sent to the group, since it conflicts with Thanksgiving. We will select a date based on the best attendance. Any stakeholders who wish to add questions or concerns to the list of discussion topics may send comments to:

Erin Culbert
Environmental Outreach Coordinator
Charlotte-Mecklenburg Utilities
704.391.4685
eculbert@ci.charlotte.nc.us

Charlotte Mecklenburg Utilities / Mount Holly
Proposed Regional Wastewater Facility
Stakeholder Meeting #3
October 25, 2007

Attendance

The following stakeholders attended the second stakeholder meeting held at the Duke Energy Customer Resource Center:

American & Efird—John Bowyer
ARCADIS—Jerry Hatton
Catawba Lands Conservancy—Rich Holmes
City of Belmont—Barry Webb
Clariant—Bill Archer
CMUD Advisory Committee—George Beckwith
Duke Energy—Jeff Lineberger
Gaston County Planning Department—Patrick Armstrong
Hawfield Road residents—Ed Hamer
Lake Wylie Marine Commission—Sandy DuPuy, Bo Ibach
Mecklenburg County LUESA—David Caldwell
Mount Holly City Council—Jerry Bishop
N.C. DENR—Rob Krebs, Mike Parker
Quality of Natural Resources Commission—Jim Burke
Riverfront Homeowners Association—Marc Soper
Town of Stanley—Wilce Martin
York County, S.C.—John Moore

The following representatives from the project Steering Committee attended:

Charlotte-Mecklenburg Utilities—Doug Bean, Jackie Jarrell,
Ron Weathers, Kit Eller, Erin Culbert
City of Mount Holly—Eric Davis, James Friday
Black & Veatch—Brent Reuss, Mary Knosby

The following stakeholder agencies were not able to attend this meeting:

Catawba Riverkeeper Foundation
Crosland
ENTRIX
Gaston County Chamber of Commerce
Mecklenburg County Park and Recreation
Mount Holly Community Development Foundation
Mount Holly Utilities Committee
N.C. Wildlife Resources Commission
Rock Hill Utilities
S.C. DHEC
Sierra Club
U.S. National Whitewater Center

Presentation
Charlotte-Mecklenburg Utilities and the City of Mount Holly conducted a brief recap of the previous Stakeholder Meetings regarding Mecklenburg County and Mount Holly's need for additional wastewater capacity. Population projections and wastewater flow projections for both the Long Creek basin (western Mecklenburg County) and the Mount Holly service area (Gaston County) were presented. In summary, Mount Holly's capacity needs are 4.5 mgd by 2012 and 7.8 mgd by 2030. Mecklenburg County's capacity needs are 7.0 mgd by 2012 and 16.9 mgd by 2030. A regional solution may be feasible, and six alternatives were identified for further evaluation in the Environmental Impact Statement (EIS) process. Additional alternatives (required as part of the EIS alternatives analysis) are "no action" and "non-discharge" alternatives.

Stakeholders had received the alternatives and conceptual diagrams in advance of the meeting. Brent Reuss of Black & Veatch presented a summary of each of the eight alternatives and corresponding maps. Questions and comments were taken after each alternative was presented.

Meeting Discussion
Below is a summary of the questions/comments discussed after presentation of each alternative.

ALTERNATIVE #1

- How would Mecklenburg County flow be handled by Alternative #1?
    - The flow would continue to be pumped to the south plants, which would eventually need to be expanded.

ALTERNATIVE #2

- The maps show the new plant located in a wooded area, but B&V is working on layouts in the previously cleared area. This option would preserve the wooded area.
- Reclaimed water/ Reuse: Highly treated wastewater used for irrigation and other nonpotable activities.
- Could we phase out McAlpine Creek WWTP and just expand this new plant to accommodate that flow?
    - McAlpine is a 64-mgd facility that treats the southern portion of the drainage basin. It would not be feasible to pursue this option.
    - Other CMU plant capacities – McDowell Creek WWTP is 12 mgd, Mallard Creek WRF is 12 mgd, Irwin Creek is 15 mgd, Sugar Creek WWTP is 20 mgd (currently under design to expand).
- The existing Mt Holly WWTP is currently located in the floodplain. How often does the facility flood?
    - Mt Holly staff does not recall the tanks being submerged. The level of the river is controlled by the dam. The issue when the river is high is that hydraulically the discharge can't go into river it backs up in the plant.

ALTERNATIVE #3

- Four options to for the river crossing.
    - Tunnel well below river bottom – no disruption to river (common method)

    - Lay pipe on bottom of river
    - Open trench–cut
    - Aerial crossing on bridge
- CMU has conducted some initial research to the river crossing. Tunneling or aerial crossings are preferred. Tunneling would be less expensive; however a pedestrian bridge might have more recreational benefits.
- How do you detect leaks under the ground?
    - Microtunnel, pipe with no joints, install tunnel and fill tunnel with concrete all around. Properly selecting pipe and process virtually eliminates possibility of leaks.
- Aerial – exposed to weather, temperature.
- Either type of river crossing can be designed to minimize the risks.
- We don't know geology of soil/rock under river. A geological survey would be conducted during design.
- Footprint of parcel?
    - Mecklenburg County ~150 acres
    - Mt Holly ~30 acres
- Was Paw Creek Pump Station taken into consideration in Alternatives 1 and 2? Paw Creek could operate as is (pumping to McAlpine), or flow could be reversed to Long Creek.

ALTERNATIVE #4

- Double pumping within the plant might be necessary because of parcel available for plant.
- Plant would be located closer to some existing homes.
- How will this alternative on the Mt Holly side impact the planned greenways?
    - Our design would accommodate the greenways and any other planned recreational areas. If we decommissioned the Mt. Holly plant, that land could be used for other purposes.
- 36-inch pipe across the river for Alternative #3
- 24-inch pipe across the river for Alternative #2
- Is redundancy needed for river crossing?
    - We will evaluate initial flows vs. build-out flows to properly size the pipe. This is a design detail.

ALTERNATIVE #5

- Scoping document feasibility study recommended Alternative #5. As we proceed with the EIS, this may or may not be recommended site.
- The maps show the new plant located in a wooded area, but B&V is working on layouts in the previously cleared area as well.
- Bridge will be necessary across Long Creek for access to the plant.
- Is it feasible to send reuse to Gaston County?
    - A parallel pipe could be installed.
    - Another option is a satellite plant at Mt Holly site – typically membrane treatment. This type of treatment will removes solids, treats sewage to high quality, and returns solids to the sewer. Effluent would be reuse water.

- How common, how expensive? Is more expensive, but may be cheaper than other options if you really want reuse as priority. Satellite facilities are becoming more common.

ALTERNATIVE #6

- Does not impact American & Efird site. This was a misplaced bullet in the presentation.
- The Mount Holly plant will still need to be upgraded, but will not need to be expanded.

ALTERNATIVE #7

- Non-discharge – Spray-irrigate plant effluent rather than discharge point.
- Would require 8,000 to 12,000 acres; this is the equivalent of 4-6 Lowe's Motor Speedways.
- Plant would still be built, just no discharge.
- Land availability and cost make this alternative not feasible.

ALTERNATIVE #8

- No action - no additional sewer services.
- The Mount Holly plant would still be upgraded but not expanded.

MATRIX

- All costs are within 10% so not a clear differentiator.
- Joint facility is less expensive to operate.
- More impact on environmental recreation.
- While cost is important, it's not the driving factor. Results of EIS and stakeholder feedback are also important elements.
- Water quality was not included in the matrix and will be covered in another meeting.

- What are most important aspects?
    - State thinks regional alternative is preferable.
    - Reuse should be incorporated into the project.
    - Water quality will be the same for all alternatives.
    - Air quality – odors, proximity to housing – additional encroachment currently on Mt. Holly side; Whitewater center and new housing plans on Mecklenburg County side.
    - NPDES permit limits probably comparable to existing McAlpine Creek WWTP permit limits, but may be more stringent; definitely more stringent than existing Mt. Holly plant.
    - Duke Energy requested to add Lake Wylie water availability (quantity) to matrix. Alt 1 (out of the Alts 1-6) is the only alternative that does not add quantity to Lake Wylie.
    - Is there an impact to river itself? Has Duke looked into this?
    - If discharge is located near existing Mt Holly WWTP discharge, this would help Lake Wylie in terms of water quantity.
    - If flow goes to McAlpine, it bypasses Lake Wylie.

- McAlpine Creek WWTP is currently permitted at 64 mgd and is currently treating about 50 mgd.
- Some QNRC members liked overhead/aerial pipe crossing. Connections for recreational tourism.
- Look at access for canoe launch into Long Creek.
- WQ modeling – samples taken through December helps determine permit limits.
- Can access be provided to plant property from Clariant? Possibly, but operators will need quicker access.
- Reuse – could industries use it? Possibly, if it meets the water quality that they require for their processes.

The next meeting will be held November 27, 2007, 6:30 to 8:00, at the City Café in Mount Holly. Any stakeholders who wish to add questions or concerns to the list of discussion topics may send comments to:

Erin Culbert
Environmental Outreach Coordinator
Charlotte-Mecklenburg Utilities
704.391.4685
eculbert@ci.charlotte.nc.us

Charlotte Mecklenburg Utilities / Mount Holly
Proposed Regional Wastewater Facility
Stakeholder Meeting #4
November 27, 2007

Attendance

The following stakeholders attended the second stakeholder meeting held at the City Café in Mount Holly:

American & Efird—John Bowyer, John Eapen
ARCADIS—Jerry Hatton
City of Belmont—Barry Webb
Catawba Lands Conservancy—Rich Holmes
Clariant—Bill Archer
CMUD Advisory Committee—George Beckwith
Crosland—Bill Daleure
Duke Energy—Jeff Lineberger
Gaston County Planning Department—Patrick Armstrong
Hawfield Road residents—Ed Hamer
Lake Wylie Marine Commission—Sandy DuPuy, Bo Ibach
Mecklenburg County LUESA—David Caldwell
Mecklenburg County Park and Recreation—Jason Pauling
Mount Holly Citizen's Group—Will Crist
Mount Holly City Council—Jerry Bishop
N.C. DENR—Mike Parker
Quality of Natural Resources Commission—Pam Beck
Rock Hill Utilities—Nick Stegall, Bill Yetman
S.C. DHEC—Carol Copeland
Town of Stanley—Wilce Martin

The following representatives from the project Steering Committee attended:

Charlotte-Mecklenburg Utilities—Doug Bean, Barry Shearin, Barry Gullet, Kit Eller, Erin Culbert
City of Mount Holly—Danny Jackson, James Friday
Black & Veatch—Brent Reuss, Mary Knosby, Sara McMillan
ENTRIX—Lauren Elmore

The following stakeholder agencies were not able to attend this meeting:

Catawba Riverkeeper Foundation
Gaston County Chamber of Commerce
Mount Holly Community Development Foundation
N.C. Wildlife Resources Commission
Riverfront Homeowners Association
Sierra Club
U.S. National Whitewater Center
York County, S.C.

Doug Bean of Charlotte-Mecklenburg Utilities opened with a discussion regarding recent news coverage of the federal investigation at the McAlpine Creek WWTP. He said Utilities is cooperating fully with investigators and emphasized this and other plants' outstanding environmental performance. He noted that many of the allegations described in the news are not physically possible at the plant and offered to answer any questions.

Presentation and Discussion

Brent Reuss of Black & Veatch presented a brief recap of the previous Stakeholder Meetings regarding Mecklenburg County and Mount Holly's need for additional wastewater capacity. The six alternatives identified by the feasibility study were presented in detail at the previous month's meeting. The focus of this meeting was a presentation of the potential environmental impacts associated with the proposed project. The goal is to have the Environmental Impact Statement completed by January, and a recap of its findings will be discussed in the February stakeholder meeting.

Examples of direct and secondary/cumulative environmental impacts were presented and questions were taken throughout the presentation. The summary of the comments and questions is presented below.

Direct Impacts: The direct environmental impacts would be located on the project site itself and associated with construction and/or operation of the new facility. Examples of these types of impacts include loss of open space from facility construction, increased impervious area on the project site and disturbance of riparian buffers due to pipeline construction. Direct impact reductions already in place were presented along with potential mitigation measures that would be implemented if the project were to move forward.

- The discharge location was discussed with DWQ personnel who recommended the outfall be located in the Catawba River as opposed to Long Creek.
- If Mount Holly decided to stay on its own, the potential for direct impacts due to the pipeline crossing would be reduced. There are various scenarios for each alternative regarding the pipe crossings, and these will be addressed in more detail at the design stage of the project.
- The project team met with DENR last week to discuss the ongoing modeling effort and present initial results. The modeling will help provide more information and will help guide water quality limits. Results from the Lake Wylie water quality model will be presented at the January stakeholders meeting, once December data has been included.
- There is no TMDL for this section of the Catawba River; however a TMDL for chlorophyll-a is in place for Lake Wylie.
- Questions were asked about the current Mount Holly discharge concentrations and the river flow in this location. Mount Holly currently does not have nutrient limits, but is required to monitor for total nitrogen and phosphorus on a monthly basis. These data, along with the modeling results, will be presented at the January meeting.
- Black & Veatch discussed at the October meeting that if Alternative #5 (regional plant on Mecklenburg side) were selected, the plant could be relocated to a portion of the property that is already disturbed. This would reduce impacts to tree cover and buffers. Brent presented a new diagram to show stakeholders this option.
- If Alternative #5 is selected, it would be constructed in phases with the final capacity of 25 mgd as the 30-year projected capacity. The plant site would accommodate further expansion if necessary and would be designed with this in mind. Larger plants have

been constructed on much smaller sites. This would be addressed in the design phase of the project as well. Clariant currently owns this property.

- Sludge currently is being anaerobically digested at other CMU facilities and subsequently land applied. The decision has not yet been made regarding how the sludge will be handled, and that aspect would be addressed in the design phase.
- If a new plant were to be constructed, there would need to be access between the plant site and the existing Long Creek pump station. It would be more advantageous for the plant operators to have a direct access across Long Creek versus the Clariant entrance. The pump station is not currently manned 24-7, but the WWTP would be and operators would need to access the pump station 2-3 times per shift.

Secondary and Cumulative Impacts: These impacts would be located off-site and would be an indirect result of the project. They can occur later in time, and the effects can be magnified when combined with other activities in the region. Examples include urbanization and increased stormwater runoff, resulting from increased impervious landscape. Potential mitigation measures for these examples were presented.

- The Charlotte City Council recently adopted a post-construction ordinance.
- Low Impact Development (LID) ordinance is not in place in this area, but the project will incorporate many of the LID approaches to site design.
- Water reuse would be subject to DENR specifications.

Doug Bean presented several sustainable design elements that are explored for the project, including LEED-certified buildings, open space preservation, reclaimed water reuse and rain gardens for stormwater management. Suggestions for those approaches that were important to the stakeholders were taken and summarized below:

- Rainwater harvesting – capture and incorporate rain water to enhance reuse
- Solar energy
- Methane capture – electricity generation, heating. CMU currently uses methane to heat digesters and is conducting a study about how to capture more.
- Reuse water users – evaluate potential customers now for reuse. The ideal reuse customers would be big users with constant, year-round usage. One drawback of reuse is it reduces water replenishing streams and waterways, which has become especially important during drought conditions.
- Greenway system – connect to other greenways and recreational areas; pedestrian bridge can connect the two counties.
- Security – if a trail is in close proximity to plant, there would need to be fencing or other security measures in place.
- Odor control – CMU expectation is to contain odor to plant site. Similar technology would be considered that has been implemented at the Sugar Creek WWTP to significantly reduce odor problems.
- Partner with Whitewater Center for recreational and educational uses of the open space.
- Joint use – ample space at the plant for community meetings, tour groups and educational uses.
- Water quality – consider phosphorus-removal technologies (including membranes) for high level treatment. CMU anticipates stringent nutrient limits and will evaluate the advanced treatment options available to meet those.

Future Meetings
The fifth meeting will be held Jan. 24, 2008, 6:30 to 8:00, at the Duke Energy Customer Resource Center near the airport. The stakeholder group will not meet in December.

In advance of the Jan. 24 meeting, Utilities and Mount Holly will host an additional meeting for those interested in a more detailed, technical discussion of the water quality modeling and data. Any stakeholders who wish to participate should contact Erin Culbert. A date and time will be set soon and an email will be sent to the group. We expect the meeting to take place in mid-January so it can include December data.

Any stakeholders who wish to add questions or concerns to the list of discussion topics may send comments to:

Erin Culbert
Environmental Outreach Coordinator
Charlotte-Mecklenburg Utilities
704.391.4685
eculbert@ci.charlotte.nc.us

Charlotte Mecklenburg Utilities / Mount Holly
Proposed Regional Wastewater Facility
Stakeholder Meeting #5
January 24, 2008

Attendance

The following stakeholders attended the fifth stakeholder meeting held at the Duke Energy Customer Resource Center:

American & Efird—John Bowyer
ARCADIS—Jerry Hatton
Clariant—Bill Archer
CMUD Advisory Committee—George Beckwith
Duke Energy—Mark Oakley
Gaston County Chamber of Commerce—Bill Gary
Gaston County Planning Department—Patrick Armstrong
Lake Wylie Marine Commission—Sandy DuPuy, Bo Ibach
Mecklenburg County LUESA—David Caldwell
Mount Holly City Council—Jerry Bishop
N.C. DENR—Mike Parker
Quality of Natural Resources Commission—Boo Robinson
York County, S.C.—Becca Bowyer, John Moore

The following representatives from the project Steering Committee attended:

Charlotte-Mecklenburg Utilities— Barry Gullet, Barry Shearin, Ron Weathers, Kit Eller, Erin Culbert, Dawn Padgett
City of Mount Holly—Eric Davis, Danny Jackson
Black & Veatch—Brent Reuss, Beth Quinlan, Mary Knosby, Sara McMillan

The following stakeholder agencies were not able to attend this meeting:

Catawba Lands Conservancy
Catawba Riverkeeper Foundation
City of Belmont
Crosland
Hawfield Road residents
Mecklenburg County Park and Recreation
Mount Holly Community Development Foundation
Mount Holly Utilities Committee
N.C. Wildlife Resources Commission
Riverfront Homeowners Association
Rock Hill Utilities
S.C. DHEC
Sierra Club
Town of Stanley
U.S. National Whitewater Center

Barry Gullet of Charlotte-Mecklenburg Utilities welcomed the stakeholders and discussed the technical stakeholder meeting held on Wednesday, where interested stakeholders heard a more technical, detailed explanation of the water quality modeling data.

January 23, 2008
All stakeholders were invited to attend a technical water quality meeting hosted Jan. 23 at Charlotte-Mecklenburg Utilities for presentation of more detailed results of the water quality modeling of Lake Wylie. Graphs of the modeling results were presented comparing the existing conditions to several different modeled scenarios. The attendees included:

ARCADIS—Jerry Hatton
Duke Energy—Bill Foris, Mark Oakley
ENTRIX—Paul Leonard
Mecklenburg County LUESA—David Caldwell
S.C. DHEC—Carol Copeland, Wayne Harden
Black & Veatch—Brent Reuss, Beth Quinlan, Mary Knosby, Sara McMillan
Charlotte-Mecklenburg Utilities— Barry Gullet, Ron Weathers, Kit Eller, Erin Culbert, Dawn Padgett

January 24, 2008
Presentation and Discussion

Brent Reuss of Black & Veatch presented a brief recap of the previous stakeholder meetings, particularly the status of the Environmental Impact Statement and potential environmental impacts associated with the regional WWTP. The focus of this meeting was a discussion of historical water quality in Lake Wylie and a detailed presentation of the water quality modeling results of the lake.

Historical Water Quality

- Land use in the Lake Wylie watershed has predominantly been agricultural/forested but is converting to more urban land uses (residential and commercial)
- Algal blooms, elevated nutrients and low dissolved oxygen led DENR to classify the lake as impaired and a total maximum daily load (TMDL) for chlorophyll-*a* was approved in 1991
- Water quality is improving since implementation of the TMDL due to nonpoint source load reductions in watershed (e.g. post-construction stormwater ordinances) and improved technology for nutrient removal at point sources.
- To continue these improvements and protect water quality, advanced treatment technologies will be included in the proposed regional WWTP design

Ambient Water Quality Monitoring

- Samples from the lake have been collected by several different federal, state and local agencies, including LUESA, EPA, USGS and DWQ
- Existing sampling is conducted by LUESA and DWQ on a generally monthly basis
- Sampling locations primarily are in the coves and were expanded to include main channel stations as well
- Trends in water quality data:
    - Chlorophyll-*a* lowest upstream and highest near the dam
    - Nutrient concentrations were highest at upstream stations and generally decreased over time

Water Quality Modeling

- The purpose of the modeling is to assist NC DWQ in developing speculative limits for proposed regional WWTP discharge and to evaluate impacts on water quality in Lake Wylie from the proposed regional WWTP discharge.
- CE-Qual-W2 model was developed and calibrated by Duke Energy
- Existing and future conditions were simulated to investigate effects of regional WWTP
- Modeling results showed that the effects of the proposed regional WWTP were minimal and limited to the area upstream of the South Fork branch
- Changes in water quality at the dam were insignificant
- Chlorophyll-*a* concentrations were well below the water quality criteria
- Concentrations of total phosphorus (TP) and total nitrogen (TN) in South Carolina waters were below the criteria

Proposed Regional WWTP Summary

- Advanced treatment processes would be included in the design to achieve low concentrations of TN and TP and protect water quality in the lake
- State-of-the-art treatment technologies will be incorporated in the design
- A new regional plant will provide enhanced reliability of treatment and would eliminate one or more existing wastewater discharges
- By discharging treated effluent to Lake Wylie instead of diverting it for treatment farther south, the water volume in the lake will be increased.

Questions:

Would there be any impact on Sugar Creek if the flow from Long Creek is no longer pumped to McAlpine?

- ➢ No impact would be expected because of the low proportion of flow from the Long Creek Basin currently being treated at McAlpine Creek WWTP. Average influent flow at McAlpine is 45 mgd, and flow from Long Creek now is just 3 mgd.

Are wastewater spills a concern for the plant?

- ➢ Spills at the plant are unlikely but are possible under a range of circumstances, including increased flow during wet weather, loss of electricity and mechanical problems. Spills are prevented with redundancy in the design of the plant: flow equalization basins, backup generators, preventative maintenance, computer gauges to indicate problems. Most importantly, the plant would be staffed 24 hours a day, 7 days a week so if a spill were to occur, the problem would be corrected immediately. Wastewater spills are more common in the collection system. Those that occur as overflows at manholes are highly visible and get reported and remedied quickly; we might not be aware of those off-street as quickly.

Does the model account for nonpoint sources of pollution, now and in the future?

- ➢ Yes. Anticipated growth and land use changes in the service area and surrounding Lake Wylie watershed was estimated through data collected by county and municipal planning agencies. The predicted changes in nutrient loads accompanying growth were added to the model and had minimal impact on the results because the Lake Wylie watershed is largely rural with the exception of a small portion of the basin in Mecklenburg County. The model was run during a year of low rainfall so nonpoint sources (those associated with stormwater runoff) were minimal. This scenario is a good test because potential impacts from the regional WWTP would be greatest during low flow conditions.

Would the modeling change based on which alternative is chosen for plant location?

- No. All alternatives are located on the same sites and would ultimately discharge the same amount of treated water to the lake. From a modeling perspective this translates into all alternatives being located in the same modeling segment.

The next meeting will be held February 28, 2008, 6:30 to 8:00, at the Duke Energy Customer Resource Center. We will discuss the findings of the EIS, wrap up stakeholder questions and discuss the next steps in the project.

Any stakeholders are encouraged to send questions or outstanding issues in advance so these can be answered at this next meeting. Please send any questions or concerns to:

Erin Culbert
Environmental Outreach Coordinator
Charlotte-Mecklenburg Utilities
704.391.4685
eculbert@ci.charlotte.nc.us

APPENDIX C

Memorandum of Agreement

Between City of Belmont and City of Charlotte through Charlotte-Mecklenburg Utilities

The City of Belmont (Belmont) and the City of Charlotte (acting through Charlotte-Mecklenburg Utilities) (Charlotte) each provide wastewater collection and treatment services to their customers and residents. Belmont has been notified by the N.C. Department of Environment and Natural Resources (DENR) that substantial improvements will soon be required to the existing Belmont wastewater treatment plant. Belmont has considered a number of alternatives as to how they may best achieve the objectives of the new requirements, including decommissioning their existing wastewater treatment plant and contracting with other wastewater utilities to provide on-going services to their residents. In light of those considerations, Belmont wishes to enter into an agreement with Charlotte to participate in a regional wastewater treatment program.

The elements of the proposed regional treatment program would consist of:

- Portions of wastewater from Belmont would be treated at Cramerton's existing wastewater plant (per existing agreements) and at Charlotte's existing plant(s)
- To create capacity to accommodate Belmont's flows in the Charlotte wastewater system, Charlotte proposes to construct a new, advanced wastewater treatment plant near Long Creek in Mecklenburg County
- The new plant at Long Creek is proposed to treat wastewater that is currently treated at Charlotte's Irwin Creek and/or McAlpine Creek wastewater plants, thereby creating capacity for flows from Belmont in Charlotte's Irwin Creek and/or McAlpine Creek plants
- The regional wastewater treatment program will provide additional environmental protection by providing advanced treatment for Belmont's wastewater while satisfying nutrient TMDL allocation goals for Lake Wylie

This Memorandum of Agreement authorizes Belmont and Charlotte to continue negotiations leading to implementation of this regional wastewater treatment program and confirms each party's commitment to negotiate in good faith. This memorandum of agreement will be the basis of a formal interlocal agreement (Agreement) to be developed jointly by the parties.

Implementation will include the following steps and actions:

1. Charlotte will work with DENR to obtain environmental approvals for the project(s) at Charlotte's expense
2. Belmont agrees to transfer NPDES wasteload allocations specified in the Lake Wylie TMDL to Charlotte through a mutually agreed upon process and to decommission their existing treatment plant upon completion of the necessary infrastructure required to convey those flows to Charlotte
3. Decommissioning and abandonment of the Belmont treatment plant will be at Belmont's expense
4. Belmont will construct, own, and operate flow equalization and pumping station systems in Belmont at Belmont's expense that will transfer wastewater to Charlotte's Paw Creek basin/lift station

5. Charlotte will construct, own, and operate a force main from the Belmont pumping station to the Charlotte wastewater system at Charlotte's expense
6. Charlotte will treat up to 2 mgd of wastewater (measured as the average daily flow in the maximum month of each year)from Belmont at one or more of the Charlotte treatment plants at no capital cost to Belmont
7. Belmont will pay Charlotte for treatment services for the first 2 mgd based on the actual average cost per 1,000 gallons treated of operations and maintenance at Charlotte's wastewater treatment plants.
8. Upon proper notice, Belmont may increase the amount of treatment capacity it is allowed to use in Charlotte's system from 2 mgd up to 5 mgd by doing either of the following:
    a. Paying Charlotte a negotiated rate per 1,000 gallons for wastewater treatment in excess of 2 mgd, said negotiated rate to be based on O&M costs plus a reasonable amount to cover Charlotte's capital cost; or,
    b. Participating proportionally in the capital cost of existing, new, or expanded treatment capacity and paying a treatment rate as described in item 7 (above).
9. Future expansion of capacity in Charlotte's system available to Belmont beyond the initial capacity may be initiated by either Belmont or Charlotte individually, or may be initiated jointly by both parties.
10. Based on state and federal regulations, Belmont and Charlotte agree that regulation of discharges to the sewer system are necessary and will be provided through sewer use ordinances adopted and enforced separately by both parties.
11. Based on design criteria, state, and federal regulations, Belmont and Charlotte agree to limit industrial waste discharges to appropriate standards.
12. Belmont will be solely responsible for regulating industrial discharges originating within their collection system or within collection systems that discharge into Belmont's collection system according to terms and conditions to be included in the Agreement.
13. Charlotte will be solely responsible for regulating industrial discharges originating within their collection system or within collection systems that discharge into Charlotte-Mecklenburg Utilities' collection system according to terms and conditions to be included in the Agreement.
14. Charlotte will provide periodic reports to Belmont about wastewater system performance and compliance, operating costs, and anticipated future capital costs (if any).
15. Belmont will provide periodic and timely reports to Charlotte about Belmont's collection system expansion, any collection system performance issues that could impact Charlotte's system, significant changes related to industrial discharges, and any other information that is relevant to the quantity or characteristics of the wastewater discharged by Belmont
16. Belmont and Charlotte agree that other terms and conditions should be included in the Agreement and may agree during continued negotiations that the Agreement should provide terms and conditions different from those proposed within this MOA.

Approved by:

City of Belmont

City of Charlotte

APPENDIX C

Memorandum of Agreement
Between City of Mount Holly and City of Charlotte Through Charlotte-Mecklenburg Utilities
January 14, 2013

The City of Mount Holly ("Mount Holly") and the City of Charlotte (acting through Charlotte-Mecklenburg Utilities) ("Charlotte") each provide wastewater collection and treatment services to their customers and residents, and both cities forecast the need for additional wastewater treatment capacity. Mount Holly has been notified by the N.C. Department of Environment and Natural Resources (DENR) that substantial improvements will soon be required to the existing Mount Holly wastewater treatment plant.

A high-level feasibility study in 2006 compared six alternative ways that Mount Holly and Charlotte could meet their additional capacity needs individually or jointly. The study concluded that construction of a regional treatment plant provided the most environmental and economic benefit.

Subsequent to the 2006 Feasibility Study, Mount Holly and Charlotte continued joint and separate consideration of a number of alternatives as to how to best achieve the new requirements and provide the needed increase in capacity. Those considerations included expanding and upgrading Mount Holly's existing wastewater treatment plant, decommissioning Mount Holly's existing wastewater treatment plant to facilitate a regional wastewater treatment approach involving Charlotte and/or Gastonia, and broadening a regional approach by including the City of Belmont and/or an existing industrial wastewater treatment plant in the planning process. In light of those considerations and the need to continue more detailed planning, Mount Holly and Charlotte seek to enter into an agreement to participate in a regional wastewater treatment program.

The elements of the proposed regional treatment program would consist of:

- Wastewater from Mount Holly would be pumped to Charlotte via a new pump station and force main across the Catawba River/Lake Wylie.
- Charlotte proposes to construct a new, advanced regional wastewater treatment plant near Long Creek in Mecklenburg County that would treat wastewater from the region.
- Charlotte proposes to replace the existing 4 mgd Mount Holly wastewater treatment plant with 4 mgd of upgraded capacity in the new Long Creek plant in exchange for the nutrient discharge allocation into Lake Wylie currently assigned to Mount Holly.
- The new plant at Long Creek is anticipated to be connected to other existing wastewater treatment plants in Mecklenburg County whereby additional and/or reserve capacity could be provided.
- Charlotte proposes to acquire phosphorus and nitrogen allocations from the City of Belmont and from the existing Clariant/ReVenture industrial wastewater treatment plant which can be used to facilitate overall achievement of TMDL goals for Lake Wylie.
- The regional wastewater treatment program will provide additional environmental protection by providing advanced treatment for Mount Holly's wastewater, satisfying nutrient TMDL allocation goals for Lake Wylie, reducing the risk of

sewer overflows by reducing the need to transport wastewater long distances, and providing other benefits from a regional system.

This Memorandum of Agreement (MOA) authorizes Mount Holly and Charlotte staff to continue negotiations and work leading to implementation of this regional wastewater treatment program and confirms each party's commitment to negotiate in good faith. This MOA will be the basis of a formal interlocal agreement ("Agreement") to be developed jointly by the parties.

Implementation will include the following steps and actions:

1. Charlotte will work with DENR to obtain environmental approvals for the project(s) at Charlotte's expense. Mount Holly agrees to provide information and support in this effort as needed.
2. Mount Holly agrees to transfer NPDES wasteload allocations specified in the Lake Wylie TMDL to Charlotte through a mutually agreed upon process and to decommission their existing treatment plant upon completion of the necessary infrastructure required to convey those flows to Charlotte.
3. Decommissioning and abandonment of the Mount Holly treatment plant will be at Mount Holly's expense.
4. Mount Holly will pay, at its expense of up to a maximum of $14 million (based on actual costs), for a pumping station, force main, and flow equalization facility to transfer flow to Charlotte at or near the site of Mount Holly's existing wastewater treatment. Mount Holly will provide the land required for this facility, the cost or value of which is not included in the $14 million ceiling.
    a. The pumping station, force main, and flow equalization facility are expected to be owned, operated, and financed by Charlotte as set forth in the Agreement and will be designed according to design and performance criteria agreed upon by both Charlotte and Mount Holly.
    b. Should the actual cost exceed $14M, Charlotte and Mount Holly agree to review the scope and design of the facility to attempt to reduce the cost. If the cost still exceeds $14M, Charlotte may elect to pay the overage or to withdraw from the Agreement.
    c. Mount Holly's payment to Charlotte for the pumping station, force main, and flow equalization costs will be based on an amount equal to the annual debt service of the actual construction amount (amortized over a 30 year period) and payments will begin upon completion of the construction of those facilities. This debt service payment will be in addition to other costs described in this MOA.
    d. Alternatively, Mount Holly may elect to reimburse Charlotte via lump sum payment for the actual cost instead of relying on Charlotte financing.
    e. All financing and payment arrangements are subject to approval by bond counsel and the NC Local Government Commission as necessary.
    f. Mount Holly and Charlotte agree that construction of the pumping station, force main, and flow equalization facility may precede the construction of the proposed wastewater treatment plant. In that case, Mount Holly may continue to operate its existing wastewater treatment plant up to its permitted and reasonable capacity and to send additional flows to the Charlotte system generally per the other terms of this MOA and per the terms of the Agreement and subject to all required regulatory approvals.

5. Mount Holly will pay Charlotte for the actual operating and maintenance costs of the proposed pump station, flow equalization facility, and force main. Ownership and operation of these facilities remains open for consideration and will be determined in the Agreement.
6. Charlotte will allocate 4 mgd of wastewater treatment capacity (measured as the average daily flow in each billing period, said billing periods anticipated to be monthly) from Mount Holly at one or more of the Charlotte treatment plants at no capital cost to Mount Holly in exchange for the nutrient allocation currently held by Mount Holly in the existing TMDL (50 lb/day total phosphorous and 300 lb/day total nitrogen).
7. Mount Holly will pay Charlotte for treatment services for up to 4 mgd based on the actual flow received each month at a treatment fee rate based on the average cost per 1,000 gallons treated of operations and maintenance at all of Charlotte's wastewater treatment plants. This fee is subject to re-calculation by Charlotte for each fiscal year.
8. Charlotte will allocate 1 mgd of wastewater planning capacity to Mount Holly to allow Mount Holly to plan and permit growth of their customer base. This planning capacity is in addition to the 4 mgd of wastewater treatment capacity described in Paragraph 6. Mount Holly will be required to increase its treatment capacity pursuant to Paragraph 9 when Mount Holly's wastewater discharge frequently or consistently exceeds it 4 mgd wastewater capacity. Specific triggers that would require such an increase will be defined in the Agreement.
9. Upon proper notice and subject to issuance of all required permits and authorizations, Mount Holly may increase the amount of treatment capacity it is allowed to use in Charlotte's system from 4 mgd up to 6 mgd by doing either of the following:
    a. Paying Charlotte a negotiated rate per 1,000 gallons for wastewater treatment in excess of 4 mgd, said negotiated rate to be based on O&M costs plus a reasonable amount to cover Charlotte's capital costs; or,
    b. Participating proportionally in the capital cost of existing, new, or expanded treatment capacity and paying a treatment rate as described in item 7 (above).
        i. Mount Holly may increase its purchased allocation from 4 mgd up to 6 mgd in single or multiple increments of 500,000 gal/day.
        ii. If Mount Holly chooses to increase its purchased allocation prior to January 1, 2025, the cost of each increment will be based proportionally on the actual cost to design and construct the initial phase of the Long Creek wastewater treatment plant.
        iii. After January 1, 2025, the cost of each increment will be based on the actual cost (or agreed upon estimate if no construction is required at that time) cost to design and construct an expansion of the Long Creek wastewater treatment plant.
10. Future expansion of treatment or planning capacity in Charlotte's system available to Mount Holly beyond the initial capacities may be initiated and implemented by either Mount Holly or Charlotte individually, or may be initiated and implemented jointly by both parties. Future expansions are subject to issuance of all required permits and authorizations.
11. Based on state and federal regulations, Mount Holly and Charlotte agree that regulation of discharges to the sewer system are necessary and will be provided through sewer use ordinances adopted and enforced separately by both parties.

12. Based on design criteria, state, and federal regulations, Mount Holly and Charlotte agree to limit industrial waste discharges to appropriate standards.
13. Mount Holly will be solely responsible for regulating industrial discharges into Mount Holly's collection system according to terms and conditions to be included in the Agreement.
14. Charlotte will be solely responsible for regulating industrial discharges into Charlotte-Mecklenburg Utilities' collection system according to terms and conditions to be included in the Agreement.
15. Charlotte will provide periodic reports to Mount Holly about wastewater system performance and compliance, operating costs, and anticipated future capital costs (if any).
16. Mount Holly will provide periodic and timely reports to Charlotte about Mount Holly's collection system expansion, any collection system performance issues that could impact Charlotte's system, significant changes related to industrial discharges, and any other information that is relevant to the quantity or characteristics of the wastewater discharged by Mount Holly.
17. If Charlotte acquires the phosphorus and nitrogen loading allocations from the City of Belmont and/or Clariant/ReVenture's existing industrial wastewater treatment plant(s) Charlotte agrees to allow Mount Holly to use these allocations to comply with NPDES permit requirements until the proposed Long Creek WWTP is completed, subject to NC DENR approval.
18. In the event Long Creek WWTP is not constructed due to findings of the Environmental Impact Statement or other unforeseen circumstances, Mount Holly agrees to purchase phosphorus and nitrogen allocations from Charlotte. The purchase price will be the same amount Charlotte paid to Clariant/ReVenture and to Belmont to acquire these allocations. Mount Holly and Charlotte agree that it may be necessary to develop a separate agreement to enact this provision, and if so, agree to cooperate in a timely manner to obtain necessary approvals.
19. Charlotte and Mount Holly will cooperatively work with NC DENR to obtain NPDES permit modifications to ensure nutrient allocations can be used, applied and/or transferred as described in this MOA.
20. Mount Holly and Charlotte agree that other terms and conditions should be included in the Agreement and may agree during continued negotiations that the Agreement should provide terms and conditions different from those proposed within this MOA.
21. Notwithstanding any provision herein to the contrary this MOA is not intended to be a contract, and the Elements set forth in this MOA are subject to continued additions, revisions, and modifications, without prejudice to either Party, as the Parties continue negotiations toward an Interlocal Agreement.

Approved by:

Danny J. Jackson
City Manager
City of Mount Holly

Ronald R Kiblle
Deputy City Manager
City of Charlotte

APPENDIX C

STATE OF NORTH CAROLINA

COUNTY OF MECKLENBURG **CONTRACT**

THIS CONTRACT is made and entered into this 6 day of May, 2013 by and between the City of Belmont, North Carolina ("Belmont") and the City of Charlotte, North Carolina ("Charlotte").

STATEMENT OF PURPOSE

Whereas, Charlotte (acting through the Charlotte-Mecklenburg Utility Department - "CMUD") intends to purchase the Nutrient Allocation (36 lbs of phosphorus (P) and 286.65 lbs of nitrogen (N)) within the NPDES permit for the Clariant Wastewater Treatment Plant. This amount equates to 90% of the total Clariant Nutrient Allocation.

AND

Whereas, if the Long Creek Regional Wastewater Treatment Plant is not constructed, Charlotte desires to sell, and Belmont desires to purchase the 90% Nutrient Allocation at the negotiated price of $5,850,000, as outlined in the terms and conditions in the Agreement,

AND

Whereas, Charlotte and Belmont have entered into a Memorandum of Agreement (MOA), dated August 22, 2011, which outlines the conceptual agreement between Charlotte and Belmont regarding the scope, schedule, and financial obligations for each party for the treatment of Belmont wastewater at existing or future CMUD plants,

NOW, THEREFORE, in consideration of the premises herein set forth, Charlotte and Belmont agree on the following:

1. Subsequent to Charlotte's purchase of Clariant's Nutrient Allocation, in the event that Charlotte is not able to acquire a NPDES permit for the proposed Long Creek Regional Wastewater plant or if, in Charlotte's sole discretion, Charlotte determines that the plant is no longer viable for economic or any other reason, then Belmont agrees it shall purchase the Nutrient Allocation that Charlotte has purchased from Clariant.

2. Belmont agrees to pay Charlotte the sum of $5,850,000 for the 90% Nutrient Allocation which equates to 36 lbs of Phosphorus and 286.65 lbs of Nitrogen.

   In the event that Charlotte is required to take legal action to collect the funds owed, each party will be responsible for their own legal fees and charges. Any dispute between the parties shall be referred to mediation prior to institution of legal action by either party.

3. If Charlotte purchases any additional Clariant Nutrient Allocation beyond the 90% Nutrient Allocation originally purchased, that Nutrient Allocation may also be purchased by Belmont

at Charlotte's cost under the same terms and conditions outlined for the 90% Nutrient Allocation.

4. If Charlotte does determine that the Long Creek Regional Wastewater Plant is not feasible and that Belmont should purchase the Nutrient Allocation, Charlotte warrants that it will not make a request for payment any sooner than December 31, 2015 or two years from giving written notice to Belmont for the purchase, whichever is the later date. Belmont's requirement to purchase is contingent upon Belmont obtaining financing acceptable to them or upon Charlotte allowing Belmont to extend payment over a period not to exceed 59 months.

5. In the event that construction of the Long Creek Regional Wastewater Treatment Plant is no longer viable and the Nutrient Allocation is no longer transferrable to Belmont due to regulatory actions or other constraints beyond the control of Charlotte or Belmont, then neither party is liable to the other and neither party would be considered in breach of this agreement.

6. If the decision is made to request Belmont to purchase the Nutrient Allocation in the future but the Nutrient Allocation has been reduced through regulatory actions beyond the control of Charlotte, then Belmont agrees to purchase the remaining share of the allocation based on a prorated amount of the remaining allocation to the original total.

7. This is the entire agreement between the parties. There are no terms on the subject matter of this Contract which are not set forth herein. This Contract may not be amended except by a written document, executed by both parties.

IN WITNESS WHEREOF, the parties here to have caused this instrument to be executed, the day and year first above written.

CITY OF BELMONT, NORTH CAROLINA

ATTEST:

BY: _____ Witness: _____
City Manager City Clerk – Deputy

CITY OF CHARLOTTE, NORTH CAROLINA

ATTEST:

BY: _____ Witness: _____
City Manager ~~City Clerk~~ Admin. Asst

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Appendix D. Service and Project Area Soils 1

Appendix D. Service Area and Project Area Soils Supplemental Existing Environment Information

Soil descriptions are from the NRCS Mecklenburg County Soil Survey (NRCS, 1980) and Gaston County Soil Survey (NRCS, 1989).

Correlates with the following Sections:

Section 5.2.1 – Service Area Soils

Table 5.2: Service area soils

Map Unit Symbol	Map Unit Name	Percent of Service Area
ApB	Appling sandy loam, 2 to 8% slopes	4.1%
ApD	Appling sandy loam, 8 to 15% slopes	2.0%
CeB2	Cecil sandy clay loam, 2 to 8% slopes, eroded	11.8%
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded	18.6%
CfB	Cecil-Urban land complex 2 to 8% slopes (Gaston)	0.8%
CfD	Cecil-Urban land complex, 8 to 15% slopes (Gaston)	0.3%
CH	Chewalca loam, frequently flooded	0.6%
Co	Congaree loam, frequently flooded	0.5%
CuB	Cecil-Urban land complex, 2 to 8% slopes	0.6%
CuD	Cecil-Urban land complex, 8 to 15% slopes	0.1%
DaB	Davidson sandy clay loam, 2 to 8% slopes	0.1%
DaD	Davidson sandy clay loam, 8 to 15% slopes	0.1%
DaE	Davidson sandy clay loam, 15 to 25% slopes	0.0%
DAM	Dam	0.2%
EnB	Enon sandy loam, 2 to 8% slopes	4.6%
EnD	Enon sandy loam, 8 to 15% slopes	5.7%
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded	1.3%
GaD2	Gaston sandy clay loam, 8 to 15% slopes, eroded	1.4%
GaE	Gaston sandy clay loam, 15 to 25% slopes	0.2%
HeB	Helena sandy loam, 2 to 8% slopes	5.4%
HuB	Helena-Urban land complex, 2 to 8% slopes	0.6%
IrA	Iredell fine sandy loam, 0 to 1% slopes	0.2%
IrB	Iredell fine sandy loam, 1 to 8% slopes	3.3%
MaB2	Madison sandy clay loam, 2 to 8% slopes, eroded	0.1%
MaD2	Madison sandy clay loam, 8 to 15% slopes, eroded	0.5%
MaE	Madison sandy clay loam, 15 to 25% slopes	0.0%
MeB	Mecklenburg fine sandy loam, 2 to 8% slopes	2.8%
MeD	Mecklenburg fine sandy loam, 8 to 15% slopes	1.3%
MkB	Mecklenburg-Urban land complex, 2 to 8% slopes	0.1%
MO	Monacan loam	2.5%

Map Unit Symbol	Map Unit Name	Percent of Service Area
PaD2	Pacolet sandy clay loam, 8 to 15% slopes, eroded	0.5%
PaE	Pacolet sandy loam, 15 to 25% slopes	8.4%
PaF	Pacolet sandy loam, 25 to 45% slopes	1.2%
Pt	Pits	0.1%
Ud	Udorthents, loamy (Gaston)	0.2%
UL	Udorthents, loamy	0.2%
Ur	Urban land	0.8%
VaB	Vance sandy loam, 2 to 8% slopes	2.1%
VaD	Vance sandy loam, 8 to 15% slopes	0.5%
W	Water	3.6%
WeB	Wedowee sandy loam, 8 to 15% slopes	0.4%
WkB	Wilkes loam, 4 to 8% slopes	2.5%
WkD	Wilkes loam, 8 to 15% slopes	3.6%
WkE	Wilkes loam, 15 to 25% slopes	3.1%
WkF	Wilkes loam, 25 to 45% slopes	1.9%
WnB	Winnsboro loam, 2 to 8% slopes	0.3%
WnD	Winnsboro loam, 8 to 15% slopes	0.1%
WoA	Worsham loam, 0 to 2% slopes	0.1%
WuD	Wilkes-Urban land complex, 8 to 15% slopes	0.2%

Service Area Soil Descriptions

CeB2, Cecil sandy clay loam, 2 to 8 percent slopes, eroded, is a well drained soil on broad, smooth ridges on the uplands. Mapped areas are oval and range from six to more than 1,000 acres. Typically the surface layer is yellowish red sandy clay loam about six inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam. This soil has a moderate potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. The potential is also moderate for broadleaf and needleleaf trees. The soil has a high potential for most urban uses.

CeD2, Cecil sandy clay loam, 8 to 15 percent slopes, eroded, differs from the above description of CeB2 only in that its potential for most urban uses is only moderate because of the slope, a limitation that can be reduced or modified by special planning, design or maintenance.

PaE, Pacolet sandy loam, 15 to 25 percent slopes, is a well drained soil is on side slopes adjacent to drainage ways. Mapped areas are commonly oblong and range from six to 100 acres. Typically, the surface layer is very dark grayish brown sandy loam about three inches thick. The subsoil is 28 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is mottled red, yellowish red, yellow, and reddish sandy loam. Most of the acreage with this soil type is woodland. A few areas are used for pasture. The potential for pasture is moderate. The soil has a moderately high potential for broadleaf and needleleaf trees. The potential is low for most urban and recreational uses because of the slope.

Section 5.2.2- Project Area Soils

CeB2, Cecil sandy clay loam, 2 to 8 percent slopes, eroded, is a well drained soil on broad, smooth ridges on the uplands. Mapped areas are oval and range from six to more than 1,000 acres. Typically the surface layer is yellowish red sandy clay loam about six inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam. This soil has a moderate potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. The potential is also moderate for broadleaf and needleleaf trees. The soil has a high potential for most urban uses.

CeD2, Cecil sandy clay loam, 8 to 15 percent slopes, us a well drained soil on side slopes of uplands. Typically the surface layer is yellowish red sandy clay loam about six inches thick. The subsoil is 47 inches thick. The upper part is red clay, and the lower part is red clay loam. The underlying material to a depth of 65 inches is red and yellow loam. The organic matter content is low in the surface layer, and available water capacity is medium. The potential for broadleaf and needleleaf trees is moderate.

CfB, Cecil Urban Land Complex, 2 to 8 percent slopes, is an intermingled soil comprised of Cecil soils with disturbed urban lands. Cecil soil is well drained and on broad ridges, and makes up 50 to 65 percent of the map unit. This soil has a yellowish red sandy clay loam surface layer about six inches deep. The subsoil extends to about 58 inches. The upper part is red clay and the lower part is red clay loam with an underlying material of red saprolite at a depth of about 80 inches.

GaB2, Gaston sandy clay loam, 2 to 8 percent slopes, eroded, is a well drained soil on broad ridges. Typically the soil has a dark reddish brown sandy clay loam surface layer that is about six inches thick. The subsoil extends to a depth of about 57 inches. It is dark red clay in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 72 inches is multicolored saprolite that has a loam texture. The water table is not within a depth of six feet. The soils is mainly used as cropland and pasture with some used as woodland. This soil supports broadleaf and needleaf trees.

GaE, Gaston loam, 15 to 25 percent slopes, is a well drained soil on side slopes and narrow ridges. Typically, the soil has a dark reddish brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 44 inches. It is dark red clay in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a loam texture. The water table is not within a depth of six feet. The soil is mainly used as woodland with some use as pasture.

HeB, Helena sandy loam, 2 to 8 percent slopes, is a moderately well drained soil on broad ridges and in slightly concave areas around the heads of intermittent streams. Mapped areas are five to 100 acres. Typically the surface layer is light olive brown sandy loam about eight inches thick. The subsoil is 32 inches thick. The upper part is brownish yellow sandy clay loam, the middle part is brownish yellow and yellowish brown clay, and the lower part is mottled yellowish brown, light gray, and reddish brown clay loam. The underlying material to a depth of 50 inches is light gray sandy clay. Below this is light gray sandy clay loam. This soil has moderately high potential for most crop, broadleaf, and needleleaf trees. The potential is low for urban uses because of slow permeability

and high shrink-swell potential. Slow permeability significantly limits the absorption of effluent in septic tank absorption fields.

HuB, Helena-Urban land complex, 2 to 8 percent slopes is a well drained soil found primarily in suburban areas of Charlotte. Typically, the surface layer is light brown sandy loam about 8 inches thick. The subsoil is 32 inches thick. The upper part is brownish yellow sandy clay loam, the middle part is brownish yellow and yellowish brown clay, and the lower part is mottled yellowish brown, light gray, and reddish brown clay loam. The underlying material to a depth of 50 inches is light gray sandy clay. Below that is light gray sandy clay loam. Organic matter content is low, permeability is slow and available water capacity is low. This unit is not assigned to a woodland group.

MeB, Mecklenburg fine sandy loam, 2 to 8 percent slopes, is a well drained soil on broad ridges on the uplands. Mapped areas are commonly oblong and range from five to more than 500 acres. Typically the surface layer is dark reddish brown fine sandy loam about seven inches thick. The subsoil is yellowish red clay 27 inches thick. The underlying material to a depth of 45 inches is mottled strong brown and yellowish red clay loam. Below this to a depth of 65 inches it is very dark grayish brown and light olive brown loam. Most of the acreage is used as cropland and pasture, with the remaining area forested. This soil has a moderately high potential for corn, soybeans, small grain, pasture, hay, and horticultural crops. The potential is moderate for broadleaf and needleleaf trees. The soil has a low potential for most urban uses because of slow permeability, moderate shrink-swell potential, low strength, and depth to bedrock.

WkE, Wilkes loam, 15 to 25 percent slopes is a well drained soil on the side slopes adjacent to drainageways. Typically, the surface layer is dark grayish brown loam about four inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches is olive brown, green and black sandy loam. Below this is dark colored hard rock. This soil has a low organic matter content in the surface layer. Most of the acreage is woodland. Some areas are used for pasture. The potential is moderate for broadleaf and needleleaf trees.

WkF, Wilkes loam, 25 to 45 percent slopes is a well drained soil on the side slopes adjacent to drainageways. Typically, the surface layer is dark grayish brown loam about four inches thick. The subsurface layer is brown loam three inches thick and the subsoil is eight inches thick. The upper part is strong brown clay, and the lower part is strong brown clay loam. The underlying material to a depth of 48 inches is olive brown, green and black sandy loam. Below this is dark colored hard rock. Permeability is moderately slow, the available water capacity is very low and surface runoff is rapid. Most of the acreage is woodland and some areas are used for pasture. The potential is moderate for broadleaf and needleleaf trees.

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Appendix E. Soils with Farmland Designation 1

Appendix E. Soils with Farmland Designation Supplemental Existing Environment Information

Correlates with the following Sections:

Section 5.5 Prime Agricultural Lands

Table 5.5a: Service Area Soils with Farmland Designation

Map Key	Description
Prime Farmland	
ApB	Appling sandy loam, 2 to 8% slopes
CeB2	Cecil sandy clay loam, 2 to 8% slopes, eroded
Co	Congaree loam, frequently flooded
DaB	Davidson sandy clay loam, 2 to 8% slopes
EnB	Enon sandy loam, 2 to 8% slopes
GaB2	Gaston sandy clay loam, 2 to 8% slopes, eroded
HeB	Helena sandy loam, 2 to 8% slopes
MaB2	Madison sandy clay loam, 2 to 8% slopes, eroded
MeB	Mecklenburg fine sandy loam, 2 to 8% slopes
VaB	Vance sandy loam, 2 to 8% slopes
WnB	Winnsboro loam, 2 to 8% slopes
Farmland of Statewide Importance	
ApD	Appling sandy loam, 8 to 15% slopes
CeD2	Cecil sandy clay loam, 8 to 15% slopes, eroded
DaD	Davidson sandy clay loam, 8 to 15% slopes
EnD	Enon sandy loam, 8 to 15% slopes
GaD2	Gaston sandy clay loam, 8 to 15% slopes, eroded
IrA	Iredell fine sandy loam, 0 to 1% slopes
IrB	Iredell fine sandy loam, 1 to 8% slopes
MaD2	Madison sandy clay loam, 8 to 15% slopes, eroded
PaD2	Pacolet sandy clay loam, 8 to 15% slopes, eroded
VaD	Vance sandy loam, 8 to 15% slopes
WeD	Wedowee sandy loam, 8 to 15% slopes
WnD	Winnsboro loam, 8 to 15% slopes
Prime Farmland if drained and either protected from flooding or not frequently flooded during the growing season	
CH	Chewalca loam, frequently flooded
MO	Monacan loam

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Appendix F. Terrestrial Communities Supplemental Existing Environment Information 1

Section 5.11.1 - Terrestrial Communities within the Proposed Service Area 1

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Mesic Mixed Hardwood Forest (Piedmont subtype) 1
Basic Mesic Forest (Piedmont subtype) 2
Basic Oak-Hickory Forest 2
Dry Oak-Hickory Forest 3
Piedmont/Low Mountain Alluvial Forest 3
Successional Areas 3
Piedmont Prairies 3

Section 5.11.2 - Terrestrial Communities and Species Observed at the Proposed Alternative Sites 4

Dry Mesic Oak-Hickory Forest 4
Mesic Mixed Hardwood Forest (Piedmont subtype) 4
Piedmont/Low Mountain Alluvial Forest 4
Successional Areas 4

Appendix F. Terrestrial Communities Supplemental Existing Environment Information

Correlates with the following Sections:

Section 5.11.1 - Terrestrial Communities within the Proposed Service Area

Dry Mesic Oak-Hickory Forest

Dry mesic oak-hickory forests occur on mid-slopes, upland flats, and low ridges on acidic soils. Soil series include Cecil, Pacolet, and Wedowee. The forest is dominated by a mixture of oaks and hickories and was once the predominant community type in the Piedmont.

The canopy is composed of white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera)*, sycamore (*Platanus occidentalis*), shagbark hickory (*Carya ovata*), beech (*Fagus grandifolia*), loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), sugar maple (*Acer saccharum*), and red maple (*Acer rubrum*). Understory species include red maple, flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), and blackgum (*Nyssa sylvatica*). Shrubs include downy arrowwood (*Viburnum rafinesquianum)*, deerberry (*Vaccinium stamineum*), and Blue Ridge blueberry (*Vaccinium pallidum*). Muscadine (*Vitis rotundifolia*) and poison ivy (*Toxicodendron radicans*) often are present. Herbs are fairly sparse, with heartleaf (*Hexastylis spp*.), rattlesnake plantain (*Goodyera pubescens*), striped prince's pine (*Chimaphila maculate*), nakedflower ticktrefoil (*Desmodium nudiflorum*), and rattlesnake weed (*Hieracium venosum*) common.

Mesic Mixed Hardwood Forest (Piedmont subtype)

Mesic mixed hardwood forests are transitional forests between alluvial or bottomland forests and upland communities such as dry-mesic oak-hickory forests. Typically the soils are well drained acidic consisting of soil series Cecil, Pacolet, and Wedowee (Typic Hapludults).

These forests are quite common. Under natural conditions these forests are uneven-aged, with old trees present. The Canopy is dominated by mesophytic trees such as American beech, red oak (*Quercus rubra*), tulip poplar, red maple, sugar maple, and in the western Piedmont, Cannadian hemlock (*Tsuga canadensis*). Typical understory trees include flowering dogwood (*Cornus florida*), hophornbeam (*Ostrya virginiana*), red maple, and American holly (*Ilex opaca*). Shrub species may include deerberry, downy arrowwood (*Viburnum rafinesquianum*), and mountain laurel (Kalmia latifolia). The herb layer is often moderately dense and diverse, though it may be sparse under heavy shade. Herb species may include Christmas fern (*Polystichum acrostichoides*), violet (Viola spp.), licorice bedstraw (*Galium circaezans*), little brownjug (*Hexastylis arifolia*), little heartleaf (H. minor), nakedflower ticktrefoil, dimpled troutlilly (*Erythronium umbilicatum ssp. Umbilicatum*), roundlobe hepatica (Hepatica Americana), fairywand (*Chamaelirium luteum*), beechdrops (*Epifagus virginiana*), heartleaf foamflower (*Tiarella cordifolia var. collina*), American alumroot (*Heuchera americana*), Tennessee starwort (*Stellaria pubera*), mayapple (*Podophyllum peltatum*), rattlesnake fern (*Botrychium virginianum*), and cankerweed (*Prenanthes serpentaria*).

Basic Mesic Forest (Piedmont subtype)

Basic mesic forests occupy lower slopes, north facing slopes, ravines, and occasionally well drained stream bottoms with basic soils. Soils are typically circumneutral or higher pH with series that include Wilkes (*Typic Hapludalf*).

The Canopy vegetation is dominated by mesophytic trees, primarily tulip poplar, American beech, southern sugar maple (*Acer floridanum*), and red oak. Trees typical of better drained bottomland sites, such as Shumard's oak (*Quercus shumardii*), black walnut (*Juglans nigra*), and sugarberry (*Celtis laevigata*), may be present. The understory may include eastern redbud (*Cercis canadensis*), flowering dogwood, hophornbeam, American hornbeam (*Carpinus caroliniana*), pawpaw (*Asimina triloba*), and slippery elm (*Ulmus rubra*). Shrubs may include Viburnium (*Viburnum spp.*), northern spicebush (*Lindera benzoin*), bigleaf snowbell (*Styrax grandifolius*), wild hydrangea (*Hydrangea arborescens*), American bladdernut (*Staphylea trifolia*), eastern sweetshrub (*Calycanthus floridus*), and painted buckeye (*Aesculus sylvatica*). The herb layer is generally dense and very diverse, with species such as Christmas fern, Canadian wildginger (*Asarum canadense*), white baneberry (*Actaea pachypoda*), common moonseed (*Menispermum canadense*), roundlobe hepatica, bloodroot (*Sanguinaria canadensis)*, bugbane (*Cimicifuga racemosa*), greater yellow lady's slipper (*Cypripedium pubescens var. calceolus*), American ginseng (*Panax quinquefolius*), northern maidenhair (*Adiantum pedatum*), mayapple, heartleaf foamflower (*Tiarella cordifolia var. cordifolia*), violet, eastern greenviolet (*Hybanthus concolor*), Dutchmans breeches (*Dicentra cucullaria*), eastern false rue anemone (*Enemion biternatum*), dwarf larkspur (*Delphinium tricorne*), little sweet betsy (*Trillium cuneatum*), veiny pea (*Lathyrus venosus*), and yellow flumewort (*Corydalis flavula*).

Basic Oak-Hickory Forest

Basic oak-hickory forests typically occupy slopes, ridges, upland flats, and other dry to dry-mesic sites with basic or circumneutral soils. Soil series include Iredell (*Typic Hapludalf*), and Mecklenburg (*Ultic Hapludalf).*

The canopy is dominated by mixtures of oaks and hickories, including white oak, post oak (*Quercus stellata*), black oak (*Q. velutina*), chinkapin oak (*Q. muehlenbergii*), southern shagbark hickory (*Carya carolinae-septentrionalis*), pignut hickory (*C. glabra*), mockernut hickory (*C. alba*), and red hickory (*C. ovalis*). Other canopy trees include white ash (*Fraxinus americana*), tulip poplar, black walnut, and pine (*Pinus spp.*) The understory includes species such as flowering dogwood, eastern redbud, white fringetree (*Chionanthus virginicus*), chalk maple (*Acer leucoderme*), and hophornbeam. Shrubs may include eastern sweetshrub (*Calycanthus floridus*), painted buckeye, fragrant sumac (*Rhus aromatica*), coral berry (*Symphoricarpos orbiculatus*), mapleleaf viburnum (*Viburnum acerifolium*), blackhaw (*Viburnum prunifolium*), and downy arrowwood. The herb layer is usually moderately diverse, with species such as whitetinge sedge (*Carex artitecta*), black edge sedge (*C. nigromarginata*), Solomon's seal (*Polygonatum biflorum*), licorice bedstraw (*Galium circaezans*), perfoliate bellwort (*Uvularia perfoliata*), littlehead nutrush (*Scleria oligantha*), Virginia snakeroot (*Aristolochia serpentaria*), flowering spurge (*Euphorbia corollata*), and in the mesic part of the range of this type, as on lower slopes, many of the herbs of the Basic Mesic Forest.

Dry Oak-Hickory Forest

Dry oak-hickory forests typically occupy ridgetops, upper slopes, steep south facing slopes, and other upland areas with acidic soils. Soil series include Cecil and Pacolet.

This forest is dominated by dry site oaks, primarily white oak, southern red oak (*Quercus falcate*), post oak, chestnut oak (*Quercus prinus*), blackjack oak (*Q. marilandica*), scarlet oak (*Q. coccinea*), black oak, mockernut hickory, red hickory, and pignut hickory. Pine species are often an important component, and may occasionally even be dominant. Typical understory species include sourwood (*Oxydendrum arboretum*), red maple, blackgum, flowering dogwood, and farkleberry (*Vaccinium arboreum*). Shrubs include deerberry, Blue Ridge blueberry, and other ericaceous shrubs. Muscadine and poison ivy are often present. Typical herbs include striped prince's pine, little brownjug, poverty oatgrass (*Danthonia spicata*), Virginia tephrosia (*Tephrosia virginiana*), greater tickseed (*Coreopsis major*), and rattlesnakeweed.

Piedmont/Low Mountain Alluvial Forest

The canopy of the Piedmont/Low Mountain Alluvial Forest is composed of the following trees: river birch (*Betula nigra*), American elm (*Ulmus americana*), winged elm (*Ulmus alata*), red elm (*Ulmus rubra*), sweet gum (*Liquidambar styraciflua*), hickory (*Carya aquatica*), boxelder, tulip poplar, sycamore, Carolina willow (*Salix caroliniana*), black gum (*Nyssa sylvatica*), and laurel oak (*Quercus laurifolia*). The shrub stratum consists of swamp doghobble (*Leucothoe racemosa*), spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), Chinese privet (*Ligustrum sinense*), highbush blueberry (*Vaccinium corymbosum*), swamp doghobble (*Leucothoe racemosa*), and silky dogwood (*Cornus amomum*). The herbaceous layer has lizard's tail (*Saururus cernuus)*, green dragon (*Arisaema dracontium*), smartweed (*Polygonum hydropiperoides*), cardinal flower (*Lobelia cardinalis*), greenbrier (*Smilax sp.*), arrowhead (*Sagittaria lancifolia*), maidencane (*Panicum hemitomon*), netted chain fern (*Woodwardia areolata*), false nettle (*Boehmeria cylindrica*), swamp mallow (*Hibiscus moscheutos*), trumpet creeper (*Campsis radicans*), and poison ivy.

Successional Areas

This community is not identified in Schafale and Weakley. Successional areas are those recovering from a disturbance such as soil removal, clear cutting, mowing, or agriculture. These areas often contain shrub sized individuals of the following tree species: sweetgum, loblolly pine, and sycamore. The herbaceous layer contains dog fennel (*Eupatorium capillifolium*), goldenrod (*Solidago canadensis*), tall fescue (*Lolium arundinaceum*), pokeweed (*Phytolacca americana*), Queen Anne's lace (*Daucus carota*), and Lespedeza (*Lespedeza stipulacea*).

Piedmont Prairies

Historical records have indicated that Piedmont prairie systems were abundant throughout the North Carolina Piedmont region prior to the removal of large native herbivores and the implementation of fire suppression (Barden, 1997). These successional areas have survived as relic systems in many areas where the vegetation is maintained or regularly disturbed such as along power line easements, agricultural pastures, and road rights of way. There are a number of current efforts in North Carolina to restore these relic ecosystems. The Piedmont Prairie habitat supports several endangered and threatened early successional plant species including: Schweinitz's sunflower (*elianthus schweinitzii*), Smooth coneflower (*Echinacea laevigata*), Georgia aster (*Symphyotrichum georgianum*), Carolina bird's-foot trefoil (*Lotus helleri)*, Tall larkspur (*Delphinium exaltatum*), and Butner

Barbara's buttons (*Marshallia sp*). Several Piedmont prairie restorations have been implemented within the service area in Mecklenburg County Nature Preserves as well as on Conservation Trust lands, and these are described further in Section 5.6.

Section 5.11.2 - Terrestrial Communities and Species Observed at the Proposed Alternative Sites

Dry Mesic Oak-Hickory Forest

This forest type is found on both the Mecklenburg and Gaston sides of the proposed alternatives sites. The canopy is composed of white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), shagbark hickory (*Carya ovata)*, beech (*Fagus grandifolia*), loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), sugar maple (*Acer saccharum*), and red maple (*Acer rubrum*). The shrub layer is composed of box elder (*Acer negundo*), red cedar (*Juniperus virginiana*), dogwood (*Cornus florida*), American holly (*Ilex opaca*), and white mulberry (*Morus alba*). The understory was sparse due to the closed canopy. The under story includes honeysuckle (*Lonicera japonica*), grape (*Vitus sp*.), and poison ivy (*Toxicodendron radicans*).

Mesic Mixed Hardwood Forest (Piedmont subtype)

This forest type is found on both the Mecklenburg and Gaston sides of the proposed alternatives sites. On the Mecklenburg side of the river the forest contains a higher percentage of loblolly pine than is usually found in this forest type. The canopy contains loblolly pine, white oak, sweetgum, red cedar, black cherry (*Prunus serotina*), and pignut hickory (*Carya glabra*). The shrub layer contains the tree species with the exception of the Loblolly pine. The herb layer was absent.

Piedmont/Low Mountain Alluvial Forest

Piedmont/Low Mountain alluvial forest is present on the Mecklenburg site along Lake Wylie and Long Creek and on the Gaston site along the Catawba River and tributaries that flow into the river. Several wetland areas were observed within this forest type. These wetland areas are discussed in Section 5.4. The canopy is composed of the following trees: river birch (*Betula nigra)*, American elm (*Ulmus americana*), winged elm (*Ulmus alata*), red elm (*Ulmus rubra*), sweet gum (*Liquidambar styraciflua*), hickory (*Carya aquatica*), box elder, tulip poplar, sycamore, Carolina willow (*Salix caroliniana*), black gum (*Nyssa sylvatica*), and laurel oak (*Quercus laurifolia*). The shrub stratum consists of swamp doghobble (*Leucothoe racemosa*), spicebush (*Lindera benzoin*), buttonbush (*Cephalanthus occidentalis*), Chinese privet (*Ligustrum sinense*), highbush blueberry (*Vaccinium corymbosum*), swamp doghobble (*Leucothoe racemosa*), and silky dogwood (*Cornus amomum)*. The herbaceous layer has lizard's tail (*Saururus cernuus*), green dragon (*Arisaema dracontium*), smartweed (*Polygonum hydropiperoides)*, cardinal flower (*Lobelia cardinalis*), greenbrier (*Smilax sp*.), arrowhead (*Sagittaria lancifolia*), maidencane (*Panicum hemitomon*), netted chain fern (*Woodwardia areolata*), false nettle (*Boehmeria cylindrica*), swamp mallow (*Hibiscus moscheutos*), trumpet creeper (*Campsis radicans*), and poison ivy.

Successional Areas

This community is not identified in Schafale and Weakley. Successional areas are found on the soil borrow area on the east side of Lake Wylie and within the power line right-of-ways at both locations. These successional areas are visible on Figure 5.11a. These areas contain shrub sized individuals of the following tree species: sweetgum,

loblolly pine, and sycamore. The herbaceous layer contains dog fennel (*Eupatorium capillifolium*), goldenrod (*Solidago canadensis*), tall fescue (*Lolium arundinaceum*), pokeweed (*Phytolacca americana*), Queen Anne's lace (*Daucus carota*), and Lespedeza (*Lespedeza stipulacea*). One small patch of the federally endangered Schweinitz's sunflower (*Helianthus schweinitzii*) was located in a power line right-of-way near the Mount Holly WWTP (Figure 5.11a).

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Appendix G. Fish Supplemental Existing Environment Information.....1

Appendix G. Fish Supplemental Existing Environment Information

Correlates with the following Sections:

Section 5.12.1.1 – Fish Community Information for the Service Area and Adjacent to Alternative Sites

Fish community data were compiled by Duke Energy as part of the Catawba-Wateree Hydro Project Aquatic-01 report (Coughlan 2005). Sites included the Mountain Island Lake tailrace, the Mountain Island Lake bypass reach, Long Creek upstream of the project site (Figure 5.12a). A combined total of 26 species were collected in the tailrace site and in the Lake Wylie site. The fish community at these locations is centracid dominated with abundant blue gill (*Lepomis macrochirus*), redbreast sunfish (*Lepomis auritus*), and largemouth bass. Other species found in abundance included alewife (*Alosa pseudoharengus*), threadfin shad (*Dorosoma petenense*), whitefin shiner (*Cyprinella nivea*), and white perch.

The bypass reach had only 5 species and was dominated by mosquito fish (*Gambusia holbrooki*) with warmouth, bluegill, and pumpkinseed present as well. Long Creek had a diverse assemblage with 21 species represented. Species found in abundance included greenfin shiner (*Cyprinella chloristia*), bluehead chub (*Nocomis leptocephalus*), spottail shiner (*Notropis hudsonius*), with several species of ictaluridae, cyprinidae, catostomidae, centrarcidae, and percidae present. Detailed fish community data for the DUKE FERC study can be viewed at the following website: (http://www.duke-energy.com/pdfs/Aquatics_01_Report.pdf).

Fish community data has also been compiled by the NCDWQ Biological Assessment Unit for Long Creek in Mecklenburg County and Dutchmans Creek in Gaston County (NCDWQ 2007). Seventeen species were collected in Long Creek in July 2004, including abundant redbreast sunfish, bluegill, bluehead chub (*Nocomis leptocephalus*), swallowtail shiner (*Notropis procne*), and sandbar shiner (*Notropis scepticus*). The last survey conducted on Dutchmans Creek occurred in June 1993. Fifteen species were collected in Dutchmans Creek including abundant greenfin shiner (*Cyprinella chlorista*), redbreast sunfish, and bluehead chub (NCDWQ 2007).

In addition to the previously mentioned surveys Charlotte-Mecklenburg's Land Use and Environmental Services Agency (LUESA) conducts regular fish surveys at a number of locations throughout the County. Data sheets are provided here for the locations sampled within the proposed service area.

In November 2007, the WRC requested that fish surveys be performed in order to better determine the status of fish communities within the service area. Fish surveys were conducted by The Catena Group at ten locations in early 2008. The survey results and document are included in this appendix.

Section 5.12.1.2 – Mussel Community

In November 2007, the WRC requested that mussel surveys be conducted to obtain recent community information and to determine if there is any evidence of the federally endangered Carolina heelsplitter in streams within the service area. In early 2008 mussel surveys were conducted by The Catena Group at twenty locations throughout the service area. The survey results and documentation are included in this appendix.

MECKLENBURG COUNTY - FISH IDENTIFICATION SHEET

STREAM	BASIN 96 -GAR CREEK	**SURVEY DATE**	
	AT BEATTIES FORD ROAD (UP & DOWNSTREAM)		9/11/2009
LOCATION	MC50		
TAXONOMIST	Tony Roux		

FAMILY	**GENUS/SPECIES**	**COUNT**
CENTRARCHIDAE	LEPOMIS AURITUS	17
CENTRARCHIDAE	LEPOMIS GIBBOSUS	2
CENTRARCHIDAE	LEPOMIS GULOSUS	4
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	7
CENTRARCHIDAE	MICROPTERUS SALMOIDES	5
CYPRINIDAE	CLINOSTOMUS FUNDULOIDES	5
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	11
CYPRINIDAE	SEMOTILUS ATROMACULATUS	56
ICTALURIDAE	AMEIURUS MELAS	1
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	37
PERCIDAE	ETHEOSTOMA OLMSTEDI	40

IBI SCORE **36**

WQ RATING **FAIR**

MECKLENBURG COUNTY - FISH IDENTIFICATION SHEET

STREAM	BASIN 62 - PAW CREEK AT WILKINSON BLVD (UPSTREAM)	**SURVEY DATE** 9/25/2007
LOCATION	MC17	
TAXONOMIST	Tony Roux	

FAMILY	**GENUS/SPECIES**	**COUNT**
CATOSTOMIDAE	ERIMYZON OBLONGUS	3
CENTRARCHIDAE	LEPOMIS AURITUS	61
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	245
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	22
CYPRINIDAE	NOTROPIS PROCNE	74
ICTALURIDAE	AMEIURUS CATUS	11
ICTALURIDAE	AMEIURUS MELAS	1
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	142

IBI SCORE	**30**
WQ RATING	**POOR**

FISH IDENTIFICATION SHEET

LOG NO: 2006 -01259 **SURVEY DATE:** 10/03/2006
SITE: BASIN 69 BASIN 69 - LONG CREEK
STATION: MC14A LONG CREEK AT PINE ISLAND DRIVE
BASIN: 69
LOCATION: MC14A

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Corey T. Priddy
Shannon D. Wheat

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CATOSTOMIDAE	SCARTOMYZON sp. Cl. LACHNERI	2	0	19(1), 23(1)
CENTRARCHIDAE	LEPOMIS AURITUS	20	0	4(2), 6(1), 7(4), 7.5(2), 8(3), 8.5(1), 9(2), 9.5(1), 10(3), 12(1)
CENTRARCHIDAE	LEPOMIS CYANELLUS	6	0	6.5(1), 7.5(2), 10(1), 12.5(1), 14(1)
CENTRARCHIDAE	LEPOMIS GIBBOSUS	1	0	15.5(1)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	5	0	5.5(1), 8(2), 9.5(1), 10.5(1)
CYPRINIDAE	CYPRINELLA CHLORISTIA	34	0	4.5(1), 5(6), 5.5(12), 6(13), 7(2)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	3	0	11.5(2), 14(1)
CYPRINIDAE	NOTROPIS HUDSONIUS	4	0	6(2), 6.5(1), 7(1)
CYPRINIDAE	NOTROPIS PROCNE	21	0	3.5(3), 4.5(4), 5(9), 5.5(5)
CYPRINIDAE	NOTROPIS SCEPTICUS	38	0	4(1), 4.5(1), 5(7), 5.5(11), 6(11), 6.5(3), 7(3), 8(1)
ICTALURIDAE	AMEIURUS PLATYCEPHALUS	1	0	21(1)
PERCIDAE	ETHEOSTOMA OLMSTEDI	11	0	4(1), 4.5(5), 5(3), 5.5(1), 6(1)
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	17	0	2.5(2), 3(8), 3.5(4), 4(3)

IBI SCORE: 44 **WATER QUALITY RATING:** 5 FAIR

FISH IDENTIFICATION SHEET

LOG NO: 2004 -01017 **SURVEY DATE:** 09/22/2004
SITE: BASIN 96 BASIN 96 - GAR CREEK
TATION: MC50 GAR CREEK AT BEATTIES FORD RD
BASIN: 96
LOCATION: MC50

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Chris F. Elmore
Isaac J. Hinson

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CENTRARCHIDAE	LEPOMIS AURITUS	43	0	5(1), 6(1), 7(2), 7.5(2), 8(2), 9(1), 9.5(4), 10(4), 10.5(4), 11(6), 11.5(2), 12(4), 12.5(4), 13(5), 14(1)
CENTRARCHIDAE	LEPOMIS GIBBOSUS	30	0	6(2), 6.5(4), 7(3), 7.5(9), 8(3), 8.5(1), 9(2), 9.5(1), 10(2), 10.5(1), 11(1), 11.5(1)
CENTRARCHIDAE	LEPOMIS GULOSUS	9	0	6(1), 8(1), 8.5(2), 9.5(2), 10.5(1), 12(1), 13.5(1)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	182	0	4(10), 4.5(19), 5(57), 5.5(34), 6(16), 6.5(4), 7(8), 7.5(11), 8(7), 8.5(4), 9(5), 9.5(3), 10(1), 10.5(2), 14(1)
CENTRARCHIDAE	MICROPTERUS SALMOIDES	20	0	5.5(1), 6(6), 6.5(2), 7(5), 7.5(3), 8(1), 9(1), 10(1)
CENTRARCHIDAE	POMOXIS NIGROMACULATUS	3	0	7(1), 7.5(2)
CLUPEIDAE	DOROSOMA CEPEDIANUM	1	0	8.5(1)
CYPRINIDAE	CLINOSTOMUS FUNDULOIDES	1	0	11.5(1)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	1	0	7.5(1)
CYPRINIDAE	SEMOTILUS ATROMACULATUS	6	0	10(1), 12(3), 12.5(1), 13.5(1)
ICTALURIDAE	AMEIURUS CATUS	1	0	19.5(1)
PERCIDAE	ETHEOSTOMA FUSIFORME	1	0	5(1)
PERCIDAE	ETHEOSTOMA OLMSTEDI	9	0	4(1), 4.5(2), 5(1), 5.5(1), 6(2), 6.5(1), 7(1)
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	17	0	4(1), 4.5(8), 5(4), 5.5(4)

IBI SCORE: 46 **WATER QUALITY RATING:** 4 FAIR-GOOD

FISH IDENTIFICATION SHEET

LOG NO: 2003 -01364
SITE: BASIN 62 BASIN 62 - PAW CREEK
STATION: MC17 PAW CREEK AT WILKINSON BLVD
BASIN: 62
LOCATION: MC17

SURVEY DATE: 10/15/2003

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Brian G. Sikes

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CATOSTOMIDAE	CATOSTOMUS COMMERSONI	1	0	23(1)
CATOSTOMIDAE	ERIMYZON OBLONGUS	2	0	15(1), 16(1)
CENTRARCHIDAE	LEPOMIS AURITUS	24	0	4(1), 6(3), 7(10), 8(1), 9(1), 11(3), 12(2), 13(3)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	54	0	4(3), 5(2), 6(6), 7(8), 8(8), 9(8), 10(10), 11(8), 13(1)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	3	0	4(1), 10(1), 14(1)
CYPRINIDAE	NOTEMIGONUS CRYSOLEUCAS	1	0	12(1)
ICTALURIDAE	AMEIURUS CATUS	17	0	6(1), 7(2), 11(1), 12(4), 13(4), 14(3), 15(1), 19(1)
ICTALURIDAE	AMEIURUS NATALIS	2	0	8(1), 10(1)
ICTALURIDAE	AMEIURUS NEBULOSUS	6	0	8(1), 11(1), 12(1), 14(1), 15(2)
PERCIDAE	ETHEOSTOMA OLMSTEDI	4	0	5(2), 6(2)

IBI SCORE: 38 **WATER QUALITY RATING:** 6 POOR-FAIR

FISH IDENTIFICATION SHEET

LOG NO: 2002 -01892
SITE: BASIN 67 BASIN 67 - LONG CREEK
STATION: MC10 LONG CREEK AT OAKDALE RD
BASIN: 67
LOCATION: MC10

SURVEY DATE: 11/15/2002

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Jonathan Beller
Brad Loveland

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CATOSTOMIDAE	ERIMYZON OBLONGUS	2	0	7(1), 8(1)
CENTRARCHIDAE	LEPOMIS AURITUS	21	0	3(5),4(1), 5(3), 6(5), 8(2), 9(2), 10(2), 11(1)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	1	0	6(1)
CENTRARCHIDAE	MICROPTERUS SALMOIDES	1	0	6(1)
CYPRINIDAE	CLINOSTOMUS FUNDULOIDES	62	0	4(27), 5(24), 6(6), 7(5)
CYPRINIDAE	CYPRINELLA CHLORISTIA	11	0	3(1), 4(4), 5(2), 6(2), 7(2)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	90	0	3(12), 4(16), 5(29), 6(11), 7(5), 8(1), 9(5), 10(6), 11(4), 16(1)
CYPRINIDAE	NOTROPIS CHILITICUS	39	0	4(11), 5(19), 6(5), 7(4)
CYPRINIDAE	NOTROPIS PROCNE	39	0	3(9), 4(17), 5(13)
CYPRINIDAE	NOTROPIS SCEPTICUS	32	0	3(1), 4(2), 5(4), 6(21), 7(4)
CYPRINIDAE	SEMOTILUS ATROMACULATUS	45	0	4(10), 5(22), 6(8), 7(1) 8(1), 9(3)
PERCIDAE	ETHEOSTOMA OLMSTEDI	37	0	3(8), 4(10), 5(12), 6(7)
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	28	0	3(12), 4(11), 5(5)

IBI SCORE: 42 **WATER QUALITY RATING:** 5 FAIR

FISH IDENTIFICATION SHEET

LOG NO: 2002 -01893
SURVEY DATE: 11/15/2002
SITE: BASIN 69 BASIN 69 - LONG CREEK
STATION: MC14A LONG CREEK AT PINE ISLAND DRIVE
BASIN: 69
LOCATION: MC14A
TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Jonathan Beller

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CATOSTOMIDAE	ERIMYZON OBLONGUS	1	0	19(1)
CATOSTOMIDAE	SCARTOMYZON RUPISCARTES	3	0	9(1), 16(1), 18(1)
CENTRARCHIDAE	LEPOMIS AURITUS	51	0	2(1), 3(12), 4(8), 5(4), 6(4), 7(5), 8(6), 9(4), 10(2), 11(2), 12(1), 13(1), 15(1)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	1	0	9(1)
CYPRINIDAE	CYPRINELLA CHLORISTIA	44	0	2(5), 3(27), 4(3), 5(3), 6(6)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	28	0	3(1), 4(5), 5(7), 6(2), 7(4), 9(5), 10(2), 12(1), 14(1)
CYPRINIDAE	NOTROPIS PROCNE	62	0	2(12), 3(25), 4(12), 5(10), 6(3)
CYPRINIDAE	NOTROPIS SCEPTICUS	5	0	5(2), 6(1) 7(2)
ICTALURIDAE	AMEIURUS PLATYCEPHALUS	3	0	11(1), 12(1), 16(1)
ICTALURIDAE	NOTURUS INSIGNIS	2	0	7(1), 10(1)
PERCIDAE	ETHEOSTOMA OLMSTEDI	5	0	4(1), 5(2), 6(2)
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	31	0	2(8), 3(19), 4(4)

IBI SCORE: 44 **WATER QUALITY RATING:** 5 FAIR

FISH IDENTIFICATION SHEET

LOG NO: 2002 -01789 **SURVEY DATE:** 10/17/2002
SITE: BASIN 68 BASIN 68 - LONG CREEK
STATION: MC13 GUM BRANCH AT GUM BRANCH RD
BASIN: 68
LOCATION: MC13

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux
Jonathan Beller
Jeff S. Price

FAMILY	GENUS/SPECIES	NO.	TOT WT	LENGTHS
CATOSTOMIDAE	ERIMYZON OBLONGUS	10	0	7(1), 8(3), 9(1), 11(3), 12(1), 16(1)
CENTRARCHIDAE	LEPOMIS AURITUS	125	0	3(25), 4(33), 5(17), 6(16), 7(6), 8(13), 9(5), 10(8), 11(1), 13(1)
CENTRARCHIDAE	LEPOMIS GULOSUS	1	0	11(1)
CENTRARCHIDAE	LEPOMIS MACROCHIRUS	7	0	7(1), 8(1), 9(2), 10(2), 14(1)
CENTRARCHIDAE	MICROPTERUS SALMOIDES	3	0	10(1), 12(1), 22(1)
CYPRINIDAE	CYPRINELLA CHLORISTIA	4	0	4(1), 5(1), 6(2)
CYPRINIDAE	NOCOMIS LEPTOCEPHALUS	91	0	4(26), 5(16), 6(12), 7(10), 8(6), 9(12), 10(4), 11(3), 12(1), 13(1)
CYPRINIDAE	NOTROPIS PROCNE	97	0	3(11), 4(41), 5(25), 6(20)
CYPRINIDAE	NOTROPIS SCEPTICUS	2	0	5(1), 7(1)
CYPRINIDAE	SEMOTILUS ATROMACULATUS	3	0	4(2), 12(1)
PERCIDAE	ETHEOSTOMA OLMSTEDI	2	0	5(1), 6(1)
POECILIDAE	GAMBUSIA HOLBROOKI (AFFINIS)	55	0	2(18), 3(17), 4(11), 5(8), 6(1)

IBI SCORE: 42 **WATER QUALITY RATING:** 5 FAIR

The Catena Group

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Freshwater Mussel & Fish Survey Report for

Proposed Regional Wastewater Treatment Plant Environmental Impact Statement

Gaston & Mecklenburg Counties, North Carolina

Prepared For:

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Prepared By:

The Catena Group
Hillsborough, North Carolina

February 27, 2008

Thomas E. Dickinson

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1.0 INTRODUCTION

Charlotte-Mecklenburg Utilities has proposed the construction of a new regional wastewater treatment facility to serve a significant portion of northwest Mecklenburg and northeastern Gaston counties (the service area, as shown in Figures). As part of the Environmental Impact Statement (EIS) for the project the NC Wildlife Resources Commission (NCWRC) requested that comprehensive mussel and fish surveys be conducted in potentially impacted streams within the service area. In order to establish a current baseline of freshwater mussel and fish assemblages in the service area, The Catena Group, Inc (TCG) was contracted by ENTRIX to conduct qualitative surveys at twenty sites for freshwater mussels and ten sites for freshwater fish.

The freshwater mussel survey efforts focused particularly on the Federally Endangered Carolina heelsplitter (*Lasmigona decorata*), which is known from drainages in the Catawba River basin in Mecklenburg County. In addition to the Carolina heelsplitter, there are several other rare freshwater mussel species known to occur in Mecklenburg County that may also occur in Gaston County. These include the Carolina creekshell (*Villosa vaughaniana*), eastern creekshell (*V. delumbis*), creeper (*Strophitus undulatus*), and notched rainbow (*V. constricta*). The Carolina creekshell is a Federal Species of Concern (FSC)[1] and is considered Endangered (E)[2] in North Carolina. The creeper, notched rainbow, and eastern creekshell are considered Threatened (T), Special Concern (SC) and Significantly Rare (SR) respectively, in North Carolina. Additionally, the Carolina elktoe (*Alasmidonta robusta*), a species believed to be extinct, was described from Long Creek, a stream within the identified service area. The FSC Carolina darter (*Etheostoma collis*) is a fish species that is known from Mecklenburg County that may also occur in Gaston County. Habitats typical of where these rare species are known to occur were targeted during these survey efforts.

2.0 FEDERALLY PROTECTED SPECIES DESCRIPTION (Carolina heelsplitter)

2.1.Species Characteristics

The Carolina heelsplitter (*Lasmigona decorata*), originally described as *Unio decoratus* by (Lea 1852), synonymized with *Lasmigona subviridis* (Conrad 1835, Johnson 1970), and later separated as a distinct species (Clarke 1985), is a federally Endangered freshwater mussel, historically known from several locations within the Catawba and Pee Dee River systems in North Carolina and the Pee Dee, Savannah, and possibly the Saluda River systems in South Carolina.

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[1] **Federal Species of Concern (FSC)** are defined as a species that is under consideration for listing for which there is insufficient information to support listing. FSCs are not afforded federal protection under the Endangered Species Act and are not subject to any of its provisions, including Section 7, until they are formally proposed or listed as Threatened or Endangered. However, the status of these species is subject to change, and so should be included for consideration.

[2] **North Carolina Endangered, Threatened and Special Concern** species have legal protection status in North Carolina under the State Endangered Species Act administered and enforced by the North Carolina Wildlife Resources Commission. Species listed as Significantly Rare are not afforded any protection.

The Carolina heelsplitter is characterized as having an ovate, trapezoid-shaped, unsculptured shell. The outer surface of the shell ranges from greenish brown to dark brown in color, with younger specimens often having faint greenish brown or black rays. The shell's nacre is often pearly white to bluish white, grading to orange in the area of the umbo (Keferl 1991). The hinge teeth are well developed and heavy and the beak sculpture is double looped (Keferl and Shelly 1988). Morphologically, the shell of the Carolina heelsplitter is very similar to the shell of the green floater (Clarke 1985), with the exception of a much larger size and thickness in the Carolina heelsplitter (Keferl and Shelly 1988).

Prior to collections in 1987 and 1990, by Keferl (1991), the Carolina heelsplitter had not been collected in the 20th century and was known only from shell characteristics. Because of its rarity, very little information of this species biology, life history, and habitat requirements was known. Feeding strategy and reproductive cycle of the Carolina heelsplitter have not been documented, but are likely similar to other native freshwater mussels (USFWS 1996).

The feeding processes of freshwater mussels are specialized for the removal (filtering) of suspended microscopic food particles from the water column (Pennak 1989). Documented food sources for freshwater mussels include detritus, diatoms, phytoplankton, and zooplankton (USFWS 1996).

Freshwater mussels have complex reproductive cycles, which include a larval stage (glochidium) that is an obligatory parasite on a fish. The glochidia develop into juvenile mussels and detach from the "fish host" and sink to the stream bottom where they continue to develop, provided suitable substrate and water conditions are available (USFWS 1996). Many species of freshwater mussels require a particular species of fish to serve as the host. The host species(s) for the Carolina heelsplitter is unknown (USFWS 1996). McMahon and Bogan (2001) and Pennak (1989) should be consulted for a general overview of freshwater mussel reproductive biology.

2.2.Distribution and Habitat Requirements

Currently the Carolina heelsplitter has a very fragmented, relict distribution. Until recently, it was known to be surviving in only six streams and one small river (USFWS 1996); however, recent discoveries have increased the number of known populations to eleven:

Pee Dee River Basin:

1. Duck Creek/Goose Creek - Mecklenburg/Union counties, NC

2. Flat Creek/Lynches River - Lancaster/Chesterfield/Kershaw counties, SC

Catawba River Basin:

3. Sixmile Creek (Twelvemile Creek Subbasin) - Lancaster County, SC

4. Waxhaw Creek - Union County, NC and Lancaster County, SC

5. Cane Creek - Lancaster County, SC

6. Gills Creek - Lancaster County, SC

7. Fishing Creek Subbasin - Chester County, SC

8. Rocky Creek Subbasin (Bull Run Creek/UT Bull Run Creek/Beaverdam Creek - Chester County, SC

Saluda River Basin:

9. Redbank Creek - Saluda County, SC

Savannah River Basin:

10. Little Stevens Creek/Mountain Creek/Sleepy Creek /Turkey Creek (Stevens Creek Subbasin) - Edgefield/McCormick counties, SC.

11. Cuffytown Creek (Stevens Creek Subbasin) - Greenwood/McCormick counties, SC

Habitat for this species has been reported from small to large streams and rivers as well as ponds. These ponds are believed to be millponds on some of the smaller streams within the species' historic range (Keferl 1991). Keferl and Shelly (1988) and Keferl (1991) reported that most individuals have been found along well-shaded streambanks with mud, muddy sand, or muddy gravel substrates, however, numerous individuals in several of the populations have been found in cobble and gravel dominated substrate, usually in close proximity to bedrock outcroppings (personal observations). The stability of stream banks appears to be very important to this species (Keferl 1991).

2.3.Threats to Species

The low numbers of individuals and the restricted range of each of the surviving populations make them extremely vulnerable to extirpation from a single catastrophic event or activity (USFWS 1996). The cumulative effects of several factors, including sedimentation, point and non-point discharge, and stream modification (impoundments, channelization, etc.) has contributed to the decline of this species throughout its range (USFWS 1996).

Siltation resulting from improper sedimentation control of various land usage practices, including agricultural, forestry, and development activities, has been recognized as a major contributing factor to degradation of mussel populations (USFWS 1996). Siltation has been documented to be extremely detrimental to mussel populations by degrading substrate and water quality, increasing potential exposure to other pollutants, and by direct smothering of mussels (Ellis 1936), (Markings and Bills 1979). Sediment accumulations of less than 1 inch have been shown to cause high mortality in most mussel species (Ellis 1936).

Sewage treatment effluent has been documented to significantly affect the diversity and abundance of mussel fauna (Goudreau et al. 1988). Goudreau et al. (1988) found that

recovery of mussel populations might not occur for up to 2 miles below points of chlorinated sewage effluent.

The impact of impoundments on freshwater mussels has been well-documented (USFWS 1992a; Neves 1993). Construction of dams transforms lotic habitats into lentic habitats, which results in changes in the aquatic community composition. Muscle Shoals on the Tennessee River in northern Alabama, once the richest site for mussels in the world, is now at the bottom of the Wilson Reservoir and covered with 19 feet of muck (USFWS 1992b). Large portions of all of the river basins within the Carolina heelsplitter's range have been impounded and this is believed to be a major factor contributing to the species decline (USFWS 1996).

The introduction of exotic species such as the Asian clam (*Corbicula fluminea*) and zebra mussel (*Dreissena polymorpha*) has also been shown to pose significant threats to native freshwater mussels. The Asiatic clam is now established in most of the major river systems in the United States (Fuller and Powell 1973); including those streams still supporting surviving populations of the Carolina heelsplitter (USFWS 1996). Concern has been raised over competitive interactions for space, food and oxygen with this species and native mussels, possibly at the juvenile stages (Neves and Widlack 1987; Alderman 1995). The zebra mussel is not known from any waterbodies supporting the Carolina heelsplitter (USFWS 1996).

3.0 MUSSEL SURVEY EFFORTS

3.1.Mussel Survey Methodology

Survey locations were chosen based on mapping and pre-survey investigations as provided by ENTRIX, accessibility, and appropriate habitat for the target species as determined in the field. Efforts were made to avoid known recently surveyed areas.

Surveys of the twenty sites were conducted as indicated by TCG personnel on the following dates; January 29-31, 2008 (Tom Dickinson and Chris Sheats, Sites 1-11), February 5, 2008 (Tom Dickinson and Shay Garriock, Site 12), February 6, 2008 (Tim Savidge and Chris Sheats (Sites 13-16), Tom Dickinson and Shay Garriock (Sites 17-19)), and February 20, 2008 (Tom Dickinson and Shay Garriock, Site 20). The respective mussel survey segments are reported as Sites 1-20, in chronological order, and are depicted in Figure 1.

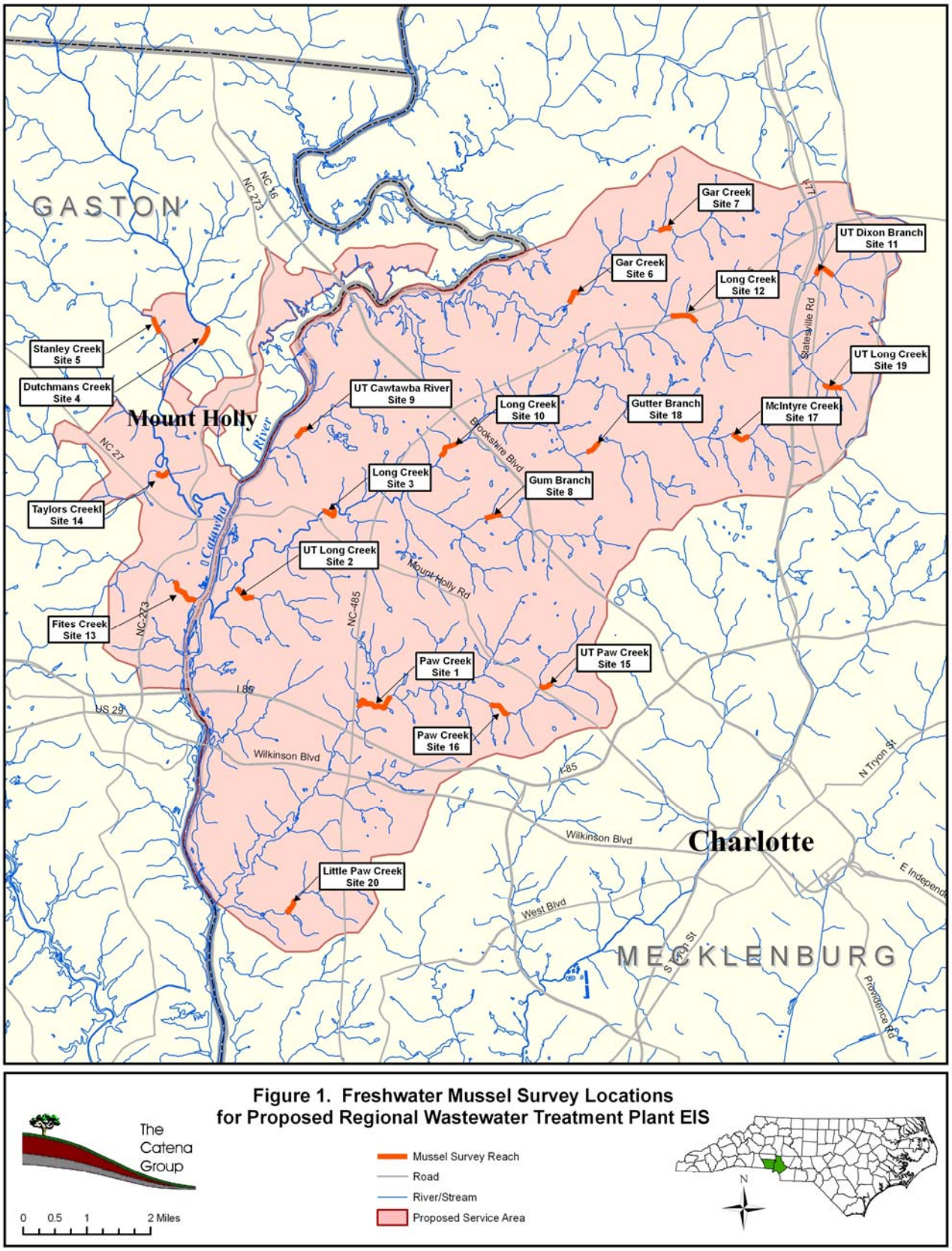

Figure 1. Freshwater Mussel Survey Locations for Proposed Regional Wastewater Treatment Plant EIS

An approximate survey length of 500 meters was followed for each site. Within the surveyed reaches, all habitat types (riffle, run, pool, slack-water, etc.) were sampled with a two-person team. The survey team began at the downstream end of the survey reach and proceeded upstream, with the team spread across the stream into survey lanes. A combination of visual, bathyscope (glass-bottom view buckets) and tactile methodologies were employed where appropriate. Upstream and downstream survey limits were recorded using a hand-held Garmin 12 or e-trex Vista GPS unit. Timed searches were employed in each reach. Searches were also conducted for relict shells. Habitat notes were recorded at each collection site. The buffer width of these habitat notes are defined as narrow (<10 m), moderate (10-100 m), and/or wide (>100 m).

3.2.Mussel Survey Results

No native freshwater mussels were located in any of the twenty sites surveyed as part of this study. Potentially suitable habitat for freshwater mussels was present in most of the survey reaches although it was usually limited due to various forms of degradation. A survey site description and results are summarized below.

Site 1 Paw Creek

This site was located upstream of the I-85 crossing of the stream and was accessed from the adjacent sewerline cooridor. The stream channel ranged from 5-8 meters wide and stream banks ranged from 1-2 meters high. Stream banks were generally vertical and unstable. The surveyed reach consisted mostly of shallow run and pool habitat. Substrate was dominated by unconsolidated sand and silt, with limited areas of gravel, cobble, and boulder. The surrounding area consisted of variably narrow to moderate forested buffer and residential areas. Timed mussel searches were conducted for 1.5 person hours. The Asian clam (*Corbicula fluminea*) was uncommon.

Site 2 UT Long Creek

This site was located near the U.S. White Water Center on a small UT to lower Long Creek. The stream channel was approximately 2 meters wide and stream banks ranged from 0-.5 meters high. Stream banks were generally stable although they exhibited some areas of erosion and undercutting. The surveyed reach consisted mostly of shallow pool and slack water habitat. Substrate was dominated by unconsolidated sand with areas of clay and muck bottom and clay banks. The surrounding area consisted of an extensive bottomland forest and wetland system. Timed mussel searches were conducted for 1.0 person hour. The Asian clam was abundant.

Site 3 Long Creek

This site was located upstream of the NC 27 crossing and was accessed from the adjacent sewerline cooridor. The stream channel ranged from 8-12 meters wide and stream banks ranged from 1-2 meters high. Banks ranged from stable to exhibiting some areas of erosion and undercutting. The surveyed reach consisted of an extensive rock fall riffle/run area transitioning into pool and slackwater habitats towards the upstream extent.

Substrate was dominated by unconsolidated sand and boulder, with areas of clay banks, silt, gravel, cobble, and bedrock also common. The surrounding area consisted of variably narrow to moderate forested buffer and residential areas. Timed mussel searches were conducted for 2.0 person hours. The Asian clam was common and a physid snail (*Physella* sp.) was uncommon.

Site 4 Dutchmans Creek

This site was located upstream of the Sandy Ford Road crossing. The stream channel was approximately 15 meters wide and incised, with stream banks ranging from 4-5 meters high. Banks were generally unstable and undercut. The surveyed reach mostly consisted of a long moderately deep pool with some riffle and run areas towards the upstream extent. Substrate was dominated by unconsolidated sand and silt, with a minor component of gravel, cobble, and boulder in the riffle/run area. The surrounding area consisted of a moderate to wide forested buffer and residential areas. Timed mussel searches were conducted for 2.0 person hours. The Asian clam was common.

Site 5 Stanley Creek

This site was located upstream of the Lowland Dairy Road crossing. The incised stream channel ranged from 3-7 meters wide and stream banks ranged from 1.5-2.5 meters high. Stream banks were generally unstable and undercut. The surveyed reach consisted of a very shallow pool/slack water habitat and run sequence. Substrate was dominated by unconsolidated sand and clay banks with limited areas of gravel in run habitat. The surrounding area consisted of a wide forested buffer towards the upstream extent and large residential developments towards the downstream extent of the survey. Timed mussel searches were conducted for 1.5 person hours. The Asian clam was common.

Site 6 Gar Creek

This site was located just upstream of the impoundment effects of Mountain Island Lake, as accessed off private land on River Circle Road. The stream channel ranged from 3-5 meters wide and stream banks ranged from 1-2 meters high. Stream banks exhibited some signs of erosion and undercutting. The surveyed reach consisted of a very shallow riffle/run and pool/slack water sequence. Substrate was dominated by unconsolidated sand with some areas of clay and silt deposition. The surrounding area consisted mostly of a wide hardwood forested buffer. A beaver impoundment was located near the upstream extent of the survey. Timed mussel searches were conducted for 1.33 person hours. The Asian clam was abundant.

Site 7 Gar Creek

This site was located upstream of the McCoy Road crossing of the stream within the upper portion of the watershed. The stream channel ranged from 2-4 meters wide and stream banks ranged from 0.5-1.5 meters high. Stream banks exhibited some signs of erosion and undercutting. The surveyed reach consisted of a very shallow alternating sequence of riffle/run and pool/slack water habitats. Substrate was dominated by unconsolidated sand with some areas of clay, gravel, and cobble. The surrounding area

consisted mostly of a wide hardwood forested buffer with an area of active pasture near the downstream extent of the survey. Timed mussel searches were conducted for 1.17 person hours. No mollusks were observed in the surveyed reach.

Site 8 Gum Branch

This site was located upstream of the Valley Dale Road crossing. The incised stream channel ranged from 3-5 meters wide and stream banks ranged from 3-5 meters high. Stream banks were generally vertical, unstable, and actively eroding. The surveyed reach consisted of a very shallow riffle/run and pool/slack water habitat sequence. Substrate was dominated by unconsolidated sand and silt, clay banks, and limited areas of cobble and boulder. The surrounding area consisted of variably narrow to moderate forested buffer and residential areas. Timed mussel searches were conducted for 1.17 person hours. The Asian clam was uncommon in the reach.

Site 9 UT Catawba River

This site was located approximately ½ mile from its confluence with the Catawba River as accessed from a power line corridor off Riverside Drive. The small stream channel ranged from 1-3 meters wide and stream banks ranged from 0-0.5 meters high. Stream banks ranged from stable to exhibiting some erosion and undercutting. The surveyed reach consisted of a very shallow riffle/run and pool/slack water habitat sequence. Substrate was dominated by unconsolidated sand and clay banks. The surrounding area consisted of variably narrow to moderate hardwood forested buffer and residential areas. Timed mussel searches were conducted for 1.17 person hours. No mollusks were observed in the surveyed reach.

Site 10 Long Creek

This site was located through the Bellhaven Blvd crossing of the stream. The stream channel ranged from 5-8 meters wide and the generally unstable stream banks ranged from 1.5-2 meters high. The surveyed reach consisted mostly of alternating shallow pool and run habitats. Substrate was dominated by unconsolidated sand, with areas of clay and silt common. A few areas of rip-rap cobble were also present. The surrounding area consisted of variably narrow to moderate natural buffer and residential areas. A beaver impoundment was located near the upstream extent of the survey. Timed mussel searches were conducted for 1.83 person hours. The Asian clam was uncommon.

Site 11 UT to Dixon Branch

This site was located upstream of its I-77 crossing, as accessed off US 21. The incised stream channel ranged from 3-4 meters wide and stream banks ranged from 2.5-3.5 meters high. Stream banks were generally vertical, unstable, and actively eroding. The surveyed reach consisted of a very shallow riffle/run and pool habitat sequence. Substrate was dominated by unconsolidated sand and hard packed clay, with some areas of gravel and cobble. The surrounding area consisted of a narrow natural buffer to an extensive urban development zone. Timed mussel searches were conducted for 1.17 person hours. No mollusks were observed in the surveyed reach.

Site 12 Long Creek

This site was located upstream of the Beatties Ford Road crossing to the I-485 corridor. The stream channel ranged from 5-8 meters wide and stream banks ranged from 0.5-2 meters high. Banks ranged from stable to exhibiting some areas of erosion and undercutting. The surveyed reach consisted of a bedrock outcrop riffle/run area transitioning into lower gradient sequence with more pool habitat towards the upstream extent. Substrate was dominated by unconsolidated sand, bedrock, and cobble with areas of clay banks, silt, gravel, and boulder also common. The surrounding area consisted of variably narrow to moderate forested buffer, residential area, and road. Timed mussel searches were conducted for 2.0 person hours. The Asian clam was common.

Site 13 Fites Creek

This site extended from the confluence with the Catawba River upstream of the Tuckaseegee Road crossing. The stream channel ranged from 6-7 meters wide and stream banks ranged from 0.5-2 meters high. The stream below the bridge is bordered by a fairly wide bottomland forest on the left descending bank, and residential development with narrow riparian buffers along the right descending bank. The stream channel is actively eroding, and the substrate is dominated by shifting coarse sand. An approximately 100 meter long high gradient area of mostly bedrock substrate occurs just upstream of the bridge crossing. This bedrock area serves as a grade control for the section of stream above, which is dominated by rock, boulder and sand. Timed mussel searches were conducted for 1.67 person hours. The Asian clam and a physid snail are common with patchy distributions.

Site 14 Taylors Creek

This section of Taylors occurs in an urbanized area extending from the confluence with Dutchman's Creek upstream of the Woodlawn Avenue crossing. The stream ranges from 5 -7 meters wide with incised and very unstable banks 2-3 meters high. Substrate consists of shifting sand over rock and boulder, with clay banks. A large beaver dam (*Castor canadensis*) is located approximately 240 meters upstream of the bridge crossing. Habitat below the bridge consists of shallow runs and flowing pools. Above the large beaverdam, the stream flows through a series of smaller dams, for the remainder of the evaluated reach. Timed mussel searches were conducted for 1.0 person hours. The Asian clam is present but relatively uncommon.

Site 15 UT Paw Creek

This UT to Paw Creek flows through an old residential development and elementary school property. The survey reach extended from the confluence with Paw Creek to upstream of the Arrowood Road crossing. The stream ranges from 1-1.5 meters wide with banks 1.5 feet high. The banks have been stabilized throughout much of the reach by various rock and timber retaining walls. Habitat consists of a series of small riffle/run/pool sequences. Substrate consists of cobble and sand. No mollusk species were found in 1.0 person hours of survey time.

Site 16 Paw Creek

This site extends from approximately 375 meters downstream of the Toddville Road crossing to a point approximately 150 meters upstream of the bridge. Below the bridge the stream is bordered by a sewer line along the left descending bank and a low density residential development on the right and a residential development borders both sides of the creek upstream of the bridge. The channel ranges from 5-7 meters wide, and the very unstable banks range from 1-2.5 meters high. Substrate consists of sand and cobble with occasional rock outcroppings. A strong odor of chlorinated effluent was noted. Timed mussel searches were conducted for 1.73 person hours. The Asian clam was common.

Site 17 McIntyre Creek

This site was located upstream of the Beatties Ford Road crossing. The small, incised stream channel ranged from 2-5 meters wide with approximately 2 meter high stream banks. Stream banks were generally vertical, and either unstable, and actively eroding or stabilized with cobble-sized rip-rap. The surveyed reach consisted of a shallow riffle/run and pool habitat sequence. Substrate was dominated by unconsolidated sand and hard packed clay banks, with some areas of silt deposition and cobble rip-rap. The surrounding area consisted of a variably narrow to moderate natural buffer and residential area. Timed mussel searches were conducted for 1.83 person hours. The Asian clam was uncommon.

Site 18 Gutter Branch

This site was located downstream of the Oakdale Road crossing. The stream channel ranged from 2-5 meters wide and stream banks ranged from 1-2 meters high. Banks exhibited some areas of erosion and undercutting. The surveyed reach consisted of a typical riffle/run/pool sequence of habitat. Substrate was dominated by clay, sand, and gravel, with areas of silt deposition and cobble also present. The surrounding area consisted of a moderate forested buffer and residential area. Timed mussel searches were conducted for 1.83 person hours. The Asian clam was common.

Site 19 UT Long Creek

This headwater tributary to Long Creek was located upstream of its US 21 crossing. The small stream channel ranged from 1-2 meters wide with approximately 1 meter high stream banks. Banks exhibited some areas of erosion and undercutting. The surveyed reach consisted of a very shallow riffle/run and pool habitat sequence. Substrate was dominated by clay, with some areas of sand and peat detritus. The surrounding area consisted of a variably narrow to moderate natural buffer to a residential area and road. Timed mussel searches were conducted for 1.0 person hour. No mollusks were observed in the surveyed reach.

Site 20 Little Paw Creek

This site was located downstream of the Mount Olive Church Road crossing. The incised stream channel ranged from 3-5 meters wide and stream banks ranged from 1.5-2.5

meters high. Stream banks were generally unstable and actively eroding. The surveyed reach consisted of a very shallow riffle/run and pool habitat sequence. Substrate was dominated by unconsolidated clay, silt, and sand, with some areas of gravel, cobble, bedrock and boulder also present. The surrounding area consisted of a moderate to wide natural buffer, residential area, and road. Timed mussel searches were conducted for 1.83 person hours. The Asian clam was uncommon.

3.3.Mussel Survey Discussion

The survey results indicate that a viable freshwater mussel fauna may not be present in the surveyed stream reaches and suggest that mussel fauna may have been extirpated from many of the streams in the study area. While it is possible that low numbers of individuals may be present in the surveyed reaches and were not located due to the time of year of the surveys and life history attributes of some potential species (i.e., they are completely buried in substrate). Most of the streams in the study area have been subject to anthropomorphic alteration that has significantly degraded the habitats from which the mussel fauna were historically known.

It is important to note that native mussel fauna have been recently found along the main stem of the Catawba River below Mountain Island Lake during survey efforts contracted by Duke Energy in 2005. The details of these finds can be found in the report, "Mussel Surveys for Catawba Relicensing" (Alderman 2005). This resource has connectivity to most of the streams surveyed as part of this project and currently serves as a potential re-colonization source of mussel fauna for streams in this service area.

4.0 FISH SURVEY EFFORTS

4.1.Fish Survey Methodology

Survey locations for fish surveys were chosen based on mapping and pre-survey investigations as provided by ENTRIX, accessibility, and appropriate habitat for a diverse fish assemblage, as determined in the field. Efforts were made to avoid known recently surveyed areas.

Surveys of the ten sites were conducted as indicated by TCG and ENTRIX personnel on the following dates; January 12, 2008 (Tom Dickinson, Chris Sheats, and Alan Moore, Sites 1-5), January 13, 2008 (Tom Dickinson and Chris Sheats, Sites 6-7), and January 20, 2008 (Tom Dickinson and Shay Garriock (Sites 8-10). The respective fish survey sites are reported as Sites 1-10, in chronological order, and the starting points of each are depicted in Figure 2.

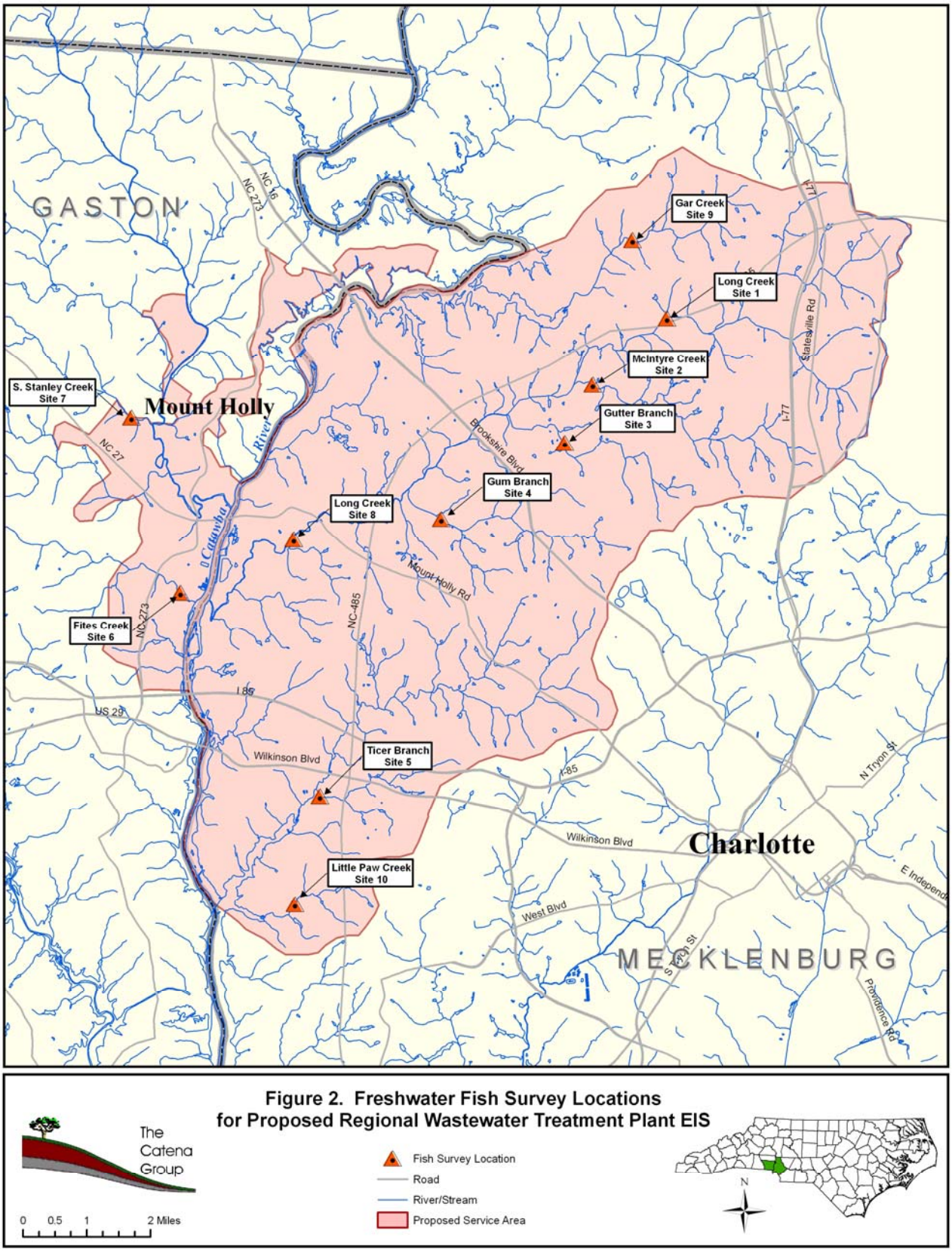

Figure 2. Freshwater Fish Survey Locations for Proposed Regional Wastewater Treatment Plant EIS

Fish inventory surveys were conducted using electroshocking methods. This was found to be the most effective method for sampling the study area streams, as fish were generally not active and holding tight to cover, which precluded effective seine net hauls. All of the habitat types in the survey reach were sampled at least once. A minimum of a two-person survey team was used with one operating a backpack electroshocker unit and a dipnet, and the other person using a dipnet. Riffle and run habitats were sampled in this manner, moving upstream until the entire length of riffle/run was sampled. This process was performed in the middle of the channel and close to each bank, in order to traverse the entire habitat. Pools were also sampled using backpack shockers and dipnets.

All fish captured were placed into a water bucket until they could be identified, counted, and released. The length of time necessary to identify, count, and release the fish depended on the number of fish in the bucket and their condition. Habitat notes were recorded at each collection site. The buffer width of these habitat notes are defined as narrow (<10 m), moderate (10-100 m), and/or wide (>100 m).

4.2 Fish Survey Results

Fish species typical of the size of the tributaries sampled for this portion of the Catawba River basin were found at each of the ten survey sites selected. A short survey site description and results in corresponding table form are summarized below.

Site 1 Long Creek

This site was located upstream of the Beatties Ford Road crossing. The stream channel ranged from 5-8 meters wide and stream banks ranged from 0.5-2 meters high. The surveyed reach consisted of a bedrock outcrop riffle/run area of a relatively high gradient with some pool habitat also present. Substrate was dominated by unconsolidated sand, bedrock, and cobble with areas of clay banks, silt, gravel, and boulder also common. A moderate natural buffer was present on the sampled portion of the stream. Fish surveys were conducted for a total of 855 seconds of electroshock time.

Table 1. Site 1: Fish Species Collected

Scientific Name	Common Name	Abundance
Ameiurus platycephalus	flat bullhead	1
Catostomus commersonii	white sucker	2
Clinostomus funduloides	rosyside dace	34
Etheostoma olmstedi	tesseslated darter	10
Lepomis auritus	redbreast sunfish	4
Lepomis gibbosus	pumpkinseed	1
Lepomis gulosus	warmouth	1
Lepomis macrochirus	bluegill	14
Micropterus salmoides	largemouth bass	2
Nocomis leptocephalus	bluehead chub	21
Notropis chiliticus	redlip shiner	6
Notropis procne	swallowtail shiner	7
Notropis scepticus	sandbar shiner	1
Semotilus atromaculatus	creek chub	1

Site 2 McIntyre Creek

This site was accessed from the Oakdale golf course off Oakdale Road. The stream channel ranged from 3-5 meters wide and stream banks were approximately 2 meters high. The surveyed reach consisted of a typical sequence of lower gradient riffle/run and pool habitat. Substrate was dominated by unconsolidated sand with areas of clay banks, silt, gravel, cobble and boulder also present. There was a moderate natural buffer on the sampled portion of the stream. Fish surveys were conducted for a total of 438 seconds of electroshock time.

Table 2. Site 2: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	1
Clinostomus funduloides	rosyside dace	14
Etheostoma olmstedi	tesseslated darter	10
Lepomis auritus	redbreast sunfish	5
Lepomis macrochirus	bluegill	2
Micropterus salmoides	largemouth bass	1
Nocomis leptocephalus	bluehead chub	25
Notropis chiliticus	redlip shiner	3
Notropis procne	swallowtail shiner	37
Notropis scepticus	sandbar shiner	1
Scartomyzon sp. cf. lachneri	brassy jumprock	6
Semotilus atromaculatus	creek chub	7

Site 3 Gutter Branch

This site was located upstream of the Kelly Road crossing. The stream channel ranged from 3-4 meters wide and stream banks ranged from 1.5-2.5 meters high. The surveyed reach consisted typical sequence of riffle/run, pool, and slack water habitats. Substrate was dominated by unconsolidated sand with areas of clay banks, silt, and gravel also present. A moderate natural buffer was present on the sampled portion of the stream. Fish surveys were conducted for a total of 431 seconds of electroshock time.

Table 3. Site 3: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	2
Clinostomus funduloides	rosyside dace	44
Etheostoma olmstedi	tesseslated darter	2
Lepomis macrochirus	bluegill	12
Micropterus salmoides	largemouth bass	1
Nocomis leptocephalus	bluehead chub	1
Notropis procne	swallowtail shiner	1
Semotilus atromaculatus	creek chub	9

Site 4 Gum Branch

This site was located upstream of the Gum Branch Road crossing in an older residential neighborhood. The stream channel ranged from 6-7 meters wide and stream banks ranged from 2-3 meters high. The surveyed reach consisted mostly of a long pool habitat with some run areas and slack water habitats. Substrate was dominated by unconsolidated sand with areas of silt and rip-rap-size cobble also present. Heavy algal growth was observed. Rip-rap stabilization was present along most of the reach. There was a moderate natural buffer on the left descending side of the stream at the start of the survey that diminished as the team moved upstream. The remaining surrounding area was completely open to the surrounding residential subdivision. Fish surveys were conducted for a total of 437 seconds of electroshock time.

Table 4. Site 4: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	3
Erimyzon oblongus	creek chubsucker	9
Etheostoma olmstedi	tesseslated darter	6
Lepomis auritus	redbreast sunfish	57
Lepomis cyanellus	green sunfish	1
Lepomis gibbosus	pumpkinseed	4
Lepomis gulosus	warmouth	1
Lepomis macrochirus	bluegill	5
Micropterus salmoides	largemouth bass	2
Nocomis leptocephalus	bluehead chub	4
Notropis procne	swallowtail shiner	93
Notropis scepticus	sandbar shiner	1
Semotilus atromaculatus	creek chub	1

Site 5 Ticer Branch

Ticer Branch is a tributary to Paw Creek. This site was accessed from a maintenance road off Old Dowd Road. The stream channel ranged from 3-5 meters wide and stream banks ranged from 1.5-2 meters high. The surveyed reach of the small stream consisted of a typical sequence of run, pool, and slack water habitats. Substrate was dominated by unconsolidated sand with areas of clay banks, silt, and pebble also present. A moderate to wide bottomland forested buffer was present on the sampled portion of the stream. Fish surveys were conducted for a total of 464 seconds of electroshock time.

Table 5. Site 5: Fish Species Collected

Scientific Name	Common Name	Abundance
Clinostomus funduloides	rosyside dace	3
Erimyzon oblongus	creek chubsucker	1
Etheostoma olmstedi	tesseslated darter	8
Lepomis auritus	redbreast sunfish	2
Lepomis gibbosus	pumpkinseed	1
Lepomis macrochirus	bluegill	5
Micropterus salmoides	largemouth bass	1
Nocomis leptocephalus	bluehead chub	4
Semotilus atromaculatus	creek chub	1

Site 6 Fites Creek

This site was located downstream of NC 273. The stream channel ranged from 4-5 meters wide and stream banks ranged from 1-2 meters high. The surveyed reach consisted of a bedrock outcrop riffle/run area of relatively high gradient with some pool habitat also present. Substrate was dominated by unconsolidated sand, boulder, and bedrock, with areas of clay banks, silt, gravel, and cobble also common. A narrow to moderate natural buffer was present to the surrounding residential area on the sampled portion of the stream. Fish surveys were conducted for a total of 546 seconds of electroshock time.

Table 6. Site 6: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	12
Clinostomus funduloides	rosyside dace	38
Cyprinella chloristia	greenfin shiner	1
Etheostoma olmstedi	tesseslated darter	16
Etheostoma thalassinum	seagreen darter	1
Lepomis auritus	redbreast sunfish	15
Lepomis cyanellus	green sunfish	2
Nocomis leptocephalus	bluehead chub	29
Notropis chiliticus	redlip shiner	8
Scartomyzon rupiscartes	striped jumprock	1
Semotilus atromaculatus	creek chub	5

Site 7 South Stanley Creek

This site was located upstream of the Woodlawn Road crossing. The stream channel ranged from 4-6 meters wide and stream banks ranged from 2-3 meters high. The surveyed reach consisted of shallow riffle/run and scoured pool habitats. Substrate was dominated by unconsolidated sand and silt with areas of clay banks and gravel also present. A narrow to moderate natural buffer to surrounding residential area was present on the sampled portion of the stream. Fish surveys were conducted for a total of 465 seconds of electroshock time.

Table 7. Site 7: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	3
Clinostomus funduloides	rosyside dace	19
Etheostoma olmstedi	tesseslated darter	12
Lepomis cyanellus	green sunfish	4
Lepomis macrochirus	bluegill	6
Nocomis leptocephalus	bluehead chub	7
Notemigonus crysoleucas	golden shiner	1
Notropis chiliticus	redlip shiner	10
Notropis scepticus	sandbar shiner	2
Semotilus atromaculatus	creek chub	7

Site 8 Long Creek

This site was accessed off a spur road to and downstream of the Mount Holly Road crossing. The stream channel ranged from 10-15 meters wide and stream banks ranged from 1-2 meters high. The surveyed reach consisted of a typical riffle/run and pool habitat. Substrate was dominated by unconsolidated sand, gravel, and cobble with areas of clay banks and silt also common. A narrow to moderate natural buffer to surrounding residences was present on the sampled portion of the stream. Fish surveys were conducted for a total of 1042 seconds of electroshock time.

Table 8. Site 8: Fish Species Collected

Scientific Name	Common Name	Abundance
Catostomus commersonii	white sucker	2
Cyprinella chloristia	greenfin shiner	14
Etheostoma olmstedi	tesseslated darter	13
Erimyzon oblongus	creek chubsucker	4
Lepomis cyanellus	green sunfish	1
Lepomis auritus	redbreast sunfish	2
Lepomis gibbosus	pumpkinseed	6
Lepomis macrochirus	bluegill	5
Micropterus salmoides	largemouth bass	5
Nocomis leptocephalus	bluehead chub	11
Notropis chiliticus	redlip shiner	3
Notropis hudsonius	spottail shiner	10
Notropis procne	swallowtail shiner	2
Notropis scepticus	sandbar shiner	17
Noturus insignis	margined madtom	4
Percina crassa	Piedmont darter	1
Pomoxis annularis	white crappie	1
Scartomyzon rupiscartes	striped jumprock	2
Semotilus atromaculatus	creek chub	1

Site 9 Gar Creek

This site was accessed from a spur road off of and upstream of the Beatties Ford Road crossing. The stream channel ranged from 3-5 meters wide and stream banks ranged from 1-1.5 meters high. The surveyed reach consisted of a typical sequence of riffle/run, pool, and slack water habitats. Substrate was dominated by unconsolidated sand, gravel, and cobble, with areas of clay banks, silt, and boulder also present. A wide hardwood forested buffer was present on the sampled portion of the stream. Fish surveys were conducted for a total of 862 seconds of electroshock time.

Table 9. Site 9: Fish Species Collected

Scientific Name	Common Name	Abundance
Etheostoma olmstedi	tesseslated darter	1
Lepomis auritus	redbreast sunfish	1
Lepomis macrochirus	bluegill	1
Semotilus atromaculatus	creek chub	11

Site 10 Little Paw Creek

This site was located downstream of the Mount Olive Church Road crossing. The incised stream channel ranged from 3-5 meters wide and stream banks ranged from 1.5-2.5 meters high. The surveyed reach consisted of a very shallow riffle/run and pool habitat sequence. Substrate was dominated by unconsolidated clay, silt, and sand, with some areas of gravel, cobble, bedrock and boulder also present. The surrounding area consisted of a moderate to wide natural buffer, residential area, and road. Fish surveys were conducted for a total of 418 seconds of electroshock time.

Table 10. Site 10: Fish Species Collected

Scientific Name	Common Name	Abundance
Cyprinella chloristia	greenfin shiner	1
Etheostoma olmstedi	tesseslated darter	6
Lepomis gibbosus	pumpkinseed	1
Lepomis macrochirus	bluegill	3
Micropterus salmoides	largemouth bass	1
Nocomis leptocephalus	bluehead chub	10
Semotilus atromaculatus	creek chub	38

4.3.Fish Survey Discussion

All of the streams surveyed contained a community of common fish species typical of similar sized water bodies in this portion of the Catawba River Basin. As these surveys were conducted in the winter months, it can be expected that the abundance and diversity of fish species may increase in these streams as various species move upstream with typically higher water levels during the breeding season. However, the data collected here does, for the most part, reflect assemblages similar to those previously collected in the same streams within the service area during other seasons.

5.0 CONCLUSIONS

These survey efforts represent updated and mostly new location survey data targeting freshwater mussel and fish within the service area of the proposed regional wastewater treatment plant.

The only federally protected species targeted by these survey efforts, the Carolina heelsplitter, was not found during the survey effort, and, given the degraded conditions of most of the streams surveyed, is unlikely to occur within the study area.

6.0 LITERATURE CITED

Alderman, J. M. (1995). Monitoring the Swift Creek Freshwater mussel community. Unpublished report presented at the UMRCC symposium on the Conservation and Management of Freshwater Mussels II Initiative for the Future. Rock Island, IL, UMRCC.

Alderman, J. M. (2005). Mussel Surveys for Catawba-Wateree Relicensing. Accessed from Duke Energy website on 28 Feb. 2008. <http://www.duke-energy.com/pdfs/Aquatics_06_Report.pdf>.

Clarke, A. H. 1985. The tribe Alasmidontini (Unionidae: Anodontinae), Part II: Lasmigona and Simpsonaias.

Conrad, T.A. (1835). Additions to, and corrections of, the Catalogue of species of American Naiades, with descriptions of new species and varieties of Fresh Water Shells. Pp. 1–8, pl. 9. Appendix to: *Synoptical table to New freshwater shells of the United States, with coloured illustrations; and a monograph of the genus Anculotus of Say; also a synopsis of the American naiades.* J. Dobson, 108 Chestnut Street, Philadelphia, Pennsylvania.

Ellis, M. M. (1936). Erosion Silt as a Factor in Aquatic Environments. Ecology 17: 29-42.

Fuller, S. L. H. and C. E. Powell (1973). Range extensions of *Corbicula manilensis* (Philippi) in the Atlantic drainage of the United States. Nautilus 87(2): 59.

Goudreau, S. E., R. J. Neves, and R.J. Sheehan (1988). Effects of Sewage Treatment Effluents on Mollusks and Fish of the Clinch River in Tazewell County, Virginia. USFWS: 128.

Johnson, R. I. (1970). The Systematics and Zoogeography of the Unionidae (Mollusca: Bivalva) of the Southern Atlantic Slope Region. Bulletin of the Museum of Comparative Zoology 140(6): 263-449.

Keferl, E. P. (1991). A status survey for the Carolina heelsplitter (*Lasmigona decorata*). A freshwater mussel endemic to the Carolinas. Unpublished report to US Fish and Wildlife Service.

Keferl, E. P. and R. M. Shelly (1988). The Final Report on a Status Survey of the Carolina Heelsplitter, *Lasmigona decorata*, and the Carolina elktoe, *Alasmidonta robusta*, Unpublished Report to the U.S. Dept of the Interior, Fish and Wildlife Service: 47.

Lea, I. (1852). Description of a new species of the family Unionidae. Transactions of the American Philosophical Society 10: 253-294.

Markings, L. L. and T. D. Bills (1979). Acute Effects of Silt and Sand Sedimentation on Freshwater Mussels. UMRCC Symposium on the Upper Mississippi River bivalve Mollusks, Rock Island, IL, UMRCC.

McMahon, R.F. and A.E. Bogan. (2001). Mollusca: Bivalvia. Pp. 331-429. IN: J.H. Thorpe and A.P. Covich. Ecology and classification of North American freshwater invertebrates. 2nd edtiion. Academic Press.

Neves, R. J. and J. C. Widlak (1987). Habitat Ecology of Juvenile Freshwater Mussels (Bivalva: Unionidae) in a Headwater Stream in Virginia. American Malacological Bulletin 1(5): 1-7.

Neves, R.J. 1993. A state of the Unionids address. Pp. 1-10 in K.S. Cummings, A.C.

Pennak, R. W. (1989). Fresh-water Invertebrates of the United States, Protozoa to Mollusca. New York, John Wiley & Sons, Inc.

USFWS (1992a). Special report on the status of freshwater mussels.

USFWS (1992b). Endangered and Threatened species of the southeast United States (The Red Book). FWS, Ecological Services, Div. of Endangered Species, Southeast Region. Govt Printing Office, Wash, DC: 1,070.

USFWS (1996). Revised Technical/Agency Draft Carolina Heelsplitter Recovery Plan, Atlanta, GA: 47.

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Appendix H. Rare and Protected Species Supplemental Existing Environment Information

The following is a discussion of rare and protected species discussed in sections 5.12 and 5.13.

Federally Protected Species

Carolina Heelsplitter (*Lasmigona decorata*)

The Carolina heelsplitter is a freshwater mussel species that was listed as federally endangered in 1993. The shell shape is ovate trapezoid with a straight dorsal margin that sometimes ends with a slight wing. The shell color is green or brown and may have green or black rays. The inner shell is white to mottled pale orange. Average shell length is around 78 mm.

Historically, Carolina heelsplitters were found in the Catawba River drainage around Mecklenburg County, in the Pee Dee River drainage in Union and Cabarrus Counties, and in the Saluda and Savannah River systems of South Carolina. According to the USFWS, there are currently only three extant populations known to exist in North Carolina. One population on Goose Creek in the Pee Dee River drainage, a population in Waxhaw Creek and Six Mile Creek in the Catawba River drainage, all in Union County. There are four extant populations known to exist in South Carolina. According to the NHIP, Carolina heelsplitter is thought to be extirpated from Gaston and Mecklenburg Counties.

The Carolina heelsplitter could historically be found in small to large streams and in small mill ponds. They are typically found in mud, muddy sand, or muddy gravel in well shaded streams. It is thought however that degradation of preferred more stable gravel habitats has restricted the species to these less desirable habitats. The decline of the species has been attributed to stream bank destabilization due to agriculture and development practices, impoundments, channelization, dredging and declining water quality. The presence of the Carolina heelsplitter (Lasmigona decorata) mussel in the project area is based on “historic occurrence”, but the species is believed to be extirpated from the area. There has been no recent verification of its continued existence within the service area. Mussel surveys conducted in early 2008 throughout the service area found no evidence of the Carolina heelsplitter.

Of the two general aquatic habitat types present within the alternate project areas, the open lake and shoreline habitat of the reservoir and the urbanized and sediment-impacted areas of Long Creek and Fites Creek, both have extremely limited potential to support Carolina heelsplitter.

Schweinitz’s Sunflower (*Helianthus schweinitzii*)

The Schweinitz’s sunflower was listed as a federally endangered species in 1991. Schweinitz’s sunflower is a rhizomatous perennial herb in the aster family that grows from 3 to 6 ft (1 to 2 m) tall from a cluster of carrot-like tuberous roots. Stems are usually solitary, branching only at or above mid-stem. The stem is usually pubescent but can be nearly glabrous; it is often purple. The lanceolate leaves are opposite on the lower stem, changing to alternate above. They are variable in size, being generally larger on the lower stem and gradually reduced upwards. The pubescence of the underside of the leaves is distinctive and is one of the best characters to distinguish Schweinitz's sunflower from its relatives. The upper surface of the leaves is rough, with the broad-

based spinose hairs directed toward the tip of the leaf. From September to frost, Schweinitz's sunflower blooms with comparatively small heads of yellow flowers.

The species occurs in clearings and edges of upland woods on moist to dryish clays, clay-loams, or sandy clay-loams that often have high gravel content and are moderately podzolized. Schweinitz's sunflower usually grows in open habitats not typical of the current general landscape in the piedmont of the Carolinas. Some of the associated species, many of which are also rare, have affinities to glade and prairie habitats of the Midwest. Other species are associated with fire-maintained sandhills and savannas of the Atlantic Coastal Plain and piedmont. The habitat of this sunflower tends to be dominated by members of the aster, pea, and grass families, an association emphasizing affinities of the habitat to both longleaf pine-dominated sandhills and savannas of the southeastern coastal plain and to glades, barrens, and prairies of the Midwest and Plains (USFWS 2005).

Suitable habitat for Schweinitz's sunflower exists within the proposed alternative sites in the form of disturbed-maintained areas. Surveys for this species are normally conducted during the appropriate flowering time (mid-August through the first frost). During a site visit on October 15, 2007, four (4) stems of Schweinitz's sunflower were located. These plants were confirmed by Misty Buchanan (North Carolina Natural Heritage Program) and Dale Suiter (USFWS). Several extant populations of Schweinitz's sunflower exist throughout the proposed service area (Figure 5.12c).

Michaux's Sumac (*Rhus michauxii*)

The Michaux's sumac was listed as a federally endangered species in 1989. Michaux's sumac is a rhizomatous shrub in the cashew family (Anacardiaceae), with erect stems that grow 1 to 3 feet high. This sumac can be distinguished by compound leaves with evenly serrated, oblong to lanceolate acuminate leaflets. Typically, most plants are unisexual but some have been found with both male and female flowers. Flowers are in terminal clusters, small, and colored greenish yellow to white. Flowering occurs from June to July. A red drupe fruit is produced in August through October.

The sumac is thought to be endemic to the coastal plain and piedmont of North and South Carolina, Georgia, and Florida. According to USFWS, thirty one extant populations are known to occur in North Carolina. According to the NHID, three counties in North Carolina are known to have extant population while three other counties have historically had population that may now be extirpated. This species grows in sandy or rocky open woods with basic soils. It survives best in disturbed areas such as highway right of ways, roadsides, or maintained areas.

Surveys were conducted in August of 2007, and Michaux's sumac populations were not found within the proposed alternative sites. Two extant populations exist within the proposed service area. One population exists in the Shuffletown Prairie Nature Preserve and one within the Latta Plantation Nature Preserve (Figure 5.12c).

Smooth Coneflower (*Echinacea laevigata*)

The smooth coneflower was listed as a federally endangered species in 1992. Smooth coneflower is an herbaceous perennial species in the aster family (Asteraceae) that typically grows to a height of 1.5 meters. Flower heads are large, solitary and distinguished by long lanceolate basal leaves that can reach 20 cm in length. Rays are typically light pink to purple and 5 to 8 cm long. Flowering occurs in late May through mid July. Fruiting occurs in June through September and fruits usually persist throughout the fall.

Smooth coneflower is usually found in habitats that have a high level of disturbance and abundant sunlight. Historically, this species depended on fire and large herbivores for necessary habitat maintenance that reduced competition and shading. Populations of smooth coneflower can be found in open woods, cedar barrens, dry limestone bluffs, and power line right of ways in magnesium and calcium rich soils.

Surveys were conducted in August of 2007 during flowering season, and no smooth coneflower populations were found within the proposed alternative sites. An extant population of the smooth coneflower does exist within the proposed service area in the Shuffletown powerline rare plant site (Figure 5.12c).

Georgia Aster (*Symphyotrichum georgianum*)

The Georgia aster was listed as a candidate for federal protection in 2002 and is currently listed as threatened by the State of North Carolina. Georgia aster is a perennial in the aster family that appears typically with 1 to 2 stems 1.4 to 8 dm tall, arising from an underground rhizome. Leaves on this aster are thick, lanceolate to oblanceolate. Flower heads are produced from October to mid-November and are distinguished by a white disk of flowers with purplish tips on the corollas, purple anthers, and white pollen. Flower heads are 5 cm across with purple rays 2 cm in length. Fruiting occurs in November through December and consists of a ribbed achene up to 4 mm in length with spreading trichomes.

Georgia aster existed widely in the southeast before wildfire suppression and the removal of large native herbivores. This species prefers habitats with a high frequency of disturbance and can be found near roads, along woodland edges, and utility right of ways where the vegetation is maintained. The main mode of reproduction in this species is vegetative and therefore most populations are small and isolated.

According to the NHIP, extant Georgia aster populations are documented in eight counties in North Carolina including Mecklenburg County. Surveys were conducted in August of 2007 during flowering season, and Georgia aster populations were not found within the proposed alternative sites. Georgia aster populations can be found throughout maintained areas within the proposed service area (Figure 5.12c).

Carolina Birdfoot-trefoil (*Acmispon unifoliatus* var. *helleri*)

The Carolina birdfoot-trefoil is a federal species of concern and listed as significantly rare in North Carolina. The birdfoot-trefoil is an annual that first appears in early April. In a study population in Wake County, growth was observed throughout the summer into early fall to an average stem height of approximately 48.7 +/- 12.11 cm (Masson and Stucky 2007 unpublished draft). Flowering and fruiting in the study population both took place in August through September. Lateral branches are produced in the upper half of the mainstem and are two ranked. Stems are characteristically red with flowers, leaves, and fruit growing on the lateral branches. Individual seed pods are produced, each containing 3 to 5 seeds.

Carolina birdfoot-trefoil typically inhabits open woods and early successional areas such as road sides and utility right of ways. In North Carolina, populations are known for 11 Piedmont counties including Mecklenburg. Surveys were conducted in August of 2007 and trefoil populations were not found within the proposed alternative sites. There are two populations within the service area along Thomas Pond Creek, a tributary to Long Creek (Figure 5.12c).

Tall Larkspur (Delphinium exaltatum)

The tall larkspur is a federal species of concern and is listed as endangered in North Carolina. The tall larkspur is a perennial herb that flowers between July and September with stems that reach up to 2 meters tall. The tall larkspur can be found in wooded areas and prairie habitats and tolerates both sun and shade. Habitat loss and fire suppression are two major impediments.

The tall larkspur has recently been found in 7 counties in North Carolina that include the piedmont and mountain regions. In Mecklenburg County, the species has only an historical occurrence.

Other Significant Species

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle has recently been removed from the federal endangered species list due to recovery of significant populations throughout the United States. The bald eagle is still protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. This is a large raptor primarily associated with coasts, large rivers, and lakes. Nests are usually constructed in large trees or snags as well as artificial nesting habitats placed near large water bodies. They typically will nest in the largest trees in the vicinity where open views of the surrounding area are ample. Nests can be six feet wide and weigh hundreds of pounds.

Significant habitat opportunities do exist for the bald eagle in and around the WWTP project alternative areas as well as throughout the proposed service area. Surveys were conducted in August 2007 and no bald eagle nests were found at the WWTP alternative project areas and no documented roosting or nest areas are near the WWTP alternative sites.

Carolina Elktoe (*Alasmidonta robusta*)

Very little is known about the life history of the Carolina elktoe. The last type specimen to be collected was from Long Creek prior to 1979. There are reports of a specimen found in Poison Fork, in Montgomery County in 2002. Aside from these reports, according to the NC NHP, this species is assumed to be extirpated from the State of North Carolina. Due to the scarcity of data, no federal or state protection has been given to this species.

Southern Bog Turtle (*Clemmys muhlenbergii*)

Due to the decline of northern populations of bog turtle, this species was listed as federally threatened due to similarity of appearance with the northern bog turtle under the Endangered Species Act in 1997. An adult bog turtle shell averages about 3 to 4.5 inches in length. They are distinguished by a large bright orange, yellow, or red blotch on each side of the head. The upper shell is dark brown with yellow and orange markings. The rigid plates of the upper shell are eventually worn smooth with age. The lower shell is typically dark brown or black.

Bog turtles are most active during the fall and spring but hibernate in the winter and are likely inactive during the hotter part of the year. Their preferred habitats are open canopy wetland areas with micro habitats that include dry, saturated, and periodically flooded areas. They typically use dryer shallow areas during the spring and hibernate in muddy bottoms during the winter. Wooded swamps are typically unsuitable as bog turtle habitat. Bog turtle habitat was not found during a wetland survey of the WWTP alternative locations conducted in August 2007. None of the wetlands described during the survey are ideal habitats for the bog turtle and impacts are not expected.

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Appendix I. Benthic Macroinvertebrate Supplemental Existing Environment Information.....1

Appendix I. Benthic Macroinvertebrate Supplemental Existing Environment Information

Correlates with the following Sections:

Section 5.12.1.3 – Benthic Macroinvertebrate Community

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 69 - LONG CREEK AT PINE ISLAND DRIVE

SURVEY DATE 7/14/2009

LOCATION MC14A

TAXONOMIST Tony Roux

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.	ABUNDANCE	EPT	TV*N
EPHEMEROPTERA	BAETIDAE	ACENTRELLA SPP.	4.0	2	1	1	4
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	15	10	1	70
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	25	10	1	70
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	6	3	1	12.9
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	2	1	1	6.6
EPHEMEROPTERA	BAETIDAE	PARACLOEODES SPP.	8.7	2	1	1	8.7
EPHEMEROPTERA	BAETIDAE	PSEUDOCLOEON PROPINQUUM	5.8	6	3	1	17.4
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	1	1	1	6.9
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	42	10	1	55
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	32	10	1	62
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	43	10	1	78
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	2	1	1	6.2
TRICHOPTERA	LEPTOCERIDAE	MYSTACIDES SEPULCHRALUS	2.7	1	1	1	2.7
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	1	1		4.1
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	20	10		51
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	5	3		25.2
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	11	10		85
DIPTERA	CHIRONOMIDAE	CRICOTOPUS TRIANNULATUS GROUP	9.0	3	3		27
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	1	1		6.4
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FLAVUM	4.9	7	3		14.7
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	5	3		27
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	1	1		8.4

BASIN 69 - LONG CREEK **AT PINE ISLAND DRIVE** **7/14/2009**

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.	ABUNDANCE	EPT	TV*N
DIPTERA	CHIRONOMIDAE	PROCLADIUS SPP.	9.1	1	1		9.1
DIPTERA	CHIRONOMIDAE	TRIBELOS JUCUNDUM	6.3	3	3		18.9
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	1	1		8.6
DIPTERA	DIXIDAE	DIXELLA INDIANA	2.5	1	1		2.5
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	11	10		60
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	1		4.3
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	22	10		73
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	1	1		7.8
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	1	1		8.2
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	4	3		26.7
ODONATA	CORDULIIDAE	SOMATOCHLORA SPP.	9.2	1	1		9.2
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	2	1		5.8
ODONATA	GOMPHIDAE	STYLOGOMPHUS ALBISTYLUS	4.7	1	1		4.7
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	1	1		6.2
GASTROPODA	PHYSIDAE	PHYSELLA SPP.	8.8	3	3		26.4
OLIGOCHAETA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	15	10		70
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	12	10		61

TOTAL ORGANISMS	**314**	**BIOTIC INDEX**	**6.74**	**13**	**1051.6**
TOTAL TAXA	**40**				**156**
TOTAL EPT	**13**	**RATING**	**FAIR**		

EPIC-WQ
06/27/2003

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2003 - 00734
SURVEY DATE: 08/09/2002

ASIN:
LOCATION: MC13

TAXONOMIST: David Buetow
COLLECTORS: David Buetow, David M. Caldwell, Will Autry, David J. Rimer

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	1	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	16	A
COLEOPTERA	HYDROPHILIDAE	BEROSUS SPP.	8.4	8	C
COLEOPTERA	HYDROPHILIDAE	HYDROCHUS SPP.	6.6	3	C
COLEOPTERA	HYDROPHILIDAE	TROPISTERNUS SPP.	9.6	2	R
COLEOPTERA	PSEPHENIDAE	PSEPHENUS HERRICKI	2.3	8	C
DIPTERA	CERATOPOGONIDAE	ALLUAUDOMYIA SPP.	6.0	2	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	4	C
DIPTERA	CHIRONOMIDAE	APEDILUM SPP.	1.0	3	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	9	C
DIPTERA	CHIRONOMIDAE	CLINOTANYPUS PINGUIS	8.7	1	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.3	11	A
DIPTERA	CHIRONOMIDAE	CRICOTOPUS/ORTHOCLADIUS GROUP	9.9	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	14	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	5	C
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.7	7	C
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	1	R
DIPTERA	STRATIOMYIDAE	STRATIOMYS SPP.	8.1	1	R
DIPTERA	TIPULIDAE	LIMONIA SPP.	9.6	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	8	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	6.6	14	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	5.0	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.7	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	6	C
EPHEMEROPTERA	BAETIDAE	CALLIBAETIS SPP.	9.8	1	R
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	1	R
EPHEMEROPTERA	BAETIDAE	PROCLOEON SPP.	5.0	8	C
EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	7	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	4	C
LEPIDOPTERA	PYRALIDAE	PETROPHILA SPP.	2.1	1	R
MNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	2	R
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.1	1	R

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

BASIN:

LOCATION: MC13

LOG NO: 2003 - 00734
SURVEY DATE: 08/09/2002

ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	1	R
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	2	R
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	15	A
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	7	C
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	1	R
ODONATA	GOMPHIDAE	OPHIOGOMPHUS SPP.	5.5	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	9	C
ODONATA	MACROMIIDAE	MACROMIA SPP.	6.2	2	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	5	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	23	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	3	C
TRICLADIDA	PLANARIIDAE	DUGESIA TIGRINA	7.2	14	A

TOTAL # ORGANISMS: 240
TOTAL TAXA: 44
TOTAL EPT: 11
SPECIES DIVERSITY: 4.9

METHOD: STD
BIOTIC INDEX: 6.72
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2004 - 00466
SURVEY DATE: 08/15/2003

ASIN:

LOCATION: MC13

TAXONOMIST: David Buetow
COLLECTORS: Will Autry, Michael Burkhard, Olivia J. Hutchins, Crystal A. Taylor

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	11	A
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	6	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	6	C
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	3	C
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	3	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	3	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	10	A
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	1	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	96	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	27	A

TOTAL # ORGANISMS: 175
TOTAL TAXA: 16
TOTAL EPT: 6
SPECIES DIVERSITY: 2.4

METHOD: STD
BIOTIC INDEX: 6.60
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2005 - 00583
SURVEY DATE: 08/20/2004

BASIN:
LOCATION: MC13

TAXONOMIST: David Buetow
COLLECTORS: Mark Popinchalk, Randall D Moore, Chris F. Elmore

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	17	A
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	2	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	1	R
DIPTERA	CHIRONOMIDAE	CRICOTOPUS/ORTHOCLADIUS GROUP	9.9	2	R
DIPTERA	CHIRONOMIDAE	DICROTENDIPES SPP.	8.1	4	C
DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	7	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	5	C
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS SPP.	7.3	2	R
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	2	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	3	C
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	4	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	46	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	4	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	39	A
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	1	R
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	2	R
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	3	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	1	R
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	4	C
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	6	C
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	3	C
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	6	C
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	6	C
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	3	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	21	A

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2005 - 00583
SURVEY DATE: 08/20/2004

ASIN:

LOCATION: MC13

TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	50	A
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	1	R

TOTAL # ORGANISMS:	266	**METHOD:**	STD
TOTAL TAXA:	34	**BIOTIC INDEX:**	6.69
TOTAL EPT:	9	**WATER QUALITY RATING:**	2 FAIR
SPECIES DIVERSITY:	4.0		

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2006 - 00498
SURVEY DATE: 08/05/2005

BASIN:
LOCATION: MC13

TAXONOMIST: David Buetow
COLLECTORS: Isaac J. Hinson, David Buetow, Brian G. Sikes, Jonathan Beller

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	3	C
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	1	R
COLEOPTERA	ELMIDAE	MACRONYCHUS GLABRATUS	4.6	1	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	8	C
DIPTERA	CHIRONOMIDAE	ABLABESMYIA PARAJANTA/JANTA	7.4	1	R
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	7	C
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	11	A
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	5	C
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	2	R
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	19	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	5	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	4	C
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS SPP.	7.3	2	R
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	7	C
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	3	C
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	6	C
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	4	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	31	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	4	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	69	A
EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES SPP.	5.1	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	4	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	4	C
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	6	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	18	A
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	32	A
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	6	C
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	2	R
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	14	A

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 68 - LONG CREEK
GUM BRANCH AT GUM BRANCH RD

LOG NO: 2006 - 00498
SURVEY DATE: 08/05/2005

ASIN:
LOCATION: MC13

ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	3	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	79	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	183	A
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	4	C

TOTAL # ORGANISMS: 557
TOTAL TAXA: 36
TOTAL EPT: 8
SPECIES DIVERSITY: 3.6

METHOD: STD
BIOTIC INDEX: 6.92
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 67 - LONG CREEK
GUTTER BRANCH AT KELLY RD
BASIN:
LOCATION: MC11

LOG NO: 99-01690
SURVEY DATE: 09/18/98

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, Richard L. Farmer, David J. Rimer, David M. Caldwell

ORDER/FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
BAETIDAE	BAETIS PLUTO	4.2	13	A
BAETIDAE	CENTROPTILUM SPP.	6.6	1	R
CAENIDAE	CAENIS SPP.	7.4	2	R
EPHEMERIDAE	HEXAGENIA SPP.	4.9	2	R
HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	48	A
ISONYCHIIDAE	ISONYCHIA SPP.	3.4	3	C
PERLIDAE	ECCOPTURA XANTHENES	3.7	15	A
PERLIDAE	NEOPERLA SPP.	1.5	14	A
HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	27	A
HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	24	A
LIMNEPHILIDAE	NEOPHYLAX OLIGIUS	2.2	27	A
PHILOPOTAMIDAE	CHIMARRA SPP.	2.7	56	A
POLYCENTROPODID	NYCTIOPHYLAX SPP.	0.8	5	C
DRYOPIDAE	HELICHUS SPP.	4.6	1	R
ELMIDAE	ANCYRONYX VARIEGATUS	6.5	6	C
ELMIDAE	DUBIRAPHIA VITTATA	4.1	4	C
ELMIDAE	STENELMIS SPP.	5.1	53	A
PSEPHENIDAE	PSEPHENUS HERRICKI	2.3	15	A
PTILODACTYLIDAE	ANCHYTARSUS BICOLOR	3.6	3	C
CULICIDAE	ANOPHELES SPP.	8.6	8	C
CULICIDAE	CULEX SPP.	10.0	1	R
TIPULIDAE	HEXATOMA SPP.	4.3	1	R
TIPULIDAE	TIPULA SPP.	7.3	5	C
CORYDALIDAE	CORYDALUS CORNUTUS	5.1	2	R
CORYDALIDAE	NIGRONIA SERRICORNIS	4.9	2	R
SIALIDAE	SIALIS SPP.	7.2	3	C
AESHNIDAE	BOYERIA VINOSA	5.9	9	A
CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	10	A
COENAGRIONIDAE	ARGIA SPP.	8.2	37	A
COENAGRIONIDAE	ENALLAGMA SPP.	8.9	50	A
GOMPHIDAE	GOMPHUS SPP.	5.8	7	C
GOMPHIDAE	OPHIOGOMPHUS SPP.	5.5	3	C
GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	1	R
MACROMIIDAE	MACROMIA GEORGINA	6.2	1	R
CORBICULIDAE	CORBICULA FLUMINEA	6.1	11	A
PHYSIDAE	PHYSELLA SPP.	8.8	3	C

TOTAL # ORGANISMS...: 473
TOTAL TAXA.....: 36
TOTAL EPT.....: 13
SPECIES DIVERSITY...: 4.3

METHOD.....: EPT
BIOTIC INDEX.....: 2.17
WATER QUALITY RATING: 0

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 65 - LONG CREEK
MCINTYRE CREEK AT MIRANDA RD
BASIN:
LOCATION: MC8A-1

LOG NO: 99-01704
SURVEY DATE: 07/31/98

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, Richard L. Farmer, David M. Caldwell, Anne Loftin

ORDER/FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
CAENIDAE	CAENIS SPP.	7.4	28	A
HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	4	C
HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	108	A
ISONYCHIIDAE	ISONYCHIA SPP.	3.4	11	A
HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	66	A
HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	58	A
DRYOPIDAE	HELICHUS SPP.	4.6	1	R
DYTISCIDAE	HYDROPORUS SPP.	8.6	1	R
ELMIDAE	ANCYRONYX VARIEGATUS	6.5	8	C
ELMIDAE	DUBIRAPHIA VITTATA	4.1	1	R
ELMIDAE	STENELMIS SPP.	5.1	2	R
TIPULIDAE	ANTOCHA SPP.	4.2	10	A
TIPULIDAE	HEXATOMA SPP.	4.3	2	R
TIPULIDAE	TIPULA SPP.	7.3	1	R
CORYDALIDAE	CORYDALUS CORNUTUS	5.1	82	A
CORYDALIDAE	NIGRONIA SERRICORNIS	4.9	19	A
SIALIDAE	SIALIS SPP.	7.2	3	C
AESHNIDAE	BOYERIA VINOSA	5.9	1	R
CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	1	R
COENAGRIONIDAE	ARGIA SPP.	8.2	9	A
GOMPHIDAE	GOMPHUS SPP.	5.8	1	R
GOMPHIDAE	OPHIOGOMPHUS SPP.	5.5	2	R
MACROMIIDAE	MACROMIA GEORGINA	6.2	1	R
CORBICULIDAE	CORBICULA FLUMINEA	6.1	13	A
PHYSIDAE	PHYSELLA SPP.	8.8	2	R

TOTAL # ORGANISMS...: 435
TOTAL TAXA.....: 25
TOTAL EPT.....: 6
SPECIES DIVERSITY...: 3.3

METHOD.....: EPT
BIOTIC INDEX.....: 1.66
WATER QUALITY RATING: 0

EPIC-WQ
06/27/2003

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 67 - LONG CREEK
BASIN: LONG CREEK AT OAKDALE RD
LOCATION: MC10

LOG NO: 2003 - 00733
SURVEY DATE: 06/14/2002

TAXONOMIST: David Buetow
COLLECTORS: David Buetow, Will Autry, David J. Rimer, David M. Caldwell

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.3	3	C
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	2	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	1	R
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS SPP.	7.3	2	R
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	5	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	6.6	15	A
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	1	R
EPHEMEROPTERA	BAETIDAE	CLOEON SPP.	7.4	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	35	A
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	1	R
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	3	C
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	1	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	4	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	1	R
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	8	C
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	2	R
ODONATA	CORDULIIDAE	SOMATOCHLORA SPP.	9.1	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	2	R
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	2	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	32	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	26	A

TOTAL # ORGANISMS: 151
TOTAL TAXA: 23
TOTAL EPT: 6
SPECIES DIVERSITY: 3.4

METHOD: STD
BIOTIC INDEX: 6.90
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 67 - LONG CREEK
LONG CREEK AT OAKDALE RD

LOG NO: 2004 - 00465
SURVEY DATE: 08/15/2003

ASIN:
LOCATION: MC10

TAXONOMIST: David Buetow
COLLECTORS: Will Autry, Gina Hodges, Brian G. Sikes, Olivia J. Hutchins

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FALLAX	6.4	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	1	R
DIPTERA	CHIRONOMIDAE	RHEOSMITTIA SPP.	7.0	1	R
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	1	R
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	44	A
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	8	C
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	2	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	5	C
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	1	R
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	1	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	3	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	8	C
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	3	C
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	1	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	5	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	21	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	1	R

TOTAL # ORGANISMS: 116
TOTAL TAXA: 21
TOTAL EPT: 6
SPECIES DIVERSITY: 3.1

METHOD: STD
BIOTIC INDEX: 6.64
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 67 - LONG CREEK
LONG CREEK AT OAKDALE RD

LOG NO: 2005 - 00584
SURVEY DATE: 08/20/2004

BASIN:
LOCATION: MC10

TAXONOMIST: David Buetow
COLLECTORS: Mark Popinchalk, Randall D Moore, Chris F. Elmore

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	2	R
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	3	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	2	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	2	R
DIPTERA	CHIRONOMIDAE	NATARSIA SPP.	10.0	2	R
DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	4	C
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	3	C
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	5	C
EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	19	A
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	36	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	12	A
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	15	A
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	32	A
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	1	R
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	6	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	2	R
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	3	C
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	2	R
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	2	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	7	C
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	3	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	7	C
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	14	A
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	5	C

TOTAL # ORGANISMS: 193
TOTAL TAXA: 27
TOTAL EPT: 8
SPECIES DIVERSITY: 4.0

METHOD: STD
BIOTIC INDEX: 6.45
WATER QUALITY RATING: 3 FAIR-GOOD

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 67 - LONG CREEK
LONG CREEK AT OAKDALE RD

LOG NO: 2006 - 00501
SURVEY DATE: 08/05/2005

ASIN:
LOCATION: MC10

TAXONOMIST: David Buetow
COLLECTORS: David Buetow, Isaac J. Hinson, Brian G. Sikes, Jonathan Beller

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	1	R
COLEOPTERA	ELMIDAE	MACRONYCHUS GLABRATUS	4.6	1	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	10	A
DIPTERA	CHIRONOMIDAE	CRICOTOPUS/ORTHOCLADIUS GROUP	9.9	2	R
DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	14	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2	R
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS SPP.	7.3	15	A
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	3	C
DIPTERA	CHIRONOMIDAE	SAETHERIA TYLUS	7.1	1	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	1	R
PTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	9	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	15	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	4	C
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	3	C
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	3	C
EPHEMEROPTERA	BAETIDAE	CALLIBAETIS SPP.	9.8	2	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	30	A
HAPLOTAXIDA	TUBIFICIDAE	LIMNODRILUS HOFFMEISTERI	9.5	1	R
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	1	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	2	R
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	12	A
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	2	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	1	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	46	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	42	A

TOTAL # ORGANISMS: 226
TOTAL TAXA: 28
TOTAL EPT: 9
ECIES DIVERSITY: 3.7

METHOD: STD
BIOTIC INDEX: 7.01
WATER QUALITY RATING: 2 FAIR

EPIC-WQ
06/27/2003

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

LOG NO: 2003 - 00870
SURVEY DATE: 05/24/2002

BASIN:
LOCATION: MC14A

TAXONOMIST: Mark Popinchalk
COLLECTORS: David J. Rimer, Will Autry, David Buetow

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	MACRONYCHUS GLABRATUS	4.5	1	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	3	C
COLEOPTERA	HYDROPHILIDAE	BEROSUS SPP.	8.4	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	1	R
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	10	A
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	10	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	1	R
DIPTERA	CHIRONOMIDAE	PROCLADIUS SPP.	9.1	7	C
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	15	A
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.2	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	2	R
EPHEMEROPTERA	BAETIDAE	ACENTRELLA AMPLA	3.6	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	6.6	1	R
EPHEMEROPTERA	BAETIDAE	CALLIBAETIS SPP.	9.8	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	40	A
EPHEMEROPTERA	ISONYCHIIDAE	ISONYCHIA SPP.	3.4	8	C
EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES SPP.	5.0	5	C
HETEROPTERA	CORIXIDAE	SIGARA SPP.	9.1	4	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	2	R
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.1	2	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	4	C
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	2	R
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	4	C
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	2	R
ODONATA	GOMPHIDAE	HAGENIUS BREVISTYLUS	3.9	1	R
ODONATA	GOMPHIDAE	OPHIOGOMPHUS SPP.	5.5	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	4	C
ODONATA	MACROMIIDAE	MACROMIA SPP.	6.2	1	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	1	R
PLECOPTERA	PERLIDAE	PERLESTA PLACIDA	4.7	2	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	81	A

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

LOG NO: 2003 - 00870
SURVEY DATE: 05/24/2002

BASIN:
LOCATION: MC14A

TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	13	A
TRICHOPTERA	LEPTOCERIDAE	NECTOPSYCHE CANDIDA	5.4	1	R

TOTAL # ORGANISMS:	234	**METHOD:**	STD
TOTAL TAXA:	34	**BIOTIC INDEX:**	6.74
TOTAL EPT:	10	**WATER QUALITY RATING:**	2 FAIR
SPECIES DIVERSITY:	3.6		

EPIC-WQ
07/07/2004

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

LOG NO: 2004 - 00559
SURVEY DATE: 08/15/2003

BASIN:
LOCATION: MC14A

TAXONOMIST: Anthony J. Roux
COLLECTORS: Brian G. Sikes, Crystal A. Taylor, Will Autry, Michael Burkhard

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	1	R
COLEOPTERA	ELMIDAE	MACRONYCHUS GLABRATUS	4.6	1	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	32	A
COLEOPTERA	HYDROPHILIDAE	TROPISTERNUS SPP.	9.7	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	2	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	2	R
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	1	R
DIPTERA	CHIRONOMIDAE	NANOCLADIUS SPP.	7.1	1	R
DIPTERA	CHIRONOMIDAE	NATARSIA SPP.	10.0	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	3	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	4	C
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	3	C
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	3	C
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	1	R
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	5	C
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	24	A
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	4	C
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	3	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	2	R
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	4	C
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	1	R
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	2	R
ODONATA	GOMPHIDAE	LANTHUS SPP.	1.8	3	C
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	3	C
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	11	A
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	107	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	7	C
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	1	R

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

LOG NO: 2004 - 00559
SURVEY DATE: 08/15/2003

ASIN:

LOCATION: MC14A

TOTAL # ORGANISMS:	244	**METHOD:**	STD
TOTAL TAXA:	32	**BIOTIC INDEX:**	6.23
TOTAL EPT:	7	**WATER QUALITY RATING:**	2 FAIR
SPECIES DIVERSITY:	3.3		

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

SURVEY DATE 7/23/04

LOCATION MC14A

TAXONOMIST BRIAN SIKES
TONY ROUX

ORDER	FAMILY	SPECIES	TOLERANCE	NO.	ABUNDANCE
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	6	3
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	1	1
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	84	10
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	7	3
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	50	10
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	6	3
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	16	10
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	2	1
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	8	3
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	1	1
DIPTERA	CHIRONOMIDAE	DICROTENDIPES NEOMODESTUS	8.1	6	3
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	1	1
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	5	3
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	3	3
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	2	1
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	3	3
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	3	3
MEGALOPTERA	CORYDALIDAE	CORYDALUS CORNUTUS	5.2	1	1
ODONATA	AESHNIDAE	BASIAESCHNA JANATA	7.4	1	1
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	2	1
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	7	3
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	3	3
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	3	3
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	4	3
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	1	1

TOTAL ORGANISMS	226	**BIOTIC INDEX**	6.74
TOTAL TAXA	25	**WATER QUALITY RATING**	POOR
TOTAL EPT	5		

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 69 - LONG CREEK
LONG CREEK AT PINE ISLAND DRIVE

LOG NO: 2006 - 00696

SURVEY DATE: ~~07/03/2006~~ 7/22/05

BASIN:

LOCATION: MC14A

TAXONOMIST: Brian G. Sikes

COLLECTORS: Mark Popinchalk, David Buetow, Olivia J. Hutchins, Monique D. LaPierre

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	2	R
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	9	C
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	1	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	1	R
DIPTERA	CHIRONOMIDAE	DICROTENDIPES SPP.	8.1	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	2	R
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	9	C
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	12	A
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	104	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	58	A
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	30	A
EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES SPP.	5.1	5	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	3	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	9	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	7	C
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	3	C
ODONATA	MACROMIIDAE	MACROMIA SPP.	6.2	3	C
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	27	A

TOTAL # ORGANISMS: 287
TOTAL TAXA: 18
TOTAL EPT: 5
SPECIES DIVERSITY: 3.0

METHOD: STD
BIOTIC INDEX: 6.72
WATER QUALITY RATING: ~~2-FAIR~~ POOR

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 69 - LONG CREEK AT PINE ISLAND DRIVE

SURVEY DATE 8/18/2006

LOCATION MC14A

TAXONOMIST Brian Sikes

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	1
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	11
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	10
EPHEMEROPTERA	BAETIDAE	PARACLOEODES SPP.	8.7	1
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	3
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	16
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	35
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	5
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	1
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	2
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	9
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS ROBACKI	7.3	1
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	1
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	2
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	5
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	2
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	1
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	1
OLIGOCHAETA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	3
OLIGOCHAETA	TUBIFICIDAE	BRANCHIURA SOWERBYI	8.3	2
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	3

TOTAL ORGANISMS 117 **BIOTIC INDEX** 6.77
TOTAL TAXA 22
TOTAL EPT 7

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 62 - PAW CREEK

BASIN 62 - PAW CREEK

SURVEY DATE 7/14/2009

LOCATION MC17

TAXONOMIST Tony Roux

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.	ABUNDANCE	EPT	TV*N
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	8	3	1	21
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	6	3	1	21
EPHEMEROPTERA	BAETIDAE	PROCLOEON SPP.	5.0	8	3	1	15
EPHEMEROPTERA	BAETIDAE	PARACLOEODES SPP.	8.7	3	3	1	26.1
EPHEMEROPTERA	BAETIDAE	PSEUDOCLOEON PROPINQUUM	5.8	16	10	1	58
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	42	10	1	55
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	52	10	1	62
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	25	10	1	78
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE VENULARIS	5.0	1	1	1	5
COLEOPTERA	DYTISCIDAE	LACCOPHILUS SPP.	10.0	1	1		10
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	1	1		5.1
COLEOPTERA	HALIPLIDAE	PELTODYTES SPP.	8.7	1	1		8.7
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	16	10		72
DIPTERA	CHIRONOMIDAE	ABLABESMYIA RHAMPHE	7.4	3	3		22.2
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	3	3		28.8
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	10	10		84
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	2	1		6.4
DIPTERA	CHIRONOMIDAE	LARSIA SPP.	9.3	1	1		9.3
DIPTERA	CHIRONOMIDAE	PARATANYTARSUS SPP.	8.5	2	1		8.5
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	1		5.1
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FLAVUM	4.9	1	1		4.9
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	5	3		27

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO. ABUNDANCE	EPT	TV*N
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	14	10	84
DIPTERA	CHIRONOMIDAE	PROCLADIUS SPP.	9.1	3	3	27.3
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	2	1	5.9
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	14	10	68
DIPTERA	CHIRONOMIDAE	TRIBELOS JUCUNDUM	6.3	3	3	18.9
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	3	3	21.9
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	1	1	5.9
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	1	1	8.2
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	3	3	17.4
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	12	10	82
MOLLUSCA	PHYSIDAE	PHYSELLA SPP.	8.8	1	1	8.8
OLIGOCHAETA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	4	3	21
OLIGOCHAETA	TUBIFICIDAE	LIMNODRILUS SPP.	9.5	1	1	9.5
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	3	3	18.3

TOTAL ORGANISMS	**273**	**BIOTIC INDEX**	**0.03**	**9**	**1030.2**
TOTAL TAXA	**36**				**40151**
TOTAL EPT	**9**	**RATING**	**FAIR**		

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 62 - PAW CREEK AT WILKINSON BLVD

SURVEY DATE 8/18/2006

LOCATION MC17

TAXONOMIST Brian Sikes

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	5
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	3
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	8
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	17
COLEOPTERA	ELMIDAE	MACRONYCHUS GLABRATUS	4.5	1
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	2
DIPTERA	CHIRONOMIDAE	NATARSIA SPP.	9.9	1
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	5
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	1
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	1
DIPTERA	CHIRONOMIDAE	TRIBELOS JUCUNDUS	6.3	2
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	8
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	7
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	3
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	2

TOTAL ORGANISMS 66 **BIOTIC INDEX** 6.91

TOTAL TAXA 15

TOTAL EPT 4

EPIC-WQ
06/14/2006

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 62 - PAW CREEK
PAW CREEK AT WILKINSON BLVD
BASIN:
LOCATION: MC17

LOG NO: 2006 - 00493
SURVEY DATE: 07/22/2005

TAXONOMIST: David Buetow
COLLECTORS: David Buetow, Michael Burkhard, Olivia J. Hutchins, Monique D. LaPierre

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	2	R
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	2	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	5	C
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	1	R
DIPTERA	CHIRONOMIDAE	LABRUNDINIA SPP.	5.9	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	9	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	9	C
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	3	C
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	7	C
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	5	C
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	4	C
DIPTERA	CHIRONOMIDAE	XYLOTOPUS PAR	6.0	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	5	C
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	15	A
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	2	R
EPHEMEROPTERA	BAETIDAE	PROCLOEON SPP.	5.0	1	R
EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	77	A
HAPLOTAXIDA	TUBIFICIDAE	LIMNODRILUS HOFFMEISTERI	9.5	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	2	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	9	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	22	A
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	1	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	2	R

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 62 - PAW CREEK
PAW CREEK AT WILKINSON BLVD

LOG NO: 2006 - 00493
SURVEY DATE: 07/22/2005

BASIN:

LOCATION: MC17

TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	3	C
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	2	R
TRICHOPTERA	LEPTOCERIDAE	TRIAENODES IGNITUS	4.6	1	R
TRICHOPTERA	PSYCHOMYIIDAE	LYPE DIVERSA	4.1	1	R

TOTAL # ORGANISMS: 207
TOTAL TAXA: 36
TOTAL EPT: 13
SPECIES DIVERSITY: 3.7

METHOD: STD
BIOTIC INDEX: 6.64
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 62 - PAW CREEK
PAW CREEK AT WILKINSON BLVD

LOG NO: 2005 - 00582
SURVEY DATE: 07/23/2004

BASIN:
LOCATION: MC17

TAXONOMIST: David Buetow
COLLECTORS: David M. Caldwell, David J. Rimer, Brian G. Sikes, Wanda M Comfort

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DYTISCIDAE	HYDROPORUS SPP.	8.6	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	6	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	3	C
DIPTERA	CHIRONOMIDAE	CRICOTOPUS/ORTHOCLADIUS GROUP	9.9	3	C
DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	6	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	5	C
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	1	R
EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	22	A
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	3	C
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	10	A
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	12	A
ODONATA	GOMPHIDAE	STYLOGOMPHUS ALBISTYLUS	4.7	1	R
ODONATA	LIBELLULIDAE	LIBELLULA SPP.	9.6	1	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	16	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	1	R

TOTAL # ORGANISMS: 97
TOTAL TAXA: 21
TOTAL EPT: 3
SPECIES DIVERSITY: 3.6

METHOD: STD
BIOTIC INDEX: 7.18
WATER QUALITY RATING: 2 FAIR

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 62 - PAW CREEK
PAW CREEK AT WILKINSON BLVD

LOG NO: 2004 - 00467
SURVEY DATE: 07/11/2003

ASIN:
LOCATION: MC17

TAXONOMIST: David Buetow
COLLECTORS: Brian G. Sikes, David M. Caldwell, David J. Rimer, Crystal A. Taylor

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DYTISCIDAE	NEOPORUS SPP.	8.6	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	7	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	2	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	5	C
DIPTERA	CHIRONOMIDAE	CRICOTOPUS SPP.	6.0	5	C
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	1	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SPP.	5.8	2	R
DIPTERA	CHIRONOMIDAE	RHEOSMITTIA SPP.	7.0	1	R
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	29	A
PTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	8	C
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	2	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	1	R
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	2	R
EPHEMEROPTERA	BAETIDAE	BAETIS SPP.	5.0	2	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	16	A
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	6	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	2	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	3	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	10	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	3	C

TOTAL # ORGANISMS: 117
TOTAL TAXA: 27
TOTAL EPT: 6
SPECIES DIVERSITY: 3.9

METHOD: STD
BIOTIC INDEX: 6.43
WATER QUALITY RATING: 2 FAIR

EPIC-WQ
06/27/2003

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 62 - PAW CREEK
PAW CREEK AT WILKINSON BLVD

BASIN:

LOCATION: MC17

LOG NO: 2003 - 00732
SURVEY DATE: 05/24/2002

TAXONOMIST: David Buetow
COLLECTORS: David Buetow, Shawn T Ralston, Will Autry

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	1	R
COLEOPTERA	DYTISCIDAE	HYDROPORUS SPP.	8.6	1	R
DIPTERA	CERATOPOGONIDAE	ALLUAUDOMYIA SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	4	C
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.3	3	C
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	4	C
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	12	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM AVICEPS	3.6	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	2	R
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	15	A
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	1	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.7	2	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	8	C
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	10	A
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	7	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	3	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	10	A
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	1	R
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	9	C
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	1	R
ODONATA	CORDULIIDAE	SOMATOCHLORA SPP.	9.1	1	R
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	1	R
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	10	A
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	2	R
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	1	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	32	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	2	R

TOTAL # ORGANISMS: 149
TOTAL TAXA: 28
TOTAL EPT: 4
SPECIES DIVERSITY: 4.0

METHOD: STD
BIOTIC INDEX: 6.95
WATER QUALITY RATING: 2 FAIR

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 96 - GAR CREEK
AT BEATTIES FORD ROAD

SURVEY DATE 6/24/2009

LOCATION MC50

TAXONOMIST Tony Roux

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO. ABUNDANCE	EPT	TV*N
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	2	1	7
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	1	1	7
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	1	1	4.3
EPHEMEROPTERA	BAETIDAE	PSEUDOCLOEON PROPINQUUM	5.8	1	1	5.8
EPHEMEROPTERA	BAETIDAE	PARACLOEODES SPP.	8.7	1	1	8.7
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	9	3	1	20.7
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	32	10	1	55
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	1	1	1	4.7
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	32	10	1	62
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	13	10	1	78
TRICHOPTERA	PHILOPOTAMIDAE	CHIMARRA SPP.	2.8	2	1	1	2.8
TRICHOPTERA	POLYCENTROPODIDAE	NYCTIOPHYLAX MOESTUS	3.3	2	1	1	3.3
TRICHOPTERA	UENOIDAE	NEOPHYLAX OLIGIUS	2.2	8	3	1	6.6
COLEOPTERA	DYTISCIDAE	NEOPORUS SPP.	8.6	8	3		25.8
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	6	3		12.3
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	2	1		5.1
COLEOPTERA	HALIPLIDAE	PELTODYTES SPP.	8.7	7	3		26.1
COLEOPTERA	PSEPHENIDAE	PSEPHENUS HERRICKI	2.4	2	1		2.4
COLEOPTERA	PSEPHENIDAE	ECTOPRIA NERVOSA	4.2	1	1		4.2
COLEOPTERA	PTILODACTYLIDAE	ANCHYTARSUS BICOLOR	3.6	1	1		3.6
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	22	10		72
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	8	3		25.2
DIPTERA	CHIRONOMIDAE	DICROTENDIPES FUMIDUS	8.9	4	3		26.7
DIPTERA	CHIRONOMIDAE	LABRUNDINIA SPP.	5.9	1	1		5.9
DIPTERA	CHIRONOMIDAE	MICROTENDIPES SPP.	5.5	6	3		16.5
DIPTERA	CHIRONOMIDAE	NATARSIA SPP.	10.0	1	1		10
DIPTERA	CHIRONOMIDAE	PARAMERINA SPP.	4.3	1	1		4.3
DIPTERA	CHIRONOMIDAE	PARAMETRIOCNEMUS SPP.	3.7	3	3		11.1
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	5	3		19.5
DIPTERA	CHIRONOMIDAE	POLYPEDILUM AVICEPS	3.7	2	1		3.7
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FALLAX	6.4	1	1		6.4

BASIN 96 - GAR CREEK **AT BEATTIES FORD ROAD** **6/24/2009**

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.	ABUNDANCE	EPT	TV*N
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FLAVUM	4.9	6	3		14.7
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	8	3		27
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	14	10		84
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	2	1		5.9
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	3	3		20.4
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	2	1		5.9
DIPTERA	CHIRONOMIDAE	XYLOTOPUS PAR	6.0	1	1		6
DIPTERA	CHIRONOMIDAE	ZAVRELIMYIA SPP.	9.1	3	3		27.3
DIPTERA	DIXIDAE	DIXELLA INDIANA	2.5	4	3		7.5
DIPTERA	DIXIDAE	DIXA SPP.	2.6	2	1		2.6
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	2	1		6
HETEROPTERA	CORIXIDAE	SIGARA SPP.	9.1	7	3		27.3
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	5.0	4	3		15
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	10	10		72
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	14	10		59
ODONATA	COENAGRIONIDAE	ARGIA SPP.	8.2	2	1		8.2
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	1	1		8.9
ODONATA	CORDULIIDAE	SOMATOCHLORA SPP.	9.2	4	3		27.6
AMPHIPODA	TALITRIDAE	HYALLELA AZTECA	7.8	1	1		7.8
GASTROPODA	PLANORBIDAE	HELISOMA ANCEPS	6.2	1	1		6.2
GASTROPODA	PHYSIDAE	PHYSELLA SPP.	8.8	1	1		8.8
OLIGOCHAETA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	2	1		7
OLIGOCHAETA	TUBIFICIDAE	TUBIFEX TUBIFEX	10.0	1	1		10

TOTAL ORGANISMS	**281**	**BIOTIC INDEX**	**0.03**	**13**	**1011.8**
TOTAL TAXA	**54**				**40141**
TOTAL EPT	**13**	**RATING**	**FAIR**		

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2006 - 00528
SURVEY DATE: 07/22/2005

ASIN:
LOCATION: MC50

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, Brian G. Sikes, Jonathan Beller, Michael Burkhard

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	1	R
COLEOPTERA	DYTISCIDAE	NEOPORUS SPP.	8.6	6	C
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	2	R
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	6	C
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	5	C
COLEOPTERA	EUBRIIDAE	ECTOPRIA NERVOSA	4.2	7	C
COLEOPTERA	GYRINIDAE	GYRINUS SPP.	6.2	1	R
COLEOPTERA	PSEPHENIDAE	PSEPHENUS HERRICKI	2.4	1	R
DIPTERA	CERATOPOGONIDAE	ALLUAUDOMYIA SPP.	6.0	1	R
DIPTERA	CHIRONOMIDAE	BRILLIA SPP.	5.2	1	R
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	1	R
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	6	C
PTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	2	R
DIPTERA	CHIRONOMIDAE	DICROTENDIPES NEOMODESTUS	8.1	5	C
DIPTERA	CHIRONOMIDAE	MICROTENDIPES SPP.	5.5	14	A
DIPTERA	CHIRONOMIDAE	NATARSIA SPP.	10.0	1	R
DIPTERA	CHIRONOMIDAE	PARAMERINA SPP.	4.3	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	5	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2	R
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	1	R
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	STICTOCHIRONOMUS SPP.	6.5	1	R
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	1	R
DIPTERA	DIXIDAE	DIXA SPP.	2.6	1	R
DIPTERA	DIXIDAE	DIXELLA INDIANA	2.6	3	C
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	2	R
DIPTERA	TABANIDAE	CHRYSOPS SPP.	6.7	3	C
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	R
DIPTERA	TIPULIDAE	HEXATOMA SPP.	4.3	4	C
PTERA	TIPULIDAE	TIPULA SPP.	7.3	6	C

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2006 - 00528
SURVEY DATE: 07/22/2005

BASIN:
LOCATION: MC50

EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	3	C
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	1	R
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	2	R
EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	13	A
EPHEMEROPTERA	HEPTAGENIIDAE	LEUCROCUTA APHRODITE	2.4	9	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	27	A
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	84	A
EPHEMEROPTERA	OLIGONEURIIDAE	ISONYCHIA SPP.	3.5	1	R
HAPLOTAXIDA	TUBIFICIDAE	LIMNODRILUS HOFFMEISTERI	9.5	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	10	A
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	3	C
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	5.0	5	C
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	7	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	23	A
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	4	C
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	3	C
ODONATA	CORDULEGASTRIDAE	CORDULEGASTER SPP.	5.7	3	C
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	11	A
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	1	R
ODONATA	GOMPHIDAE	STYLOGOMPHUS ALBISTYLUS	4.7	3	C
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	2	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	5	C
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	5	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	49	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	29	A
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	3	C
TRICHOPTERA	LEPTOCERIDAE	TRIAENODES IGNITUS	4.6	1	R
TRICHOPTERA	PHILOPOTAMIDAE	CHIMARRA SPP.	2.8	36	A
TRICHOPTERA	POLYCENTROPODIDAE	NYCTIOPHYLAX MOESTUS	3.3	2	R
TRICHOPTERA	PSYCHOMYIIDAE	LYPE DIVERSA	4.1	1	R
TRICHOPTERA	UENOIDAE	NEOPHYLAX OLIGIUS	2.2	33	A

TOTAL # ORGANISMS: 486
TOTAL TAXA: 64
TOTAL EPT: 18
SPECIES DIVERSITY: 4.8

METHOD: STD
BIOTIC INDEX: 5.93
WATER QUALITY RATING: 3 FAIR-GOOD

MECKLENBURG COUNTY - MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM BASIN 96 - GAR CREEK AT BEATTIES FORD ROAD

SURVEY DATE 7/7/2006

LOCATION MC50

TAXONOMIST Tony Roux

ORDER	FAMILY	GENUS/SPECIES	TOLERANCE	NO.
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	1
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	1
EPHEMEROPTERA	HEPTAGENIIDAE	LEUCROCUTA APHRODITE	2.4	5
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	15
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	90
EPHEMEROPTERA	LEPTOPHLEBIIDAE	PARALEPTOPHLEBIA SPP.	0.9	1
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	7
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	88
TRICHOPTERA	HYDROPSYCHIDAE	DIPLECTRONA MODESTA	2.2	1
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	37
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	3
TRICHOPTERA	LIMNEPHILIDAE	NEOPHYLAX OLIGIUS	2.2	27
TRICHOPTERA	PHILOPOTAMIDAE	CHIMARRA SPP.	2.8	64
TRICHOPTERA	POLYCENTROPODIDAE	NYCTIOPHYLAX MOESTUS	3.3	3
TRICHOPTERA	POLYCENTROPODIDAE	POLYCENTROPUS SPP.	3.5	1
TRICHOPTERA	PSYCHOMYIIDAE	LYPE DIVERSA	4.0	6
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	3
COLEOPTERA	ELMIDAE	ANCYRONYX VARIEGATUS	6.5	1
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	3
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	7
COLEOPTERA	HALIPLIDAE	PELTODYTES LENGI	8.0	1
COLEOPTERA	PSEPHENIDAE	ECTOPRIA NERVOSA	4.2	1
COLEOPTERA	PSEPHENIDAE	PSEPHENUS HERRICKI	2.4	4
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	5
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	3
DIPTERA	CHIRONOMIDAE	CARDIOCLADIUS SPP.	5.8	1
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	7
DIPTERA	CHIRONOMIDAE	DICROTENDIPES NEOMODESTUS	8.1	1
DIPTERA	CHIRONOMIDAE	MICROTENDIPES SPP.	5.5	5
DIPTERA	CHIRONOMIDAE	PARALAUTERBORNIELLA NIGROHALTERALIS	4.7	1
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	1
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	3
DIPTERA	CHIRONOMIDAE	POLYPEDILUM AVICEPS	3.6	2
DIPTERA	CHIRONOMIDAE	POLYPEDILUM SCALAENUM	8.4	2
DIPTERA	CHIRONOMIDAE	PROCLADIUS SPP.	9.1	1
DIPTERA	CHIRONOMIDAE	RHEOCRICOTOPUS ROBACKI	7.3	3
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	1
DIPTERA	CHIRONOMIDAE	STICTOCHIRONOMUS SPP.	6.5	1
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	2
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA XENA	5.9	1

DIPTERA	EMPIDIDAE	EMPIDIDAE	7.6	1
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.2	1
DIPTERA	TIPULIDAE	HEXATOMA SPP.	4.3	2
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	9
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	5.0	6
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	2
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	17
ODONATA	COENAGRIONIDAE	ARGIA SEDULA	8.5	1
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	3
ODONATA	GOMPHIDAE	STYLOGOMPHUS ALBISTYLUS	4.7	1
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	4
GASTROPODA	PHYSIDAE	PHYSELLA SPP.	8.8	2
GASTROPODA	PLANORBIDAE	HELISOMA ANCEPS	6.2	1
OLIGOCHAETA	TUBIFICIDAE	LIMNODRILUS SPP.	9.5	1

TOTAL ORGANISMS	**461**	**BIOTIC INDEX**	**5.53**
TOTAL TAXA	**54**		
TOTAL EPT	**16**		

EPIC-WQ
04/08/2005

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2005 - 00364
SURVEY DATE: 06/04/2004

BASIN:
LOCATION: MC50

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, Olivia J. Hutchins, Michael Burkhard, Brian G. Sikes

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	HYDROPHILIDAE	BEROSUS SPP.	8.4	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	5	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	27	A
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	17	A
DIPTERA	CHIRONOMIDAE	DICROTENDIPES NEOMODESTUS	8.1	4	C
DIPTERA	CHIRONOMIDAE	MICROTENDIPES SPP.	5.5	51	A
DIPTERA	CHIRONOMIDAE	NILOTANYPUS SPP.	3.9	1	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	4	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM FALLAX	6.4	3	C
DIPTERA	CHIRONOMIDAE	STENOCHIRONOMUS SPP.	6.5	11	A
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	2	R
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	1	R
DIPTERA	CHIRONOMIDAE	XYLOTOPUS PAR	6.0	8	C
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	1	R
DIPTERA	DIXIDAE	DIXELLA INDIANA	2.6	1	R
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	4	C
DIPTERA	TIPULIDAE	PSEUDOLIMNOPHILA SPP.	7.2	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	10	A
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	1	R
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	7	C
EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	7	C
EPHEMEROPTERA	EPHEMERIDAE	HEXAGENIA SPP.	4.9	4	C
EPHEMEROPTERA	HEPTAGENIIDAE	LEUCROCUTA APHRODITE	2.4	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	2	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	72	A
HAPLOTAXIDA	TUBIFICIDAE	LIMNODRILUS HOFFMEISTERI	9.5	2	R
HETEROPTERA	CORIXIDAE	SIGARA SPP.	9.1	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	9	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	2	R
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	5.0	1	R
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	4	C
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	1	R

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2005 - 00364
SURVEY DATE: 06/04/2004

BASIN:
LOCATION: MC50

ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	4	C
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	1	R
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	1	R
PLECOPTERA	PERLIDAE	PERLESTA PLACIDA	4.7	4	C
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	30	A
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	49	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	18	A
TRICHOPTERA	HYDROPSYCHIDAE	SYMPHITOPSYCHE SPARNA	2.7	3	C
TRICHOPTERA	PHILOPOTAMIDAE	CHIMARRA SPP.	2.8	33	A
TRICHOPTERA	PSYCHOMYIIDAE	LYPE DIVERSA	4.1	2	R
TRICHOPTERA	UENOIDAE	NEOPHYLAX OLIGIUS	2.2	13	A

TOTAL # ORGANISMS: 424
TOTAL TAXA: 43
TOTAL EPT: 15
SPECIES DIVERSITY: 4.3

METHOD: STD
BIOTIC INDEX: 6.16
WATER QUALITY RATING: 3 FAIR-GOOD

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2004 - 00270
SURVEY DATE: 08/08/2003

BASIN:
LOCATION: MC50

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, David J. Rimer, David Buetow, Michael Burkhard

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	DRYOPIDAE	HELICHUS SPP.	4.6	3	C
COLEOPTERA	DYTISCIDAE	NEOPORUS SPP.	8.6	5	C
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	6	C
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	11	A
COLEOPTERA	EUBRIIDAE	ECTOPRIA NERVOSA	4.2	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	6	C
DIPTERA	CHIRONOMIDAE	CONCHAPELOPIA GROUP	8.4	11	A
DIPTERA	CHIRONOMIDAE	CRICOTOPUS BICINCTUS	8.5	2	R
DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS SPP.	6.4	1	R
DIPTERA	CHIRONOMIDAE	MICROTENDIPES SPP.	5.5	2	R
DIPTERA	CHIRONOMIDAE	PARAMETRIOCNEMUS SPP.	3.7	4	C
DIPTERA	CHIRONOMIDAE	PARATANYTARSUS SPP.	8.5	2	R
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	2	R
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	6	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM AVICEPS	3.7	7	C
DIPTERA	CHIRONOMIDAE	POLYPEDILUM CONVICTUM/FLAVUM	4.9	23	A
DIPTERA	CHIRONOMIDAE	POLYPEDILUM ILLINOENSE	9.0	10	A
DIPTERA	CHIRONOMIDAE	RHEOTANYTARSUS SPP.	5.9	21	A
DIPTERA	CHIRONOMIDAE	TANYTARSUS SPP.	6.8	8	C
DIPTERA	CHIRONOMIDAE	THIENEMANNIELLA SPP.	5.9	1	R
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	10	A
DIPTERA	DIXIDAE	DIXELLA INDIANA	2.6	3	C
DIPTERA	EMPIDIDAE	EMPIDIDAE	7.6	1	R
DIPTERA	SIMULIIDAE	SIMULIUM SPP.	6.0	99	A
DIPTERA	TIPULIDAE	ANTOCHA SPP.	4.3	1	R
DIPTERA	TIPULIDAE	TIPULA SPP.	7.3	9	C
EPHEMEROPTERA	BAETIDAE	BAETIS EPHIPPIATUS	3.7	10	A
EPHEMEROPTERA	BAETIDAE	BAETIS FLAVISTRIGA	7.0	39	A
EPHEMEROPTERA	BAETIDAE	BAETIS INTERCALARIS	7.0	3	C
EPHEMEROPTERA	BAETIDAE	BAETIS PLUTO	4.3	6	C
EPHEMEROPTERA	BAETIDAE	BAETIS PROPINQUUS	5.8	7	C
EPHEMEROPTERA	BAETIDAE	CENTROPTILUM SPP.	6.6	6	C

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2004 - 00270
SURVEY DATE: 08/08/2003

BASIN:
LOCATION: MC50

EPHEMEROPTERA	CAENIDAE	CAENIS SPP.	7.4	20	A
EPHEMEROPTERA	HEPTAGENIIDAE	LEUCROCUTA APHRODITE	2.4	3	C
EPHEMEROPTERA	HEPTAGENIIDAE	STENACRON INTERPUNCTATUM	6.9	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	65	A
EPHEMEROPTERA	LEPTOPHLEBIIDAE	HABROPHLEBIODES SPP.	1.0	1	R
EPHEMEROPTERA	OLIGONEURIIDAE	ISONYCHIA SPP.	3.5	7	C
LUMBRICULIDA	LUMBRICULIDAE	LUMBRICULIDAE	7.0	2	R
MEGALOPTERA	CORYDALIDAE	NIGRONIA FASCIATUS	5.6	1	R
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	5.0	12	A
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	2	R
ODONATA	AESHNIDAE	BASIAESCHNA JANATA	7.4	2	R
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	2	R
ODONATA	CALOPTERYGIDAE	CALOPTERYX SPP.	7.8	10	A
ODONATA	CORDULEGASTRIDAE	CORDULEGASTER SPP.	5.7	2	R
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	4	C
ODONATA	GOMPHIDAE	LANTHUS SPP.	1.8	1	R
PLECOPTERA	PERLIDAE	ECCOPTURA XANTHENES	3.7	14	A
PLECOPTERA	PERLIDAE	PERLESTA SPP.	4.7	3	C
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	88	A
TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	13	A
TRICHOPTERA	PHILOPOTAMIDAE	CHIMARRA SPP.	2.8	6	C
TRICHOPTERA	UENOIDAE	NEOPHYLAX CONSIMILIS	1.5	35	A

TOTAL # ORGANISMS: 620
TOTAL TAXA: 54
TOTAL EPT: 18
SPECIES DIVERSITY: 4.6

METHOD: STD
BIOTIC INDEX: 5.85
WATER QUALITY RATING: 4 GOOD

EPIC-WQ
04/30/2003

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

LOG NO: 2003 - 00470
SURVEY DATE: 06/14/2002

ASIN:
LOCATION: MC50

TAXONOMIST: Anthony J. Roux
COLLECTORS: Anthony J. Roux, David Buetow, David J. Rimer, Will Autry

ORDER	FAMILY	GENUS/SPECIES	TV	NO.	ABUNDANCE
COLEOPTERA	ELMIDAE	DUBIRAPHIA VITTATA	4.1	4	C
COLEOPTERA	ELMIDAE	STENELMIS SPP.	5.1	2	R
COLEOPTERA	EUBRIIDAE	ECTOPRIA NERVOSA	4.2	8	C
COLEOPTERA	PSEPHENIDAE	PSEPHENUS HERRICKI	2.3	1	R
DIPTERA	CHIRONOMIDAE	ABLABESMYIA MALLOCHI	7.2	7	C
DIPTERA	CHIRONOMIDAE	APEDILUM SPP.	1.0	3	C
DIPTERA	CHIRONOMIDAE	CHIRONOMUS SPP.	9.6	22	A
DIPTERA	CHIRONOMIDAE	DICROTENDIPES NEOMODESTUS	8.1	18	A
DIPTERA	CHIRONOMIDAE	PARATENDIPES SPP.	5.1	12	A
DIPTERA	CHIRONOMIDAE	PHAENOPSECTRA SPP.	6.5	7	C
DIPTERA	CULICIDAE	ANOPHELES SPP.	8.6	2	R
DIPTERA	CULICIDAE	CULEX SPP.	10.0	1	R
EPHEMEROPTERA	HEPTAGENIIDAE	LEUCROCUTA APHRODITE	2.4	10	A
EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA MODESTUM	5.5	29	A
EPHEMEROPTERA	ISONYCHIIDAE	ISONYCHIA SPP.	3.4	2	R
LIMNOPHILA	ANCYLIDAE	FERRISSIA SPP.	6.6	1	R
LIMNOPHILA	LYMNAEIDAE	PSEUDOSUCCINEA COLUMELLA	7.6	1	R
LIMNOPHILA	PHYSIDAE	PHYSELLA SPP.	8.8	20	A
LIMNOPHILA	PLANORBIDAE	HELISOMA ANCEPS	6.2	15	A
LIMNOPHILA	PLANORBIDAE	MENETUS DILATUS	8.3	6	C
MEGALOPTERA	CORYDALIDAE	NIGRONIA SERRICORNIS	4.9	5	C
MEGALOPTERA	SIALIDAE	SIALIS SPP.	7.2	10	A
ODONATA	AESHNIDAE	BOYERIA VINOSA	5.9	2	R
ODONATA	COENAGRIONIDAE	ENALLAGMA SPP.	8.9	3	C
ODONATA	GOMPHIDAE	GOMPHUS SPP.	5.8	2	R
ODONATA	GOMPHIDAE	LANTHUS SPP.	1.7	6	C
ODONATA	GOMPHIDAE	PROGOMPHUS OBSCURUS	8.2	1	R
ODONATA	GOMPHIDAE	STYLOGOMPHUS ALBISTYLUS	4.7	1	R
ODONATA	MACROMIIDAE	MACROMIA GEORGINA	6.2	2	R
PELECYPODA	CORBICULIDAE	CORBICULA FLUMINEA	6.1	18	A
TRICHOPTERA	HELICOPSYCHIDAE	HELICOPSYCHE BOREALIS	0.0	1	R
TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE SPP.	6.2	8	C

MACROINVERTEBRATE IDENTIFICATION SHEET

STREAM: BASIN 96 - GAR CREEK
GAR CREEK AT BEATTIES FORD RD

BASIN:

LOCATION: MC50

LOG NO: 2003 - 00470
SURVEY DATE: 06/14/2002

TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE BETTENI	7.8	11	A
TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA SPP.	6.2	21	A
TRICHOPTERA	LIMNEPHILIDAE	NEOPHYLAX OLIGIUS	2.2	6	C
TRICHOPTERA	LIMNEPHILIDAE	NEOPHYLAX ORNATUS	1.5	2	R
TRICHOPTERA	POLYCENTROPODIDAE	NYCTIOPHYLAX MOESTUS	0.3	4	C

TOTAL # ORGANISMS: 274
TOTAL TAXA: 37
TOTAL EPT: 10
SPECIES DIVERSITY: 4.6

METHOD: STD
BIOTIC INDEX: 6.08
WATER QUALITY RATING: 3 FAIR-GOOD

Appendix J
Local Regulations, Policies, and Ordinances

Corresponds with Section 7 – Impact Minimization and Mitigation

Town of Stanley

- **Stormwater Ordinance**: Interlocal Agreement for enforcement services for Gaston County Stormwater Ordinance 20 August 2007. Resolution to adopt Gaston County Stormwater Ordinance and Approve Interlocal Agreement with Gaston County to Enforce the Ordinance in Municipal Boundaries 7 May 2007.

- **Soil Erosion and Sediment Control**: Gaston County enforces the County's Soil Erosion and Sedimentation Control Ordinance within Stanley.

Town of Mount Holly

- **Water Supply Watershed Protection Rules**

- **Zoning Ordinance.** Chapter 20, Mount Holly Code of Ordinances. Includes floodplain regulations: Article XVI Flood Plain Management and Article V Section 5.13: Watershed Overlay District.

- **Soil Erosion and Sediment Control.** Gaston County enforces the County's Soil Erosion and Sedimentation Control Ordinance within Mount Holly.

Town of Huntersville

- **Post-Construction Storm Water Ordinance.** 30 June 2007, revised 10 January 2008. See Mecklenburg County.

- **Floodplain Regulations.** Mecklenburg County is designated as Floodplain Administrator. Ordinance available online: ftp://ftp1.co.mecklenburg.nc.us/luesa/stormwater/Floodplain%20Regulations/Meck%20Flood%20Regs%20Adopted%20121900.pdf (accessed 02/28/08)

- **Zoning Ordinance.** Amended 18 July 2007. Includes Watershed Overlay District regulations in Article 3. Available online: http://www.huntersville.org/interactive%20ordinance/ZONING_TOCA3.htm (accessed 02/28/08)

- **Soil Erosion and Sedimentation Control.** Adopted Mecklenburg County Ordinance.

- **Surface Water Improvement and Management Ordinance.** Available online: http://www.charmeck.org/NR/rdonlyres/e654rznq4y7buw24flxf4hqwkmva5ibsvd22yuogi3jx4h4vht45xwuhk5qvm22qizzazmlpaxlwiphjofckodeie7f/huntersville.pdf (accessed 02/28/08)

City of Charlotte

- **Soil Erosion and Sedimentation Control Ordinance.** 28 May 2002. Available online: http://www.charmeck.org/NR/rdonlyres/eh6dbi4c5ktggb6gecfdxrek33e4currupopmbgt5uxbpmzk3qcjacaelccl5bg5iuh3acqdtuw34aicck6skfhfpmd/Erosion+Control+Ord+as+adopted+5_28_2002.pdf (accessed 02/28/08)

- **Post Construction Controls Ordinance.** Effective 1 July 2008. Applies to City limits and ETJ. Available online: http://www.charmeck.org/NR/rdonlyres/emwzm64sk3w5enos7xsxbxvyuxhcqkfu7xntybva6vul4euolm474ahngjxmwmnu2zd4kuhx4mtuy7fhxwcqljx6xxg/CharlottePostConstructionControlsOrdinance.pdf (accessed 02/28/08)

- **Water Supply Watershed Protection.** Available online: http://www.municode.com/Resources/gateway.asp?pid=19970&sid=33 (Accessed 02/28/08)

- **Charlotte Mecklenburg Stormwater Design Manual (2008/2008).** Available online:

http://www.charmeck.org/Departments/StormWater/Contractors/Storm+Water+Design+Manual.htm# (accessed 02/28/08)

- **Floodplain Regulations.** Chapter 6, City of Charlotte Code of Ordinances. 1 July 2007. Available online: http://www.charmeck.org/NR/rdonlyres/ebcpygbrq45aby7urtudok7zp77szomviuqjfyqifuaaqhsgkjhpyciuqtjzwerbovpqozigxe2wjmjglvjq2g4blha/ALLFinalFloodOrdinanceCharlotte.pdf (accessed 02/28/08)

- **Zoning Ordinance.** Available online: http://www.municode.com/Resources/gateway.asp?pid=19970&sid=33 (accessed 02/28/08)

- **Surface Water Improvement and Management Ordinance.** Available online: http://www.charmeck.org/NR/rdonlyres/e5uldirsm3xp4bp2n43a7nmhughfxuxmteczn6y6qum2hzptzd7gihkg4ynu5hichoqmoba346sq6arfhejho7uqmig/Charlotte.pdf (accessed 02/28/08)

Gaston County

- **Gaston County Unified Development Ordinance:** Adopted January 22, 2009. Available online: http://library.municode.com/index.aspx?clientID=14664&stateID=33&statename=North%20Carolina

- **Soil Erosion and Sediment Control Ordinance.** 28 June 2007 (note that says effective July 1.) Applies to unincorporated areas of the County with exemptions for agriculture and forestry. Available online: http://www.co.gaston.nc.us/NaturalResources/PDF/ESControlOrdinance.pdf (accessed 02/28/08)

- **Flood Damage Prevention Ordinance.** 28 September 2007. Available online: http://www.co.gaston.nc.us/ordinances/2007FloodDamagePreventionOrd.pdf (accessed 02/28/08)

- **Watershed Protection Ordinance.** 25 September 1997. Available online: http://www.co.gaston.nc.us/ordinances/watershedord10197.pdf (accessed 02/28/08)

- **Stormwater Ordinance.** 26 July 2007. Applies to all of County except areas within water supply watersheds or city limits of municipalities. Available online: http://www.co.gaston.nc.us/ordinances/StormwaterOrdinance.pdf (accessed 02/28/08)

- **Zoning Ordinance.** 9 January 1992. Amended through 26 October 2006. Available online: http://www.co.gaston.nc.us/ordinances/ordinances.HTM (accessed 02/28/08)

Mecklenburg County

- **Post-Construction Stormwater Ordinance.** 30 June 2007, revised 10 January 2008. Applies to all unincorporated areas. Adopted together with Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville. Available online: http://www.charmeck.org/NR/rdonlyres/emwzm64sk3w5enos7xsxbxvyuxhcqkfu7xntybva6vul4euolm474ahngjxmwmnu2zd4kuhx4mtuy7fhxwcqljx6xxg/CharlottePostConstructionControlsOrdinance.pdf (accessed 02/28/08)

- **Floodplain Regulations.** 19 December 2000. Available online: ftp://ftp1.co.mecklenburg.nc.us/luesa/stormwater/Floodplain%20Regulations/Meck%20Flood%20Regs%20Adopted%20121900.pdf (accessed 02/28/08)

- **Soil Erosion and Sedimentation Control Ordinance.** Applies to unincorporated areas of County with exemptions for agriculture and forestry. Available online: http://www.charmeck.org/NR/rdonlyres/exwnbflszjvumu2ae4zzexhfdhrzc2adorqwpjwifp6drz4cmj3yixmylgwkwqhti2o4v4d4ptqzhqq7r2vcihwztgg/ErosOrd.pdf (accessed 02/28/08)

- **Charlotte Mecklenburg Stormwater Design Manual (2008/2008).** Available online: http://www.charmeck.org/Departments/StormWater/Contractors/Storm+Water+Design+Manual.htm# (accessed 02/28/08)

- **BMP Design Standards Manual (Mecklenburg County and Towns.** Available online: http://www.charmeck.org/Departments/StormWater/Contractors/BMP+Standards+Manual.htm (accessed 02/28/08)

- **Zoning Ordinance.** Includes Watershed Overlay District regulations in Chapter 10 Overlay Districts. Available online: http://www.charmeck.org/NR/rdonlyres/e3vlnqp7qgnh4igl4vo2uzpui2inesj4z3xfp44ewocyivxcp2iis7ustqo63lduoui3qolxlojz4w2d7nf4rdo4acg/ZoningOrdCityChapter10.pdf (accessed 02/28/08)

- **Surface Water Improvement and Management Ordinance.** Available online: http://www.charmeck.org/NR/rdonlyres/evsplh4owyzn5uqtjndgcmqdldw7axuqj7k7ha4l7qijsa2jo73un6ijz4yau5gy46rg5vhaiw76dggkxfs7w6zpeoh/County.pdf (accessed 02/28/08).

- **SWIM Implementation Guidelines.** Explains how SWIM Ordinances are applied. Applicable to all of Mecklenburg County, the City of Charlotte, and Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville. Available online: ftp://ftp1.co.mecklenburg.nc.us/WaterQuality/SWIM%20Implementation%20Guidelines%20Revised%202-25-08.doc (accessed 02/28/08).

State of North Carolina

- **Water Supply Watershed Protection Rules.** See Water Supply Watershed Protection website: http://h2o.enr.state.nc.us/wswp/ (accessed 02/28/08)

- **Catawba River Riparian Buffer Protection Rules 15A NCAC 02B .0243.** North Carolina Administrative Code available online: http://reports.oah.state.nc.us/ncac.asp (accessed 02/28/08)

- **Historic Preservation GS 121-12(a).** North Carolina General Statutes available online: http://www.ncleg.net/gascripts/Statutes/StatutesTOC.pl (accessed 02/28/08)

- **Minimum Discharge Criteria 15A NCAC 2T .305.** North Carolina Administrative Code available online: http://reports.oah.state.nc.us/ncac.asp (accessed 02/28/08)

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality

Pat McCrory
Governor

Thomas A. Reeder
Acting Director

John E. Skvarla, III
Secretary

June 28, 2013

Mr. Barry Shearin, Chief Engineer
Charlotte Mecklenburg Utilities
5100 Brookshire Blvd.
Charlotte, North Carolina 28216

Subject: Speculative Effluent Limits
Proposed CMU Regional WWTP
Mecklenburg County

Dear Mr. Shearin:

This letter is in response to your request for revised speculative effluent limits for the proposed Charlotte Mecklenburg Utilities (CMU) Regional WWTP. Speculative limits in September 2009 included the City of Mount Holly Wastewater Treatment Plant in partnership with CMU for the proposed CMU Regional WWTP at the wasteflows of 17 MGD and 25 MGD. In January 2010, speculative limits included Mount Holly and Clariant WWTP in partnership for the proposed CMU Regional Plant at 17 MGD and 25 MGD.

This latest speculative limits request now includes the City of Belmont, the City of Mount Holly, and Clariant as partners in the CMU Regional WWTP. Limits are requested for wasteflows of 12 MGD and 25 MGD. It should be understood by all entities that these speculative limits are only applicable if the nutrient allocations from Belmont, Mount Holly, and Clariant are included in the proposed project. There is no capacity in Lake Wylie for a Charlotte Mecklenburg Utilities discharge facility on its own, based on the EPA approved 1996 Lake Wylie nutrient total maximum daily load (TMDL) allocation. In addition, Mount Holly, Belmont, and Clariant must all submit formal permit modifications to confirm the transfers of flow and nutrient loading to the proposed CMU Regional WWTP. **Please recognize that speculative limits may change based on future water quality initiatives, and it is highly recommended that the applicant verify the speculative limits with the Division's NPDES Unit prior to any engineering design work.**

Receiving Stream. Lake Wylie has a stream classification of WS-IV CA. Waters with this designation are a source of drinking water supply, culinary or food processing purposes in

1617 Mail Service Center, Raleigh, North Carolina 27699-1617
Location: 512 N. Salisbury St. Raleigh, North Carolina 27604
Phone: 919-807-6300 \ FAX: 919-807-6492
Internet: www.ncwaterquality.org

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addition to the standard uses for waters with a C classification. This segment of the Catawba River (Lake Wylie) is listed on the North Carolina 2012 Impaired Streams list for low pH.

Based upon a review of information available from the North Carolina Natural Heritage Program Online Map Viewer, there are not any Federally Listed threatened or endangered aquatic species identified within a 5 mile radius of the discharge location. If there are any identified threatened/endangered species, it is recommended that the applicant discuss the proposed project with the US Fish and Wildlife Service to determine whether the proposed discharge might impact such species.

Speculative Limits. The speculative limits were developed based on Division staff recommendation and consideration of the Lake Wylie TMDL allocation. Based on available information, speculative effluent limits for the proposed discharge of 12 and 25 MGD to Lake Wylie are presented in Tables 1 and 2. A complete evaluation of these limits and monitoring requirements for metals and other toxicants will be addressed upon receipt of a formal NPDES permit application.

CBOD5/NH3 Limits. The limits for CBOD5 and NH3 are based on best professional judgment for the protection of instream dissolved oxygen through the assignment of tertiary treatment limits. The CBOD limits of 4.2 mg/L in the summer and 8.3 mg/L in the winter are effectively equivalent to BOD5 limits of 5 mg/L (summer) and 10 mg/L (winter). The year-round NH3 limit of 1 mg/L is assigned based on instream protection against ammonia toxicity.

Dissolved Oxygen. The dissolved oxygen (D.O.) effluent limit of 7 mg/L was based on the minimum D.O. level used as model input to predict acceptable downstream D.O. levels.

Nutrients. The nutrient loading for the three partner dischargers was combined to determine the total nutrient allocation for the proposed CMU Regional WWTP. The entire allocation for Mount Holly and Belmont will be included in the Regional facility. While the Clariant facility has a total nitrogen (TN) allocation of 318.5 lb/day, only 90 % or 287 lb/day will be allocated to the CMU Regional WWTP. The same percentage of total phosphorus (TP) will be allocated; therefore 36 lb/day of total phosphorus of 40 lb/day will be allocated. The nutrient limitations are consistent with the Lake Wylie nutrient TMDL allocations and the contributed nutrient allocation for the three dischargers is below :

Discharger	**TN Allocation**	**TP Allocation**	**Basis**
Mount Holly	300 lb/day	50 lb/day	TMDL
Belmont	350 lb/day	58 lb/day	TMDL
Clariant	287 lb/day	36 lb/day	TMDL, (Nonpoint) BAT
Total	**937 lb/day**	**144 lb/day**	
	200,518 lb/summer	**52,560 lb/year**	
	141,487 lb/winter		

TABLE 1. Speculative Limits for CMU Regional WWTP, Proposed flow of 12.0 MGD

Effluent Characteristic	Effluent Limitations		
	Monthly Average	Weekly Average	Daily Maximum
Flow	12.0 MGD		
CBOD5, Summer	4.2 mg/L	6.3 mg/L	
CBOD5, Winter	8.3 mg/L	12.5 mg/L	
TSS	30 mg/L	45 mg/L	
NH3 as N	1.0 mg/L	3.0 mg/L	
Dissolved Oxygen (minimum)	7.0 mg/L		
Total Residual Chlorine			17 ug/L
Fecal coliform (geometric mean)	200/100 mL	400/100 mL	
Total Nitrogen (summer)1	200,518 lbs/summer		
Total Nitrogen (winter)1	141,487 lbs/winter		
Total Phosphorus2	52,560 lbs/year		
Chronic Toxicity Pass/Fail (Quarterly test)	90%		

1. The total nitrogen limit is equivalent to a 9.4 mg/L annual average.
2. The total phosphorus limit is equivalent to a 1.4 mg/L annual average.

TABLE 2. Speculative Limits for CMU Regional WWTP, Proposed flow of 25.0 MGD

Effluent Characteristic	Effluent Limitations		
	Monthly Average	Weekly Average	Daily Maximum
Flow	25.0 MGD		
CBOD5, Summer	4.2 mg/L	6.3 mg/L	
CBOD5, Winter	8.3 mg/L	12.5 mg/L	
TSS	30 mg/L	45 mg/L	
NH3 as N	1.0 mg/L	3.0 mg/L	
Dissolved Oxygen (minimum)	7.0 mg/L		
Total Residual Chlorine			17 ug/L
Fecal coliform (geometric mean)	200/100 mL	400/100 mL	
Total Nitrogen (summer)1	200,518 lbs/summer		
Total Nitrogen (winter)1	141,487 lbs/winter		
Total Phosphorus2	52,560 lbs/year		
Chronic Toxicity Pass/Fail (Quarterly test)	90%		

1. The total nitrogen limit is equivalent to a 4.5 mg/L annual average.
2. The total phosphorus limit is equivalent to a 0.69 mg/L annual average.

Monitoring in Lake Wylie will also be required to ensure that the water quality model predictions were accurate, and to ensure the discharge does not create adverse conditions in the Lake in the future. CMU will be required to monitor upstream and downstream of the outfall. The following parameters should be included in sampling: dissolved oxygen, temperature, conductivity, pH, total phosphorus, total nitrogen and chlorophyll a. Instream monitoring will be required three times per week during the months of June, July, August and September and once per week during the rest of the year.

Engineering Alternatives Analysis (EAA). Please note that the Division cannot guarantee that an NPDES permit for discharge of up to 25.0 MGD will be issued with these speculative limits. Final decisions can only be made after the Division receives and evaluates a formal permit application for the proposed discharge. In accordance with the North Carolina General Statutes, the practicable wastewater treatment and disposal alternative with the least adverse impact on the environment is required to be implemented.

Therefore, as a component of all NPDES permit applications for new or expanding flow, a detailed engineering alternatives analysis (EAA) must be prepared. The EAA must justify requested flows, and provide an analysis of potential wastewater treatment alternatives. Alternatives to a surface water discharge, such as a spray/drip irrigation or wastewater reuse are considered to be environmentally preferable. A copy of the EAA requirements is attached to this letter. Permit applications for new or expanding flow will be returned if all EAA requirements are not adequately addressed.

State Environmental Policy Act (SEPA) EA/EIS Requirements. A SEPA EA/EIS document must be prepared for all projects that: 1) need a permit; 2) use public money or affect public lands; and 3) might have a potential to significantly impact the environment. For new wastewater discharges, significant impact is defined as a proposed discharge of >500,000 gpd or producing an instream waste concentration of > 33% based on summer 7Q10 streamflow conditions. Since CMU's facility is proposing a discharge of >500,000 gpd flow, the CMU facility must prepare a SEPA document that evaluates the potential for impacting the quality of the environment. **The NPDES Unit will not accept an NPDES permit application for the proposed discharge until the Division has approved the SEPA document and sent a Finding of No Significant Impact (FONSI) to the State Clearinghouse for review and comment.**

A SEPA Environmental Assessment (EA) should contain a clear justification for the proposed project. If the SEPA EA demonstrates that the project may result in a significant adverse effect on the quality of the environment, you must then prepare a SEPA EIS (Environmental Impact Statement). Since your proposed discharge is subject to SEPA, the EAA requirements discussed above will need to be folded into the SEPA document. The SEPA process will be delayed if all EAA requirements are not adequately addressed. If you have any questions regarding SEPA EA/EIS requirements, please contact Hannah Headrick with the DWQ Planning Branch at (919) 807-6434.

Should you have any questions about these speculative limits or NPDES permitting requirements, please feel free to contact Jackie Nowell at (919) 807- 6386.

Respectfully,

Tom Belnick
Supervisor, Complex Permitting Unit

Attachment: EAA Guidance Document

Hardcopy:

Central Files
NPDES Permit File
Barry Gullet, CMUD Director 5100 Brookshire Blvd. Charlotte NC 28216
Brent M. Reuss/ Black & Veatch 8520 Cliff Cameron Drive Suite 210 Charlotte, N.C. 28269
Jeff Debessonet/SCDHEC 2600 Bull Street Columbia, S.C. 29201

Electronic Copy:

NC WRC, Inland Fisheries, shannon.deaton@ncwildlife.org
US Fish and Wildlife Service, Sara_Ward@fws.gov
DWQ/SWPS Mooresville Regional Office
DWQ/SEPA, Hannah Headrick
DWQ/Modeling TMDL Unit, Kathy Stecker
DWQ/Basinwide Planning, Jeff Manning
NPDES Server>Specs

ORIGINAL

PURCHASE AND SALE AGREEMENT

This **PURCHASE AND SALE AGREEMENT** (this "**Agreement**") is made and executed by and between **REVENTURE PARK INVESTMENTS I, LLC**, a North Carolina limited liability company (hereinafter "**ReVenture**"), **CLARIANT CORPORATION**, a New York corporation (hereinafter "**Clariant**") and **CITY OF CHARLOTTE**, a municipal corporation (hereinafter "**Buyer**" or the "**City**").

WHEREAS, ReVenture is the owner of approximately 248.9533 acres of real property in Mecklenburg County, North Carolina, as described on **Exhibit A** ("**ReVenture Property**").

WHEREAS, Clariant is the owner of approximately 351.817 acres of real property in Mecklenburg County, North Carolina, as described on **Exhibit A** ("**Clariant Property**").

WHEREAS, (1) ReVenture desires to sell to Buyer, and Buyer desires to buy from ReVenture: (i) that portion of the ReVenture Property that is designated as "Tract A" on **Exhibit B** (such portion of the ReVenture Property is referred to as "**Tract A**"); (ii) that portion of the ReVenture Property that is designated as "Tract B" on **Exhibit B** (such portion of the ReVenture Property is referred to as "**Tract B**"); and (2) Clariant (or ReVenture as the successor in title to Clariant) desires to sell to Buyer, and Buyer desires to buy from Clariant (or ReVenture as the successor in title to Clariant), that portion of the Clariant Property that is designated as "Tract C" on **Exhibit B** (such portion of the Clariant Property is referred to as "**Tract C**") (Tract A, Tract B and Tract C are collectively referred to as the "**Property**").

WHEREAS, as part of its waste water treatment operations, Buyer operates the Long Creek Pump Station (the "**Pump Station**") located on Tract A; and

WHEREAS, Buyer desires to purchase the Property for the continued protection and operation of the Pump Station as well as for construction and operation of a new regional waste water facility (the "**City Project**") to serve the citizens of Mecklenburg County and surrounding areas.

NOW, THEREFORE, in consideration of the mutual covenants and agreements set forth herein, the parties hereby agree as follows:

1. LAND SALE AND PURCHASE:

(a) As of the Effective Date (as defined in **Section 31(f)**), Clariant is the owner of Tract C. Prior to Closing, Clariant may transfer Tract C to ReVenture. If Tract C is transferred to ReVenture, then ReVenture shall convey all of the Property to Buyer at Closing. If Tract C is not transferred to ReVenture, then ReVenture shall convey Tract A and Tract B to Buyer at Closing, and Clariant shall convey Tract C to Buyer at Closing. Accordingly, the term "**Seller**" means ReVenture as to Tract A and Tract B, and Clariant as to Tract C, except that if Tract C is transferred to ReVenture, then "**Seller**" means ReVenture as to all of the Property.

(b) Seller agrees to sell and Buyer agrees to purchase the Property under the terms and conditions hereinafter set forth.

2. PROPERTY: The Property consists of approximately 181.252 acres, and comprises all of tax parcels 053-051-03, 053-061-17 and 053-281-05, and a portion of tax parcel 053-051-02. The Property is more fully described on the Recombination Plat (as defined in **Section 7**) attached hereto as **Exhibit B** and a legal description derived from the Recombination Plat attached hereto as **Exhibit C**.

3. EARNEST MONEY DEPOSIT: Within three (3) business days after the Effective Date, Buyer shall deliver to Chicago Title Insurance Company, 200 South Tryon Street, Suite 800, Charlotte, NC 28202 (**"Escrow Agent"**) the sum of $265,732.00 as an earnest money deposit (such sum, together with any interest earned thereon, is the **"Deposit"**). Escrow Agent shall hold the Deposit in an interest bearing account with a financial institution insured by the Federal Deposit Insurance Corporation. Escrow Agent shall hold and disburse the Deposit in accordance with the terms of this Contract, including the terms on **Exhibit D**. At Closing, the Deposit will be applied against the Purchase Price.

4. PURCHASE PRICE: The total purchase price for the Property is $ 6,579,700.00 as determined pursuant to the schedule (and related map) attached as **Exhibit E** (**"Purchase Price"**). The Purchase Price shall be paid in cash by wire transfer at Closing.

5. CLOSING:

(a) Seller and Buyer agree that, subject to the terms of this Agreement, the closing of the Property shall be held at a time and place in Charlotte, North Carolina as agreed by Buyer and Seller, on June 4, 2013 (hereinafter, the **"Closing"**). At Closing, Buyer, in addition to any and all other items required by the terms hereof, shall deliver to Seller the following items: the Purchase Price; a closing statement; and any additional documents reasonably and customarily required by the Title Company (as defined herein) for the proper consummation of the transaction. At Closing, Seller, in addition to any and all other items required by the terms hereof, shall deliver to Buyer the following items: the Special Warranty Deed (**"Deed"**) as provided for herein; a lien waiver affidavit (but only as to work performed at the direction of Seller); a certification as to applicable representations and warranties as required by **Section 18**; and any and all additional documents reasonably and customarily required by the Title Company for the proper consummation of this transaction.

(b) Each party shall bear the costs of this transaction as follows: Buyer shall pay for: (i) any escrow fee of the Escrow Agent and Title Company; (ii) Buyer's attorney's fees; (iii) the premium for the issuance of the Owner's Title Insurance Policy; (iv) any and all inspection costs described in **Section 9** hereof; (v) the cost of the Recombination Plat and any Survey (as defined in **Section 10**); and (vi) the recording fees for the Deed. Seller shall pay for: (i) any transfer taxes and/or documentary stamps, if any; (ii) the preparation of the Deed and all other closing documents reasonably and customarily required by the Title Company to properly transfer title to the Property; and (iii) Seller's attorney's fees.

(c) At Closing, Buyer shall pay ReVenture, in addition to the Purchase Price, the sum of $265,732.00 (**"Use Payment"**), representing payment for Buyer's pre-Closing use of that portion of Tract A where the Pump Station is located. If this Agreement terminates and ReVenture is entitled to retain the Use Payment pursuant to the terms of this Agreement, then

the retention of the Use Payment by ReVenture imposes no obligations whatsoever on ReVenture to lease the Property to Buyer after the date of such termination, and Buyer acknowledges that the Use Payment represents payment to ReVenture for Buyer's pre-termination use of such portion of the Property.

6. DUE DILIGENCE PERIOD: The period beginning in the Effective Date and ending on May 31, 2013 is referred to as the "**Due Diligence Period**").

7. RECOMBINATION PLAT: Buyer, at Buyer's expense, has obtained a recombination plat (the "**Recombination Plat**") for the Property, made by a surveyor duly licensed in the state of North Carolina, a copy of which is attached hereto as **Exhibit B**. The legal description of the Property to be attached to the Special Warranty Deed is attached as **Exhibit C**. Seller shall have no obligation to convey the Property until the Recombination Plat has been approved by all applicable governmental authorities, and has been recorded in the Office of the Mecklenburg County Register of Deeds ("**Registry**"). The Recombination Plat shall not be recorded until Closing.

8. TITLE, TITLE POLICY AND REMEDIES: Either before or promptly following the date of full execution of this Agreement, Seller shall provide Buyer with copies of any title or survey documents in its possession which pertain to the Property. During the Due Diligence Period, and without imposing any obligation on Seller, Buyer shall have the right to obtain, at Buyer's expense, an Owner's Title Policy Commitment dated after the Effective Date (herein the "**Title Commitment**") and issued by such title insurer of national recognition as Buyer shall select (the "**Title Company**"), together with complete and legible copies of all exceptions set forth herein, showing good and marketable title to the Property (including any and all easement rights owned by Seller relating to the Property) vested in Seller, free and clear of all liens, leases, restrictions, claims, easements, public rights-of-way, encroachments, reservations, or other matters or encumbrances, except those listed on **Exhibit F** attached hereto and incorporated herein by reference (herein called the "**Permitted Encumbrances**"), which shall not be considered to be title defects. Without imposing any obligation on Seller, said policy of the Title Company shall provide full coverage against mechanics' or materialmen's liens, have full survey coverage and shall contain such other special endorsements as Buyer's counsel may reasonably require.

9. INSPECTIONS: Prior to Closing, Seller grants unto Buyer, and/or its agents, employees and/or contractors (as determined by Buyer) full permission and license to enter upon the Property for the purposes of inspection and the performance of any and all tests or studies including, but not limited to, feasibility studies, environmental studies and geotechnical tests (collectively, the "**Inspections**"), in order to assure the Property is suitable to Buyer for its intended use. Buyer agrees to indemnify and hold Seller harmless from any and all loss, liability, claims and damages arising out of the exercise of Buyer's rights under this **Section 9** which indemnity shall survive the Closing of the Property and termination of this Agreement. Immediately upon the completion of the Inspections, Buyer shall (i) repair all material damage to the Property caused by Buyer's inspections, unless caused by the negligence or willful misconduct of Seller, its agents, employees or contractors, and (ii) provide Seller with a copy of any and all reports, conclusions, or summaries resulting from any Inspections performed by Buyer and/or its agents, employees or contractors on the Property. Buyer agrees that it shall

keep confidential all information, findings and data which are developed by soil borings and tests to determine the hydrocarbon and hazardous substance or chemical content of the soil, and that same shall not be disclosed to any third party except as required by federal, state and local laws, rules and regulations (including, without limitation, public records laws), or as may be necessary for Buyer to disclose to lenders and/or other third parties reasonably necessary for Buyer's completion of the purchase contemplated by this Agreement. Buyer's obligations under this **Section 9** shall survive Closing and the termination of this Agreement.

10. BUYER'S OBJECTIONS:

(a) On or before May 28, 2013, Buyer shall inform Seller, in writing, of any objections it may have to any survey of the Property obtained by Buyer (**"Survey"**) or the Title Commitment (hereinafter, the **"Objections"**). Within ten (10) days after Buyer delivers its notice of Objections to Seller, Seller may deliver notice to Buyer of Seller's election to attempt to cure or not attempt to cure each Objection (**"Objection Response"**). If Seller fails to respond to any Objection within that ten (10) day period, then Seller shall be deemed to have elected not to attempt to cure that Objection. Seller shall have the right, but not the obligation, to attempt to cure any Objections, at Seller's sole cost and expense, within twenty (20) days after receipt of Buyer's notice of Objections (hereinafter, the **"Cure Period"**) and, if necessary, the Closing Date shall automatically be extended until the end of the Cure Period.

(b) If Seller refuses, or is unable, to cure the Objections within the Cure Period, Buyer shall have the option, as its sole remedy, to either (i) waive the Objections and close this transaction subject to the Objections, with no reduction in the Purchase Price therefor, except for reductions in the Purchase Price for Objections voluntarily created by Seller that can be cured by payment of a stated fixed amount such as a lien (to the extent the lien arises from work performed at the direction of Seller) or deed of trust or (ii) terminate this Agreement, in which latter event the Deposit, less the Use Payment (which shall be retained by Seller), shall be returned to Buyer, this Agreement shall be void and neither Buyer nor Seller shall have any further rights, liabilities or obligations hereunder, except those that expressly survive the termination of this Agreement. If Seller elects (or is deemed to have elected) not to attempt a cure under **Section 10(a)**, then Buyer must give notice to Seller within (and, if necessary, the Closing Date shall automatically be extended until) ten (10) days after the first to occur of (1) receipt of Seller's Objection Response or (2) the expiration of the ten (10) day period in which Seller may deliver the Objection Response, as to whether Buyer elects (i) or (ii) in this **Section 10(b)**. Further, if Seller elects to cure, but fails to cure by the end of the Cure Period, then Buyer must give notice to Seller within (and, if necessary, the Closing Date shall automatically be extended until) ten (10) days after the end of the Cure Period as to whether Buyer elects (i) or (ii) in this **Section 10(b)**. If Buyer fails to make its election (under either of the two preceding sentences) within the applicable ten (10) day period, then Buyer shall be deemed to have chosen (i) in this **Section 10(b)**.

(c) Notwithstanding anything herein to the contrary, with respect to Objections to Seller's title (other than Permitted Encumbrances or items arising out of Buyer's acts or omissions) which first arise, occur or appear of record after the effective date of the Title Commitment, Buyer may raise such Objections at any time prior to Closing. The Closing shall be postponed for so long as necessary for the Objections to be cleared to the reasonable

satisfaction of Buyer and the Title Company; provided, however, if said Objections are not cleared within a period of fifteen (15) days after the Closing Date, Buyer may, as its sole remedy, choose either (i) or (ii) in **Section 10(b)** above by delivering written notice to Seller within ten (10) days after the end of that fifteen (15) day period. If Buyer fails to make its election within that ten (10) day period, then Buyer shall be deemed to have chosen (i) in **Section 10(b)**.

11. SPECIAL COVENANTS OF BUYER, REVENTURE AND CLARIANT:

Buyer, ReVenture and Clariant (as applicable) make the following special covenants, agreeing to be bound, each to the other.

(a) NPDES Permit. ReVenture has executed a lease and/or option to lease, and a purchase agreement, concerning an adjacent parcel to the Property, which parcel is owned by Clariant and described on **Exhibit G** (hereinafter the "**Clariant Tract**"). The Clariant Tract is a brownfield site on which is located a currently operating wastewater treatment facility (the "**Clariant Plant**") that is currently permitted to discharge to the Catawba River pursuant to NPDES Permit No. NC0004735 (the "**NPDES Permit**") issued by the North Carolina Department of Environment and Natural Resources ("**DENR**"). In anticipation of this Agreement, Clariant requested and was granted a permit modification in 2011 that prescribes (and Clariant intends to seek a further permit modification in 2013 that will prescribe) conditions for transfer of 90% of Clariant's permitted Nitrogen and Phosphorus allocations ("**Nutrient Transfer**") to the Buyer and/or others, as provided in the NDPES Permit. On or prior to the date of this Nutrient Transfer, Clariant and/or ReVenture will have taken actions to limit the quantity and type of wastewaters treated such that it can comply with the reduced nutrient allocations. Prior to the Nutrient Transfer, Clariant and/or ReVenture intends to have made necessary provisions including any facility and permit modifications required by DENR to allow the Clariant Plant (i) to treat and discharge contaminated ground water from the Clariant Tract to the Catawba River, (ii) to treat as necessary and discharge storm water from the Clariant Tract to the Catawba River; and (iii) to treat and discharge other miscellaneous water generated by operations on the Clariant Tract; provided that nothing shall prevent Clariant or ReVenture from implementing alternative measures for the proper collection and treatment of the ground water, storm water, and miscellaneous water. In the event that there are discharges from operations on the Clariant Tract that (1) would cause the Clariant Plant to exceed the then-permitted discharge of nitrogen and/or phosphorus to the Catawba River, or (2) otherwise cannot be treated and discharged by the Clariant Plant under the NPDES Permit (the "**Additional Discharges**"), Clariant and/or ReVenture agrees to apply to Buyer for waste water service to handle the Additional Discharges, and Buyer agrees to accept such application and to provide such service in accordance with applicable law, policies, regulations and/or ordinances of the Buyer as the same may then exist or may be subsequently revised. Nothing in this provision may be construed to create a continuing obligation that would extend beyond the fulfillment of each party's obligations under this **Section 11(a)**. This **Section 11(a)** shall survive Closing.

(b) Nutrient Allocation.

(i) Simultaneously with the Closing of the Property, Buyer shall purchase from ReVenture 90% of the permitted Nitrogen and Phosphorous allocations in the NPDES Permit (286.65 lbs/day Nitrogen and 36 lbs/day Phosphorus) (the "**90% Nutrient Allocation**"). At Closing, Buyer shall pay ReVenture the price of $5,850,000.00 for the 90% Nutrient Allocation (the "**90% Nutrient Allocation Purchase Price**").

(ii) After (A) Buyer has paid the 90% Nutrient Allocation Purchase Price, (B) Buyer delivers to ReVenture a written notice requesting the 90% Nutrient Allocation transfer be made, and (C) testing under the NDPES Permit has confirmed that, for four consecutive months, the Clariant Plant has complied with its new nutrient limits that would be effective after the Nutrient Transfer, ReVenture, at its own expense, shall provide DENR with a written notification as prescribed in the NPDES Permit authorizing transfer to the City of Mt Holly, the City of Belmont and/or Buyer's NPDES permits of the 90% Nutrient Allocation as provided in the NPDES Permits for Clariant, Mt Holly, Belmont and/or Buyer.

(iii) The City shall also have the right of first refusal to purchase the remaining 10% of the nutrient allocations in the NPDES Permit for Six Hundred and Fifty Thousand and No/100 Dollars ($650,000.00), at whatever time that ReVenture, in its sole discretion, elects to sell such remaining 10% allocation.

(iv) Until such time that the Nutrient Allocation is formally transferred from ReVenture and/or Clariant by DENR, ReVenture and Clariant shall use their commercially reasonable efforts to maintain the nutrient allocation reflected in the current NPDES Permit.

(v) If Clariant, and not ReVenture, is the NPDES Permit holder at the time of the Closing of the sale of the Property and/or the nutrient allocation transfers identified above, then Clariant shall (A) receive the 90% Nutrient Allocation Purchase Price from the City at the Closing and (B) meet the transfer obligations of ReVenture under this **Section 11(b)**, as the case may be.

(vi) This **Section 11(b)** shall survive Closing.

(c) Renewable Energy Credits. Buyer acknowledges that the Property has been conditionally designated as a Cleanfields Renewable Energy Demonstration Park ("**Cleanfields Park**") by the North Carolina Secretary of State pursuant to Session Law 2010-195, an Act to Authorize the Establishment of Cleanfields Renewable Energy Demonstration Park in the State ("**Cleanfields Act**"). Buyer agrees to cooperate and take such actions, if any, as are necessary to ensure that the Property remains designated as a Cleanfields Park. ReVenture shall be solely entitled to any additional renewable energy credits authorized by Section 4 of the Cleanfields Act ("**RECs**"), together with any other environmental benefits, credits or attributes arising from the designation of the Property as a Cleanfields Park. Buyer shall take such actions and execute such documents as may reasonably be required to confirm ReVenture's entitlement and/or title to such additional RECs and any other environmental benefits, credits or attributes. This **Section 11(c)** shall survive Closing.

(d) Access Easement.

(i) At Closing, Clariant shall grant to Buyer a temporary access easement ("**Temporary Access Easement**") over and across the existing roadway shown as "Access Road" on **Exhibit I** ("**Temporary Access Easement Area**") by executing and delivering to Buyer the Temporary Access Easement Agreement attached as **Exhibit J**. The Temporary Access Easement shall be effective until the earlier to occur of: (a) the date on which a bridge over Long Creek that connects Tract A with Tract B and/or Tract C ("**Bridge**") is substantially complete such that vehicles can cross the Bridge; and (b) January 1, 2018 (the date set forth in this subsection (b) is the "**Outside Termination Date**"). Buyer shall exercise commercially reasonable efforts to obtain all necessary permits for the construction of the Bridge from the applicable governmental authorities (collectively, "**Permits**") as promptly as possible after Closing and, after such permits are obtained, complete construction of the Bridge by the Outside Termination Date.

(ii) If as of Outside Termination Date, Buyer has exercised those best efforts, but the Permits have been not been obtained due to the final and absolute rejection of one or more of such Permits by the applicable governmental authorities, and the Bridge, therefore, is not substantially complete, then Clariant (or ReVenture as successor in title to the Clariant Tract) and Buyer shall exercise commercially reasonable efforts to agree upon the form of an easement agreement ("**Permanent Easement Agreement**") that provides permanent access over a roadway from a public right-of-way over the Clariant Tract and to the Property ("**Permanent Access Easement Area**"). The form of that Permanent Easement Agreement shall be substantially in the form of the Temporary Access Easement Agreement attached as **Exhibit J**, but shall provide for (a) a permanent easement, and (b) compensation to Clariant (or ReVenture as successor in title to the Clariant Tract) for the value of the permanent easement granted to Buyer. The location of the Permanent Access Easement Area shall be substantially the location of the Temporary Access Easement Area; provided, however, that Clariant (or, as the successor in title to the Clariant Tract, ReVenture) may (1) designate a new location for all or any portion of the Permanent Access Easement Area prior to entering into the Permanent Easement Agreement; and (2) at any time after entering into the Permanent Easement Agreement, relocate all or any portion of the Permanent Access Easement Area. If Clariant (or ReVenture as the successor in title to the Clariant Tract) designates a new location for, or elects to relocate, all or any portion of the Permanent Access Easement Area, then Clariant (or ReVenture as the successor in title to the Clariant Tract) shall construct a road within the new location of the Permanent Access Easement Area that is of a condition at least equal to the condition of the road then existing within that portion of the Permanent Access Easement Area that is being removed from the Permanent Access Easement Area. Prior to commencing use of the road in the Permanent Access Easement Area, Buyer shall pave any unpaved portion of that road (even if any unpaved portion of road was used as part of the Temporary Access Easement Area) pursuant to plans approved by Clariant (or ReVenture as successor in title to the Clariant Tract).

(iii) This **Section 11(d)** shall survive Closing.

(e) Intentionally Deleted.

(f) Environmental Monitoring Easement. At Closing, Seller shall reserve for the benefit of Seller, its successors and assigns, a non-exclusive perpetual easement over, under

and through Property for the purposes of ingress, egress and regress to conduct such soil, sediment, groundwater, surface water sampling and other response, removal, remediation and monitoring activities on, in and under the Property as may be required from time to time to comply with applicable law (the "**Permitted Activities**"). The easement shall provide that:

(i) Buyer, including its representatives, agents, contractors and subcontractors, shall have the right to be present during and to observe all of Seller's activities at the Property under this Agreement.

(ii) Seller shall provide Buyer with written notice at least three (3) business days in advance of each entry onto the Property to conduct the Permitted Activities. Seller and Buyer shall use good faith efforts to work cooperatively in coordinating times and methods for each entry.

(iii) Seller and its representatives, agents, contractors and/or subcontractors shall conduct the Permitted Activities in a prompt, good and workmanlike manner, and in a manner that will not unreasonably interfere with Buyer's activities at the Property. Seller shall comply with all applicable laws, regulations and guidance in carrying out the Permitted Activities.

(iv) At the conclusion of the Permitted Activities, Seller shall restore the Property to the same condition as it was in immediately preceding the Permitted Activities, or as close thereto as reasonably practicable. Seller shall, at its sole cost and expense, remove from the Property and be responsible for (1) waste generated by the Permitted Activities, and (2) all equipment brought onto the Property in connection with this Agreement. Seller shall not treat, dispose or release on the Property any material or waste generated by the Permitted Activities. In addition, no material or waste shall be stored at the Property after the conclusion of the Permitted Activities.

12. BUYER'S CONDITIONS TO CLOSING: Buyer's obligation to close on the Property is specifically contingent upon the following ("**Buyer's Conditions Precedent**"):

(a) All representations and warranties of Seller set forth in this Agreement are true and correct in all material respects as of the date of Closing.

(b) All deeds of trust, liens and other charges against the Property (other than those arising out of the acts or omissions of Buyer) that are due and payable have been, subject to the payment by Buyer of any prorated share of such charges as required by this Agreement, paid and cancelled by Seller at or prior to Closing.

(c) Title is delivered at Closing by special warranty deed and must be fee simple marketable title, subject only to ad valorem taxes for the current year and the Permitted Encumbrances.

(d) Neither Seller nor any agent of Seller shall have received any notices from any city, county or any governmental authority (other than Buyer) of any taking of the Property, or any portion thereof, by eminent domain or similar proceeding, and no such taking or other

condemnation of the Property, or any portion thereof, shall be threatened or contemplated by any such governmental authority (other than Buyer).

In the event one or more of Buyer's Conditions Precedent are not met, or it becomes apparent that Buyer's Conditions Precedent will not be met, on or before Closing, Buyer shall have the option, exercised by giving written notice to Seller, of either (i) terminating this Agreement or (ii) waiving such condition. If this Agreement is terminated by Buyer pursuant to this Section, the Deposit, less the Use Payment (which shall be retained by Seller), shall be returned to Buyer, this Agreement shall be void and neither Buyer nor Seller shall have any further rights, liabilities or obligations hereunder, except those that expressly survive the termination of this Agreement. In the event of the waiver by Buyer of any condition set forth in this Section, this Agreement shall continue in full force and effect as to all other terms and conditions.

13. SELLER'S CONDITIONS TO CLOSING: Seller's obligation to close on the Property is specifically contingent upon the following (**"Seller's Conditions Precedent"**):

(a) All representations and warranties of Buyer set forth in this Agreement are true and correct in all material respects as of the date of Closing.

(b) The Recombination Plat has been recorded in the Registry.

In the event one or more of Seller's Conditions Precedent are not met, or it becomes apparent that Seller's Conditions Precedent will not be met, on or before Closing, Seller shall have the option, exercised by giving written notice to Buyer, of either (i) terminating this Agreement or (ii) waiving such condition. If this Agreement is terminated by Seller pursuant to this Section, then the Deposit, less the Use Payment (which shall be retained by Seller), shall be returned to Buyer, this Agreement shall be void and neither Buyer nor Seller shall have any further rights, liabilities or obligations hereunder, except those that expressly survive the termination of this Agreement. In the event of the waiver by Seller of any condition set forth in this Section, this Agreement shall continue in full force and effect as to all other terms and conditions.

14. POSSESSION: Possession of the Property shall be delivered to Buyer at the time of Closing free and clear of all tenancies, leases and licenses for the use of the Property, except the Permitted Encumbrances and as otherwise herein permitted.

15. LICENSES, LEASES AND OTHER AGREEMENTS AFFECTING PROPERTY: Prior to the Closing, Seller shall not enter into any agreement with any third party for use of the Property without prior written permission from Buyer if that agreement would be binding on Buyer after Closing.

16. TAXES AND ASSESSMENTS: Taxes and assessments applicable to the tax parcels containing the Property (**"Tax Parcels"**) for the calendar year of Closing will be allocated (by acreage) between the Property and the remainder of the Tax Parcels and prorated on a calendar year basis. If the ad valorem real property taxes for the year in which Closing occurs have not been determined by Closing, then the proration shall be based on the previous year's taxes, and the parties agree to adjust between themselves any difference in the estimated and actual prorations within 30 days after the actual tax statements for the Tax Parcels for the year of Closing have been received. If ad valorem real property taxes are due and payable at Closing,

then those taxes shall be paid at Closing. If ad valorem real property taxes are not due and payable at Closing, then, at Closing, Buyer and Seller shall each deposit into escrow with Escrow Agent their proportionate share of the estimated ad valorem real property taxes on the Tax Parcels and Escrow Agent shall pay the taxes on the Tax Parcels at such time as those taxes are due and payable. This **Section 16** shall survive Closing.

17. BROKERAGE: Seller and Buyer represent and warrant to each other that they have not retained any broker in connection with the transaction contemplated by this Agreement. Should any claim for commission be asserted, each party hereby expressly agrees to indemnify and hold the other harmless with respect thereto to the extent that such indemnifying party is shown to have been responsible for the creation of such claim. This **Section 17** shall survive Closing and the termination of this Agreement.

18. REPRESENTATIONS AND WARRANTIES OF SELLER: Seller represents to Buyer that to Seller's actual knowledge as of the Effective Date:

(a) There are no lawsuits or similar legal proceedings pending or expressly threatened against Seller regarding the Property or any portion thereof.

(b) Seller has received no actual notice of any eminent domain or condemnation proceedings filed or pending, which affect the Property.

(c) Seller has not received any actual, written notice of any violations by Seller of law, governmental ordinances, environmental regulations, orders or requirements applicable to the Property, including, but not limited to, those relating to zoning, land use, hazardous materials, building codes, and fire, health and safety codes (collectively, "**Legal Requirements**") other than environmental regulations.

(d) Seller has not entered into any unrecorded leases, unrecorded easements or unrecorded encumbrances affecting the Property that would be binding upon Buyer or its successors or assigns after Closing.

(e) Except for the Permitted Encumbrances, Seller has entered into no agreement, oral or written, encumbering the Property that would be binding upon Buyer or its successors or assigns after Closing.

(f) The undersigned, as the designated representative of Seller, has the right, power and authority to execute and deliver this Agreement and the closing documents and consummate the sale of the Property. Seller shall deliver to Buyer at the Closing evidence satisfactory to Buyer, Buyer's attorneys and the Title Company with respect to the right, power and authority of Seller's designated representative(s) to execute and deliver the closing documents and consummate the sale of the Property.

If requested by Buyer, Seller shall execute and deliver an instrument at Closing reaffirming, to the extent true, all of said representations and warranties. If any representation or warranty above is not true in all material respects at Closing as a result of a matter, event or circumstance beyond Seller's reasonable control, then Seller shall not be in default under this Agreement and Buyer's sole remedy shall be to terminate this Agreement as a result of the

failure of the condition under **Section 12(a)** and, thereafter, neither Buyer nor Seller shall have any further obligations hereunder, except those that expressly survive the termination of this Agreement. Further, if Seller acquires actual knowledge of any fact(s) rendering any of the foregoing representations and warranties false at any time prior to Closing, Seller shall promptly notify Buyer in writing of such fact(s). The representations and warranties of Seller hereunder shall survive Closing for a period of six (6) months only.

19. REPRESENTATIONS AND WARRANTIES OF BUYER: Buyer represents to the Seller that the undersigned, as the designated representative of Buyer, has the right, power and authority to execute and deliver this Agreement and the closing documents and consummate the sale of the Property. Buyer shall deliver to Seller at the Closing evidence satisfactory to Seller, Seller's attorneys and the Title Company with respect to the right, power and authority of Buyer's designated representative(s) to execute and deliver the closing documents and consummate the sale of the Property. The representations and warranties of Buyer hereunder shall survive Closing for a period of six (6) months only.

20. PROPERTY CONVEYED "AS IS"/BROWNFIELDS:

(a) Property Conveyed As-Is. Buyer acknowledges and agrees that (i) the Property shall be sold, and Buyer shall accept possession of the Property at Closing, "as is, where is, with all faults", with no right of setoff or reduction in the Purchase Price except as set forth in **Section 10(b)**; (ii) except for the representations and warranties set forth in **Section 18** and for the special warranty of title in the deed to Buyer, neither Seller nor the Seller Related Parties (as defined below) have or shall be deemed to have made any verbal or written representations or warranties (whether express, implied, statutory or otherwise) to Buyer with respect to the Property, any matter set forth, contained or addressed in any documents or materials regarding the Property delivered to or obtained by Buyer (including the accuracy and completeness thereof) or the results of any inspections; and (iii) by closing on the Property, Buyer shall be deemed to have confirmed independently all information that it considers material to its purchase of the Property. **BUYER SPECIFICALLY ACKNOWLEDGES THAT, EXCEPT FOR THE REPRESENTATIONS AND WARRANTIES SET FORTH IN SECTION 18 AND FOR THE SPECIAL WARRANTY OF TITLE IN THE DEED TO BUYER, BUYER IS NOT RELYING ON (AND SELLER AND THE SELLER RELATED PARTIES DO HEREBY DISCLAIM AND RENOUNCE) ANY REPRESENTATIONS OR WARRANTIES, WHETHER ORAL OR WRITTEN, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, FROM SELLER OR ANY SELLER RELATED PARTIES, AS TO: (1) THE OPERATION OF THE PROPERTY, THE HABITABILITY OF THE PROPERTY, OR THE MERCHANTABILITY OF THE PROPERTY FOR A PARTICULAR PURPOSE; (2) THE PHYSICAL CONDITION OF THE PROPERTY OR THE CONDITION OR SAFETY OF THE PROPERTY OR ANY IMPROVEMENTS THEREON, OR SUITABILITY OF THE PROPERTY OR ANY IMPROVEMENTS THEREON FOR A PARTICULAR PURPOSE; (3) THE PRESENCE OR ABSENCE, LOCATION OR SCOPE OF ANY HAZARDOUS MATERIALS (AS DEFINED BELOW) IN, AT, UNDER OR AROUND THE PROPERTY; (4) ANY IMPROVEMENTS ON THE PROPERTY AND THE QUALITY OF THEIR CONSTRUCTION; (5) WHETHER THE PROPERTY OR THE**

IMPROVEMENTS THEREON ARE IN COMPLIANCE WITH APPLICABLE LAWS, REGULATIONS OR ORDINANCES; OR (6) THE ZONING OF THE PROPERTY.

(b) Brownfields.

(i) Buyer acknowledges that ReVenture has applied to enroll the Property, the Clariant Tract and other surrounding land in the North Carolina Brownfields Program, through which ReVenture would obtain Brownfields Agreements ("**BFAs**") pursuant to the Brownfields Property Reuse Act of 1997, N.C. Gen. Stat. 130A-310-37, et seq. As part of the brownfields process, ReVenture will record in the Mecklenburg County Register of Deeds one or more Notices of Brownfields Property ("**Notices**") covering both the Property and the Clariant Tract, which Notices will contain land use restrictions and other requirements. The North Carolina Department of Environment and Natural Resources ("**DENR**") deemed the Property and the Clariant Tract eligible for a BFA by letter dated June 30, 2011. Buyer further acknowledges that Seller, in its discretion, may elect not to include Tract C in the Brownfields Program and that Tract C may not be subject to Brownfields protections or restrictions.

(ii) Buyer agrees to execute the Notice applicable to the Property to acknowledge its recordation, and to execute such other documents as DENR may require to subject Buyer's interests in the Property to the restrictions and requirements in that Notice; provided, however, that (1) ReVenture shall provide Buyer with an opportunity to review the Notice prior to agreeing with DENR on its final form, and (2) Buyer shall not be required to acknowledge the recordation or priority of the Notice if the Notice materially interferes with Buyer's planned uses of the Property for the City Project.

(c) Release.

(i) **BUYER, FOR BUYER AND BUYER'S SUCCESSORS AND ASSIGNS, HEREBY RELEASES, DISCHARGES AND COVENANTS NOT TO SUE SELLER AND THE SELLER RELATED PARTIES FROM OR FOR ANY CLAIM, DEMAND, NOTICE, ASSESSMENT, LIABILITY, WARRANTY, OBLIGATION, DAMAGE (INCLUDING, WITHOUT LIMITATION, CONSEQUENTIAL, MULTIPLE AND NATURAL RESOURCES DAMAGES), COST, EXPENSES OR LOSS WHATSOEVER, KNOWN OR UNKNOWN, ANTICIPATED OR UNANTICIPATED, RELATED OR ATTRIBUTABLE TO THE FOLLOWING:**

(1) ANY AND ALL STATEMENTS OR OPINIONS MADE PRIOR TO, AT OR AFTER THE EFFECTIVE DATE, OR INFORMATION FURNISHED BY SELLER OR THE SELLER RELATED PARTIES TO BUYER OR ITS EMPLOYEES, AGENTS, CONTRACTORS OR REPRESENTATIVES (EXCEPT FOR THE REPRESENTATIONS AND WARRANTIES UNDER SECTION 18 AND FOR THE SPECIAL WARRANTY OF TITLE IN THE DEED TO BUYER); AND

(2) THE PROPERTY OR ANY MATTER PERTAINING THERETO, INCLUDING, WITHOUT LIMITATION, THE FOLLOWING: LATENT AND PATENT CONDITIONS, ANY AND ALL ENVIRONMENTAL MATTERS;

WITHOUT LIMITING THE FOREGOING, THE PRESENCE OR RELEASE OF HAZARDOUS MATERIALS IN, ON, UNDER, FROM OR AROUND THE PROPERTY OR ANY ADJOINING PROPERTY; ZONING REQUIREMENTS, SUBSOIL CONDITIONS; STORM WATER DRAINAGE CONDITIONS; THE EXISTENCE OR CONDITIONS OF UTILITIES; RESTRICTIONS AND OTHER MATTERS AFFECTING TITLE TO THE PROPERTY; ANY AND ALL LAWS, STATUTES, RULES, REGULATIONS, ORDERS, NOTICES AND OTHER REQUIREMENTS, INCLUDING, WITHOUT LIMITATION, COMMON LAW (COLLECTIVELY "LAWS") RELATING TO THE PROPERTY, INCLUDING, WITHOUT LIMITATION, ENVIRONMENTAL LAWS

(ii) **BUYER ACKNOWLEDGES THAT BUYER HAS BEEN REPRESENTED BY INDEPENDENT LEGAL COUNSEL OF BUYER'S SELECTION AND BUYER IS GRANTING THIS RELEASE OF ITS OWN VOLITION AND AFTER CONSULTATION WITH BUYER'S COUNSEL.**

(d) Definitions.

(i) **"Hazardous Materials"** means any waste, pollutant, chemical, hazardous material, hazardous substance, toxic substance, hazardous waste, special waste, solid waste, asbestos, radioactive materials, polychlorinated biphenyls, petroleum or petroleum-derived substance or waste and any other pollutant, material, substance or waste regulated under or as defined by any Environmental Laws.

(ii) **"Environmental Laws"** means all present and future Laws, including without limitation any agreements or permits, issued, promulgated, approved or entered thereunder by any government authority, relating to pollution or hazardous materials or protection of human health or the environment, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 U.S.C. §§9601 et seq., as amended by the Superfund Amendment and Reauthorization Act (SARA) of 1986 and Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§6901 et seq., as any of the foregoing may be amended.

(iii) **"Seller Related Parties"** means Seller's officers, agents, managers, members, directors, contractors, representatives and employees, and Seller's affiliated companies, and the officers, agents, managers, members, directors, contractors, representatives and employees of those affiliated companies.

(e) Survival. The terms of this **Section 20** shall survive Closing and any termination of this Agreement. The terms of **Section 20(c)** shall be set forth in the deed to Buyer.

21. DEFAULT:

(a) If Buyer defaults in the performance of any of its obligations under this Agreement and fails to cure such default within ten (10) business days after receipt of written notice thereof from Seller, then the Deposit shall be forfeited to Seller immediately, and Seller may terminate this Agreement and/or seek any other remedies at law or at equity which may

be available to Seller for such default. In addition, at Seller's request (and only at Seller's request) Buyer shall deliver to Seller all surveys, appraisals, site plans, reports, title information, studies and any other due diligence information pertaining to the Property arising out of the Inspections or otherwise within five days following such request.

(b) If Seller defaults in the performance of any of its obligations under this Agreement and fails to cure such default within ten (10) business days after receipt of written notice thereof from Buyer, then Buyer may, as its sole and exclusive remedy, either: (i) terminate this Agreement, in which case Escrow Agent shall refund the Deposit to Buyer, and neither party shall have any further obligations under this Agreement (other than those obligations that expressly survive the termination of this Agreement); (ii) seek specific performance of this Agreement; or (iii) permanently waive the default and proceed to Closing in accordance with the terms of this Agreement.

(c) This **Section 21** shall survive Closing and the termination of this Agreement.

22. NOTICE AND ADDRESSES: All notices concerning this Agreement shall be addressed as follows:

BUYER:	City of Charlotte Ron Kimble, Deputy City Manager 600 East Fourth Street Charlotte, NC 28202 Facsimile: (704) 336-2408
COPIES TO:	City Attorney's Office CMGC, 7th Floor 600 East Fourth Street Charlotte, NC 28202 Attn: Catherine L. Cooper Facsimile: (704) 632-8333
SELLER:	ReVenture Park Investments I, LLC 5320 Old Pineville Road Charlotte, NC 28217 Attn: Thomas J. McKittrick Facsimile: (704) 364-0090
COPIES TO:	Parker Poe Adams & Bernstein LLP 401 South Tryon Street, Suite 3000 Charlotte, NC 28202 Attn: Thomas M. Quirk, Esquire Facsimile: (704) 335-9743 Attn: Thomas N. Griffin, Esquire Facsimile: (704) 335-9567

CLARIANT: Clariant Corporation
4000 Monroe Road
Charlotte, NC 28205
Attention: Christopher S. Barnard
Facsimile: (704) 377-1063

Notice shall be effective upon the date of receipt by the intended recipient, provided that any notice that is sent by tele-fax or electronic mail shall also be simultaneously sent by mail deposited with the U.S. Postal Service or by overnight courier. Each party may change its address for notification purposes by giving the other party written notice of the new address and the date upon which it shall become effective.

23. TERM OF AGREEMENT: This Agreement shall commence upon the Effective Date.

24. ENTIRE AGREEMENT AND AMENDMENTS: There are no agreements, promises or understandings between the parties except as specifically set forth herein. No modification, waiver, amendment, discharge or other change to this Agreement shall be valid unless the same is in writing and signed by the party to which the same is charged. Buyer has designated the City Manager, or his designee, as the City's representative under this Agreement. Such representative shall have the authority, on behalf of Buyer, to discharge responsibilities, exercise rights and options, settle disputes, make adjustments and amendments (including reasonable time extensions) and issue waivers, to the full extent permitted by law.

25. NO THIRD PARTY RIGHTS: This Agreement is entered into by and between the parties hereto for their exclusive benefit. The parties do not intend to create or establish by this Agreement any third-party beneficiary status or rights, and no such third-party shall be entitled to enforce any right of obligation or enjoy any benefit created or established by this Agreement.

26. AUTHORITY TO EXECUTE: Each of Buyer, ReVenture and Clariant warrant and represent, as to itself only, that this Agreement has been duly authorized by all necessary action on the part of such party, and has been duly executed and delivered by such party, and constitutes the valid and binding agreement of such party, and is enforceable against such party in accordance with its terms, and that each person executing this Agreement on behalf or Buyer, ReVenture and Clariant has authority to do so.

27. RISK OF LOSS: Risk of loss prior to the Closing shall be on Buyer. If, prior to Closing, any portion or all of the Property is damaged or destroyed by fire or any other cause, except where such event is occasioned by a willful negligent act of Seller or its employees, agents or contractors, then this Agreement shall continue in full force and effect and risk of loss shall be on Buyer. If such event is occasioned by the willful negligent act of Seller or its employees, agents or contractors, then Buyer may elect by written notice delivered to Seller on or before Closing to either: (i) terminate this Agreement in which case the Deposit, less the Use Payment (which shall be retained by Seller), shall be returned to Buyer, this Agreement shall be void and neither Buyer nor Seller shall have any further rights, liabilities or obligations hereunder, except those that expressly survive the termination of this Agreement; or (ii) take title to the Property "as-is" without any credit or offset for such damage or destruction.

28. SURVIVAL OF COVENANTS, REPRESENTATIONS AND WARRANTIES: Except as otherwise expressly set forth in this Agreement, the representations, warranties and covenants contained in this Agreement shall merge in the deed and shall not survive Closing. Without limiting the prior sentence and in addition to the express survival provisions set forth in this Agreement, the terms of **Sections 22, 24, 25, 26, 28, 29 and 31** shall survive Closing and any termination of this Agreement.

29. PARTIES BOUND: This Agreement and all rights hereunder shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns. This Agreement may not be assigned, in whole or in part, by Buyer.

30. TIME OF ESSENCE: Time is of the essence to both Seller and Buyer in the performance of this Agreement, and they have agreed that strict compliance by both of them is required as to any date set out herein. If the final day of any period of time set out in any provision of this Agreement falls upon a Saturday or Sunday or a legal holiday under the laws of the State of North Carolina, then and in such event, the time of such period shall be extended to the next day which is not a Saturday, Sunday or legal holiday in the State of North Carolina.

31. MISCELLANEOUS:

(a) Words of any gender used in this Agreement shall be held and construed to include any other gender, and words in singular number shall be held to include the plural and vice versa, unless context requires otherwise.

(b) The captions used in connection with the sections of this Agreement are for convenience only and shall not be deemed to construe or limit the meaning of the language contained in this Agreement, or be used as interpreting the meanings and provisions of this Agreement.

(c) In case any one or more of the provisions contained in this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof and this Agreement shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

(d) In the event Seller or Buyer or their successors or assigns shall breach any of the terms of this Agreement and Seller or Buyer retain the services of any attorney for enforcement, the prevailing party shall recover from the other party, in addition to any other relief allowed provided herein, all reasonable costs of enforcement including reasonable attorney's fees which are actually incurred at customary rates without presumption of law.

(e) This Agreement shall be governed by and construed in accordance with the laws and judicial decisions of the State of North Carolina. Venue for any action with respect to this Agreement shall lie in any court of competent jurisdiction in Mecklenburg County, North Carolina.

(f) The date by which this Agreement has been fully executed by both parties shall be known as the "Effective Date".

32. COUNTERPARTS: This Agreement may be signed in any number of counterparts, each to be an original, but all of which shall constitute but one agreement, and it shall be sufficient to bind a party if such party signs any such counterpart.

[SIGNATURES FOLLOW]

IN WITNESS WHEREOF, the parties have set their hand as of the date appearing below.

REVENTURE:

REVENTURE PARK INVESTMENTS I, LLC,
a North Carolina limited liability company

By: **CLEAN ENERGY, LLC,**
a Nevada limited liability company,
its Manager

By: _____
Tom McKittrick, Manager

Date: 5-13-13

BUYER:

CITY OF CHARLOTTE,
a North Carolina municipal corporation

By: _____
Name: _____
Title: _____

Date: _____

CLARIANT:

CLARIANT CORPORATION,
a New York corporation

By: _____
Name: C. S. Barnard
Title: Senior Vice President - Legal
Secretary & General Counsel

Date: 5-14-2013

IN WITNESS WHEREOF, the parties have set their hand as of the date appearing below.

REVENTURE:

REVENTURE PARK INVESTMENTS I, LLC,
a North Carolina limited liability company

By: **CLEAN ENERGY, LLC,**
a Nevada limited liability company,
its Manager

By: _____
Tom McKittrick, Manager

Date: _____

BUYER:

CITY OF CHARLOTTE,
a North Carolina municipal corporation

By: Ronald R Kole
Name: _____
Title: Deputy City Manager

Date: 5-9-13

CLARIANT:

CLARIANT CORPORATION,
a New York corporation

By: _____
Name: _____
Title: _____

Date: _____

EXHIBIT A

ReVenture Property and Clariant Property

The real property located in Mecklenburg County, North Carolina and described as follows:

ReVenture Property

Tract 2

That approximately 56.718 acre tract ("**Tract 2**") designated as "Tract 2" on the plat ("**ReVenture Plat**") recorded in Plat Book 52, Page 643 in the Office of the Mecklenburg County Register of Deeds ("**Registry**");

Tract 3

That approximately 201.744 acre tract ("**Tract 3**") designated as "Tract 3" on the ReVenture Plat;

Tract 4

That approximately 46.336 acre tract ("**Tract 4**") designated as "Tract 4" on the ReVenture Plat;

LESS AND EXCEPT that portion of the property described above that was conveyed by ReVenture to Catawba Lands Conservancy by deed recorded in Deed Book 26977, Page 599 in the Registry (which conveyed property is designated as "50.6874 ACRES" on plat recorded in Plat Book 53, Pages 747-751 ("**CLC Plat**"), and as "5.1573 ACRES" on the CLC Plat).

Clariant Property

That approximately 351.817 acre tract designated as "Tract 1" on the plat recorded in Plat Book 52, Page 643 in the Registry.

EXHIBIT B

Recombination Plat

APPENDIX L

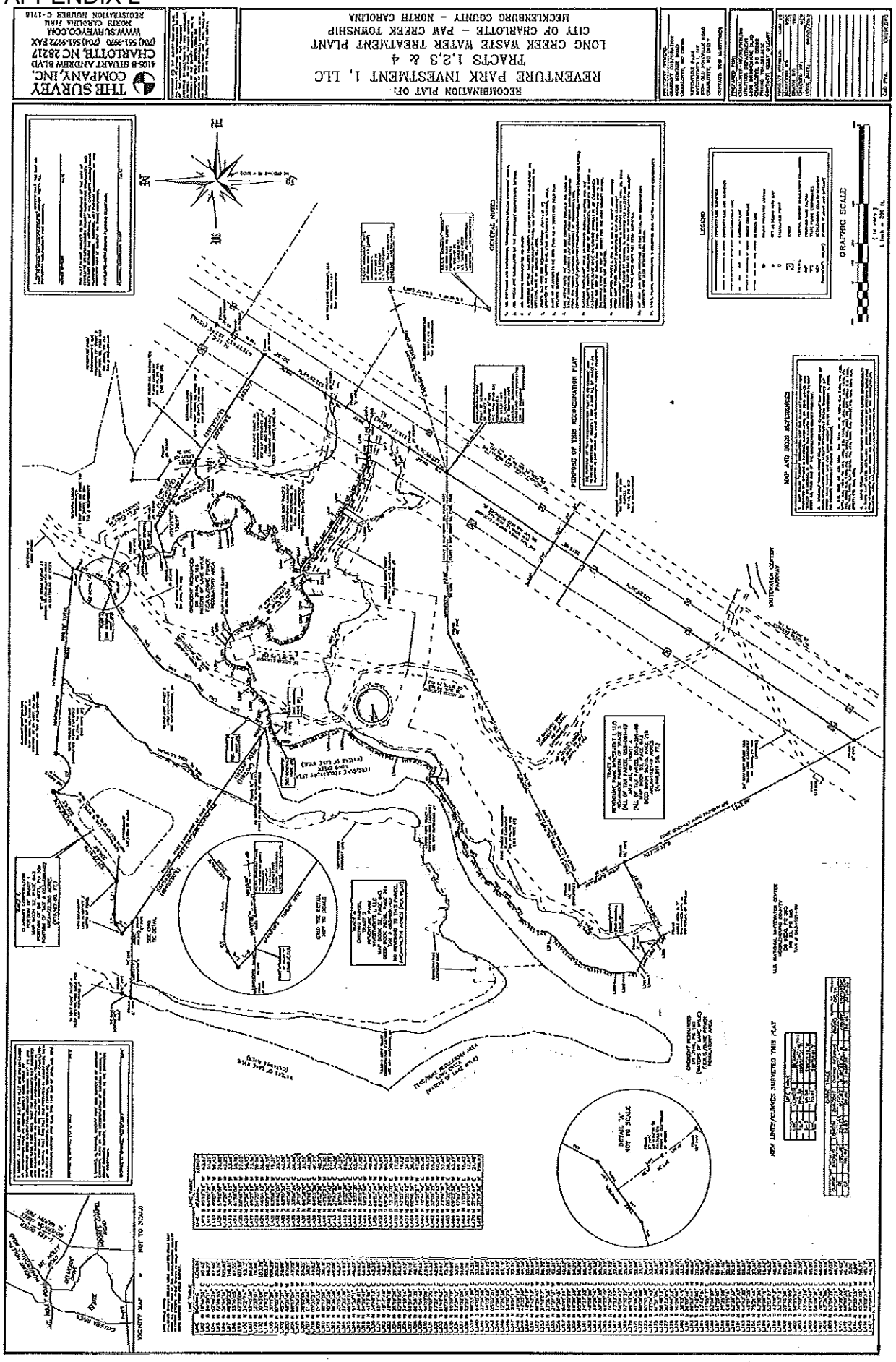
THE SURVEY COMPANY, INC.
4105-B STUART ANDREW BLVD
CHARLOTTE, NC 28217
(704) 561-9970 (704) 561-9972 FAX
WWW.SURVEYCO.COM
NORTH CAROLINA firm
REGISTRATION NUMBER C-1918
RECOMBINATION PLAT OF:
REVENTURE PARK INVESTMENT I, LLC
TRACTS 1,2,3 & 4
LONG CREEK WASTE WATER TREATMENT PLANT
CITY OF CHARLOTTE - PAW CREEK TOWNSHIP
MECKLENBURG COUNTY - NORTH CAROLINA
GENERAL NOTES
LEGEND
GRAPHIC SCALE
MAP AND BOOK REFERENCES
PURPOSE OF THIS RECOMBINATION PLAT
VICINITY MAP - NOT TO SCALE
NEW LINES/CURVES SUPPORTED THIS PLAT
DETAIL "A"
NOT TO SCALE
WASTEWATER CENTER PARKWAY

EXHIBIT C

Legal Description

Tract A

(PROPOSED LONG CREEK WASTE WATER TREATMENT PLANT SITE)
REVENTURE PARK INVESTMENT I, LLC PROPERTY

BEING A REMAINDER PORTION OF THAT TRACT 3 AND ALL OF THAT TRACT 4 PER THAT PLAT TITLED "EXEMPT SUBDIVISION MAP FOR CLARIANT CORPORATION" RECORDED IN MAP BOOK 52, PAGE 643, AND DESCRIBED IN BOOK 26318, PAGE 718, MECKLENBURG COUNTY REGISTRY (HENCE MCR) AND BEING ALL OF THAT PROPOSED 102.149 ACRE TRACT A, AS SHOWN ON THAT MAP TITLED "RECOMBINATION PLAT OF REVENTURE PARK INVESTMENT 1, LLC TRACTS 1,2,3 & 4 - LONG CREEK WASTE WATER TREATMENT PLANT" PREPARED BY THE SURVEY COMPANY, INC., DATED JUNE 15, 2012, SIGNED AND SEALED BY MICHAEL C. SAWHILL, NCPLS #L-3223, TO WHICH REFERENCE IS HEREBY MADE:

COMMENCING AT NCGS STATION "WHITE" HAVING NC GRID COORDINATES IN U.S. SURVEY FEET OF NORTH 564,987.70 AND EAST 1,411,954.61 WITH A COMBINED GRID FACTOR OF 0.99984387;

THENCE, S 72°-08'-58" W, A GRID DISTANCE OF 8,713.01 FEET TO A FOUND 7/8" PIPE, THE COMMON EASTERLY CORNER OF TRACTS 3 & 4 (MAP BOOK 57, PAGE 643, MCR) AND BEING THE NORTHWESTERLY CORNER OF THAT CLARIANT CORPORATION TRACT DESCRIBED IN BOOK 5290, PAGE 804 (MCR) AND **THE POINT OF BEGINNING**;

THENCE, WITH SAID CLARIANT TRACT'S WESTERLY LINE, S 32°-29'-30" W, A DISTANCE OF 2,518.49 FEET TO A FOUND 1/2" PIPE, THE MOST EASTERLY CORNER OF THAT MECKLENBURG COUNTY U.S NATIONAL WHITEWATER CENTER TRACT AS DESCRIBED IN BOOK 6230, PAGE 893 (MCR);

THENCE, WITH SAID MECKLENBURG COUNTY TRACT'S NORTHERLY LINES THE FOLLOWING EIGHT (8) COURSES:
1) N 27°-20'-32" W, A DISTANCE OF 1,342.06 FEET TO A FOUND 1 1/2" PIPE;
2) S 62°-39'-42" W, A DISTANCE OF 421.97 FEET TO A FOUND ANGLE IRON AND 2" GALVANIZED PIPE IN CENTER LINE OF TRIBUTARY TO LONG CREEK;
3) N 57°-02'-49" W, A DISTANCE OF 25.23 FEET TO A FOUND 1/2" PIPE;
4) N 45°-31'-37" W, A DISTANCE OF 28.99 FEET TO A FOUND 1/2" PIPE;
5) N 48°-31'-41" W, A DISTANCE OF 67.08 FEET TO A FOUND 1/2" PIPE;
6) N 58°-57'-04" W, A DISTANCE OF 47.75 FEET TO A CALCULATED POINT;

7) N 66°-53'-26" W, A DISTANCE OF 29.30 FEET TO A CALCULATED POINT;
8) N 58°-02'-06" W, A DISTANCE OF 25.25 FEET TO A CALCULATED POINT ON THE FERC/DUKE REGULATORY LINE OF THAT CRESCENT RESOURCES TRACT DESCRIBED IN BOOK 3146, PAGE 165 (MCR);

THENCE, WITH SAID FERC/DUKE REGULATORY LINE THE FOLLOWING ONE HUNDRED FIFTY-NINE (159) COURSES:
1) N 01°-36'-44" E, A DISTANCE OF 38.21 FEET TO A CALCULATED POINT;
2) N 05°-33'-27" W, A DISTANCE OF 49.83 FEET TO A CALCULATED POINT;
3) N 01°-43'-33" E, A DISTANCE OF 32.90 FEET TO A CALCULATED POINT;
4) N 18°-17'-59" E, A DISTANCE OF 58.16 FEET TO A CALCULATED POINT;
5) N 10°-32'-38" E, A DISTANCE OF 46.72 FEET TO A CALCULATED POINT;
6) N 14°-34'-38" E, A DISTANCE OF 49.08 FEET TO A CALCULATED POINT;
7) N 35°-15'-38" E, A DISTANCE OF 48.37 FEET TO A CALCULATED POINT;
8) N 37°-23'-39" E, A DISTANCE OF 49.92 FEET TO A CALCULATED POINT;
9) N 48°-07'-57" E, A DISTANCE OF 54.98 FEET TO A CALCULATED POINT;
10) N 51°-53'-11" E, A DISTANCE OF 46.02 FEET TO A CALCULATED POINT;
11) N 34°-30'-01" E, A DISTANCE OF 55.62 FEET TO A CALCULATED POINT;
12) N 04°-29'-47" E, A DISTANCE OF 54.67 FEET TO A CALCULATED POINT;
13) N 41°-17'-18" E, A DISTANCE OF 54.02 FEET TO A CALCULATED POINT;
14) N 34°-48'-13" E, A DISTANCE OF 62.28 FEET TO A CALCULATED POINT;
15) N 65°-15'-44" E, A DISTANCE OF 56.64 FEET TO A CALCULATED POINT;
16) N 45°-15'-48" E, A DISTANCE OF 43.21 FEET TO A CALCULATED POINT;
17) N 39°-45'-18" E, A DISTANCE OF 59.88 FEET TO A CALCULATED POINT;
18) N 35°-59'-26" E, A DISTANCE OF 29.25 FEET TO A CALCULATED POINT;
19) N 62°-32'-56" E, A DISTANCE OF 36.57 FEET TO A CALCULATED POINT;
20) N 24°-59'-14" E, A DISTANCE OF 41.17 FEET TO A CALCULATED POINT;
21) N 58°-24'-03" E, A DISTANCE OF 79.13 FEET TO A CALCULATED POINT;
22) N 66°-56'-35" E, A DISTANCE OF 48.11 FEET TO A CALCULATED POINT;
23) N 34°-08'-44" E, A DISTANCE OF 37.65 FEET TO A CALCULATED POINT;
24) N 44°-33'-08" E, A DISTANCE OF 23.65 FEET TO A CALCULATED POINT;
25) N 65°-07'-25" E, A DISTANCE OF 64.23 FEET TO A CALCULATED POINT;
26) N 77°-37'-49" E, A DISTANCE OF 42.69 FEET TO A CALCULATED POINT;
27) S 81°-49'-43" E, A DISTANCE OF 39.97 FEET TO A CALCULATED POINT;
28) N 60°-24'-52" E, A DISTANCE OF 73.79 FEET TO A CALCULATED POINT;
29) N 55°-50'-19" E, A DISTANCE OF 50.80 FEET TO A CALCULATED POINT;
30) N 57°-39'-12" E, A DISTANCE OF 57.91 FEET TO A CALCULATED POINT;
31) N 46°-33'-29" E, A DISTANCE OF 51.09 FEET TO A CALCULATED POINT;
32) N 52°-27'-30" E, A DISTANCE OF 41.78 FEET TO A CALCULATED POINT;
33) S 86°-33'-39" E, A DISTANCE OF 21.51 FEET TO A CALCULATED POINT;
34) S 64°-10'-23" E, A DISTANCE OF 33.82 FEET TO A CALCULATED POINT;
35) N 37°-54'-56" E, A DISTANCE OF 51.62 FEET TO A CALCULATED POINT;
36) N 14°-05'-22" E, A DISTANCE OF 60.75 FEET TO A CALCULATED POINT;
37) N 05°-02'-20" E, A DISTANCE OF 67.18 FEET TO A CALCULATED POINT;
38) N 17°-54'-08" E, A DISTANCE OF 27.63 FEET TO A CALCULATED POINT;
39) N 12°-24'-38" E, A DISTANCE OF 51.19 FEET TO A CALCULATED POINT;

40) N 23°-10'-29" E, A DISTANCE OF 44.15 FEET TO A CALCULATED POINT;
41) N 29°-01'-11" E, A DISTANCE OF 72.71 FEET TO A CALCULATED POINT;
42) N 29°-08'-19" E, A DISTANCE OF 58.96 FEET TO A CALCULATED POINT;
43) N 43°-35'-39" E, A DISTANCE OF 44.56 FEET TO A CALCULATED POINT;
44) N 18°-26'-17" E, A DISTANCE OF 52.61 FEET TO A CALCULATED POINT;
45) N 17°-42'-13" W, A DISTANCE OF 39.84 FEET TO A CALCULATED POINT;
46) N 09°-28'-40" W, A DISTANCE OF 32.19 FEET TO A CALCULATED POINT;
47) N 21°-19'-07" W, A DISTANCE OF 56.70 FEET TO A CALCULATED POINT;
48) N 23°-36'-58" W, A DISTANCE OF 52.69 FEET TO A CALCULATED POINT;
49) N 21°-21'-13" W, A DISTANCE OF 42.21 FEET TO A CALCULATED POINT;
50) N 14°-30'-45" W, A DISTANCE OF 55.25 FEET TO A CALCULATED POINT;
51) N 04°-41'-04" E, A DISTANCE OF 40.52 FEET TO A CALCULATED POINT;
52) N 60°-35'-27" E, A DISTANCE OF 61.81 TO A FOUND 1/2" PIPE;
53) N 68°-35'-35" E, A DISTANCE OF 54.25 TO A FOUND 1/2" PIPE;
54) N 85°-28'-04" E, A DISTANCE OF 52.76 FEET TO A CALCULATED POINT;
55) N 74°-37'-33" E, A DISTANCE OF 55.44 FEET TO A CALCULATED POINT;
56) N 48°-08'-28" E, A DISTANCE OF 44.01 FEET TO A CALCULATED POINT;
57) N 39°-28'-15" E, A DISTANCE OF 26.55 FEET TO A CALCULATED POINT;
58) N 38°-38'-33" E, A DISTANCE OF 35.30 FEET TO A CALCULATED POINT;
59) N 69°-25'-19" E, A DISTANCE OF 30.73 FEET TO A CALCULATED POINT;
60) S 74°-36'-25" E, A DISTANCE OF 24.73 FEET TO A CALCULATED POINT;
61) N 73°-23'-37" E, A DISTANCE OF 37.91 FEET TO A CALCULATED POINT;
62) N 58°-09'-42" E, A DISTANCE OF 28.75 FEET TO A CALCULATED POINT;
63) N 07°-30'-27" E, A DISTANCE OF 35.81 FEET TO A CALCULATED POINT;
64) N 09°-37'-51" E, A DISTANCE OF 30.53 FEET TO A CALCULATED POINT;
65) N 41°-49'-45" E, A DISTANCE OF 32.99 FEET TO A CALCULATED POINT;
66) N 50°-06'-08" E, A DISTANCE OF 21.11 FEET TO A CALCULATED POINT;
67) N 85°-50'-39" E, A DISTANCE OF 34.45 FEET TO A CALCULATED POINT;
68) S 77°-06'-40" E, A DISTANCE OF 33.41 FEET TO A CALCULATED POINT;
69) S 61°-55'-06" E, A DISTANCE OF 34.31 FEET TO A CALCULATED POINT;
70) S 56°-48'-13" E, A DISTANCE OF 34.09 FEET TO A CALCULATED POINT;
71) S 30°-23'-05" E, A DISTANCE OF 50.43 FEET TO A CALCULATED POINT;
72) S 18°-44'-23" E, A DISTANCE OF 32.09 FEET TO A CALCULATED POINT;
73) S 15°-29'-06" E, A DISTANCE OF 25.72 FEET TO A CALCULATED POINT;
74) S 38°-13'-45" E, A DISTANCE OF 31.51 FEET TO A CALCULATED POINT;
75) S 26°-07'-48" W, A DISTANCE OF 48.43 FEET TO A CALCULATED POINT;
76) S 69°-33'-44" W, A DISTANCE OF 46.64 FEET TO A CALCULATED POINT;
77) S 82°-42'-00" W, A DISTANCE OF 37.21 FEET TO A CALCULATED POINT;
78) S 23°-43'-15" W, A DISTANCE OF 58.18 FEET TO A CALCULATED POINT;
79) S 11°-55'-17" E, A DISTANCE OF 45.35 FEET TO A CALCULATED POINT;
80) S 23°-04'-07" E, A DISTANCE OF 71.80 FEET TO A CALCULATED POINT;
81) S 61°-20'-09" E, A DISTANCE OF 61.80 FEET TO A CALCULATED POINT;
82) S 79°-25'-08" E, A DISTANCE OF 51.46 FEET TO A CALCULATED POINT;
83) S 68°-15'-15" E, A DISTANCE OF 32.87 FEET TO A CALCULATED POINT;
84) S 83°-36'-37" E, A DISTANCE OF 29.57 FEET TO A CALCULATED POINT;
85) N 50°-57'-33" E, A DISTANCE OF 58.94 FEET TO A CALCULATED POINT;

86) N 64°-43'-32" E, A DISTANCE OF 55.51 FEET TO A CALCULATED POINT;
87) S 45°-51'-20" E, A DISTANCE OF 33.52 FEET TO A CALCULATED POINT;
88) N 75°-21'-44" E, A DISTANCE OF 27.41 FEET TO A CALCULATED POINT;
89) N 63°-30'-34" E, A DISTANCE OF 30.06 FEET TO A CALCULATED POINT;
90) S 60°-06'-19" E, A DISTANCE OF 16.42 FEET TO A CALCULATED POINT;
91) S 53°-07'-27" E, A DISTANCE OF 46.53 FEET TO A CALCULATED POINT;
92) S 42°-19'-13" E, A DISTANCE OF 42.99 FEET TO A CALCULATED POINT;
93) S 53°-53'-12" E, A DISTANCE OF 74.61 FEET TO A CALCULATED POINT;
94) S 55°-16'-56" E, A DISTANCE OF 69.90 FEET TO A CALCULATED POINT;
95) S 61°-36'-00" E, A DISTANCE OF 53.99 FEET TO A CALCULATED POINT;
96) S 56°-25'-52" E, A DISTANCE OF 39.61 FEET TO A CALCULATED POINT;
97) S 71°-07'-15" E, A DISTANCE OF 31.50 FEET TO A CALCULATED POINT;
98) S 33°-54'-28" E, A DISTANCE OF 29.24 FEET TO A CALCULATED POINT;
99) S 66°-24'-47" E, A DISTANCE OF 58.90 FEET TO A CALCULATED POINT;
100) S 56°-09'-21" E, A DISTANCE OF 73.97 FEET TO A CALCULATED POINT;
101) S 70°-53'-41" E, A DISTANCE OF 60.03 FEET TO A CALCULATED POINT;
102) S 63°-36'-06" E, A DISTANCE OF 48.18 FEET TO A CALCULATED POINT;
103) N 83°-04'-27" E, A DISTANCE OF 47.03 FEET TO A CALCULATED POINT;
104) S 81°-57'-22" E, A DISTANCE OF 49.77 FEET TO A CALCULATED POINT;
105) S 86°-35'-30" E, A DISTANCE OF 41.02 FEET TO A CALCULATED POINT;
106) S 88°-00'-35" E, A DISTANCE OF 60.52 FEET TO A CALCULATED POINT;
107) N 01°-13'-15" W, A DISTANCE OF 2.00 FEET TO A CALCULATED POINT;
108) N 62°-20'-25" W, A DISTANCE OF 0.99 FEET TO A CALCULATED POINT;
109) N 85°-56'-02" W, A DISTANCE OF 58.71 FEET TO A CALCULATED POINT;
110) N 85°-02'-37" W, A DISTANCE OF 45.17 FEET TO A CALCULATED POINT;
111) N 80°-59'-59" W, A DISTANCE OF 46.79 FEET TO A CALCULATED POINT;
112) S 85°-17'-28" W, A DISTANCE OF 43.67 FEET TO A CALCULATED POINT;
113) N 64°-06'-20" W, A DISTANCE OF 51.21 FEET TO A CALCULATED POINT;
114) N 69°-01'-39" W, A DISTANCE OF 59.42 FEET TO A CALCULATED POINT;
115) N 5°-10'-07" W, A DISTANCE OF 78.92 FEET TO A CALCULATED POINT;
116) N 67°-20'-26" W, A DISTANCE OF 42.25 FEET TO A CALCULATED POINT;
117) N 39°-39'-13" W, A DISTANCE OF 23.18 FEET TO A CALCULATED POINT;
118) N 61°-58'-04" W, A DISTANCE OF 50.18 FEET TO A CALCULATED POINT;
119) N 50°-46'-40" W, A DISTANCE OF 27.03 FEET TO A CALCULATED POINT;
120) N 57°-56'-54" W, A DISTANCE OF 58.15 FEET TO A CALCULATED POINT;
121) N 55°-21'-39" W, A DISTANCE OF 73.34 FEET TO A CALCULATED POINT;
122) N 54°-25'-04" W, A DISTANCE OF 70.96 FEET TO A CALCULATED POINT;
123) N 46°-04'-12" W, A DISTANCE OF 36.64 FEET TO A CALCULATED POINT;
124) N 50°-27'-00" W, A DISTANCE OF 50.55 FEET TO A CALCULATED POINT;
125) N 63°-08'-14" W, A DISTANCE OF 19.31 FEET TO A CALCULATED POINT;
126) N 09°-42'-06" E, A DISTANCE OF 35.13 FEET TO A CALCULATED POINT;
127) S 83°-15'-53" E, A DISTANCE OF 43.09 FEET TO A CALCULATED POINT;
128) N 45°-50'-31" E, A DISTANCE OF 34.12 FEET TO A CALCULATED POINT;
129) N 33°-50'-24" E, A DISTANCE OF 38.66 FEET TO A CALCULATED POINT;
130) N 31°-17'-57" E, A DISTANCE OF 33.00 FEET TO A CALCULATED POINT;
131) N 64°-58'-10" E, A DISTANCE OF 31.81 FEET TO A CALCULATED POINT;

132) N 79°-10'-01" E, A DISTANCE OF 41.29 FEET TO A CALCULATED POINT;
133) N 64°-55'-26" E, A DISTANCE OF 41.75 FEET TO A CALCULATED POINT;
134) N 78°-53'-26" W, A DISTANCE OF 40.51 FEET TO A CALCULATED POINT;
135) N 45°-10'-24" W, A DISTANCE OF 29.70 FEET TO A CALCULATED POINT;
136) N 24°-07'-47" E, A DISTANCE OF 57.77 FEET TO A CALCULATED POINT;
137) N 27°-47'-32" E, A DISTANCE OF 34.38 FEET TO A CALCULATED POINT;
138) S 57°-04'-11" E, A DISTANCE OF 34.21 FEET TO A CALCULATED POINT;
139) N 76°-32'-38" E, A DISTANCE OF 68.33 FEET TO A CALCULATED POINT;
140) N 49°-36'-16" E, A DISTANCE OF 54.40 FEET TO A CALCULATED POINT;
141) N 43°-37'-26" E, A DISTANCE OF 52.60 FEET TO A CALCULATED POINT;
142) N 20°-05'-24" E, A DISTANCE OF 37.45 FEET TO A CALCULATED POINT;
143) N 18°-23'-34" W, A DISTANCE OF 56.64 FEET TO A CALCULATED POINT;
144) N 54°-46'-46" W, A DISTANCE OF 40.88 FEET TO A CALCULATED POINT;
145) N 68°-57'-24" W, A DISTANCE OF 48.70 FEET TO A CALCULATED POINT;
146) S 62°-42'-39" W, A DISTANCE OF 54.91 FEET TO A CALCULATED POINT;
147) S 09°-34'-25" W, A DISTANCE OF 50.51 FEET TO A CALCULATED POINT;
148) S 15°-36'-02" E, A DISTANCE OF 30.09 FEET TO A CALCULATED POINT;
149) S 35°-06'-29" W, A DISTANCE OF 17.02 FEET TO A CALCULATED POINT;
150) N 42°-57'-20" W, A DISTANCE OF 19.12 FEET TO A CALCULATED POINT;
151) N 25°-55'-42" W, A DISTANCE OF 34.01 FEET TO A CALCULATED POINT;
152) N 02°-40'-59" W, A DISTANCE OF 38.12 FEET TO A CALCULATED POINT;
153) N 14°-51'-21" W, A DISTANCE OF 47.28 FEET TO A CALCULATED POINT;
154) N 10°-44'-47" E, A DISTANCE OF 55.76 FEET TO A CALCULATED POINT;
155) N 06°-30'-32" W, A DISTANCE OF 46.13 FEET TO A CALCULATED POINT;
156) N 32°-09'-23" W, A DISTANCE OF 55.47 FEET TO A CALCULATED POINT;
157) N 53°-07'-42" W, A DISTANCE OF 50.60 FEET TO A CALCULATED POINT;
158) N 73°-28'-05" W, A DISTANCE OF 37.46 FEET TO A CALCULATED POINT;
159) N 05°-22'-20" E, A DISTANCE OF 38.69 FEET TO A FOUND #5 STEEL REBAR, THE SOUTHWEST CORNER OF LOT 1 PER THAT PLAT TITLED "BOUNDARY SURVEY FOR CATAWBA LANDS CONSERVANCY" RECORDED IN MAP BOOK 53, PAGE 747 (MCR) ;

THENCE, WITH SAID LOT'S SOUTHERLY LINES, THE FOLLOWING TWO (2) COURSES:
1) N 71°-21'-10" E, A DISTANCE OF 138.97 FEET TO A FOUND #5 REBAR;
2) S 57°-29'-40" E, A DISTANCE OF 399.21 FEET TO A FOUND #5 REBAR, THE SOUTHWESTERLY CORNER OF LOT 1B PER THAT PLAT TITLED "BOUNDARY SURVEY FOR CATAWBA LANDS CONSERVANCY" RECORDED IN MAP BOOK 53, PAGE 747 (MCR)

THENCE, WITH SAID LOT'S SOUTHERLY LINE, S 57°-30'-13" E, A DISTANCE OF 632.77 FEET TO A FOUND #5 REBAR, THE MOST SOUTHERLY CORNER OF SAID LOT 1B, IN THE WESTERLY LINE OF THAT NW SOUTHEAST HOLDINGS, LLC TRACT DESCRIBED IN BOOK 27030, PAGE 157 (MCR);

THENCE, WITH SAID WESTERLY LINE, S 32°-29'-44" W, PASSING THROUGH A FOUND #5 REBAR AT 373.05 FEET AND CONTINUING ANOTHER 128.76 FEET FOR A TOTAL DISTANCE OF 501.81 TO A FOUND 7/8" PIPE, THE MOST NORTHERLY

CORNER OF THAT CLARIANT CORPORATION TRACT DESCRIBED IN BOOK 4677, PAGE 309 (MCR);

THENCE, WITH SAID CLARIANT TRACT'S WESTERLY LINE, S 32°-29'-30" W, PASSING A FOUND #5 REBAR AT 388.17 FEET AND CONTINUING ANOTHER 229.94 FEET FOR A TOTAL DISTANCE OF 618.11 FEET TO **THE POINT OF BEGINNING** AND CONTAINING 102.149 ACRES OR 4,449,614 SQUARE FEET OF LAND, MORE OR LESS, ALL ACCORDING TO THAT MAP TITLED "RECOMBINATION PLAT OF REVENTURE PARK INVESTMENT 1, LLC TRACTS 1,2,3 & 4 - LONG CREEK WASTE WATER TREATMENT PLANT" PREPARED BY THE SURVEY COMPANY, INC., DATED JUNE 15, 2012, SIGNED AND SEALED BY MICHAEL C. SAWHILL, NCPLS #L-3223, TO WHICH REFERENCE IS HEREBY MADE.

In the event that the above metes and bounds legal description of Tract A encompasses property lying outside of the boundaries of Tract 3 and Tract 4 as shown on plat titled "Exempt Subdivision Map for Clariant Corporation" recorded in Map Book 52, Page 643 in the Office of the Mecklenburg County Register of Deeds (any such property lying outside the boundaries of Tract 3 and Tract 4 is referred to as the "**Excluded Property**"), then the boundaries of Tract 3 and Tract 4 as shown on that plat shall control and the Excluded Property is not part of Tract A and will not be conveyed by Seller to Buyer.

Tract B

That approximately 56.718 acre tract ("**Tract 2**") designated as "Tract 2" on the plat ("**ReVenture Plat**") recorded in Plat Book 52, Page 643 in the Office of the Mecklenburg County Register of Deeds ("**Registry**");

Tract C

BEING A PORTION OF TRACT 1 PER THAT PLAT TITLED **"EXEMPT SUBDIVISION MAP FOR CLARIANT CORPORATION"** RECORDED IN MAP BOOK 52, PAGE 643, MECKLENBURG COUNTY REGISTER OF DEEDS OFFICE AND BEING ALL OF THAT PROPOSED 22.385 ACRE TRACT C, AS SHOWN ON THAT MAP OF SURVEY TITLED **"RECOMBINATION PLAT OF CLARIANT TRACTS 1,2,3 & 4 - LONG CREEK WASTE WATER TREATMENT PLANT"** PREPARED BY THE SURVEY COMPANY, INC., DATED DECEMBER 09, 2010, LAST REVISED MARCH 25, 2011 AND SIGNED AND SEALED BY MICHAEL C. SAWHILL, NCPLS #L-3223, TO WHICH REFERENCE IS MADE.

COMMENCING AT NCGS STATION "WHITE" HAVING NC GRID COORDINATES IN U.S. SURVEY FEET OF NORTH 564,987.70 AND EAST 1,411,954.61, WITH A COMBINED GRID FACTOR OF 0.99984387;

THENCE, S 84°-17'-02" W, A HORIZONTAL GROUND DISTANCE OF 10,623.65 FEET TO A FOUND 1/2" PIPE, **THE POINT OF BEGINNING**;

THENCE, S 54°-55'-00" E, PASSING A FOUND 3/4" WITNESS PIPE AT 1,142.69 FEET AND CONTINUING ANOTHER 50.27' FOR A TOTAL DISTANCE OF 1,192.96 FEET TO A CALCULATED POINT ON THE FERC/ REGULATORY LINE;

THENCE, WITH THE FERC/ REGULATORY LINE THE FOLLOWING TWELVE (12) COURSES AND DISTANCES:

1) N 30°-11'-29" E, A DISTANCE OF 106.20 FEET TO A CALCULATED POINT;

2) N 23°-43'-18" E, A DISTANCE OF 155.74 FEET TO A CALCULATED POINT;

3) N 30°-43'-09" E, A DISTANCE OF 103.78 FEET TO A CALCULATED POINT;

4) N 55°-37'-01" E, A DISTANCE OF 79.96 FEET TO A CALCULATED POINT;

5) N 23°-40'-39" E, A DISTANCE OF 86.58 FEET TO A CALCULATED POINT;

6) N 24°-21'-14" E, A DISTANCE OF 93.12 FEET TO A CALCULATED POINT;

7) N 47°-23'-09" E, A DISTANCE OF 107.97 FEET TO A CALCULATED POINT;

8) N 55°-16'-05" E, A DISTANCE OF 87.55 FEET TO A CALCULATED POINT;

9) N 49°-02'-23" E, A DISTANCE OF 116.6 FEET TO A CALCULATED POINT;

10) N 58°-44'-18" E, A DISTANCE OF 105.83 FEET TO A CALCULATED POINT;

11) N 72°-49'-55" E, A DISTANCE OF 65.74 FEET TO A CALCULATED POINT;

12) N 52°-45'-29" E, A DISTANCE OF 53.83 FEET TO A CALCULATED POINT IN THE CENTER LINE OF LONG CREEK;

THENCE, WITH THE CENTER LINE OF LONG CREEK THE FOLLOWING THREE (3) COURSES AND DISTANCES:

1) N 52°-45'-29" E, A DISTANCE OF 3.57 A CALCULATED POINT;

2) N 26°-39'-11" E, A DISTANCE OF 86.27 A CALCULATED POINT;

3) N 18°-46'-52" E, A DISTANCE OF 86.43 A CALCULATED POINT;

THENCE, DEPARTING LONG CREEK, N 84°-59'-00" W, PASSING A SET #5 WITNESS REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.) AT 50.00 FEET AND CONTINUING ANOTHER 888.18 FEET FOR A TOTAL DISTANCE OF 938.18 FEET TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.;

THENCE, WITH THE ARC OF A CIRCULAR CURVE TO THE RIGHT HAVING A RADIUS OF 100.00 FEET, AN ARC LENGTH OF 274.11 FEET AND A CHORD OF 196.00

FEET BEARING N 86°-17'-34" W TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, S 57°-53'-48" W, A DISTANCE OF 222.93 FEET TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, S 51°-20'-54" W, A DISTANCE OF 334.69 FEET TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, N 86°-03'-36" W, A DISTANCE OF 166.39 FEET TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, WITH THE ARC OF A CIRCULAR CURVE TO THE LEFT HAVING A RADIUS OF 100.00 FEET, AN ARC LENGTH OF 52.55 FEET AND A CHORD OF 51.95 FEET BEARING S 78°-00'-38" W TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, S 56°-59'-49" W, A DISTANCE OF 56.58 FEET TO A SET #5 REBAR WITH PLASTIC CAP INSCRIBED "THE SURVEY COMPANY, INC.);

THENCE, S 46°-56'-01" E, A DISTANCE OF 75.61 FEET TO **THE POINT OF BEGINNING** AND CONTAINING 22.385 ACRES OR 975,112 SQUARE FEET OF LAND ALL ACCORDING TO THAT MAP TITLED "RECOMBINATION PLAT OF REVENTURE PARK INVESTMENT 1, LLC TRACTS 1,2,3 & 4 - LONG CREEK WASTE WATER TREATMENT PLANT" PREPARED BY THE SURVEY COMPANY, INC., DATED JUNE 15, 2012, SIGNED AND SEALED BY MICHAEL C. SAWHILL, NCPLS #L-3223, TO WHICH REFERENCE IS HEREBY MADE.

In the event that the above metes and bounds legal description of Tract C encompasses property lying outside of the boundaries of Tract 1 as shown on plat titled "Exempt Subdivision Map for Clariant Corporation" recorded in Map Book 52, Page 643 in the Office of the Mecklenburg County Register of Deeds (any such property lying outside the boundaries of Tract 1 is referred to as the **"Excepted Property"**), then the boundaries of Tract 1 as shown on that plat shall control and the Excepted Property is not part of Tract C and will not be conveyed by Seller to Buyer.

EXHIBIT D

ESCROW PROVISIONS

1. In performing any of its duties as Escrow Agent, and except for damages, losses or expenses arising out of the gross negligence or willful misconduct of Escrow Agent, Escrow Agent shall not incur any liability to anyone for any damages, losses or expenses, including (a) any action taken or omitted in good faith upon advice of its legal counsel given with respect to any questions relating to the duties and responsibilities of Escrow Agent under the Agreement; or (b) any action taken or omitted in good faith reliance upon any written notice or instruction provided for in the Agreement. Escrow Agent may rely upon any written notice or instruction provided for in the Agreement as being duly executed, valid and effective, and as containing accurate information and genuine signatures.

2. Notwithstanding anything in the Agreement to the contrary, in the event of a dispute between Seller and Buyer arising prior to or at the time of the delivery or other disposition of the Deposit by Escrow Agent pursuant to the Agreement, which dispute shall be sufficient, in the sole discretion of Escrow Agent, to justify its doing so, Escrow Agent shall be entitled to tender the Deposit into the registry or custody of any court of competent jurisdiction, together with such legal pleadings as it may deem appropriate, and thereupon Escrow Agent shall be discharged from all further duties and liabilities under the Agreement. Any such legal action may be brought in such court as Escrow Agent shall determine to have jurisdiction thereof. Escrow Agent's reasonable determination of whether a dispute exists between Seller and Buyer shall be binding and conclusive upon all parties hereto, notwithstanding any contention that no dispute exists. All costs and expenses incurred by Escrow Agent in taking any action pursuant to this paragraph shall be covered by and paid pursuant to the indemnification of Escrow Agent contained in the following paragraph.

3. Seller and Buyer shall and do hereby jointly and severally indemnify, defend and hold Escrow Agent harmless from, against and in respect of: (a) any and all demands, judgments, expenses, costs, losses, injuries or claims of any kind whatsoever whether existing on the date hereof or hereafter arising, incurred by Escrow Agent by reason of, from or in connection with the Agreement or any action taken or not taken by Escrow Agent under or in connection with the Agreement, except for any such demands, judgments, expenses, costs, losses, injuries or claims arising out of the gross negligence or willful misconduct of Escrow Agent; and (b) any and all counsel fees, expenses, disbursements of counsel, amounts of judgments, demands, assessments, costs, fines or penalties, and amounts paid in compromise or settlement, incurred or sustained by Escrow Agent by reason of, in connection with or as a result of any claim, demand, action, suit, investigation or proceeding (or any appeal thereof or relating thereto or other review thereof) incident to the matters covered by the immediately preceding clause (a).

4. If Escrow Agent shall notify Seller and Buyer of its desire to be relieved of any further duties and liabilities hereunder, then Escrow Agent shall deliver the Deposit to a successor escrowee designated by Seller and Buyer. If Seller and Buyer shall fail to agree upon and designate a successor escrowee within two days after having been requested by Escrow Agent to do so, then Escrow Agent shall in its discretion designate the successor escrowee. The successor escrowee designated by Seller and Buyer or by Escrow Agent, as the case may be,

shall be a bank or trust company having trust powers in good standing and located in Charlotte, North Carolina, and shall agree to be bound by all the terms and conditions of the Agreement. Immediately upon agreement by the successor escrowee to be bound by all the terms and conditions of this agreement, the original escrowee shall be relieved of any and all duties and liabilities under or in connection with the Agreement accruing after the date of the delivery of the Deposit to the successor escrowee; provided, however, that no successor escrowee shall assume any liability for the acts or omissions of its predecessor escrowee(s) under the Agreement.

5. The agency created in Escrow Agent hereby is coupled with an interest of Seller and Buyer and shall be binding upon and enforceable against the respective successors, legal representatives and assigns of Seller and Buyer. The escrow shall not be revoked or terminated by reason of the dissolution or liquidation of Seller or Buyer but shall continue to be binding upon and enforceable against the respective successors, legal representatives and assigns of Seller and Buyer in the manner provided in this **Exhibit D**. In the event of the dissolution or liquidation of Seller and Buyer, Escrow Agent may rely and act upon any notices permitted or required to be given hereunder from any person, firm, partnership or corporation believed by Escrow Agent in good faith to be the successor, legal representative or assign of such dissolved or liquidated party.

EXHIBIT E

PURCHASE PRICE

ReVenture Park Sites				
		Acres	$/Acres	Value
Tract A	Unencumbered	52.234	$50,000	$2,611,700
	Conservation/Deed Restr	28.641	$12,500	$358,013
	Floodplain	6.24	$25,000	$156,000
	Watershed	0	$25,000	$0
	Duke Easement Area	15.034	$50,000	$751,700
Total Tract A		**102.149**		**$3,877,413**
		Acres	$/Acre	Value
Tract B	Unencumbered	33.897	$50,000	$1,694,850
	Conservation/ Deed Restrict	22.628	$12,500	$282,850
	Floodplain	0.073	$25,000	$1,825
	Watershed	0.12	$25,000	$3,000
Total Tract B		**56.718**		**$1,982,525**
		Acres	$/Acre	Value
Tract C	Unencumbered	11.727	$50,000	$586,350
	Conservation/ Deed Restrict	10.643	$12,500	$133,038
	Floodplain	0.015	$25,000	$375
	Watershed	0	$25,000	$0
Total Tract C		**22.385**		**$719,763**
TOTALS		**181.252**	**$36,301**	**$6,579,700**

(See attached map on following page)

EXHIBIT F

PERMITTED ENCUMBRANCES

1. Ad valorem taxes for the year of Closing;

2. Matters that would be shown on a current and accurate survey of the Property;

3. All easements, covenants, restrictions and conditions of record, including, but not limited to, the following:

(a) Long Creek East [Tracts 2 & 2b] Deed of Conservation Easement recorded in Book 26977, Page 618 in the Registry;

(b) Long Creek West [Tracts 4 & 5] Deed of Conservation Easement recorded in Book 26977, Page 657 in the Registry;

(c) Declaration of Covenants and Restrictions recorded in Book 26977, Page 678 in the Registry;

(d) Trail and Parking Easement Agreement recorded in Book 26977, Page 639 in the Registry;

(e) Access Easement Agreement recorded in Book 26977, Page 693 in the Registry;

4. All easements, restrictions and rights-of-way as may be apparent from an inspection of the Property;

5. All zoning, subdivision, land use and other laws, regulations or ordinances applicable to the Property;

6. Any matters arising out of Buyer's operations on the Property prior to Closing; and

7. Notice of Brownfields Property recorded in Book _____, Page _____ in the Registry.

EXHIBIT G

CLARIANT TRACT

That approximately 351.817 acre tract designated as "Tract 1" on the plat recorded in Plat Book 52, Page 643 in the Registry ("**Tract 1**"), ***LESS AND EXCEPT*** that portion of Tract 1 depicted as "Tract C" on the Recombination Plat.

EXHIBIT H

(INTENTIONALLY DELETED)

EXHIBIT I

Access Road

APPENDIX L

EXHIBIT J

Temporary Access Easement Agreement

TEMPORARY ACCESS EASEMENT AGREEMENT

THIS TEMPORARY ACCESS EASEMENT AGREEMENT ("**Agreement**") is entered into _____, 20___ by **CLARIANT CORPORATION**, a New York corporation ("**Clariant**"), and the **CITY OF CHARLOTTE**, a municipal corporation ("**City**").

A. Clariant owns the real property located in Mecklenburg County, North Carolina, designated as "Tract 1" ("**Tract 1**") on the plat recorded in Map Book 52, Page 643 in the Mecklenburg County Public Registry ("**Registry**"), less and except that portion of Tract 1 depicted as "Tract C" on Plat ("**Plat**") recorded in Map Book _____, Page ___ in the Registry ("**Clariant Property**").

B. City owns the real property located in Mecklenburg County, North Carolina, designated as "Tract A", "Tract B" and "Tract C" on the Plat ("**City Property**").

C. City intends to construct a bridge over Long Creek that will connect Tract A with Tract B and Tract C ("**Bridge**").

D. Clariant has agreed to grant for the benefit of City a temporary access easement over and across the portion of Clariant Property designated as "Access Road" on **Exhibit A** ("**Access Easement Area**").

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are acknowledged, Clariant and City agree as follows:

1. **Grant of Easement**. Clariant grants for the benefit of City a non-exclusive temporary easement ("**Access Easement**") over and across the Access Easement Area for pedestrian and vehicular ingress, egress and regress as reasonably necessary for the sole purpose of mobilizing equipment and materials necessary for the construction of the Bridge. The Access Easement is granted subject to all conditions, covenants, restrictions, easements and other matters of record, to any matters that would appear on a current and accurate survey of the Access Easement Area and to all subdivision ordinances, zoning ordinances, land use regulations and other laws, regulations or ordinances applicable to the Access Easement Area. The Access Easement shall terminate on the earlier of: (i) the date on which the Bridge is substantially complete such that vehicles can cross the Bridge; and (ii) January 1, 2018.

2. **Terms of Easement**.

(a) Use of Access Easement. The intersection of the Access Easement Area and Highway 27 shall be used by the City as an entrance onto the Access Easement Area and shall not be used by the City as an exit from the Access Easement Area onto Highway 27. The intersection of the Access Easement Area and Belmeade Drive shall be used by the City as an exit from the Access Easement Area onto Belmeade Drive and may not be used by the City as

an entrance to the Access Easement Area. The Access Easement Area may be used solely for access to City Property for the purpose of mobilizing equipment and materials necessary for the construction of the Bridge. Accordingly, the Access Easement Area may not be used by City in connection with the construction of any wastewater treatment facilities, or any other structures or facilities, on the City Property except as set forth in the preceding sentence. To the maximum extent reasonably possible in connection with the mobilization of equipment and materials necessary for the construction of the Bridge, City shall access the area of the Bridge from Tract A. City shall limit its use of the Access Easement Area to occasions when the mobilization of equipment and materials can not be accomplished through Tract A. In no event shall the Access Easement Area be used for the removal of dirt or debris from the area of the Bridge (and all such dirt and debris shall be removed through Tract A). Except in connection with the mobilization of equipment and materials necessary for the construction of the Bridge, contractors and others working on the Bridge shall access the area of the Bridge through Tract A.

(b) No Obligation to Maintain. Clariant shall have no obligation to maintain, repair or replace the road located in the Access Easement Area (**"Road"**), or any other portion of the Access Easement Area.

(c) Damage. If City or any of its agents, invitees, contractors, employees or representatives, damages the Access Easement Area or the Road, then, within thirty (30) days after demand therefor, the costs of repairing any such damage shall be paid by City to Clariant or the City shall make the necessary repairs to restore the road.

(d) Relocation. Clariant may relocate, at its sole cost, the Access Easement Area upon prior written notice to City. If Clariant elects to relocate the Access Easement Area, then Clariant shall construct at least a dirt road (consistent with the condition of the dirt road then existing within the Easement Area) within the new easement area. Upon the completion of that road and, at the sole cost of Clariant, an instrument specifying the location of the new easement area shall be recorded in the Registry, and the Access Easement shall no longer burden the portion of the Access Easement Area from which the Road was relocated, but shall burden the new easement area. Upon the recording of such instrument, the new easement area shall constitute part of the Access Easement Area.

(e) Continued Use of Easement Areas. Clariant shall have the right to use the Access Easement Area, including the full use of the Road, in any manner which will not prevent or unreasonably interfere with the use of the Road or the exercise of the easement rights under this Agreement. Any damage to the Road as a result of the use by Clariant will not be the responsibility of the City.

3. **Easement Appurtenant**. The Access Easement shall burden, and run with title to, the Access Easement Area and benefit, be appurtenant to and run with title to, the City Property.

4. **Covenant Against Liens**. City shall promptly pay and discharge on or before the due date any claim or obligation for labor or materials furnished at the direction of City which, if not paid or discharged, would result in a lien on the Property.

5. **Release; Indemnification.**

(a) City acknowledges that the exercise of the rights granted to City under this Agreement involves risks, including death, personal injury, property loss and property damage, and City hereby agrees to accept and assume all risks. City shall not hold Clariant, its directors, officers, shareholders, agents, employees, affiliates, successors and assigns (collectively, "**Clariant Related Parties**"), liable for any loss, injury or damage which may occur to City or its property, and City hereby releases and discharges Clariant and the Clariant Related Parties from (and covenants not to sue Clariant and the Clariant Related Parties for) any such loss, injury or damage or any claims related thereto.

(b) City shall indemnify, defend (with counsel acceptable to Clariant) and hold harmless Clariant and the Clariant Related Parties from and against all liens, claims of lien, losses, fines, penalties, liabilities, claims, demands, causes of action, costs and expenses (including reasonable attorneys' and consultants' fees) arising in any manner, directly or indirectly, out of or by reason of: (i) the activities of and/or presence of City, its agents, invitees, contractors, employees or representatives upon or about the Clariant Property; and (ii) City's or its agents, invitees, contractors, employees or representatives breach of any of representations, warranties or obligations under this Agreement.

6. **Insurance**. City shall maintain Commercial General Liability Insurance against claims for personal injury or death and property damage in an amount of not less than $2,000,000.00 per occurrence and aggregate limits of not less than $5,000,000.00, commercial auto liability insurance and such workers' compensation/employer's liability insurance as required by law. If City enters into any agreements that necessitate access to the Property by City's contractors, then such agreements shall require that City's contractors maintain Commercial General Liability Insurance in the above amounts, commercial auto liability insurance and workers' compensation/employer's liability insurance. All liability policies required by this **Section 6** shall: (a) be issued by insurers that are authorized to issue the applicable insurance in the state where the Property is located and are reasonably acceptable to Clariant; (b) name Clariant as an additional insured; (c) contain a provision by which the insurer will give Clariant at least 30 days prior written notice before making any material change in the nature or extent of the coverage provided under such policies and/or canceling or terminating such policies; and (d) contain a provision by which City's policies are primary to and non-contributory with any coverage that Clariant may have in effect. Prior to exercising any rights under this Agreement, City shall provide Clariant with evidence satisfactory to Clariant of the policies required by this **Section 6**. Notwithstanding the foregoing, City may provide the required insurance and proof of such insurance under a qualified self-funded insurance program in accordance with the terms and provisions of the letter to be provided by City. North Carolina law prohibits the naming of additional insureds under self-funded programs.

7. **Governing Law**. This Agreement shall be governed by North Carolina law.

8. **Binding Effect**. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

9. **Interpretation**. Except as otherwise specified in this Agreement: (a) "includes" and "including" mean includes or including by way of illustration and not by way of limitation; (b) "may" is permissive; (c) references to Exhibits, Sections or subsections are to those attached to or included in this Agreement, and all Exhibits are incorporated into this Agreement; and (d) the section and other headings in this Agreement are for convenience only and do not limit or expand any provisions of this Agreement.

10. **Severability**. If any provision of this Agreement is held to be invalid or unenforceable, then such provision will be fully severable from this Agreement; and the remaining provisions of this Agreement will remain in full force and effect and will not be affected thereby. Furthermore, in lieu of such invalid or unenforceable provision, there shall be added automatically as a part of this Agreement a valid and enforceable provision as similar in terms to such invalid or unenforceable provision as may be reasonably possible.

11. **Notice**. Any notice contemplated by this Agreement must be in writing, addressed as set forth in the records maintained by the Mecklenburg County Tax Assessor's Office and shall be either (a) sent by United States Mail, postage prepaid, registered or certified mail, return receipt requested, in which case the notice will be deemed delivered two (2) business days after being deposited in the United States mail; (b) sent by overnight delivery using a nationally recognized overnight courier, in which case the notice shall be deemed delivered one (1) business day after deposit with such courier; (c) sent by facsimile, in which case the notice shall be deemed delivered upon confirmed transmission of such notice; provided that no later than the next business day after the facsimile is sent, a hard copy of the facsimile transmission is also sent in the manner set forth in (a), (b) or (d) of this subsection; or (d) sent by personal delivery, in which case the notice will be deemed delivered on the date of delivery.

12. **Survival**. The terms of **Sections 2(c), 4, 5, 7-10, and 11-13** shall survive the expiration or earlier termination of this Agreement.

13. **Amendment**. No provision of this Agreement may be amended without the prior written consent of Clariant and City.

TO HAVE AND TO HOLD the Access Easement granted herein, together with all privileges and appurtenances thereunto belonging, for the use and purposes aforesaid unto the parties hereto, their successors and assigns, for the term specified in this Agreement.

[SIGNATURE PAGES FOLLOW]

IN WITNESS WHEREOF, the undersigned have executed this Agreement as of the day and year first above written.

CLARIANT CORPORATION,
a New York corporation

By:_____
Name: _____
Its: _____

STATE OF NORTH CAROLINA
COUNTY OF MECKLENBURG

I, _____, a Notary Public of _____ County and State of North Carolina, do hereby certify that _____ (**"Signatory"**), personally came before me this day and acknowledged that he is _____ of **CLARIANT CORPORATION**, a New York corporation, and that he, as _____, being authorized to do so, executed the foregoing instrument on behalf of the corporation.

I certify that the Signatory personally appeared before me this day, and
(check one of the following)
_____ (I have personal knowledge of the identity of the Signatory); or
_____ (I have seen satisfactory evidence of the Signatory's identity, by a current state or federal identification with the Signatory's photograph in the form of:
(check one of the following)
___ a driver's license *or*
___ in the form of _____); **or**
_____ (a credible witness has sworn to the identity of the Signatory).

The Signatory acknowledged to me that he voluntarily signed the foregoing instrument for the purpose stated and in the capacity indicated.

Witness my hand and official stamp or seal this _____ day of _____, 2013.

_____
Notary Public
Print Name:_____
[Note: Notary Public must sign exactly as on notary seal]

My Commission Expires:_____

☜ [NOTARY SEAL] **(MUST BE FULLY LEGIBLE)**

CITY OF CHARLOTTE,
a municipal corporation

By:_____
Name:_____
Title:_____

STATE OF NORTH CAROLINA
COUNTY OF MECKLENBURG

I, _____, a Notary Public of _____ County and State of North Carolina, do hereby certify that _____ (**"Signatory"**), personally came before me this day and acknowledged that he/she is _____ of **CITY OF CHARLOTTE**, a municipal corporation, and that he, as _____, being authorized to do so, executed the foregoing instrument on behalf of the municipal corporation.

I certify that the Signatory personally appeared before me this day, and
(check one of the following)
_____ (I have personal knowledge of the identity of the Signatory); **or**
_____ (I have seen satisfactory evidence of the Signatory's identity, by a current state or federal identification with the Signatory's photograph in the form of:
(check one of the following)
___ a driver's license *or*
___ in the form of _____); **or**
_____ (a credible witness has sworn to the identity of the Signatory).

The Signatory acknowledged to me that he voluntarily signed the foregoing instrument for the purpose stated and in the capacity indicated.

Witness my hand and official stamp or seal this _____ day of _____, 2013.

_____
Notary Public
Print Name:_____
[Note: Notary Public must sign exactly as on notary seal]

My Commission Expires:_____

[NOTARY SEAL] **(MUST BE FULLY LEGIBLE)**

EXHIBIT A
to
Temporary Access Easement Agreement

ACCESS EASEMENT AREA
(Temporary)

APPENDIX L

North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

MEMORANDUM

TO: Lyn Hardison, Environmental Assistance Coordinator
NCDENR Division of Environmental Assistance and Outreach

FROM: Shari L. Bryant, Piedmont Region Coordinator
Habitat Conservation Program

DATE: 29 January 2014

SUBJECT: Draft Environmental Impact Statement for Long Creek Regional Wastewater Treatment Plant, Charlotte-Mecklenburg Utilities, Mecklenburg County, DENR Project No. 1597.

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the subject document and we are familiar with the habitat values of the area. Our comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e), North Carolina Environmental Policy Act (G.S. 113A-1 through 113A-10; 1 NCAC 25), and North Carolina General Statutes (G.S. 113-131 et seq.).

Charlotte-Mecklenburg Utilities proposes to construct a new 25 million gallon per day (mgd) regional wastewater facility in northwestern Mecklenburg County. The Cities of Mount Holly and Belmont will participate in the regional facility. The proposed project would provide service to the Cities of Charlotte, Mount Holly, and Belmont, the Towns of Stanley and Huntersville, the Long Creek basin in Mecklenburg County, and the Clariant Corporation. The purpose of the project is to meet continued growth in the service area.

The service area for the new regional wastewater facility includes Catawba River including Mountain Island Lake and Lake Wylie, Long Creek, Gar Creek, Paw Creek, Dutchman's Creek, Fites Creek, and their tributaries. There are records for the state threatened creeper (*Strophitus undulatus*) and the state significantly rare Eastern creekshell (*Villosa delumbis*) in Catawba River, and there are records for the state significantly rare seagreen darter (*Etheostoma thalassinum*) in Fites Creek. Also, there are records for the federal threatened (S/A) and state threatened bog turtle (*Glyptemys muhlenbergii*) and the state threatened bald eagle (*Haliaeetus leucocephalus*) near the service area. The Significant Natural Heritage Areas – Latta Plantation Natural Areas, Shuffletown Powerline Rare Plant Site, Mountain Island Lake Dam Rare Plant Sites, and McCoy Road Sunflower Site – are located within the proposed service area.

A Wastewater Treatment Plant Expansion Study was performed that focused on three wastewater treatment plants (WWTP) – the Irwin Creek WWTP, Sugar Creek WWTP and McAlpine Creek

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Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

Wastewater Management Facility (WWMF). The study concluded construction of a new regional WWTP to provide service to the Long Creek basin in Mecklenburg County, major expansion of the Sugar Creek WWTP, moderate expansion of the McAlpine Creek WWMF, and rehabilitation of the Irwin Creek WWTP was the best approach to meet future wastewater capacity needs. These improvements would increase wastewater capacity from 99 mgd to 144 mgd by 2030.

The Wastewater Treatment Plant Expansion Study identified several options to meet the need for increased wastewater treatment capacity within the proposed service area. These options included no action, operate separately with expanded and upgraded facilities, operate separately with additional and expanded/upgraded facilities, operate with upgraded and expanded Mount Holly WWTP, operate with new regional WWTP (Mount Holly), operate with new regional WWTP (Mecklenburg County near Long Creek), operate with additional and upgraded facilities, and non-discharge/land application. The Draft Environmental Impact Statement (DEIS) considers three alternatives: the no-action alternative, a new regional facility in Mount Holly (Alternative 1) and a new regional facility in Mecklenburg County (Alternative 2). Alternative 2 is the preferred alternative.

Direct Impacts

According to the DEIS, the new wastewater facility would have advanced wastewater treatment including nutrient removal, ultraviolet disinfection, spill prevention containment, odor control, and noise and lighting reduction components. In addition, the new facility would implement a reclaimed water system, and include LEED building practices, low impact development technology, landscaping with native plants, and additional open space/recreational opportunities. The DEIS indicates discharging wastewater generated in the Long Creek basin into Lake Wylie would increase water volume in the lake and decrease energy used for pumping wastewater to the McAlpine Creek WWMF. It also indicates it would protect water quality, support aquatic life, and provide recreational opportunities.

While the discharge may provide some benefits (e.g., increased water volume in the lake), there are constituents in wastewater such as ammonia, nutrients, and copper that may directly or indirectly impact fish and freshwater mussel populations. In addition, studies have shown emerging contaminants such as pharmaceuticals and personal care products (PPCP) and endocrine disrupting compounds (EDC) in municipal wastewater effluent can cause adverse physiological effects to fish and freshwater mussels (Quinn et al. 2004, Bouchard et al. 2009, Bringolf et al. 2010, Farcy et al. 2011, Gagné et al. 2011a, Gagné et al. 2011b, Liney et al. 2011, and Vajda et al. 2011). It is unclear whether the new wastewater treatment plant would be designed with technology that is known to reduce or eliminate PPCP and EDC in the effluent.

We offer the following recommendations to minimize direct impacts on aquatic and terrestrial wildlife resources.

- Install wastewater treatment technologies to reduce or eliminate emerging contaminants such as PPCP and EDC in the effluent. Some measures that appear to provide effective reduction or elimination of these emerging contaminants include membrane bioreactors, granular activated carbon, powdered activated carbon, ozonation, and combinations of these treatment technologies.
- Gravity lines and force mains should follow existing road or utility rights-of-way, where possible. If gravity lines or force mains will follow stream channels, then a minimum 100-foot undisturbed forested buffer should be maintained along each side of perennial streams and 50-foot undisturbed forested buffer should be maintained along each side of intermittent streams and wetlands or the 100-year floodplain, whichever is greater. Manholes or similar access structures should not be allowed within buffer areas.

- Measures to avoid or minimize impacts to wetlands should be implemented during construction. Temporarily disturbed wetlands should be reseeded with annual small grains appropriate for the season (e.g. annual oats, millet, or wheat) and be allowed to revert to native natural wetland vegetation.
- All stream crossings should be kept to a minimum and should be near perpendicular (75° to 105°) to stream flow. We are pleased to see directional drilling will be used for stream crossings as this should minimize direct impact to aquatic resources. We recommend the entrance and exit bore pits are a minimum of 100 feet from the stream channel. Also, we suggest that measures be used to monitor for a frac-out during the directional drilling, and vacuum trucks be present during construction to mitigate impacts in the event of a frac-out.
- Avoid the removal of large trees at the edges of construction corridors. Where feasible, use woody debris and logs from corridor clearing to establish brush piles and downed logs adjacent to the cleared right-of-way to improve habitat for wildlife.
- Where feasible, re-seed all disturbed areas with seed mixtures that are beneficial to wildlife; avoid fescue based mixtures because fescue is invasive and provides little benefit to wildlife. Wheat/clover mixes can be planted with the edges maintained in native warm season grasses for bugging, nesting, and loafing sites. The warm season grasses can be mixed with other beneficial wildlife plantings (i.e., partridge pea, beggar weed, and ragweed) to present some variety of food and cover. It is the "step-down" edge effect from forest to open land that wildlife seem to prefer. Minimize corridor maintenance and prohibit mowing between April 1 and October 1 to minimize impacts to nesting wildlife.

Secondary and Cumulative Impacts

According to the DEIS, approximately 80% of the service area is currently served by public sewer and remainder of the service area likely would obtain public sewer according to future land use plans. Also, the DEIS indicates the regional wastewater facility has been proposed in response to an anticipated increase in wastewater generated within the service area; the facility itself would not produce this population growth.

While we understand the facility itself would not produce population growth, the facility will allow development at a higher density than would be allowed with the use of septic systems. This higher density growth has the potential to add significant impervious surface to the watershed. Additional impervious surface associated with new development results in an increase in stormwater runoff that can exert significant impacts on stream morphology. This will cause further degradation of aquatic habitats through accelerated stream bank erosion, channel changes, bedload changes, altered substrates, and scouring of the stream channel. In addition, pollutants (e.g., sediment, heavy metals, pesticides, and fertilizers) washed from roads and urban landscapes can adversely affect and extirpate species downstream of developed areas.

According to the DEIS, each of the local governments has measures to protect riparian buffers, floodplains, and open space, limit impervious surface, manage stormwater, and control sediment and erosion, and many of the measures exceed federal and state standards. However, the DEIS states "The Mecklenburg County Water Quality Program's Bioassessment Report concluded that Charlotte streams are experiencing habitat impairment associated with stream bank erosion, point and non-point source pollution including industrial discharges, sewer line leaks, treated wastewater effluent and stormwater pollutants." Also, several streams in the service area are on the State's 303(d) list of impaired waters. It is unclear whether these impairments occurred prior to the protective measures being adopted (e.g., riparian buffers and stormwater management), or if these are on-going issues even with the current measures.

We encourage each of the local governments to consider integrating additional measures to address the secondary and cumulative impacts of development on water quality and aquatic and terrestrial wildlife habitat before degradation of area streams occurs. Adopting ordinances that protect wide forested riparian corridors and the 100-year floodplain and that adequately treat stormwater in development areas in and outside of water supply areas are essential to protect water quality and aquatic habitat in developing landscapes. Measures to address the issues of development can be found in NCWRC's *Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality* (August 2002; http://www.ncwildlife.org/Portals/0/Conserving/documents/2002_GuidanceMemorandumforSecondaryandCumulativeImpacts.pdf). Also, the Green Growth Toolbox (http://216.27.39.101/greengrowth/) provides information on nature-friendly planning.

Thank you for the opportunity to comment on this project. If we can be of further assistance, please contact our office at (336) 449-7625 or shari.bryant@ncwildlife.org.

Literature cited:

Bouchard, B., F. Gagné, M. Fortier, and M Fournier. 2009. An in-situ study of the impacts of urban wastewater on the immune and reproductive systems of the freshwater mussel *Elliptio complanata*. Comparative Biochemistry and Physiology Part C: Toxicology and Pharmacology 150(2):132-140.

Bringolf, R.B., R.M. Heltsley, J.T. Newton, C.B Eads, S.J. Fraley, D. Shea, W.G. Cope. 2010. Environmental occurrence and reproductive effects of the pharmaceutical fluoxetine in native freshwater mussels. Environmental Toxicology and Chemistry 29(6):1311-1318.

Farcy, E., F. Gagné, L Martel, M. Fortier, S. Trépanier, P. Brousseau, M. Fournier. 2011. Short-term physiological effects of a xenobiotic mixture on the freshwater mussel *Elliptio complanata* exposed to municipal effluents. Environmental Research 111(8):1096-1106

Gagné, F., C André, P. Cejka, R. Hausler, and M Fournier. 2011a. Evidence of neuroendocrine disruption in freshwater mussels exposed to municipal wastewaters. Science of the Total Environment 409(19):3711-3718.

Gagné, F., C André, P. Cejka, R. Hausler, and M Fournier. 2011b. Alterations in DNA metabolism in *Elliptio complanata* mussels after exposure to municipal effluents. Comparative Biochemistry and Physiology Part C: Toxicology and Pharmacology 154(2):100-107.

Liney, K.E., J.A. Hagger, C.R. Tyler, M.H. Depledge, T.S. Galloway, and S. Jobling. 2011. Health effects in fish of long-term exposure to effluents from wastewater treatment works. Environmental Health Perspectives, April, 114(Suppl 1):81-89

Quinn, B., F. Gagné, M Costello, C. McKenzie, J. Wilson, and C. Mothersill. 2004. The endocrine disrupting effect of municipal effluent on the zebra mussel (*Dreissena polymorpha*). Aquatic Toxicology 66(3):279-292.

Vajda, A.M., L.B. Barber, J.L. Gray, E.M. Lopez, A.M. Bolden, H.L. Schoenfuss, and D.O Norris. 2011. Demasculinization of male fish by wastewater treatment plant effluent. Aquatic Toxicology, June, 103(3-4):213-221.

ec: Allen Ratzlaff, USFWS

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March 31, 2014

Ms. Shari Bryant
North Carolina Wildlife Resources Commission
Division of Inland Fisheries
1721 Mail Service Center
Raleigh, NC 27699-1721

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant

Dear Ms. Bryant,

We acknowledge receipt of your letter dated January 29, 2014. As discussed on March 28, 2014, we will update the EIS to indicate that we will reserve space on the site for potential future processes necessary for EDC and PPCP removal. You mentioned that the comments in your letter are general in nature. As the design and construction proceed, we will take these into consideration to minimize impact to the environment.

Thank you for your review and please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Barry Shearin, CMUD
Jackie Roddy, NCDENR
Lauren Elmore, Cardno-Entrix

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

January 6, 2014

Mr. David Wainwright
Mr. Jackie Roddy
Division of Water Resources
NCDENR
1634 Mail Service Center
Raleigh, NC 22699-1634

Dear Mr. Wainwright and Mr. Roddy:

Subject: Draft Environmental Impact Statement, Charlotte Mecklenburg Utilities, Long Creek Wastewater Treatment Plant, Mecklenburg County, North Carolina

We received your letter dated December 4, 2013 (received December 6, 2013), transmitting and requesting our comments on the subject draft Environmental Impact Statement. The following comments are provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C.§ 4321 et seq.); Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), the Migratory Bird Treaty Act, as amended (16 U.S.C. 703); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

According to your letter, Charlotte-Mecklenburg Utilities (CMU) provides wastewater services to more than 805,000 customers in the City of Charlotte and surrounding areas in Mecklenburg County, including the towns of Matthews, Mint Hill, Pineville, Huntersville and Cornelius. As part of a coordinated effort to proactively plan for and accommodate future growth in the region, CMU undertook a comprehensive evaluation of their current and anticipated future wastewater treatment needs by performing a Wastewater Treatment Plant Expansion Study that concluded that the best approach toward meeting future wastewater capacity needs would include construction of a new regional wastewater treatment plant (WWTP) to provide wastewater service to the Long Creek Basin in Mecklenburg County, major expansion of the Sugar Creek WWTP, and moderate expansion of the McAlpine Creek WWMF. The Irwin Creek WWTP would also need to be rehabilitated. These improvements would increase the wastewater capacity from the current level of 99 million gallons per day (mgd) to 144 mgd by 2030. The Long Creek sub-basin (which includes the Paw Creek sub-basin, Catawba Creek sub-basin, Gar Creek sub-basin, and Lower Mountain Island sub-basin) is the fastest growing basin. Wastewater in the Long Creek Basin in Mecklenburg County is pumped relatively long distances (about 20 miles) and treated at the McAlpine Creek wastewater management facilities (WWMF).

In 2006, a Feasibility and Preliminary Planning Study for Regional Wastewater Treatment was conducted that focused on developing an innovative regional solution to meet the needs of this growing area. Six options were identified to provide treatment capacity through the year 2030. The options from the 2006 study were modified to include the current partners and updated population and flow projections which were projected out to 2034. These are further evaluated in this Draft Environmental Impact Statement (DEIS) and based on this analysis, the preferred alternative is a new regional facility constructed in northwestern Mecklenburg County. The City of Mount Holly and the City of Belmont have committed to participate in the regional treatment facility.

The proposed project would provide wastewater service to the City of Mount Holly (which also accepts a
small portion of flow from a southeastern section of the Town of Stanley), the City of Belmont, the City of Charlotte, a small southern section of the Town of Huntersville, the Long Creek Basin in Mecklenburg County, and the Clariant Corporation adjacent to the proposed regional facility site. The new regional facility was selected to minimize environmental impacts and meet the planning goals of the region. Specifically the preferred alternative would include:

- Comparatively fewer natural resource and environmental impact issues at the building site;
- Fewer construction and operational constraints;
- Greater public recreation and open space benefits;
- Reduced energy use for pumping to south plants;
- Increased water volume in Lake Wylie for local uses such as power generation, cooling water, lowflow supplementation, and drinking water;
- Concurrence with the planning goals of the affected local governments;
- Elimination of the NPDES permit discharges associated with the wastewater treatment facilities in the City of Belmont and the City of Mount Holly; and
- Modification to the existing Clariant Corporation NPDES permit.

Mitigation efforts developed in coordination with state and local agencies would minimize secondary and
cumulative impacts related to growth. Measures currently in place, including smart growth land use planning, stream buffers, and stormwater Best Management Practices (BMPs), are anticipated to minimize impacts to water quality, water resources, land use compatibility, and animal habitats in the service areas as development occurs.

General Comments – The well-written DEIS provided a thorough review of the expected environmental impacts and the mitigation measures to be put in place to lessen those impacts. While we are pleased to see many of the environmentally-protective measures included in the proposed plan (directional drilling, riparian buffers, avoidance of federally listed species), we recommend the following additional/enhanced measures to further lessen possible/probable environmental impacts. Please note that the following are standard recommendations and may not all be applicable or may have been already addressed.

Our principle concern with this project is the potential impacts to area streams, wetlands, and floodplains. Regardless of whether the intent of the proposed project is to encourage development, the availability of municipal sewer will facilitate and change the density and type of development in the service area. In our experience, the combination of the increase in development (commercial, residential, and industrial) and increases in the density of development that accompany expanded sewer service will result in poorer area water quality after project completion unless proper stream protection measures are in place before the project is implemented.

Our office regularly reviews projects that involve the installation, repair, and relocation of sewer lines that have been installed parallel to waterways and now are exposed and failing. Many of these repairs cost hundreds of thousands of dollars. The primary reasons for these failures are as follows: (1) the sewer lines were installed too close to the stream; (2) the wooded riparian buffers, which stabilized the stream bank, were lost; and (3) high-water flows increased because of increased runoff from adjacent development (made possible by the sewer line). We strongly recommend that the proposed sewer lines and any connecting lines be located as far as possible from streams; it may prove less expensive in the long term.

Riparian Buffers and Floodplains - One of the most important and effective measures that can be taken to protect stream health is the preservation of riparian buffers. Wide, contiguous riparian buffers have greater and more flexible potential than other options to maintain biological integrity[1] and can ameliorate many ecological issues related to land use and environmental quality.[2] Riparian buffers accomplish the following:

1. catch and filter runoff, thereby preventing nonpoint-source pollutants from reaching streams;
2. enhance the in-stream processing of both point- and nonpoint-source pollutants;
3. act as "sponges" by absorbing runoff (which reduces the severity of floods) and, by allowing runoff to infiltrate and recharge groundwater levels, maintains stream flows during dry periods;
4. catch and help prevent excess woody debris from entering the stream and creating logjams;
5. stabilize stream banks and maintain natural channel morphology;
6. provide coarse woody debris for habitat structure and most of the dissolved organic carbon and other nutrients necessary for the aquatic food web; and
7. maintain air and water temperatures around the stream.

Impervious surfaces, ditches, pipes, roads, and utility lines (sewer, water, gas, transmission, etc.), and other infrastructures that require maintained cleared rights-of-way and/or compromise the functions and values of the forested riparian buffers should not occur within these areas. It is

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[1]R. Horner, C. May, E. Livingston, and J. Maxted. 1999. Impervious Cover, Aquatic Community Health, and Storm Water BMPs: Is There a Relationship? *In:* Proceedings of the Sixth Biennial Storm Water Research and Watershed Management Conference. Southwest Florida Water Management District, Tampa, FL.

[2]R. J. Naiman, H. DeCamps, and M. Pollock. 1993. The role of riparian corridors in maintaining regional biodiversity. Ecol. Appl. 3:209-212.

important to remember that one of the main purposes of sewer systems is to protect water quality. If the impacts of installing a sewer system adjacent to streams are greater than an alternative collection system or the use of septic systems, then a less environmentally degrading alternative should be sought. We acknowledge that local topography can make the avoidance of riparian buffers difficult when installing sewer lines and that, in some instances, the impacts are unavoidable for practical reasons (cost and depth of sewer lines). However, the DEIS for this project should demonstrate that the sewer line will be designed to be as far away from any waterways as possible and that only in instances where the topography or existing structures/infrastructure prevent maintaining the riparian buffers should encroachment be necessary.

For most projects, we recommend the maintenance or establishment of minimum 100-foot native forested buffers along each side of perennial streams and 50-foot native forested buffers along each side of intermittent streams and wetlands[3] throughout the present and future service areas of the entire municipal jurisdiction.[4] We additionally encourage the implementation of buffers on ephemeral streams due to the important functions they provide as headwater streams.[5,6] Buffers should be measured horizontally from the edge of the stream bank,[7] which may result in wider buffers at higher gradients, and must be provided over the entire length of the stream, including headwater streams.

To maximize the buffers, we recommend that the subject lines and any future connecting sewer lines be installed as far "upslope" (outside the buffers) as possible. Additionally, to ensure that the stream buffers are maintained, development within the buffers should be discouraged by not allowing development within 100 feet of area streams and creeks to connect to the subject sewer lines (this does not preclude existing residences or businesses from connecting). This will prevent further alteration of riparian buffers and the in-fill of area floodplains, which would increase the potential for the flooding of adjacent properties and interfere with the natural hydrological process of area waterways. In addition, it would prevent the disruption of migration corridors for wildlife.

We also remind you that Executive Order 11988 requires federal agencies to consider and protect floodplain functions; the loss of woody vegetation affects floodplain functions. We believe the recent examples of flooding throughout North Carolina highlight the importance of avoiding the

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[3]For projects potentially affecting waterways that contain federally listed species, the above-recommended buffer widths should be doubled (100 feet for intermittent streams and 200 feet for perennial streams).

[4]J. S. Stewart, D. M. Downes, L. Wang, J. A. Wierl, and R. Bannerman. 2000. Influences of riparian corridors on aquatic biota in agricultural watersheds. Pages 209–214 *in* P. J. Wigington, Jr., and R. L. Beschta, eds. Proceedings of the American Water Resources Association International Conference on riparian ecology and management in multi-land use watersheds, Portland, OR.

[5]R. B. Alexander, R. A. Smith, and G. E. Schwarz. 2000. Effect of Stream Channel Size on the Delivery of Nitrogen to the Gulf of Mexico. Nature 403:758-761.

[6]B. J. Peterson, W. M. Wolheim, P. J. Mulholland, J. R. Webster, J. L. Meyer, J. L. Tank, E. Marti, W. B. Bowden, H. M. Valett, A. E. Hershey, W. H. McDowell, W. K. Dodds, S. K. Hamilton, S. Gregory, and D. D. Morrall. 2001. Control of Nitrogen Export from Watersheds by Headwater Streams. Science 292:86-90.

[7]K. L. Knutson and V. L. Naef. 1997. Management recommendations for Washington's priority habitats: riparian. Washington Department of Fish and Wildlife, Olympia, WA. 181 pp.

"long- and short-term impacts associated with the occupancy and modification of floodplains" and that we should "avoid direct and indirect support of floodplain development." To help prevent floodplain development, development within the floodplain should be discouraged by not allowing any residential, commercial, or industrial facility built within 100 feet of a perennial stream or within the 100-year floodplain (whichever is greater) to connect to the new sewer lines (this does not preclude existing residences or businesses from connecting). This will prevent both the further alteration of the riparian buffer and in-fill of the floodplain, which would also decrease the potential for the flooding of adjacent properties and interference with the natural hydrological process of the waterway. It also would prevent the disruption of migration corridors for wildlife.

Utility Crossing/Directional Drilling - We recommend the use of directional boring under all streams to prevent stream impacts. From our experiences with similar projects, we believe the use of open-trenching technique increases the likelihood of future lateral movement of the stream (which could undercut or erode around the sewer line), and the correction of these problems could result in additional future maintenance and impacts to the stream. Utility crossings should be kept to a minimum, and all utility infrastructures should be kept out of riparian buffer areas. Directional boring under streams significantly minimizes impacts to aquatic resources and riparian buffers. If this method cannot be used and trenching is determined to be the only viable method, the crossing should be made perpendicular to the stream flow, and we recommend the development of a stream-bank monitoring and maintenance program that would allow for the prompt stabilization of stream banks near the utility crossing (should any stream-bank erosion or destabilization occur) throughout the life of this project.

Erosion and Sedimentation Control - Construction activities near streams, rivers, and lakes have the potential to cause water pollution and stream degradation if measures to control erosion and sediment are not properly installed and maintained. In order to effectively reduce erosion and sedimentation impacts, Best Management Practices should be designed, installed, and maintained during land-disturbing activities. A complete design manual, which provides extensive details and procedures for developing site-specific plans to control erosion and sediment and is consistent with the requirements of the North Carolina Sedimentation and Pollution Control Act and Administrative Rules, is available at *http://www.dlr.enr.state.nc.us/pages/publications.html.*

Equipment Use in Riparian Areas - Equipment should be kept out of streams by operating from the banks in a fashion that minimizes disturbance to woody vegetation. Equipment should be inspected daily and should be maintained in order to prevent the contamination of surface waters from leaking fuels, lubricants, hydraulic fluids, or other toxic materials. All fuels, lubricants, and other toxic materials should be stored outside the riparian management area of the stream, in a location where the material can be contained. Equipment should be checked for leaks of hydraulic fluids, cooling system liquids, and fuel and should be cleaned before fording any stream. Also, all fueling operations should be accomplished outside the riparian management area.

Impervious Surface/Storm-water Management - In addition to the increased storm-water flows caused by the lack of or loss of riparian buffers and any floodplain development, increased development outside the floodplain will also contribute to the quantity and quality of storm water entering project area waterways. Recent studies[8] have shown that areas of 10- to 20-percent impervious surface (such as roofs, roads, and parking lots) double the amount of storm-water runoff compared to natural cover and decrease deep infiltration (groundwater recharge) by 16 percent. At 35- to 50-percent impervious surface, runoff triples, and deep infiltration is decreased by 40 percent. Above 75-percent impervious surface, runoff is 5.5 times higher than natural cover, and deep infiltration is decreased by 80 percent. Additionally, the adequate treatment of storm water in development areas is essential for the protection of water quality and aquatic habitat in developing landscapes. Additionally, these impervious surfaces collect pathogens, metals, sediment, and chemical pollutants and quickly transmit them (via storm-water runoff) to receiving waters. According to the Environmental Protection Agency, this nonpoint-source pollution is one of the major threats to water quality in the United States, posing one of the greatest threats to aquatic life, and is also linked to chronic and acute illnesses in human populations from exposure through drinking water and contact recreation. Increased storm-water runoff also directly damages aquatic and riparian habitat, causing stream-bank and stream-channel scouring. In addition, impervious surfaces reduce groundwater recharge, resulting in even lower than expected stream flows during drought periods, which can induce potentially catastrophic effects for fish, mussels, and other aquatic life. Accordingly, we recommend that all new developments, regardless of the percentage of impervious surface area they will create, implement storm-water-retention and -treatment measures designed to replicate and maintain the hydrograph at the preconstruction condition in order to avoid any additional impacts to habitat quality within the watershed.

Best management practices can reduce, but not eliminate, the loading of common storm-water pollutants. Designs that collect runoff and allow it to infiltrate the soil have the highest documented pollutant-removal efficiency, eliminating nearly all lead, zinc, and solids and more than 50 percent of total phosphorous. Ponds and wetlands, which allow contaminants to settle out of the water column or to be broken down by sunlight and biological activity, can remove more than 70 percent of bacteria. The North Carolina Wildlife Resources Commission (NCWRC) has developed a *A Guidance Memorandum to Address and Mitigate Secondary and*

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[8]Federal Interagency Stream Restoration Working Group (15 federal agencies of the United States Government). October 1998. Stream Corridor Restoration: Principles, Processes, and Practices. GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3.

Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality that we support and encourage you to use; it can be accessed via the Internet as follows:

http://www.ncwildlife.org/pg07_wildlifespeciescon/pg7c3_impacts.pdf.

We recommend the use of low-impact development techniques, such as reduced road widths, grassed swales in place of curb and gutter, rain gardens, and wetland retention areas, for retaining and treating storm-water runoff rather than the more traditional measures, such as large retention ponds, etc. These designs often cost less to install and significantly reduce environmental impacts from residential development.

Where detention ponds are used, storm-water outlets should drain through a vegetated area prior to reaching any natural stream or wetland area. Detention structures should be designed to allow for the slow discharge of storm water, attenuating the potential adverse effects of storm-water surges; thermal spikes; and sediment, nutrient, and chemical discharges. Also, because the purpose of storm-water-control measures is to protect streams and wetlands, no storm-water-control measures or best management practices should be installed within any stream (perennial or intermittent), wetland, or riparian area.

Invasive Exotic Species - We are also concerned with the introduction and spread of invasive exotic species in association with the proposed project. Without active management, including the revegetation of disturbed areas with native species, project corridors will likely only be sources of (and corridors for) the movement of invasive exotic plant species. Exotic species are a major contributor to species depletion and extinction, second only to habitat loss. Exotics are a factor contributing to the endangered or threatened status of more than 40 percent of the animals and plants on the *Federal List of Endangered and Threatened Wildlife and Plants*.[9] It is estimated that at least 4,000 exotic plant species and 2,300 exotic animal species are now established in the United States, costing more than $130 billion a year to control.[10] Additionally, the U.S. Government has many programs and laws in place to combat invasive species (see *www.invasivespecies.gov*) and thus cannot spend money to counter these efforts. Specifically, Section 2(a)(3) of Executive Order 13112 - Invasive Species (February 3, 1999) directs federal agencies to "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere." Despite their short-term erosion control benefits, many exotic species used in soil stabilization seed mixes are persistent once they are established, thereby preventing the reestablishment of native vegetation. Many of these exotic plants[11] are also aggressive invaders of nearby natural areas, where they are capable of displacing already-established native species. Therefore, we strongly recommend that only native plant species be used in association with all aspects of this project, including secondary impacts (i.e., future sewer lines).

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[9] D. S. Wilcove, D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience 48:607-615.

[10] D. Pimentel, L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. BioScience 50:53-65.

[11] Lists of invasive exotic plants can be found at *http://www.tneppc.org/* and *http://www.invasive.org/eastern/srs/* on the Internet.

Federally Listed Endangered and Threatened Species - According to our records and a review of the information you provided, we concur with your conclusion that the implementation of Alternative 2 is not likely to adversely affect the endangered Schweinitz's sunflower (Helianthus schweinitzii). Therefore, if Alternative 2 is selected and impemented as described in the DEIS, we believe the requirements under section 7 of the Endangered Species Act would be fulfilled for this species. However, obligations under section 7 of the Endangered Species Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

Additional Conservation Measures - We recommend the local governments consider integrating additional measures to address issues of development and its impact on water quality and aquatic and terrestrial wildlife habitat before degradation of area streams occurs. Implementation of the following measures (in addition to those mentioned above) would help to address the secondary and cumulative impacts associated with this project and to reduce impacts to aquatic and terrestrial wildlife resources. More detailed information on each of these measures and supporting literature can be found in NCWRC's previously mentioned *Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality* and the Green Growth Toolbox (http://www.ncwildlife.org/GreenGrowth/index.htm) provides information on nature-friendly planning.

1. Delineate streams according to U.S. Army Corps of Engineers or N.C. Division of Water Quality methodology.
2. The directional bore (installation of utilities beneath the riverbed, avoiding impacts to the stream and buffer) stream crossing method should be used for utility crossings wherever practicable, and the open cut stream crossing method should be used only when water level is low and stream flow is minimal. Manholes or similar access structures should not be allowed within buffer areas. Stream crossings should be near perpendicular (75° to 105°) to stream flow and monitored at least every three months for maintenance needs during the first 24 months of the project and then annually thereafter.
3. Avoid the removal of large trees at the edges of construction corridors. Re-seed disturbed areas with seed mixtures that are beneficial to wildlife. Where feasible, use woody debris and logs from corridor clearing to establish brush piles and downed logs adjacent to the cleared right-of-way to improve habitat for wildlife. Avoid fescue based mixtures because fescue is invasive and provides little benefit to wildlife. Minimize corridor maintenance and prohibit mowing between April 1 and October 1 to minimize impacts to nesting wildlife.
4. Use bridges for all permanent roadway crossings of streams and associated wetlands to eliminate the need to fill and culvert, where practicable. If culverts must be used, the culvert should be designed to allow passage of aquatic organisms.

5. Insecticides and herbicides should not be used for maintenance of rights-of-way within 100 feet of perennial streams and 50 feet of intermittent streams, or within floodplains and wetlands associated with these streams.

Please contact Mr. Allen Ratzlaff of our staff at 828/258-3939, Ext. 229, if you have any questions regarding our comments. We have assigned our Log No. 4-2-14-078 to this project; please refer to it in all future correspondence directed to us concerning this matter.

cc:
Ms. Shari Bryant, Piedmont Region Coordinator, Falls Lake Office, North Carolina Wildlife Resources Commission, 1142 I-85 Service Road, Creedmoor, NC 27522

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March 31, 2014

Mr. Allen Ratzlaff
US Fish and Wildlife Service
160 Zillicoa Street
Asheville, NC 28801

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant

Dear Mr. Ratzlaff,

We acknowledge receipt of your letter dated January 6, 2014. As discussed on March 28, 2014, we will update the EIS to note that the Northern Long Eared Bat has been proposed for the endangered list. You mentioned that the comments in your letter are general in nature. As the design and construction proceed, we will take these into consideration to minimize impact to the environment.

Thank you for your review and please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Barry Shearin, CMUD
Jackie Roddy, NCDENR
Lauren Elmore, Cardno-Entrix

NCDENR
North Carolina Department of Environment and Natural Resources
Office of Land and Water Stewardship

Pat McCrory
Governor

Bryan Gossage
Director

John E. Skvarla, III
Secretary

February 5, 2014

MEMORANDUM

TO: Lyn Hardison, NCDENR State Clearinghouse Coordinator

FROM: Allison (Schwarz) Weakley, North Carolina Natural Heritage Program AEW

SUBJECT: Draft EIS – Charlotte Mecklenburg Utilities Long Creek Regional Wastewater Treatment Facilitiy, Mecklenburg County

REFERENCE: Project No. 1597

Thank you for the opportunity to provide information on the proposed project referenced above. We appreciate the interest of the applicant in the data and other information that the NC Natural Heritage Program (NCNHP) can provide, and note that the NCNHP data cited in the DEIS is dated May 2007. The NCNHP database (as of January 2014) shows occurrence records for the following rare species within the immediate vicinity of the preferred alternative (Alternative 2):

SCIENTIFIC NAME	COMMON NAME	ELEMENT OCCURRENCE STATUS*	NC STATUS*	USA STATUS*
Alasmidonta robusta	Carolina Elktoe	Historical	SR	---
Lasmigona decorata	Carolina Heelsplitter	Historical	E	E
Etheostoma thalassinum	Seagreen Darter	Current	SR	---

* For status definitions, please see the Help document at http://www.ncnhp.org/web/nhp/database-search.

The records for Carolina Elktoe and Carolina Heelsplitter are considered historical and these occurrences are considered extripated from Long Creek and Paw Creek, respectively. The occurrence for Seagreen Darter is located in the lower reach of Fites Creek (Gaston County, NC), a tributary of Catawba River; this occurrence was documented in 2008 and consists of approximately 2 km of Fites Creek in the vicinities of NC-273, SR-2044, and SR-2146.

Please note that although we may not be aware of natural heritage elements within the project area, it does not necessarily mean that they are not present. It may simply mean that the area has not been surveyed. The use of Natural Heritage Program data should not be substituted for actual field surveys where they are needed, particularly if the project area contains suitable habitat for rare species or important natural communities.

Also within the vicinity of the proposed project are conservation/managed lands protected by easement by the Catawba Land Conservancy; these easements protect riparian areas along the Catawba River and Long Creek. Based on the maps submitted with the DEIS showing the proposed force main lines associated with Alternative 2, these easements could be impacted.

The applicant may wish to visit the new NCNHP website (www.ncnhp.org) that offers access to data and other information on rare species, natural communities, significant natural areas, and lands managed for conservation. The online map viewer currently available shows boundaries of SNHAs and conservation/managed areas, included the conservation lands referenced above, and can be searched for NCNHP records that occur within one mile to five miles of the project location.

Please feel free to contact me at 919-707-8629 or Allison.Weakley@ncdenr.gov if you have questions or need further information.

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March 31, 2014

Ms. Allison (Schwarz) Weakley
North Carolina Natural Heritage Program
NCDENR
1601 Mail Service Center
Raleigh, NC 27699-1601

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant

Dear Ms. Weakley

We acknowledge receipt of your letter dated February 5, 2014. As discussed on March 28, 2014, we will update the rare species section of the EIS and will coordinate with Catawba Land Conservancy to minimize disruption for pipeline and bridge crossings.

Thank you for your review and please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Barry Shearin, CMUD
Jackie Roddy, NCDENR
Lauren Elmore, Cardno-Entrix
Lyn Hardison, NCDENR

North Carolina Department of Environment and Natural Resources
Division of Waste Management
Dexter R. Matthews
Director

Pat McCrory
Governor

John E. Skvarla, III
Secretary

January 28, 2014

To: Dexter Matthews, Director
Division of Waste Management

From: Brent Burch, Supervisor MW for BB
Western Region Compliance Branch

RE: RCRA comments on Mecklenburg County Utilities/City of Mount Holly/City of Belmont Long Creek Regional Wastewater Treatment Project #1597

The Hazardous Waste Section has reviewed the proposed construction of a 25 million gallons per day regional wastewater treatment facility adjacent to the Long Creek pumping station.

Mecklenburg County Utilities Division/City of Mount Holly/City of Belmont are reminded if during the project, a solid waste is generated, they are required to determine if the waste is a hazardous waste. Additionally, if >220 pounds of hazardous waste is generated in a calendar month the Hazardous Waste Section must be notified and the generator must comply with the small quantity generator requirements. If ≥2200 pounds are generated in a calendar month the Hazardous Waste Section must be notified and the generator must comply with the large quantity generator requirements.

The Hazardous Waste Section has no objection to the proposal.

Should any questions arise, please contact me at 828-321-9585.

North Carolina Department of Environment and Natural Resources
Division of Waste Management

Pat McCrory
Governor

Dexter R. Matthews
Director

John E. Skvarla, III
Secretary

Date: January 28, 2014

To: Dexter Matthews, Director
Division of Waste Management

Through: Jim Bateson, Superfund Section Chief

From: Pete Doorn, Special Remediation Branch Head

Subj: SEPA Project #1597 Proposed Long Creek Regional Waste Water Treatment Plant, Charlotte, Mecklenburg County

A review of the proximity of the Long Creek Regional Waste Water Treatment Plant to CERCLIS and other sites under the jurisdiction of the Superfund Section has been completed. The preferred alternative for this project involves constructing a new regional waste water treatment plant in northwestern Mecklenburg County and a new pump station and forcemain to pump flow from Belmont to the Paw Creek Pumping Station. These improvements are intended to provide adequate utilities for projected growth in the area.

Two sites were identified within a 1-mile radius of the proposed location of the proposed Long Creek Regional WWTP, and 2 sites were identified within a 1-mile radius of the proposed Belmont Pumping Station and Forcemain (as listed below and shown on the attached maps). It does not appear that these sites will impact the proposed project, however, because these sites are open cases it is advised that when a final project configuration is selected, files for environmental contamination sites in close proximity to the final project location be reviewed to ensure that potential health and safety issues are understood. Files for the sites listed below can be accessed by following the "Access File Records Online" link on the Superfund Section website: http://portal.ncdenr.org/web/wm/sf.

Please contact me at 919.707.8369 if you have any questions.

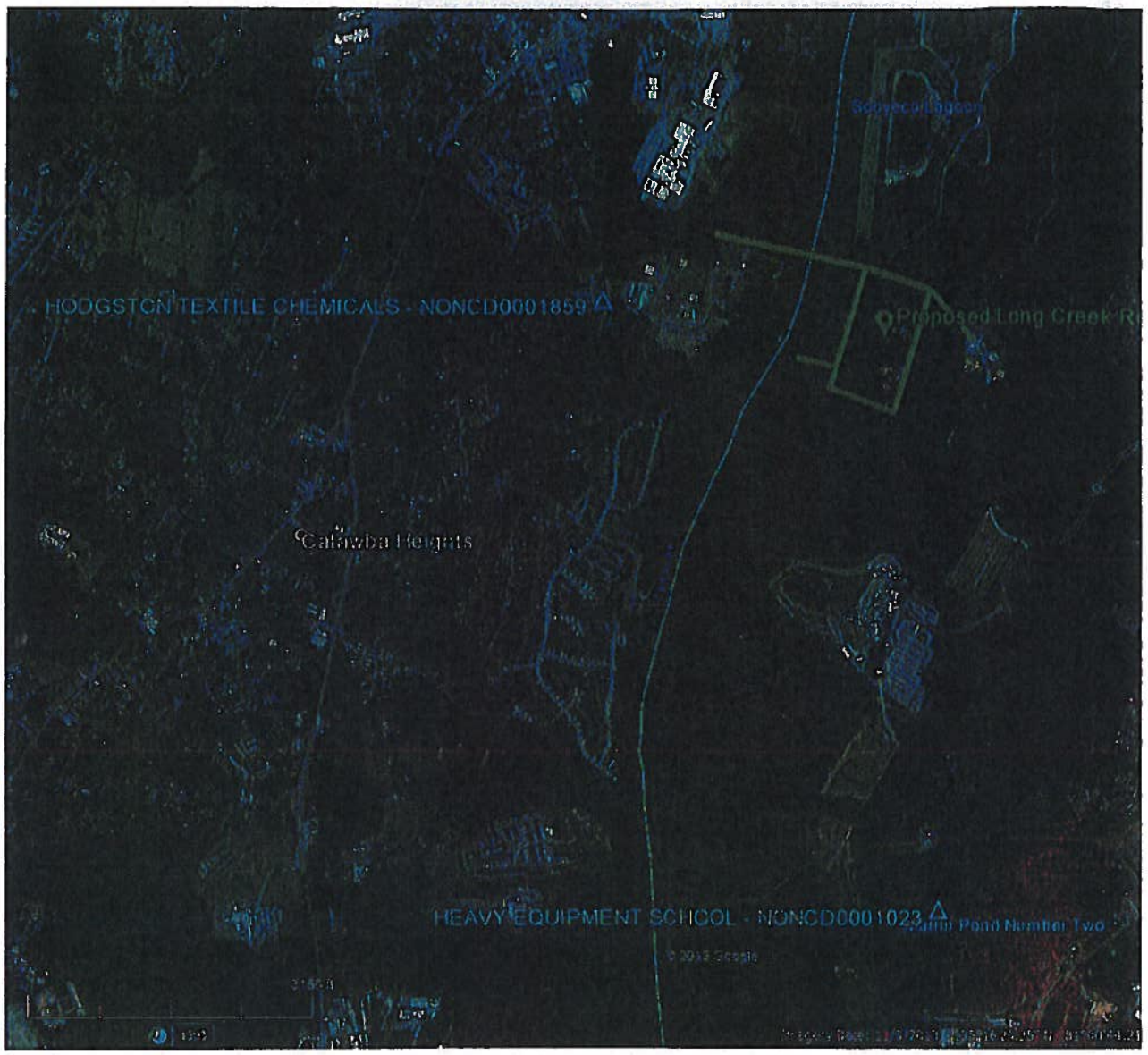
Site Name	ID #	Program	Estimated Distance	Dir. from SEPA Proj.	Status
Proposed Long Creek Regional WWTP					
Dixie Yarns Piedmont	NONCD0001621	IHSB	0.4 mi	N	Site is on the Inactive Hazardous Sites Inventory; it is an open case.
Belmont Dyers	NONCD0001335	IHSB	0.6 mi	N	Site is on the Inactive Hazardous Sites Inventory; it is an open case.

Proposed Belmont Pumping Station & Forcemain					
Hodgston Textile Chemicals	NONCD0001859	IHSB	0.3 mi	W	Site is on the Inactive Hazardous Sites Inventory; it is an open case.
Heavy Equipment School	NONCD0001023	IHSB	0.6 mi	S	Site is on the Inactive Hazardous Sites Inventory; it is an open case.

Cc: Jim Bateson

Map 1: Superfund Sites Identified within 1-Mile Radius of SEPA Project #1597, Proposed Long Creek Regional Was Charlotte, Mecklenburg County, NC.

Note: Site locations are estimated based on the best available information.



Map 2: Superfund Sites Identified within 1-Mile Radius of SEPA Project #1597, Proposed Long Creek Regional Was Charlotte, Mecklenburg County, NC.

Note: Site locations are estimated based on the best available information.

North Carolina Department of Environment and Natural Resources

Dexter Matthews, Director

Division of Waste Management
Solid Waste Section
Winston-Salem Regional Office

Pat McCrory, Governor
John E. Skvarla, III, Secretary

Date: January 29, 2014

To: Dexter Matthews, Division Director

From: Jason Watkins, Western District Supervisor – Solid Waste Section JRW

RE: SEPA Review: Project #1597 - Mecklenburg County -Draft Environmental Impact Statement – Charlotte Mecklenburg Utilities Long Creek Regional Wastewater Treatment facility

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The Solid Waste Section has reviewed the Draft Environmental Impact Statement for the Charlotte Mecklenburg Utilities Long Creek Regional Wastewater Treatment facility in Mecklenburg County and has seen no adverse impact on the surrounding community and likewise knows of no situations in the community, which would affect this project from a solid waste perspective.

Charlotte Mecklenburg Utilities (CMU) and/or its contractors should make every feasible effort to minimize the generation of waste during the construction phases of this project, to recycle materials for which viable markets exist, and to use recycled products and materials in the development of this project where suitable. Any waste generated by the project that cannot be beneficially reused or recycled must be disposed of at a solid waste management facility permitted by the Division. The Division strongly recommends that CMU require the contractors to provide proof of proper disposal for all waste generated during the project, in the form of disposal tickets.

Questions regarding solid waste management and/or the location of permitted solid waste facilities should be directed to Mrs. Teresa Bradford, Environmental Senior Specialist, Solid Waste Section, at (704) 235-2160.

Cc: Michael Scott, Section Chief
Jessica Montie, Compliance Officer
Teresa Bradford, Environmental Sr. Specialist

585 Waughtown Street, Winston-Salem, NC 27107
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March 28, 2014

Mr. Dexter Matthews
Director, Division of Waste Management
NCDENR
1601 Mail Service Center
Raleigh, NC 27699-1601

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant (Project Review Form 1597)

Dear Mr. Matthews

We acknowledge receipt of the memoranda from Jason Watkins dated January 29, 2014 related to DEPA review, from Jim Bateson and Pete Doorn dated January 28, 2014 related to Superfund review; and from Brent Burch dated January 28, 2014 related to RCRA and we concur with their comments of the draft EIS.

Thank you for your review and please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manger

Enclosure[s]

cc: Barry Shearin, CMUD
Brent Burch, NCDENR
Jackie Roddy, NCDENR
Jason Watkins, NCDENR
Jim Bateson, NCDENR
Pete Doorn, NCDENR

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Waste Management

Pat McCrory
Governor

Dexter R. Matthews
Director

John E. Skvarla, III
Secretary

TO: Lyn Hardison, Environmental Coordinator

FROM: Ron Taraban, Regional UST Supervisor

DATE: January 24, 2014

RE: Project Review Form: 1597

I have searched the Underground Storage Tank (UST) databases for documented releases of petroleum and regulated substances in the vicinity of the proposed Long Creek Regional Wastewater Treatment Plant. I did not find a documented open incident in the general vicinity of the proposed project. The following comments however, are pertinent to my review:

1. The Mooresville Regional Office (MRO) UST Section recommends removal of any abandoned or out-of-use petroleum USTs or petroleum above ground storage tanks (ASTs) within the project area. The UST Section should be contacted regarding use of any proposed or on-site petroleum USTs or ASTs. We may be reached at 704-663-1699.

2. Any petroleum spills must be contained and the area of impact must be properly restored. Petroleum spills of significant quantity must be reported to the North Carolina Department of Environment & Natural Resources – Division of Waste Management Underground Storage Tank Section in the Mooresville Regional Office at 704-663-1699.

3. Any soils excavated during demolition or construction that show evidence of petroleum contamination, such as stained soil, odors, or free product must be reported immediately to the local Fire Marshall to determine whether explosion or inhalation hazards exist. Also, notify the UST Section of the Mooresville Regional Office at 704-663-1699. Petroleum contaminated soils must be handled in accordance with all applicable regulations.

If you have any questions or need additional information, please contact me at Ron.Taraban@ncdenr.gov or by phone at 704-235-2167.

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March 28, 2014

Mr. Ron Taraban
Regional UST Supervisor
Division of Waste Management
NCDENR
610 East Center Ave, Suite 301
Mooresville, NC 28115

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant (Project Review Form 1597)

Dear Mr. Taraban,

We acknowledge receipt of your letter dated January 24, 2014 and concur with your comments on the draft EIS document.

Thank you for your review and please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Barry Shearin, CMUD
Jackie Roddy, NCDENR
Lyn Hardison, NCDENR

North Carolina Department of Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

December 23, 2013

MEMORANDUM

TO: David Wainwright
Division of Water Resources
NC Department of Environment and Natural Resources

FROM: Ramona M. Bartos RSG for Ramona M. Bartos

SUBJECT: Draft Environmental Impact Statement, Charlotte Mecklenburg Utilities, Long Creek Regional Wastewater Treatment Plant, Mecklenburg County, ER 13-2894

Thank you for your letter of December 4, 2013, transmitting the Draft Environmental Impact Statement (EIS) for the above project. We believe the Draft EIS adequately addresses our concerns for historic resources.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Location: 109 East Jones Street, Raleigh NC 27601 **Mailing Address**: 4617 Mail Service Center, Raleigh NC 27699-4617 **Telephone/Fax**: (919) 807-6570/807-6599

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March 28, 2014

Ms. Ramona M. Bartos
Administrator, State Historic Preservation Office
North Carolina Department of Cultural Resources
4617 Mail Service Center
Raleigh, NC 27699-4617

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant (ER 13-2894)

Dear Ms. Bartos

We acknowledge receipt of your memo dated December 23, 2013 and thank you for your review.

Please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Jackie Roddy, NCDENR
Barry Shearin, CMUD

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

MEMORANDUM

TO: Jackie Roddy, P.E
Public Water Supply Section
Division of Water Resources

FROM: Lyn Hardison
Division of Environmental Assistance and Customer Service
Permit Assistance & Project Review Coordinator

RE: Draft Environmental Impact Statement
Charlotte Mecklenburg Utilities Long Creek Regional Wastewater Treatment Facility
Mecklenburg County
DENR # 1597

Date: January 31, 2014

The Department of Environment and Natural Resources has reviewed the proposal for the referenced project. Based on the information provided, our agencies have identified permits that may be required. The NC Wildlife Resource Commission has provided some recommendations to minimize impacts on aquatic resources. Please forward this memorandum and the attachments to the applicant for their consideration.

Thank you for the opportunity to respond.

Attachments

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State of North Carolina
Department of Environment and Natural Resources

Reviewing Office: **Mooresville Regional Office**

INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS

Project Number: 1597 Due Date: 1/31/2014

After review of this project it has been determined that the ENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
☐	Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.	Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.	30 days (90 days)
☐	NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begin activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90-120 days (N/A)
☐	Water Use Permit	Pre-application technical conference usually necessary	30 days (N/A)
☐	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a well.	7 days (15 days)
☐	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
☐	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100 thru 2Q.0300)	Application must be submitted and permit received prior to construction and operation of the source. If a permit is required in an area without local zoning, then there are additional requirements and timelines (2Q.0113).	90 days
☐	Permit to construct & operate Transportation Facility as per 15 A NCAC (2D.0800, 2Q.0601)	Application must be submitted at least 90 days prior to construction or modification of the source.	90 days
☐	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
☐	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 20.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-707-5950.		
☐	Complex Source Permit required under 15 A NCAC 2D.0800		
☑	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) At least 30 days before beginning activity. A fee of $65 for the first acre or any part of an acre. An express review option is available with additional fees.		20 days (30 days)
☐	Sedimentation and erosion control must be addressed in accordance with NCDOT's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable stormwater conveyances and outlets.		(30 days)
☐	Mining Permit	On-site inspection usual. Surety bond filed with ENR Bond amount varies with type mine and number of acres of affected land. Any arc mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
☐	North Carolina Burning permit	On-site inspection by N.C. Division Forest Resources if permit exceeds 4 days	1 day (N/A)
☐	Special Ground Clearance Burning Permit - 22 counties in coastal N.C. with organic soils	On-site inspection by N.C. Division Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."	1 day (N/A)
☐	Oil Refining Facilities	N/A	90-120 days (N/A)
☑	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, certify construction is according to ENR approved plans. May also require permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of $200.00 must accompany the application. An additional processing fee based on a percentage or the total project cost will be required upon completion.	30 days (60 days)

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
☐	Permit to drill exploratory oil or gas well	File surety bond of $5,000 with ENR running to State of NC conditional that any well opened by drill operator shall, upon abandonment, be plugged according to ENR rules and regulations.	10 days N/A
☐	Geophysical Exploration Permit	Application filed with ENR at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days N/A
☐	State Lakes Construction Permit	Application fee is charged based on structure size. Must include descriptions & drawings of structure & proof of ownership of riparian property.	15-20 days N/A
☐	401 Water Quality Certification	N/A	60 days (130 days)
☐	CAMA Permit for MAJOR development	$250.00 fee must accompany application	55 days (150 days)
☐	CAMA Permit for MINOR development	$50.00 fee must accompany application	22 days (25 days)
☐	Several geodetic monuments are located in or near the project area. If any monument needs to be moved or destroyed, please notify: N.C. Geodetic Survey, Box 27687 Raleigh, NC 27611		
☐	Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.		
☑	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
☐	Compliance with 15A NCAC 2H 1000 (Coastal Stormwater Rules) is required.		45 days (N/A)
☐	Tar Pamlico or Neuse Riparian Buffer Rules required.		
☐	Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq. Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
☐	If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days

* Other comments (attach additional pages as necessary, being certain to cite comment authority)

DAQ. Air Quality Permit required. for [illegible] 1-22-2014

DENR - E&S Control Permit, Dam Safety Permit, Stormwater, NPDES, required from State & various other agencies.

UST - see attached comments 1/24/14

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

☐ **Asheville Regional Office**
2090 US Highway 70
Swannanoa, NC 28778
(828) 296-4500

☒ **Mooresville Regional Office**
610 East Center Avenue, Suite 301
Mooresville, NC 28115
(704) 663-1699

☐ **Wilmington Regional Office**
127 Cardinal Drive Extension
Wilmington, NC 28405
(910) 796-7215

☐ **Fayetteville Regional Office**
225 North Green Street, Suite 714
Fayetteville, NC 28301-5043
(910) 433-3300

☐ **Raleigh Regional Office**
3800 Barrett Drive, Suite 101
Raleigh, NC 27609
(919) 791-4200

☐ **Winston-Salem Regional Office**
585 Waughtown Street
Winston-Salem, NC 27107
(336) 771-5000

☐ **Washington Regional Office**
943 Washington Square Mall
Washington, NC 27889
(252) 946-6481

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March 28, 2014

Ms. Lyn Hardison
Division of Environmental Assistance and Customer Service
NCDENR
1601 Mail Service Center
Raleigh, NC 27699-1601

B&V Project 148017.0500

Subject: Draft EIS, CMUD Long Creek Regional Wastewater Treatment Plant (Project Review Form 1597)

Dear Ms. Hardison,

We acknowledge receipt of your letter dated January 31, 2014 with list of potential permits required for the project. As the project moves into detailed design and construction CMUD will obtain all required permits. We have received comments in a separate letter from the NC Wildlife Resource Commission and will address those comments directly with them.

Thank you for your review and please contact me if you have any questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Project Manager

Enclosure[s]

cc: Jackie Roddy, NCDENR
Barry Shearin, CMUD

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

May 12, 2014

MEMORANDUM

TO: Brent Reuss, Black & Veatch

FROM: Jackie Roddy, SEPA Review Coordinator

SUBJECT: EA Review - Proposed wastewater treatment plant servicing CMUD, the City of Mount Holly, and the City of Belmont in Mecklenburg County. DENR #1603

Thank you for providing the Division of Water Resources (DWR) an opportunity to provide comments regarding the proposed wastewater treatment plant servicing Charlotte Mecklenburg Utilities, the City of Mount Holly, and the City of Belmont in northwestern Mecklenburg County.

DWR offers the following comments, from the individuals and entities as indicated:

Teresa Rodriguez of the NPDES Complex Permitting Unit:

1. The Alternatives Analysis section included the options of direct discharge and land application; however, the NPDES group recommends that the alternative analysis also include a discussion on the potential for wastewater reuse.

Andy Painter of the Modeling and Assessment Branch:

2. Table 5-16 and the first bullet on page 5-42 shows Lake Wylie as impaired for Chl a; as per the most recent (2012) integrated report the lake is no longer impaired for Chl a. Please be aware that the segment of the Catawba River [AU#: 11-(117)] the Regional Facility will be discharging to is on the current 2012 Impaired Waters list and existing TMDL requirements remain in effect.

Melanie Williams of the River Basin Planning Branch:

3. In section 4.2.3, please provide a more detailed explanation of what the wastewater flow projections would be per facility and the associated nutrient loading allocation per facility for each stage of the project. Table 4-2 appears to conflict with the statement found earlier in this section that Belmont would be decommissioned.

4. Please aware that Clariant should continue their monthly effluent monitoring including all nutrient parameters to ensure the remaining effluent isn't exceeding the remaining nutrient allocations.

1617 Mail Service Center, Raleigh, North Carolina 27699-1617
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Internet:: www.ncwaterquality.org

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Andrew Pitner of the DWR Mooresville Regional Office:

5. If impacts are proposed to streams, wetlands, or riparian buffers a 401 Certificate may be required.

6. Any wells on the property should be properly abandoned.

Britt Setzer of the DWR PWS Section Mooresville Regional Office:

The following concerns primarily address issues associated with the City of Belmont's drinking water intake which is located approximately two (2) miles downstream of the preferred Alternative 2 discharge.

7. In the second paragraph on page 5-36, reference is made to figure 5.10g. The figure is supposed to reference water supply intake locations. We were unable to locate the water supply intakes on this map. This information would be helpful for other agencies reviewing this document.

8. Appendix K: Speculative Effluent Limits. The model results establish speculative effluent limits for 12 MGD and 25 MGD flows. Of these two flows, what is the percentage of flow associated with the discharge in relation to the 7Q10 flow in the Catawba River? Does the model predict what the speculative concentrations may be after dilution 2 miles downstream at the City of Belmont's drinking water intake?

9. Section .0403 of the NC Rules Governing Public Water Systems (RGPWS) requires the construction of a pre-settling reservoir when there are wide and rapid variations in turbidity, bacterial concentrations or chemical qualities or where the following raw water quality standards are not met: turbidity – 150 NTU, coliform bacteria – 3000/100 ml, fecal coliform bacteria – 300/100 ml and color 75 CU. Will the water quality of the raw water at the point of withdrawal at the City of Belmont's drinking water intake meet these standards? Will there be any significant changes in raw water chemical quality that the City of Belmont's conventional water treatment plant may not be able to treat adequately?

10. The City of Belmont has experienced elevated THMs in their distribution system at times. Will there be an expected increase in TOC levels in the raw water that may contribute to an elevated formation of THMs at the water treatment plant?

11. Has any considerations been given to possible USEPA emerging contaminants (pharmaceuticals) in the waste stream associated with this discharge? Will the conventional water treatment plant at Belmont be able to adequately treat for these emerging contaminants if present in the raw water at elevated levels?

In Section .0202 of the RGPWS, reference is made that a water supply source be protected from sources of pollution. The PWS Section has historically concurred with NPDES discharges located a minimum of five (5) miles upstream from a drinking water supply intake. However, in this case, the proposed discharge is located approximately 2 miles upstream from the City of Belmont's drinking water intake. The PWS Section feels it is necessary to address the items listed above (#7-11) as part of the review process. Britt Setzer can be reached at (704) 235-2127 to discuss items #7-11.

If you have any questions regarding the resolution of comments, please contact me at (919) 807-6442 or jackie.roddy@ncdenr.gov. Thank you.

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February 2, 2015

Mr. Andrew Pitner
NCDENR
Mooresville Regional Office
610 East Center Ave.
Mooresville, NC 28115

B&V Project 148017.0500

Subject: EA Review – Proposed wastewater treatment plant servicing CMUD, the City of Mount Holly, and the City of Belmont in Mecklenburg County. DENR #1603.

Dear Mr. Pitner,

We acknowledge receipt of your memo dated May 12, 2014 and thank you for your review.

Please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Managing Director, East Region

cc: David Wainright, NCDENR
Barry Shearin, CMUD

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February 2, 2015

Ms. Teresa Rodriguez
NCDENR
Complex Permitting Unit
1601 Mail Service Center
Raleigh, NC 27699-1601

B&V Project 148017.0500

Subject: EA Review – Proposed wastewater treatment plant servicing CMUD, the City of Mount Holly, and the City of Belmont in Mecklenburg County. DENR #1603.

Dear Ms. Rodriguez,

We acknowledge receipt of your memo dated May 12, 2014 and thank you for your review.

Please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Managing Director, East Region

cc: David Wainright, NCDENR
Barry Shearin, CMUD

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February 2, 2015

Ms. Melanie Williams
NCDENR
Basin Planning Branch
1601 Mail Service Center
Raleigh, NC 27699-1601

B&V Project 148017.0500

Subject: EA Review – Proposed wastewater treatment plant servicing CMUD, the City of Mount Holly, and the City of Belmont in Mecklenburg County. DENR #1603.

Dear Ms. Williams

We acknowledge receipt of your memo dated May 12, 2014 and thank you for your review.

Please contact me if you have any additional questions.

Best Regards,
BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss, P.E.
Managing Director, East Region

cc: David Wainright, NCDENR
Barry Shearin, CMUD

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MEMORANDUM

Charlotte Mecklenburg Utilities
Long Creek Regional Wastewater Treatment Plant
Internal Completeness Review Response

B&V Project: 148017
January 15, 2015

To: Jessica Godreau, NCDENR
Britt Setzer, DWR PWS

From: Brent Reuss, P.E.

This letter pertains to the letter from your office dated May 12, 2014 regarding the Draft Environmental Impact Statement for the proposed regional wastewater treatment facility for Charlotte-Mecklenburg Utilities (CMUD).

The itemized responses below correspond to your comments numbered 7 through 11 in the May 12, 2014 letter from the North Carolina Department of Environment and Natural Resources (NCDENR):

7. Comment: In the second paragraph on page 5-36, reference is made to figure 5.10g. This figure is supposed to reference water supply intake locations. We were unable to locate water supply intakes on this map. This information would be helpful for other agencies reviewing this document.

   Response: This correction will be made in the revised document.

8. Comment: Appendix K: Speculative Effluent Limits. The model results establish speculative effluent limits for 12 MGD and 25 MGD flows. Of these two flows, what is the percentage of flow associated with the discharge in relation to the 7Q10 flow in the Catawba River? Does the model predict what the speculative concentrations may be after dilution 2 miles downstream at the City of Belmont's drinking water intake?

9. Comment: Section .0403 of the NC Rules Governing Public Water Systems (RGPWS) requires the construction of a pre-settling reservoir when there are wide and rapid variations in turbidity, bacterial concentrations or chemical qualities or where the following raw water quality standards are not met: turbidity – 150 NTU, coliform bacteria – 3000/100 ml., fecal coliform bacteria – 300/100 ml and color 75 CU. Will the water quality of the raw water at the point of withdrawal at the City of Belmont's drinking water intake meet these standards? Will there be any significant changes in raw water chemical quality that the City of Belmont's conventional water treatment plant may not be able to treat adequately?

   Response to Comments 8 and 9: Black & Veatch employed the EPA-recognized CORMIX (Cornell Mixing Model), PLUMES models, and mass-balance equations to determine the dilution of effluents discharged into surface waters based on a range of minimum in-stream flows (MIF). Three MIF scenarios were evaluated:

1. 265.0 cubic feet per second (cfs) based on the lowest seven day average flow during the drought year of record (2007).
2. 499.7 cfs based on the lowest monthly average flow from 2007.
3. 527.1 cfs based on the second lowest monthly average flow from 2007.

Since a full 7Q10 statistical analysis was not completed, we feel that it is prudent to evaluate a range of conservative low flow conditions. Using these MIF conditions, the Long Creek WWTP maximum discharge (25 mgd) would comprise a range of 2.3 to 10.4 percent of flow at the City Belmont WTP Intake. It is important to remember that the 7Q10 flow is the lowest 7-day average flow that occurs (on average) once every 10 years. Therefore, the 7Q10 flow would be greater than the flow evaluated in scenario 1 which produced the most conservative concentration.

Additionally, the following variables were evaluated in the model:

- Ambient water body data including cross sectional area, flow, and velocity;
- Anticipated effluent discharge characteristics;
- Discharge configuration including type, characteristics, and distance to nearest bank; and
- Region of interest.

Total coliform bacteria and color are not typically monitored by WWTPs since these parameters are not included in NPDES permit limits. However, total suspended solids (TSS) and fecal coliform bacteria are routinely measured. As previously mentioned, the treatment technology and the McDowell Creek WWTP closely mirrors the anticipated treatment technology at the Long Creek WWTP; therefore, the actual effluent characteristics of the Long Creek WWTP should be significantly better than those listed in the speculative limits. Again, to be conservative in the evaluation, the speculative limits were employed in the model coupled with the maximum flow concentration of 10%.

Tables 1 and 2 present effluent quality characteristics based on the NCDENR speculative limits and effluent sampling at the McDowell Creek WWTP, respectively. The McDowell Creek WWTP effluent data were collected from January through October 2013 and were collected five times per week. Table 2 demonstrates that there is very little particulate material in the effluent and, therefore, turbidity values would be expected to be low. Additionally, the effluent is visually very clear so the color value would be low as well. It is important to note that the results in the following pages considered both the speculative limits as well as the sampling history from the McDowell WWTP.

Table 1. Speculative limits for the Long Creek WWTP

	TOTAL SUSPENDED SOLIDS (MG/L)	FECAL COLIFORM BACTERIA (CFS/100 ML)
Maximum	45	400

Table 2. Summary of Effluent Quality for the McDowell Creek WWTP

	TOTAL SUSPENDED SOLIDS (MG/L)	FECAL COLIFORM BACTERIA (CFS/100 ML)
Minimum	2.5	1
Maximum	6.1	44
Average	**2.6**	**10**

It is also important to evaluate the existing TSS and fecal coliform parameters already present in Lake Wylie. Table 3 below includes water quality data collected in Lake Wylie near the I-85 bridge in 2007. Based on the data below, the effluent discharged into Lake Wylie from the Long Creek WWTP should not significantly affect these water quality parameters. In fact, the characteristics presented in Table 2 are actually better than the ambient characteristics presented in Table 3.

Table 3. Summary of Water Quality in the Upper Reach of Lake Wylie

	TOTAL SUSPENDED SOLIDS (MG/L)	FECAL COLIFCFSORM BACTERIA (CFS/100 ML)	TURBIDITY (NTU)
Minimum	5.4	2	7.3
Maximum	11	29	12
Average	**8.2**	**12**	**10**

The potential concentrations of fecal coliform and TSS at the City of Belmont WTP Intake were calculated using the NCDENR speculative limits presented in Table 1 as well as the performance data presented in Table 2 coupled with the background concentrations presented in Table 3 assuming that a maximum of 10.4 percent of the flow at the intake location was comprised of the effluent. In this case, the anticipated concentrations at the Belmont WTP Intake would be:

- Speculative limit basis
    - Fecal coliform: 51.0 cfs/100ml
    - Total suspended solids: 11.5 mg/l

- McDowell sampling basis
    - Fecal coliform: 15.0 cfs/100ml
    - Total suspended solids: 8.0 mg/l

Even if the WWTP discharged at the speculative limits, concentrations of fecal coliform and TSS would be well below the concentrations that would be of concern to water treatment plant operations. Therefore, we anticipate no adverse effects to the City of Belmont's ability to treat raw water using its existing conventional water treatment plant.

10. Comment: The City of Belmont has experienced elevated THMs in their distribution system at times. Will there be an expected increase in TOC levels in the raw water that may contribute to an elevated formation of THMs at the water treatment plant?

    Response: A TOC analysis was performed under the same assumptions outlined previously. A range of potential TOC levels was developed based on maximum ambient TOC levels in Lake Wylie, speculative-limit based TOC levels in the wastewater effluent, and McDowell-based TOC levels in the wastewater effluent. The calculated TOC range was found to be 1.8 to 2.4 mg/l which is not anticipated to impact the current raw water TOC range of 1.8-2.3 mg/l at the City of Belmont WTP Intake.

11. Comment: Has any consideration been given to possible USEPA emerging contaminants (pharmaceuticals) in the waste stream associated with this discharge? Will the conventional water treatment plant at Belmont be able to adequately treat for these emerging contaminants if present in the raw water and elevated levels?

    Response: The Long Creek WWTP will be designed to meet current discharge limitations while also being able to be upgraded to meet anticipated discharge limitations in the future.

The itemized responses below correspond to comments generated during a phone conversation between Black & Veatch, CMUD, and the NCDENR DWR on December 4, 2014.

- Evaluate the permitted industries in the Long Creek Basin – We reviewed the applicable Priority Pollutant Analysis (PPA) and do not anticipate any adverse effects to the City of Belmont's ability to treat raw water using the existing conventional water treatment plant. If fact, there is only a single permitted industrial discharge (laundry facility) in the Long Creek Basin. The PPA information is attached to this memo.

- Consider developing a contingency plan for the City of Belmont's raw water supply – As a partner in the development of the Long Creek Regional WWTP, the City of Belmont is committed to the sustainability of its raw water supply. CMUD and the City of Belmont will work together to develop a contingency plan as the project progresses.

If you have any questions or comments, please do not hesitate to contact me.

Very truly yours,

BLACK & VEATCH INTERNATIONAL COMPANY

Brent Reuss
Managing Director, East Region

Enclosure[s]

EFFLUENT Annual Monitoring and Pollutant Scan

Permit No. NC0036277
Outfall 001

Month July
Year 2014

Facility Name McDowell Creek WWTP
ORC Mr. S. Joseph Lockler
Date of **EFFLUENT** sampling: 7/9/14, Low Level Mercury on 7/8/14
Phone (704) 875-6443
Analytical Laboratory: CMUD Environmental Lab--NC 192; and Prism Lab NC 402

Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Ammonia (as N)	Composite	SM 4500-NH3-H-97	0.10	Less than	mg/L	2
Dissolved oxygen	Grab	SM4500-O-G-01	1	8.1	mg/L	1
Nitrate/Nitrite	Composite	EPA 353.2-93	0.25	7.6	mg/L	2
Total Kjeldahl nitrogen	Composite	EPA 351.2-93	0.25	0.93	mg/L	2
Total Phosphorus	Composite	SM 4500P-H-99	0.10	Less than	mg/L	2
Total dissolved solids	Composite	SM 2540C-97	25	318	mg/L	1
Hardness	Composite	SM 2340B-97	1	180	mg/L	1
Chlorine (total residual, TRC)	Grab	SM 4500Cl-G-00	10	Less than	ug/L	1
Oil and grease	Grab	EPA 1664B	5	Less than	mg/L	1
Metals (total recoverable), cyanide and total phenols						
Antimony	Composite	EPA 200.8	5.0	Less than	ug/L	1
Arsenic	Composite	EPA 200.8	5.0	Less than	ug/L	2
Beryllium	Composite	EPA 200.8	5.0	Less than	ug/L	1
Cadmium	Composite	EPA 200.8	1.0	Less than	ug/L	2
Chromium	Composite	EPA 200.8	5.0	Less than	ug/L	2
Copper	Composite	EPA 200.8	2.0	2.1	ug/L	2
Lead	Composite	EPA 200.8	5.0	Less than	ug/L	2
Mercury	Grab	EPA 1631E	1.0	Less than	ng/L	1
Nickel	Composite	EPA 200.8	2.0	2.8	ug/L	2
Selenium	Composite	EPA 200.8	5.0	Less than	ug/L	2
Silver	Composite	EPA 200.8	5.0	Less than	ug/L	2
Thallium	Composite	EPA 200.8	5.0	Less than	ug/L	1
Zinc	Composite	EPA 200.8	10	38	ug/L	2
Cyanide	Grab	10-204-00-1-X	10	Less than	ug/L	1
Total phenolic compounds	Grab	EPA 420.2	0.050	Less than	mg/L	1
Volatile organic compounds						
Acrolein	Grab	EPA 624	100	Less than	ug/L	1
Acrylonitrile	Grab	EPA 624	100	Less than	ug/L	1
Benzene	Grab	EPA 624	5	Less than	ug/L	1
Bromoform	Grab	EPA 624	5	Less than	ug/L	1
Carbon tetrachloride	Grab	EPA 624	5	Less than	ug/L	1
Chlorobenzene	Grab	EPA 624	5	Less than	ug/L	1
Chlorodibromomethane (Dibromochloromethane)	Grab	EPA 624	5	Less than	ug/L	1
Chloroethane	Grab	EPA 624	10	Less than	ug/L	1
2-chloroethylvinyl ether	Grab	EPA 624	10	Less than	ug/L	1
Chloroform	Grab	EPA 624	5	Less than	ug/L	1
Dichlorobromomethane (Bromodichloromethane)	Grab	EPA 624	5	Less than	ug/L	1
1,1-dichloroethane	Grab	EPA 624	5	Less than	ug/L	1
1,2-dichloroethane	Grab	EPA 624	5	Less than	ug/L	1
Trans-1,2-dichloroethylene	Grab	EPA 624	5	Less than	ug/L	1

EFFLUENT Annual Monitoring and Pollutant Scan

Permit No. NC0036277
Outfall 001

Month July
Year 2014

Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Volatile organic compounds (Cont.)						
1,1-dichloroethylene	Grab	EPA 624	5	Less than	ug/L	1
1,2-dichloropropane	Grab	EPA 624	5	Less than	ug/L	1
1,3-dichloropropylene	Grab	EPA 624	5	Less than	ug/L	1
Ethylbenzene	Grab	EPA 624	5	Less than	ug/L	1
Methyl bromide(Bromomethane)	Grab	EPA 624	10	Less than	ug/L	1
Methyl chloride(Chloromethane)	Grab	EPA 624	10	Less than	ug/L	1
Methylene chloride	Grab	EPA 624	5	Less than	ug/L	1
1,1,2,2-tetrachloroethane	Grab	EPA 624	5	Less than	ug/L	1
Tetrachloroethylene	Grab	EPA 624	5	Less than	ug/L	1
Toluene	Grab	EPA 624	5	Less than	ug/L	1
1,1,1-trichloroethane	Grab	EPA 624	5	Less than	ug/L	1
1,1,2-trichloroethane	Grab	EPA 624	5	Less than	ug/L	1
Trichloroethylene	Grab	EPA 624	5	Less than	ug/L	1
Vinyl chloride	Grab	EPA 624	10	Less than	ug/L	1
Acid-extractable compounds						
P-chloro-m-creso (4-chloro-3-methylphenol)	Composite	EPA 625	10	Less than	ug/L	1
2-chlorophenol	Composite	EPA 625	10	Less than	ug/L	1
2,4-dichlorophenol	Composite	EPA 625	10	Less than	ug/L	1
2,4-dimethylphenol	Composite	EPA 625	10	Less than	ug/L	1
4,6-dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	Composite	EPA 625	20	Less than	ug/L	1
2,4-dinitrophenol	Composite	EPA 625	50	Less than	ug/L	1
2-nitrophenol	Composite	EPA 625	10	Less than	ug/L	1
4-nitrophenol	Composite	EPA 625	10	Less than	ug/L	1
Pentachlorophenol	Composite	EPA 625	20	Less than	ug/L	1
Phenol	Composite	EPA 625	10	Less than	ug/L	1
2,4,6-trichlorophenol	Composite	EPA 625	10	Less than	ug/L	1
Base-neutral compounds						
Acenaphthene	Composite	EPA 625	10	Less than	ug/L	1
Acenaphthylene	Composite	EPA 625	10	Less than	ug/L	1
Anthracene	Composite	EPA 625	10	Less than	ug/L	1
Benzidine	Composite	EPA 625	50	Less than	ug/L	1
Benzo(a)anthracene	Composite	EPA 625	10	Less than	ug/L	1
Benzo(a)pyrene	Composite	EPA 625	10	Less than	ug/L	1
3,4 benzofluoranthene (Benzo(b)fluoranthene)	Composite	EPA 625	10	Less than	ug/L	1
Benzo(ghi)perylene	Composite	EPA 625	10	Less than	ug/L	1
Benzo(k)fluoranthene	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroethoxy) methane	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroethyl) ether	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroisopropyl) ether	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-ethylhexyl) phthalate	Composite	EPA 625	10	Less than	ug/L	1
4-bromophenyl phenyl ether	Composite	EPA 625	10	Less than	ug/L	1
Butyl benzyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
2-chloronaphthalene	Composite	EPA 625	10	Less than	ug/L	1
4-chlorophenyl phenyl ether	Composite	EPA 625	10	Less than	ug/L	1

EFFLUENT Annual Monitoring and Pollutant Scan

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Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Base-neutral compounds (cont.)						
Chrysene	Composite	EPA 625	10	Less than	ug/L	1
Di-n-butyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Di-n-octyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Dibenzo(a,h)anthracene	Composite	EPA 625	10	Less than	ug/L	1
1,2-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
1,3-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
1,4-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
3,3-dichlorobenzidine	Composite	EPA 625	10	Less than	ug/L	1
Diethyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Dimethyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
2,4-dinitrotoluene	Composite	EPA 625	10	Less than	ug/L	1
2,6-dinitrotoluene	Composite	EPA 625	10	Less than	ug/L	1
1,2-diphenylhydrazine	Composite	EPA 625	10	Less than	ug/L	1
Fluoranthene	Composite	EPA 625	10	Less than	ug/L	1
Fluorene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorobutadiene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorocyclo-pentadiene	Composite	EPA 625	10	Less than	ug/L	1
Hexachloroethane	Composite	EPA 625	10	Less than	ug/L	1
Indeno(1,2,3-cd)pyrene	Composite	EPA 625	10	Less than	ug/L	1
Isophorone	Composite	EPA 625	10	Less than	ug/L	1
Naphthalene	Composite	EPA 625	10	Less than	ug/L	1
Nitrobenzene	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodi-n-propylamine	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodimethylamine	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodiphenylamine	Composite	EPA 625	10	Less than	ug/L	1
Phenanthrene	Composite	EPA 625	10	Less than	ug/L	1
Pyrene	Composite	EPA 625	10	Less than	ug/L	1
1,2,4,-trichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system to design to assure that qualified perdonnel properly gather and evaluat the information submitted. Based on my inquiry of the person or persons that manage the system, or those persons directly responsibel for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Rhonda L Hutson
Authorized Representative name

Signature

8/27/2014
Date

EFFLUENT Annual Monitoring and Pollutant Scan

Permit No. NC0036277
Outfall 001

Month July
Year 2014

Facility Name McDowell Creek WWTP
ORC Mr. S. Joseph Lockler
Date of **EFFLUENT** sampling: 7/9/14, Low Level Mercury on 7/8/14
Phone (704) 875-6443
Analytical Laboratory: CMUD Environmental Lab--NC 192; and Prism Lab NC 402

Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Ammonia (as N)	Composite	SM 4500-NH3-H-97	0.10	Less than	mg/L	2
Dissolved oxygen	Grab	SM4500-O-G-01	1	8.1	mg/L	1
Nitrate/Nitrite	Composite	EPA 353.2-93	0.25	7.6	mg/L	2
Total Kjeldahl nitrogen	Composite	EPA 351.2-93	0.25	0.93	mg/L	2
Total Phosphorus	Composite	SM 4500P-H-99	0.10	Less than	mg/L	2
Total dissolved solids	Composite	SM 2540C-97	25	318	mg/L	1
Hardness	Composite	SM 2340B-97	1	180	mg/L	1
Chlorine (total residual, TRC)	Grab	SM 4500Cl-G-00	10	Less than	ug/L	1
Oil and grease	Grab	EPA 1664B	5	Less than	mg/L	1
Metals (total recoverable), cyanide and total phenols						
Antimony	Composite	EPA 200.8	5.0	Less than	ug/L	1
Arsenic	Composite	EPA 200.8	5.0	Less than	ug/L	2
Beryllium	Composite	EPA 200.8	5.0	Less than	ug/L	1
Cadmium	Composite	EPA 200.8	1.0	Less than	ug/L	2
Chromium	Composite	EPA 200.8	5.0	Less than	ug/L	2
Copper	Composite	EPA 200.8	2.0	2.1	ug/L	2
Lead	Composite	EPA 200.8	5.0	Less than	ug/L	2
Mercury	Grab	EPA 1631E	1.0	Less than	ng/L	1
Nickel	Composite	EPA 200.8	2.0	2.8	ug/L	2
Selenium	Composite	EPA 200.8	5.0	Less than	ug/L	2
Silver	Composite	EPA 200.8	5.0	Less than	ug/L	2
Thallium	Composite	EPA 200.8	5.0	Less than	ug/L	1
Zinc	Composite	EPA 200.8	10	38	ug/L	2
Cyanide	Grab	10-204-00-1-X	10	Less than	ug/L	1
Total phenolic compounds	Grab	EPA 420.2	0.050	Less than	mg/L	1
Volatile organic compounds						
Acrolein	Grab	EPA 624	100	Less than	ug/L	1
Acrylonitrile	Grab	EPA 624	100	Less than	ug/L	1
Benzene	Grab	EPA 624	5	Less than	ug/L	1
Bromoform	Grab	EPA 624	5	Less than	ug/L	1
Carbon tetrachloride	Grab	EPA 624	5	Less than	ug/L	1
Chlorobenzene	Grab	EPA 624	5	Less than	ug/L	1
Chlorodibromomethane (Dibromochloromethane)	Grab	EPA 624	5	Less than	ug/L	1
Chloroethane	Grab	EPA 624	10	Less than	ug/L	1
2-chloroethylvinyl ether	Grab	EPA 624	10	Less than	ug/L	1
Chloroform	Grab	EPA 624	5	Less than	ug/L	1
Dichlorobromomethane (Bromodichloromethane)	Grab	EPA 624	5	Less than	ug/L	1
1,1-dichloroethane	Grab	EPA 624	5	Less than	ug/L	1
1,2-dichloroethane	Grab	EPA 624	5	Less than	ug/L	1
Trans-1,2-dichloroethylene	Grab	EPA 624	5	Less than	ug/L	1

EFFLUENT Annual Monitoring and Pollutant Scan

Permit No. NC0036277
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Month July
Year 2014

Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Volatile organic compounds (Cont.)						
1,1-dichloroethylene	Grab	EPA 624	5	Less than	ug/L	1
1,2-dichloropropane	Grab	EPA 624	5	Less than	ug/L	1
1,3-dichloropropylene	Grab	EPA 624	5	Less than	ug/L	1
Ethylbenzene	Grab	EPA 624	5	Less than	ug/L	1
Methyl bromide(Bromomethane)	Grab	EPA 624	10	Less than	ug/L	1
Methyl chloride(Chloromethane)	Grab	EPA 624	10	Less than	ug/L	1
Methylene chloride	Grab	EPA 624	5	Less than	ug/L	1
1,1,2,2-tetrachloroethane	Grab	EPA 624	5	Less than	ug/L	1
Tetrachloroethylene	Grab	EPA 624	5	Less than	ug/L	1
Toluene	Grab	EPA 624	5	Less than	ug/L	1
1,1,1-trichloroethane	Grab	EPA 624	5	Less than	ug/L	1
1,1,2-trichloroethane	Grab	EPA 624	5	Less than	ug/L	1
Trichloroethylene	Grab	EPA 624	5	Less than	ug/L	1
Vinyl chloride	Grab	EPA 624	10	Less than	ug/L	1
Acid-extractable compounds						
P-chloro-m-creso (4-chloro-3-methylphenol)	Composite	EPA 625	10	Less than	ug/L	1
2-chlorophenol	Composite	EPA 625	10	Less than	ug/L	1
2,4-dichlorophenol	Composite	EPA 625	10	Less than	ug/L	1
2,4-dimethylphenol	Composite	EPA 625	10	Less than	ug/L	1
4,6-dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	Composite	EPA 625	20	Less than	ug/L	1
2,4-dinitrophenol	Composite	EPA 625	50	Less than	ug/L	1
2-nitrophenol	Composite	EPA 625	10	Less than	ug/L	1
4-nitrophenol	Composite	EPA 625	10	Less than	ug/L	1
Pentachlorophenol	Composite	EPA 625	20	Less than	ug/L	1
Phenol	Composite	EPA 625	10	Less than	ug/L	1
2,4,6-trichlorophenol	Composite	EPA 625	10	Less than	ug/L	1
Base-neutral compounds						
Acenaphthene	Composite	EPA 625	10	Less than	ug/L	1
Acenaphthylene	Composite	EPA 625	10	Less than	ug/L	1
Anthracene	Composite	EPA 625	10	Less than	ug/L	1
Benzidine	Composite	EPA 625	50	Less than	ug/L	1
Benzo(a)anthracene	Composite	EPA 625	10	Less than	ug/L	1
Benzo(a)pyrene	Composite	EPA 625	10	Less than	ug/L	1
3,4 benzofluoranthene (Benzo(b)fluoranthene)	Composite	EPA 625	10	Less than	ug/L	1
Benzo(ghi)perylene	Composite	EPA 625	10	Less than	ug/L	1
Benzo(k)fluoranthene	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroethoxy) methane	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroethyl) ether	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-chloroisopropyl) ether	Composite	EPA 625	10	Less than	ug/L	1
Bis (2-ethylhexyl) phthalate	Composite	EPA 625	10	Less than	ug/L	1
4-bromophenyl phenyl ether	Composite	EPA 625	10	Less than	ug/L	1
Butyl benzyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
2-chloronaphthalene	Composite	EPA 625	10	Less than	ug/L	1
4-chlorophenyl phenyl ether	Composite	EPA 625	10	Less than	ug/L	1

EFFLUENT Annual Monitoring and Pollutant Scan

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Parameter	Sample Type	Analytical Method	Quantitation Level	Sample Result	Units of Measurement	Number of samples
Base-neutral compounds (cont.)						
Chrysene	Composite	EPA 625	10	Less than	ug/L	1
Di-n-butyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Di-n-octyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Dibenzo(a,h)anthracene	Composite	EPA 625	10	Less than	ug/L	1
1,2-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
1,3-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
1,4-dichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
3,3-dichlorobenzidine	Composite	EPA 625	10	Less than	ug/L	1
Diethyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
Dimethyl phthalate	Composite	EPA 625	10	Less than	ug/L	1
2,4-dinitrotoluene	Composite	EPA 625	10	Less than	ug/L	1
2,6-dinitrotoluene	Composite	EPA 625	10	Less than	ug/L	1
1,2-diphenylhydrazine	Composite	EPA 625	10	Less than	ug/L	1
Fluoranthene	Composite	EPA 625	10	Less than	ug/L	1
Fluorene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorobenzene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorobutadiene	Composite	EPA 625	10	Less than	ug/L	1
Hexachlorocyclo-pentadiene	Composite	EPA 625	10	Less than	ug/L	1
Hexachloroethane	Composite	EPA 625	10	Less than	ug/L	1
Indeno(1,2,3-cd)pyrene	Composite	EPA 625	10	Less than	ug/L	1
Isophorone	Composite	EPA 625	10	Less than	ug/L	1
Naphthalene	Composite	EPA 625	10	Less than	ug/L	1
Nitrobenzene	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodi-n-propylamine	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodimethylamine	Composite	EPA 625	10	Less than	ug/L	1
N-nitrosodiphenylamine	Composite	EPA 625	10	Less than	ug/L	1
Phenanthrene	Composite	EPA 625	10	Less than	ug/L	1
Pyrene	Composite	EPA 625	10	Less than	ug/L	1
1,2,4,-trichlorobenzene	Composite	EPA 625	10	Less than	ug/L	1

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system to design to assure that qualified perdonnel properly gather and evaluat the information submitted. Based on my inquiry of the person or persons that manage the system, or those persons directly responsibel for gathering the information, the information submitted is , to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Rhonda L Hutson
Authorized Representative name

Signature

8/27/2014
Date

NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

January 26, 2015

Mr. Brent Reuss
Black and Veatch
10715 David Taylor Drive, Suite 240
Charlotte, NC 28262

Subject: Review of Internal Completeness Response
Charlotte Mecklenburg Utilities Department
Long Creek Regional Wastewater Treatment Plant

Dear Mr. Reuss,

We have completed the review of your January 15, 2015 memo in reference to the Long Creek Regional Wastewater Treatment Plant. The comments from our May 12, 2014 were adequately addressed in this memo.

Due to the proposed discharge being located in close proximity to the City of Belmont's drinking water intake, the future Long Creek Wastewater Treatment Plant must be operated and maintained properly, the effluent limits must be met prior to discharge and the discharge can't contravene the designated water quality standards. If the designated water quality standards were impacted by the discharge into the Catawba River, we would fully expect the wastewater treatment plant to be upgraded to address any issues.

If you have any questions, please call me at (704) 235-2127.

Sincerely,

Britt Setzer
Regional Engineer
Division of Water Resources
Public Water Supply Section

Cc: Jessica Godreau