

APPENDIX E

Environmental Assessment and FONSI

Environmental Assessment for the Addition of the Goose Creek Watershed to IBT Certificate under the Provisions of G.S. 143-215.221



Goose Creek Watershed in Mecklenburg County

Prepared for:

North Carolina Division of Water Resources

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Executive Summary

This Environmental Assessment (EA) has been prepared to support a request to eliminate Condition 3 in the Interbasin Transfer (IBT) Certificate issued to Charlotte-Mecklenburg Utilities Department (CMUD) on March 14, 2002. The IBT Certificate is included in Appendix A-1, with Condition 3 located on page II-7. Condition 3 excluded the Goose Creek Watershed in Mecklenburg County from the IBT Certificate service area due to potential impacts from future growth in the basin on the Carolina heelsplitter, a Federally listed endangered species. This request for an IBT Certificate revision does not require any change in the current IBT amount of 33 million gallons per day (mgd).

The IBT Certificate issued by the Environmental Management Commission (EMC) increased the maximum day amount of IBT from the Catawba River for CMUD from 16.1 mgd to 33 mgd. In addition, the certificate contained five conditions, one of which excluded the Goose Creek Watershed in Mecklenburg County from receiving water as a result of the approved transfer (Condition 3). At that time, it was contemplated that the Goose Creek Watershed protection needs would be addressed in a later environmental study relative to a new wastewater plant that was being considered by Union, Cabarrus, and Mecklenburg Counties. The wastewater treatment plant effort has since been abandoned and watershed protection needs within Goose Creek have been addressed through separate local and state level regulations and initiatives, most specifically the Town of Mint Hill's Post-Construction Ordinance (PCO).

This EA provides supporting documentation for the elimination of Condition 3 and the addition of the Goose Creek Watershed to the existing IBT Certificate. The Town of Mint Hill's PCO addresses the action items listed in the NC Department of Environment and Natural Resources (DENR) Site Specific Water Quality Management Plan for the Goose Creek watershed. This plan was approved by the EMC.

The project area for the EA is within the Town of Mint Hill's planning jurisdiction and consists of the Goose Creek Watershed, including:

- Goose Creek (main channel sourced in Mecklenburg County)
- Stevens Creek (tributary channel sourced in Mecklenburg County)
- Paddle Branch (tributary channel sourced in Union County)
- Duck Creek (tributary channel sourced in Mecklenburg County)

Included is an analysis of potential impacts of the IBT on the Goose Creek Watershed, including: wetlands, urban lands, prime agricultural lands, forestry resources, public and recreational lands, archaeological and historical resources, fish and wildlife resources, sensitive aquatic and terrestrial species and habitats, water quality and water resources, air quality, groundwater, noise, and toxic substances per the North Carolina State Environmental Policy Act

(NC SEPA). Sections 3 and 4 of this EA were, in part, derived from an EA that CH2M HILL prepared for CMUD in 2001 before the Goose Creek Watershed was removed from the IBT Petition. Section 6 discusses mitigation for potential secondary and cumulative impacts, mainly through the Town of Mint Hill's 2010 update to its PCO and its efforts to implement the PCO. These mitigation measures address action items listed in the NC Department of Environment and Natural Resources (NC DENR) Site Specific Water Quality Management Plan for the watershed (approved by the EMC). Significant collaboration between Mecklenburg County, the Town of Mint Hill, and NC Division of Water Quality (NC DWQ) has created a mutually agreed-upon approach to protect the watershed.

CMUD is requesting removal of Condition 3 as the first step in future infrastructure planning in the Goose Creek Watershed. This EA concludes that the direct, indirect, and secondary and cumulative impacts of removing Condition 3 from the IBT Certificate on Goose Creek Watershed would be insignificant given the watershed mitigation measures that have been implemented by the Town of Mint Hill through its PCO.

Section 1

Background and Project Description

1.1 Background

Charlotte-Mecklenburg Utilities Department (CMUD) has two intake locations within the Catawba River Basin. Water is withdrawn from Lake Norman through one intake and is conveyed to the Lee S. Dukes Water Treatment Plant. Water is withdrawn from Mountain Island Lake through the other intake and is conveyed to the Walter M. Franklin Water Treatment Plant and the Vest Water Treatment Plant. Potable water is distributed to water utility customers throughout CMUD's service area, including small portions of Iredell, Cabarrus, and Union Counties. CMUD also provides wholesale water through agreements with Concord, Harrisburg, Union County, York County Water and Sewer Authority (South Carolina), and Lancaster County Water and Sewer District (South Carolina).

Lake Norman is the water supply for Lincoln County, Davidson, Mooresville, Huntersville, and CMUD in North Carolina (Duke Energy Website, accessed 2011). Lake Norman was constructed in 1963 when Duke Energy built the Cowans Ford Dam. It is the largest man-made body of water in North Carolina, with 520 miles of shoreline and a surface area of 32,475 acres. It provides hydroelectric power to the Cowans Ford Hydroelectric Plant and provides the water that cools the turbines at the Marshall Steam Station (coal-fired power plant) and McGuire Nuclear Power Plant (Duke Energy Website, accessed 2011).

Mountain Island Lake was built by Duke Energy in 1924 when the Mountain Island Hydroelectric Plant was constructed (Duke Energy Website, accessed 2011). With only 61 miles of shoreline and 3,281 acres of surface area, Mountain Island Lake is a much smaller reservoir than Lake Norman. It is the water supply to Mount Holly, Gastonia, and CMUD in North Carolina and it provides water to cool the Riverbend Steam Station (Duke Energy Website, accessed 2011).

Approximately 70 percent of Mecklenburg County is in the Catawba River Basin, while the remaining 30 percent is in the Rocky River portion of the Yadkin-Pee Dee River Basin; thus, some of the water that is withdrawn from the Catawba River Basin is actually supplied to residents of Mecklenburg County in another river basin. Some of the water that is supplied from the Catawba River Basin to the Rocky River Basin in Mecklenburg County remains in the Rocky River Basin due to irrigation, septic systems, discharges of treated wastewater into Mallard Creek and the Rocky River, fire fighting, and other uses. Any water that is withdrawn from the Catawba River Basin within Mecklenburg County that is not returned to the Catawba River Basin is an interbasin transfer (IBT). Water currently transferred to the Goose Creek Watershed (which is within the Rocky River Basin) is permissible under CMUD's grandfathered IBT and with approval of the North Carolina Division of Water Resources (NC DWR).

Wastewater from Mecklenburg County is treated at five wastewater treatment plants (WWTPs) in Mecklenburg County. Four of these WWTPs discharge treated water into small

streams that lie within the Catawba River Basin. One of the five WWTPs discharges into Mallard Creek, which is a small stream in the Rocky River Basin. CMUD also sends wastewater from parts of Mecklenburg County to the Rocky River Regional WWTP, which is operated by the Water and Sewer Authority of Cabarrus County. Treated water from this facility is also discharged into the Rocky River Basin in Cabarrus County.

In 2001, CMUD petitioned the Environmental Management Commission (EMC) for an increase in the amount of water transferred from the Catawba River Basin to the Rocky River Basin (Moreau, 2002). To meet the water demands through the year 2030, CMUD requested that the IBT be increased from a grandfathered IBT of 16.1 million gallons per day (mgd) to 33 mgd on a maximum daily basis. On March 14, 2002, the EMC approved the IBT increase under the following five conditions under the authority of G.S. §143-215.22:

1. Require Mecklenburg County to summarize progress in implementation of watershed management approaches of the Surface Water Improvement and Management Program (SWIM) on an annual basis. The NC DWR shall have the authority to approve modifications to and need for continued reporting as necessary.
2. Require Mecklenburg County and the City of Charlotte to continue the stakeholder process to investigate water quantity control from single-family development and water quality control for all development until completed. To accomplish this end, the stakeholder group should consider evaluating the feasibility of single-family storm water detention and recommending ordinance revisions based on technical, political, long-term maintenance, cost, and benefits related to the proposed ordinance changes.
3. The Goose Creek subbasin in Mecklenburg County is removed from the area to be served by the IBT. A moratorium on the installation of new IBT water lines (water lines crossing the ridgeline) into Goose Creek subbasin is in effect until the impacts of additional urban growth on the endangered species are fully evaluated. This moratorium will not impact Charlotte-Mecklenburg Utility's ability to fully utilize existing water lines. The DWR shall have the authority to grant exemptions for reasons of public health and safety for dwellings existing on or before March 14, 2002.
4. If either the EA is found at a later date to be incorrect or new information becomes available such that the environmental impacts associated with this transfer are substantially different from those projected impacts that formed the basis for the above Findings of Facts and this certificate, the Commission may reopen the certificate to adjust the existing conditions or require new conditions to ensure that the detriments continue to be mitigated to a reasonable degree.
5. Require the applicant to develop a compliance and monitoring plan for reporting maximum daily transfer amounts, compliance with certificate conditions, and progress on mitigation measures, and drought management activities. The Division of Water Resources shall have the authority to approve modifications to the compliance and monitoring plan and drought management plan as necessary.

The purpose of this EA is to address Condition 3 of the IBT Certificate. The full certificate is included in Appendix A-1.

1.2 Project Description

As stated in Condition 3, the Goose Creek Watershed was removed from the service area granted by the IBT Certificate issued in 2002 by the EMC due to the presence of the endangered mussel species *Lasmigona decorata*, commonly known as the Carolina heelsplitter. The Carolina heelsplitter was added to the Endangered Species List on June 30, 1993. Only six populations are known to exist, one of which is a small population within the Goose Creek Watershed, a tributary of the Rocky River Basin in Union County, North Carolina (Fridell, 2011). The Carolina heelsplitter population has declined since construction of the I-485 (Outer Loop) by the North Carolina Department of Transportation (NCDOT) began in 1989 (Allan, 2003). The loss of Carolina heelsplitter habitat due to degraded water quality within the Goose Creek Watershed was cause for concern when the IBT increase was proposed in 2001. According to the 2002 IBT Certificate, the moratorium on the Goose Creek Watershed will remain until “the impacts of additional urban growth on the endangered species are fully evaluated.”

The project area for the EA is within the Town of Mint Hill’s planning jurisdiction within Mecklenburg County and consists of the Goose Creek Watershed (Appendix A-1, Figures 1 and 2), which includes:

- Goose Creek (main channel sourced in Mecklenburg County)
- Stevens Creek (tributary channel sourced in Mecklenburg County)
- Paddle Branch (tributary channel sourced in Union County; portion in Mecklenburg County)
- Duck Creek (tributary channel sourced in Mecklenburg County)

The purpose of this EA is to request removal of Condition 3 from the IBT Certificate and document implementation of the North Carolina Department of Environment and Natural Resources (NC DENR) Site Specific Water Quality Management Plan for the Goose Creek Watershed (2009) (Plan) as mitigation for the potential impacts of additional urban growth on the Goose Creek Watershed and the Carolina heelsplitter. Included in this EA is an analysis of potential impacts of the IBT on the Goose Creek Watershed per the North Carolina State Environmental Policy Act (NC SEPA). An assessment of the environmental conditions of the Goose Creek Watershed is presented in Section 3. Secondary and cumulative impacts the IBT would have on the Goose Creek Watershed are presented in Section 4. The alternatives analysis is discussed in Section 5. Mitigation of potential adverse impacts, the focus of this EA, is discussed in Section 6.

This EA provides supporting documentation for the addition of the Goose Creek Watershed to the existing IBT Certificate. If Condition 3 were removed from the IBT Certificate, CMUD would be able to use its current infrastructure to convey additional water supply to the Goose Creek Watershed. Until this condition is removed, CMUD is unable to move forward on any planning for water service in the watershed. No additional construction of infrastructure is

being evaluated through this environmental review but could be evaluated in the future consistent with the requirements of the NC SEPA.

Section 2

Purpose and Need

Condition 3 of the 2002 IBT Certificate includes a moratorium on the installation of new water lines in the Goose Creek Watershed that would provide service via an IBT until the impacts of additional urban growth on the endangered species are fully evaluated. The purpose of this EA is to evaluate the direct, indirect, and secondary/cumulative impacts of the addition of the Goose Creek Watershed to the existing IBT authorization and present mitigation for any such impacts, resulting in the elimination of Condition 3 from the IBT Certificate. Since the issuance of the Certificate, many actions have taken place applicable to the Goose Creek Watershed that are designed to either protect environmental resources, including endangered species, or to improve environmental conditions, such as reducing the loading of fecal coliform bacteria entering streams. As a result, it is believed that sufficient site-specific controls have been implemented to manage and mitigate impacts of growth and that Condition 3 is no longer necessary.

Existing water lines within the Goose Creek Watershed provide water supply via CMUD's grandfathered IBT amount, not via the IBT Certificate; however, no increases in connections have been allowed (following an initial coordination period after the certificate was issued in 2002). The existing water lines, shown in Figure 3 of Appendix A-1, have capacity above their current use. The elimination of Condition 3 from the IBT Certificate would provide CMUD the option to increase its distribution of a safe, reliable public water supply to this portion of the County. In addition, CMUD's recent IBT annual maximum day amounts are well below the total IBT Certificate amount of 33 mgd, indicating that removal of Condition 3 and increasing water service within the Goose Creek Watershed would not impact CMUD's ability to continue providing water service within the bounds of its IBT Certificate (Table 1).

Table 1 CMUD Annual IBT Summary

Calendar Year	Average Annual IBT (mgd)	Maximum Day IBT (mgd)	Percent of IBT Amount Used
2002	6.74	11.97	36
2003	6.91	9.82	30
2004	7.79	12.56	38
2005	8.66	13.79	42
2006	9.56	14.35	43
2007	9.96	17.22	52
2008	11.39	17.42	53
2009	12.04	16.00	48
2010	13.33	18.33	56
2011	13.11	18.82	57

Note: Percent used is calculated with maximum day information and the IBT Certificate amount of 33 mgd.

Sources: CMUD Annual IBT Reports, 2003 - 2011

Private wells in Mecklenburg County have been known not to provide residents with a reliable source of clean water. The groundwater aquifer in Mecklenburg County is composed of crystalline bedrock that has little storage capacity. In the Goose Creek Watershed, the NC DWR has approved water supply connections to five separate residences since the restrictions were put in place, addressing wells that were either contaminated or providing inadequate amounts of water (pers. comm., Steve Miller/CMUD). By allowing residents living within the Goose Creek Watershed to have access to the public water service that CMUD provides, the reliability of supply, especially during droughts, would increase.

Despite a lack of access to public water and sewer services from CMUD, development in the Town of Mint Hill, which includes the Mecklenburg County portion of the Goose Creek Watershed, has continued to slowly increase since the completion of I-485. Other neighboring areas have grown significantly faster, as shown in Table 2. The Town of Mint Hill's total population in 2010 was 22,722 (U.S. Census Bureau, 2012). Growth rates have recently slowed in the area as a result of the economic downturn. Recognizing that growth pressures will return and in response to NC DENR's Site-Specific Plan for Goose Creek, the Town of Mint Hill updated its Post-Construction Ordinance (PCO) with more stringent development requirements in the Goose Creek Watershed. Further detail regarding this update is included in Section 6.

Table 2 Population Over the Last Decade for Municipalities in the Goose Creek Watershed

Municipality	County	2000	2010	Percent Increase
Mint Hill ^a	Mecklenburg	14,922	22,722	52.3
Stallings	Union	3,189	13,381	333.7
Indian Trail	Union	11,905	33,518	181.5
Fairview	Union	2,495	11,111	345.3

^a Town limits only

Future population projections for the area are available from the Metrolina Planning Organization (formed through a memorandum of agreement among the various metropolitan planning organizations) and NCDOT. These data were developed by the Metrolina Regional Model planning team and are generally accepted as a reliable source to assess future population changes. Transportation area zone (TAZ) data are officially sanctioned by the Metrolina Planning Board and are a good source of population projections for small areas for the years 2000, 2010, 2020, and 2030 (NCDOT, 2005). For the purposes of this study, only TAZ data within the Mint Hill extraterritorial jurisdiction (ETJ) and Goose Creek Watershed were selected. In some cases, populations were calculated (in part) if only a portion of a TAZ data polygon intersected with these areas by apportioning the population according to percent of the polygon within the service area. Table 3 summarizes future population projections.

The corresponding water supply needed by this growing population can be estimated using per capita water demands, with the assumption that water demands in the Goose Creek Watershed are similar to those throughout CMUD's service area. Using CMUD's 2011 per capita demand of 128 mgd per person and the population projections derived from TAZ data, water supply demand for the Goose Creek watershed was calculated and is also presented in

Table 3 (Metrolina, 2005; pers. comm Brunson, 2012). For the purposes of this analysis, it is assumed that per capita water demand will be consistent into the future. The 2011 value was calculated using data presented in CMUD’s annual Local Water Supply Plan documentation and includes commercial, industrial, and unaccounted for water. This demand is currently met in the watershed through private wells, private water systems, and limited CMUD service. It is expected that a combination of providers and private individual wells will be used to meet future water supply demand.

Table 3 Future Water Supply Demand Projections

Area	2020		2030	
	Projected Population	Water Demand (mgd)	Projected Population	Water Demand (mgd)
Goose Creek Watershed ^a	22,875	2.93	30,576	3.91
Entire Mint Hill ETJ ^b	74,514	9.54	93,210	11.93

^a Goose Creek Watershed within Mecklenburg County only

^b Mint Hill ETJ data is provided for comparison purpose only

Sources: NCDOT, 2005; Pers. comm. Brunson, 2012.

With Condition 3 in place, CMUD has limited its planning activities in the Goose Creek Watershed. The removal of Condition 3 would give CMUD the opportunity to plan for potential growth and infrastructure. The towns within CMUD’s service area are responsible for land use planning, and CMUD works cooperatively to plan appropriate infrastructure to meet accommodate land use plans. The Town of Mint Hill is responsible for land use planning in this watershed and has done site-specific small area planning, such as at the Lawyers Road and I-485 interchange, which is within the Goose Creek Watershed (HNTB, 2011). Currently, there are plans for a shopping mall and subdivision development near this interchange. In adjacent watersheds, CMUD is planning to improve sewer infrastructure. If sewer infrastructure were added in Goose Creek, the flow would likely be pumped over a ridge line to the Irvin Creek Watershed and carried to the McAlpine Creek relief sewer, and then to the McAlpine Creek Water Reclamation Facility. Sufficient capacity in both the conveyance and treatment infrastructure would be available, according to recent planning (LandDesign, 2003). This facility discharges to McAlpine Creek, which would return a portion of the transferred water to the Catawba River Basin and minimize IBT to the watershed. However, exact planning data for predicted water demands and sewer needs in the watershed are not yet available. CMUD is requesting removal of Condition 3 as the first step in future planning in the Goose Creek Watershed.

Section 3

Environmental Conditions

This section describes the existing environment for the Goose Creek Watershed, a portion of CMUD's receiving basin for its IBT. It also includes information directly obtained from the EA CH2M HILL prepared for CMUD before the Goose Creek Watershed was removed from the IBT petition and more current information specifically regarding the Goose Creek Watershed.

A discussion of the primary consequences (or direct impacts) of the proposed IBT is included as a summary at the conclusion of this section. Secondary and cumulative impacts are discussed in Section 4.

3.1 Wetlands

The western Piedmont physiographic province of the state is characterized by gently sloping to strongly sloping, well drained and moderately well drained soils that have clayey or loamy subsoil (USDA, 1980).

Within the 124,129-acre Rocky River Basin study area, 2,927 total acres of various types of wetlands have been identified by the National Wetlands Inventory (NWI) (as published by the U.S. Fish and Wildlife Service [USFWS], 2002). Of those total acres of wetlands, 1,940 acres are within the Mecklenburg County portion of the Rocky River Basin, including Goose Creek. The majority of the wetlands within the Rocky River Basin study area identified on the NWI maps are bottomland hardwood forests of the Palustrine Piedmont/ Low Alluvial Forest type.

The following Significant Natural Heritage Areas (SNHAs) containing wetland natural communities have been listed by the North Carolina Natural Heritage Program (NHP) and were identified as being within the U.S. Geological Survey (USGS) quadrangles that include the receiving basin study area:

- Back Creek Swamp, portion within Mecklenburg County, Harrisburg Quad, Swamp Forest
- Rocky River/Harrisburg Bottomland, portion within Mecklenburg County, Piedmont/Low Mountain Alluvial Forest

In addition to those communities listed by NHP for the receiving basin, the North Carolina Wetlands Restoration Program (WRP) lists the Piedmont/Mountain Swamp Forest, Hillside Seepage Bog, and Upland Pool wetland community types as existing in the Yadkin-Pee Dee River Basin (WRP, 1998).

3.2 Land Use

Historically, land uses in the watershed were primarily agricultural and rural residential. As urbanization has spread from the City of Charlotte, the population in the Goose Creek Watershed has increased, especially within the last 20 to 30 years. Most recently, growth has been further facilitated by the construction of I-485. With an increase in the residential population, commercial development has followed and a mall is under development within the watershed. Overall, impervious area within the watershed is increasing. A summary of land use information for the Mecklenburg County portion of the watershed is included in Table 4. More detailed land use data are included in the Charlotte-Mecklenburg Storm Water Services (MCSWS) 2009 Goose Creek Watershed Management Plan, presented in Appendix A-1. Figure 8 in the Plan shows recent land use data for the watershed.

Table 4 General Goose Creek Watershed Statistics (portion of Watershed within Mecklenburg County)

Estimated Goose Creek Watershed Population	5,616	
Goose Creek Watershed Area	6,975 acres	
Stream Miles (Draining > 50 acres)	28 miles	
Dominant Land Uses	Rural Residential	34%
	Vacant	31%
	Low Density Residential	11%
	Medium/Low Density Residential	9%
	Transportation	8%
Major Political Jurisdictions	Town of Mint Hill	

Source: CMSWS, 2009

3.2.1 Public Lands (Parks / Recreation Areas and Greenways)

An updated Greenway Master Plan was adopted for Mecklenburg County in 2008. A copy of the plan is attached in Appendix A-1. As stated on page MPU-1, “As of this 2008 master plan update, 30 miles of trail within 14 streamside corridors have been constructed and protected over 3,000 acres of floodplain and riparian habitat have been protected. The County reaffirms its intent to adhere to the vision, goals and objectives established with both the 1980 and 1999 master plans, to protect valued stream corridors for multiple purposes, and to continue the development of appropriate creek side trails and overland connector trails.”

As shown on the South Park Region map in Appendix A, Mecklenburg County Parks and Recreation has purchased park land in the Goose Creek Watershed. Stevens Creek Nature Preserve is just north of I-485 and consists of two parcels (40.287 acres and 187.170 acres) for a total of 227.457 acres. The Ezell Farm Community Park is just south of Matthews Mint Hill Road and includes two parcels (60.189 acres and 30.493 acres) for a total of 90.682 acres. As seen on the Polaris (GIS) information attached in Appendix A-1, most of this property was purchased in 2001.

3.2.2 Prime Agricultural and Forestry Land

According to the Soil and Water Conservation District for Mecklenburg County, 11 percent of the total soils in Mecklenburg County are considered characteristic of prime farmland. This translates into a small proportion (approximately 3 percent) of the total soils in the Mecklenburg County portion of the receiving basin considered characteristic of prime farmland if it is assumed that there is an even distribution of the soils throughout the county. Much of this land is no longer being used for agricultural purposes.

The original forest communities of the area are being progressively cleared out for wood products, crop production, and residential and industrial development. The Forest Natural Communities in the Receiving Basin Table in Appendix B lists the known types of terrestrial or upland forest natural communities that occur in the receiving basin. Wetland forests known to exist in the receiving basin are listed in the Wetlands section.

Common trees found today in these forest lands are beech, red maple, tuliptree, scarlet oak, chestnut oak, white oak, loblolly pine, shortleaf pine, southern red oak, Spanish oak, post oak, mockernut hickory, pignut hickory, Carolina shagbark hickory, red hickory, Virginia pine, yellow-poplar, and sweetgum (Schafale and Weakley, 1990; USDA, 1980).

3.2.3 Archeological and Historic Areas

The three District Plans in place for the Mecklenburg County portion of the Rocky River Basin have included Historic Resource Protection elements that call for the identification and preservation of historic properties and districts within the county. Several historic sites in the area have been protected (CH2M HILL, 2001).

The Catawba River Basin and the Yadkin-Pee Dee River Basin contain many archeological sites that have been surveyed and several sites where significant archeological resources have been found from many native groups that lived in the region until 200 years ago. Due to the size of the Goose Creek Watershed and the fact that no construction would occur associated with the proposed action, no archeological survey was prepared for this EA.

3.3 Fish and Wildlife Resources

3.3.1 Wildlife Habitat and Resources

Wildlife habitat and resources within the Goose Creek Watershed include species common to the Piedmont region of North Carolina and rare species and habitats which are protected by the USFWS, NHP, and other programs. The natural communities predicted to occur in the vicinity of the Goose Creek Watershed, according to the NHP, are listed in Appendix B. Additional rare habitats are also present, identified, and protected by the NHP as SNHAs. Portions of Goose Creek and Duck Creek within Mecklenburg County are aquatic SNHAs that continue through Union County to the Rocky River, designated in an effort to protect aquatic biodiversity, and specifically freshwater mussels. Field studies specific to the Goose Creek Watershed were not undertaken as part of this EA.

3.3.2 Fishery Habitat and Aquatic Resources

Goose Creek is a tributary of the Rocky River with habitats, including bedrock formations and cobble riffles that are common among tributaries of the Rocky River. Streams in the Goose Creek Watershed, including the main stems of Goose and Duke Creeks, are very sensitive to drought due to the underlying geological conditions of the area. The streams have been known to run dry for periods during droughts. This stresses aquatic communities, both fish and macroinvertebrates. NC DENR does not have a fish monitoring station on Goose Creek. With the Carolina heelsplitter habitat in this watershed, much research and sampling have been conducted to characterize its aquatic communities and habitats.

Macroinvertebrate sampling data from recent NC DENR monitoring are included in Table 5. For the most part, streams support Good or Fair bioclassifications. For example, the NC DENR station at SR 1004 exhibited a Good-Fair bioclassification in 1998 and Good in a 2003 monitoring event. Downstream in Union County, station B-7 received a Poor bioclassification in 2001 and then a Fair bioclassification in 2006 (NC DENR, 2008).

Table 5 NC DENR 2003 Macroinvertebrate Sample Results in the Goose Creek Watershed

Site	Stream	County	Road	Bioclassification
SSB-3	Goose Creek	Mecklenburg	SR 1004	Good
SSB-4	Goose Creek	Union	Glamorgan Rd.	Good
SSB-5	Goose Creek	Union	SR 1525	Good
SSB-6	Goose Creek	Union	SR 1533	Fair
SSB-7	Goose Creek	Union	US 601	Poor
SSB-8	Goose Creek	Union	SR 1547	Fair
B-5	Goose Creek	Union	US 601	Poor
SSB-9	Goose Creek	Union	SR 1547	Fair
SSB-1	Stevens Creek	Mecklenburg	Maple Hollow Rd.	Good
SSB-2	Stevens Creek	Mecklenburg	Thompson Rd.	Not Impaired
SSB-10	Duck Creek	Union	US 601	Fair

3.3.3 Rare and Protected Species or Habitats

A total of 14 endangered, threatened, special concern, or significantly rare aquatic species (fishes and mussels) occur in waters within the Yadkin-Pee Dee River Basin, and several other non-aquatic threatened and endangered amphibians, mammals, and plants occur along stream banks in the basin (NHP, 2011).

A total of 21 sensitive plant and animal species potentially occur within the original receiving basin study area. Specifically, the Goose Creek Watershed is part of identified critical habitat for the Carolina heelsplitter, as referenced in Condition 3 of the IBT Certificate. This species and its habitat requirements are described below, followed by other species in these

categories and protected habitats in the area. Other freshwater mussel species are also found in Goose Creek, and it is assumed that protection measures for the Carolina heelsplitter will also benefit these species.

Carolina heelsplitter

The Carolina heelsplitter (*Lasmigona decorata*) is a freshwater mussel that was listed by the federal government as an endangered species in 1993. It is currently listed as an endangered species by North Carolina. The heelsplitter inhabits cool, slow-moving, small- to medium-sized streams and rivers. There are only four known populations of the heelsplitter remaining in the world – one of which is in the Union County portion of Goose Creek near the confluence with the Rocky River. Critical habitat has been identified by the USFWS (USFWS, 2002). The headwaters of this sensitive habitat area originate within the IBT project receiving basin and focus area of this EA, in Mecklenburg County. This “Goose Creek Aquatic Habitat” is an SNHA with four freshwater mollusks—the heelsplitter, squawfoot, notched rainbow, and Eastern creekshell are all known to inhabit the watershed (NHP, 1999). Downstream of the IBT receiving basin study area, this habitat is considered vulnerable to the potentially significant effects of upstream urbanization within the IBT receiving basin study area (CH2M HILL, 2001).

Goose Creek is a small stream that contains only a limited amount of this suitable habitat for the species. The extremely small population of the species in Goose Creek has been reduced to a few scattered sites within short reaches of the stream due to impoundments and the general deterioration of water quality resulting from streambank erosion, siltation, discharges, prolonged drought conditions, and other pollutants and habitat alterations from poor land use practices. The species is therefore only currently present in areas of Goose Creek (in Union County) where there are remaining stable, well-shaded stream banks and good water quality (USFWS, 1997; USFWS, 2002, CH2M HILL, 2001).

According to Keferl and Shelley (1988), *Lasmigona decorata* has been extirpated from many river systems in North and South Carolina due to the alteration of many streams and other effects of urbanization, including channelization, dredging, damming, agricultural runoff, siltation, sand mining, and increased urban storm water runoff.

The decline in the Carolina heelsplitter throughout its range has been attributed to several factors tied to urbanization, including:

- Sedimentation and siltation from land use and development activities, which causes direct mortality of the species
- Increased storm water runoff from urban land uses, resulting in increased scouring and erosion of stream banks
- Clearing of trees up to or along the stream banks, resulting in destabilization and erosion of streambanks.
- Heavy nutrient and pollutant loads from nonpoint and point sources that are toxic to individuals

- Habitat alterations from channelization, ditching, damming or streambank alterations that create water quality degradation, including sedimentation and siltation

According to the USFWS (1997), all of these factors contribute greatly to reducing the species' distribution and reproductive capacity. Many of these same factors from rapid urbanization are suspected to have led to the recent extirpation of another freshwater mussel in the Charlotte area (the Carolina elktoe, *Alasmidonta robusta*) (Keferl and Shelley, 1988). These impacts of growth continue to threaten the remaining populations of the species in the Charlotte-Mecklenburg area (USFWS, 1997; CH2M HILL, 2001).

The USFWS (1997) provides the following evaluation:

The low number of individuals and the restricted range of each of the surviving populations of the heelsplitter make them extremely vulnerable to extirpation from a single catastrophic event or activity. The existing and potential future land-uses of the surrounding area continue to threaten the habitat and water quality of the Goose Creek population with increased discharge or runoff of silt, sediments, and organic and chemical pollutants. Land-clearing and disturbance activities implemented without proper sedimentation control pose a significant threat to the species' continued existence. Mussels are sedentary and are not able to move long distances to more suitable areas in response to heavy silt loads. Natural sedimentation resulting from seasonal storm events probably does not significantly affect mussels, but human activities often create excessively heavy silt loads that can have severe effects on mussels and other aquatic organisms. Siltation has been documented to adversely affect native freshwater mussels both directly and indirectly. Siltation degrades water and substrate quality, limiting the available habitat for freshwater mussels (and their fish hosts); irritates and clogs the gills of filter-feeding mussels, resulting in reduced feeding and respiration; smothers mussels if sufficient accumulation occurs; and increases the potential exposure of the mussels to other pollutants. Studies have found that less than 1 inch of sediment deposition caused high mortality in most mussel species. Sediment accumulations that are less than lethal to adults may adversely affect or prevent recruitment of juvenile mussels into the population through the direct mortality of juvenile mussels or effects to the species' fish host(s). Unless existing populations are protected and maintained, this species is likely to become extinct in the foreseeable future (USFWS, 1997; CH2M HILL, 2001).

Atlantic pigtoe

The Atlantic pigtoe (*Fusconaia masoni*) is a freshwater mussel that is listed by USFWS (2010) as a federal species of concern and is listed by North Carolina as endangered. One of the few remaining populations of the Atlantic pigtoe in the Yadkin-Pee Dee River Basin is found in Goose Creek (North Carolina Wildlife Resources Commission [WRC], 2011). It is not known if the species extends the entire length of the creek, or only certain segments (CH2M HILL, 2001). All populations within the basin are in decline (CH2M HILL, 2001).

Carolina creekshell

The Carolina creekshell (*Villosa vaughaniana*) is a freshwater mussel that is listed by the USFWS as a federal species of concern in Mecklenburg County. It is also listed by North Carolina as endangered.

Schweinitz's sunflower

Schweinitz's sunflower (*Helianthus schweinitzii*) is a federally listed endangered plant species that is endemic to the upper Piedmont area of North Carolina. There are several known locations of this species within eastern Mecklenburg County, including the Goose Creek Watershed.

Schweinitz's sunflower occurs in relatively open habitats – early successional fields, forest ecotonal margins, or forest clearings. It thrives in full sun but also grows in the light shade of open stands of oak-pine-hickory. Schweinitz's sunflower generally occurs in moist to dry clay soils or soils that are clay-loams or sandy-clay loams with high gravel content. Formerly, the species probably occurred in prairie-like habitats or oak savanna maintained by fires set by lightning or Native Americans. Loss of this open habitat to fire suppression and urbanization has resulted in the decline of the species and its reduction to marginal and vulnerable sites such as roadsides, power line easements, and old pastures. Rapid urban growth in the Charlotte metropolitan area is continuing to convert Schweinitz's sunflower habitat to urban and suburban uses (USFWS, 2011; CH2M HILL, 2001).

Although this species is listed as endangered by the USFWS and the NC Department of Agriculture's Plant Conservation Program, such listing provides only limited protection since neither law protects the species from destruction by the landowner. In addition, Schweinitz's sunflower requires active management to maintain optimal habitat and cannot be "left alone" in a static habitat (USFWS, 2010; CH2M HILL, 2001).

Michaux's sumac

Michaux's sumac, *Rhus michauxii*, is a small shrub with compound leaves with oblong, serrated leaflets. Preferring basic soils in open woods, development and habitat destruction from activities such as pine plantation conversion have reduced populations. In most cases, plants are unisexual. This federally listed endangered plant's range includes the coastal plain and Piedmont of North Carolina, although no known population exists in Mecklenburg County or its neighboring counties (USFWS, 2010).

Smooth coneflower

The federally listed endangered smooth coneflower, *Echinacea laevigata*, is in the aster family and grows up to 1.5 meters tall, exhibiting flower structures with light pink to purple rays from late May through mid July. The stems are smooth with few leaves, and the leaves reach up to 20 centimeters in length. This herb prefers full sun, often growing in areas that experience disturbance such as rights-of-way and open woods. Historically, this species thrived with natural fires and large herbivores creating open habitats in full sun and is often found with Schweinitz's sunflower. Currently, the species is known in Virginia, North Carolina, South Carolina, and Georgia, with populations recorded in Mecklenburg County (USFWS, 2010).

Other listed species

Other federal species of concern are listed for Mecklenburg County. The aquatic species include the American eel, Carolina darter, Carolina creekshell, and shoals spider lily (found in the Catawba River Basin). Vascular plants include the Georgia aster (candidate species), dwarf

aster, and prairie birdsfoot-trefoil (USFWS, 2010). These plants typically prefer open habitats requiring frequent disturbance and have seen populations decline due to development and other land use changes.

3.4 Water Quality / Water Resources

The Goose Creek Watershed streams are Class C waters. Over 16 miles of Goose Creek are considered impaired or impacted, depending on the reach, by construction activities, storm water runoff, and imperviousness in the watershed. Of these, 13 miles are considered impacted by fecal coliform bacteria from failing septic systems, animals, and package WWTPs. Also, at times dissolved oxygen in the stream may be low (NC DENR, 2008). Within the Mecklenburg County portion of the Goose Creek Watershed, CMUD provides no sewer service, and the primary sewage disposal method is the onsite septic system. The source of high levels of fecal coliform and other sewage-related bacteria in Goose Creek and its tributaries is suspected to be malfunctioning and degraded septic systems (MCSWS, 2009).

Over the past decade numerous agencies and groups have worked to mitigate water quality issues in the Goose Creek Watershed. A total maximum daily load (TMDL) for fecal coliform was approved in 2005. See Appendix A for a list of agencies, programs, and regulations that have been implemented in the Goose Creek Watershed since 2002. An example of these programs is Mecklenburg County's inspection of septic systems. Approximately 1,400 single-family residential lots, dispersed throughout the watershed in Mecklenburg County, have an onsite septic system. To address elevated stream bacteria levels, in 2008 Mecklenburg County initiated a program to complete an inspection of all the septic systems in the watershed in order to identify deficiencies and take actions necessary to ensure correction. This effort was completed in 2010 with the inspection of 1,422 septic systems resulting in the correction of 13 deficiencies that could contribute to elevated bacteria levels in Goose Creek. Seven of the 13 failing systems were corrected during FY09-10. This resulted in an estimated annual load of 1.89×10^{11} colony-forming units (cfu) being removed from Goose Creek at a cost of \$47,085.10, which equates to a cost/benefit ratio of \$249/billion colonies removed (MCSWS, 2010).

NC DENR data, collected from 2004 to 2008, documented a reduction in fecal coliform bacteria levels. In 2010, Goose Creek from its source to Steven's Mill Road was lowered from a Category 5 to a Category 4 on the 303(d) list due to the ongoing implementation of several management strategies that are expected to address the impairments. However, downstream in Union County, from Steven's Mill Road to its confluence with the Rocky River, Goose Creek is still on the 303(d) list as an impaired stream (Category 5) for impaired biological integrity and high levels of fecal coliform (NC 2010 Integrated Report, 2010, Appendix A-2).

3.5 Air Quality

The overall ambient air quality has steadily improved since 1980. An air quality index (AQI) is used to report ambient air conditions, and the AQI categories include good, moderate, unhealthy, very unhealthy, and hazardous. Through 1998, the Mecklenburg County AQI levels had not exceeded the unhealthy range, with most reports indicating the air quality was good or moderate. The county had been a non-attainment area for ozone and carbon monoxide but was re-designated in 1995 as an attainment area (CH2M HILL, 2001).

A new, more stringent National Ambient Air Quality Standard (NAAQS) for ozone was established by the U.S. Environmental Protection Agency (EPA) in 1997, and the greater Charlotte-Mecklenburg region has been struggling to meet this new standard. In 2009, the compliance value was 0.085 part per million (ppm), which is a 3-year average and slightly above the standard of 0.08 ppm. Since 2009, the daily standard has been 0.075 ppm.

Ozone is not directly emitted, but is formed when sunlight reacts with volatile organic compounds (VOCs) and nitrogen oxides (NO_x). According to the NC Air Awareness program, NO_x is the limiting factor on the formation of ozone in North Carolina because of the abundance of naturally occurring VOCs from trees, which cannot be controlled. In North Carolina urban areas, more than 60 percent of NO_x emissions are from automobiles (CH2M HILL, 2001).

3.6 Groundwater Resources

Mecklenburg County is located in the physiographic region described as the Piedmont, which is between the Blue Ridge and the Coastal Plain regions. According to the North Carolina Cooperative Extension Service, the crystalline bedrock aquifer in the Piedmont region has relatively little storage capacity, and the well yields tend to be low (around 5 to 35 gallons per minute). The USGS indicates that the major groundwater-related issues in North Carolina are (1) declining water levels (especially in the Coastal Plain region); (2) contamination from hazardous wastes and landfill leachate; and (3) effects of land use on water quality (especially the effects of urbanization). While groundwater is used by individuals and some community systems in Mecklenburg County, it is not an appropriate source for centralized use by CMUD because of insufficient yield and the costs associated with combining surface and groundwater resources (CH2M HILL, 2001).

According to the *2010 State of the Environment Report for Mecklenburg County* (MCDEP, 2010), about 15 percent of residents use groundwater. Most of the wells used for water supply are located in rural or low density areas, including the Goose Creek Watershed; however, there are private and community wells located within CMUD's water supply service area. Based on the ambient groundwater sampling network for Mecklenburg County, the average values are within the suggested EPA drinking water levels except for manganese and iron (MCDEP, 2010). Manganese is not known to have a toxicological effect, and the recommended limit is based largely on aesthetic and taste considerations. The recommended limit on iron is also based on aesthetic and taste considerations and not physiological effects. Mecklenburg County maintains one ambient groundwater monitoring well in the Goose Creek watershed; recent data do not indicate any water quality issues (Corbitt, pers. comm., 2012). Mecklenburg County also offers mapping of registered wells via its Well Information System on its groundwater website (Mecklenburg County Groundwater and Wastewater Services, 2012).

In 2010 there were more than 1,370 known or potential sources of groundwater contamination in Mecklenburg County. Approximately 250 private wells have been identified as contaminated. The County works to identify and track contamination through its Mecklenburg Priority List (MCDEP, 2010).

3.7 Noise Level

Quiet is conducive to psychological and physiological well-being for humans. Just as excessive noise has been documented to negatively affect human health and welfare, elevated noise levels from human activities can disrupt the normal behavior patterns of wildlife, interfering with migration, breeding, hunting, and predator avoidance.

The receiving basin currently exhibits the day-to-day normal noise conditions representative of forested and open land cover areas. With the growth that is anticipated in the area, the noise level will increase temporarily during construction of new subdivisions, homes, and commercial development. A long-term increase in noise levels can be expected due to increasing mobile source traffic.

3.8 Toxic Substances/Hazardous Wastes

The *2010 State of the Environment Report: Mecklenburg County, NC* (MCDEP, 2010) reports that approximately 7,800 tons of hazardous waste was generated in 2007. This is less than the 2005 amount, and overall there has been a decreasing trend. There were 48 large quantity generators and 227 small quantity generators of hazardous waste in the County. At the time, there were nine treatment, storage, or disposal facilities.

Potential sources of toxic substances present in the source basin study area are agricultural-related substances such as fertilizers, weed control chemicals, and pesticides. Other common toxic substances are employed in the construction of homes and commercial buildings such as glues, solvents, and paints. Typical household hazardous wastes include oils, cleaners, solvents, paints, herbicides, and fertilizers (CH2M HILL, 2001).

3.8 Summary of Primary Consequences

The purpose of this EA is to request removal of Condition 3 from the IBT Certificate. No construction is involved in this change to the IBT Certificate. As such, no construction is associated with this EA and therefore no direct impacts, or primary consequences, would occur. However, its removal would give CMUD the ability to begin planning for the provision of additional water service to the Goose Creek Watershed. Future infrastructure plans could trigger environmental reviews and the NC SEPA process, depending on the characteristics of the projects.

Section 4

Secondary and Cumulative Impacts in the Receiving Basin

This section provides a broad evaluation of the potential secondary¹ and cumulative² impacts that may result from development facilitated by the proposed action. This section contains a general overview of the potential indirect impacts to the Goose Creek Watershed that could result from the removal of Condition 3 from the IBT Certificate. It must be emphasized that modest growth has been occurring despite a lack of access to public water and sewer. Modest growth is likely to continue with the removal of Condition 3 given the watershed's location in Mecklenburg County and the construction of I-485.

Additional water and sewer infrastructure, subject to environmental review under NC SEPA, would be necessary to support higher intensity growth in the watershed. No infrastructure improvements are planned at this time, and development patterns are difficult to predict and quantify. It is likely that commercial development, including a proposed shopping mall will occur around I-485 interchanges while construction of the interstate itself is leading to low to medium density residential development. Mitigation for potential impacts is the focus of Section 6.

4.1 Secondary Impacts

4.1.1 Use of Existing Water Lines

The existing water lines into the Goose Creek Watershed have sufficient capacity to transfer more water into the watershed. Adding the Goose Creek Watershed to the IBT Certificate would allow this capacity to be used to support new development as well as provide water to existing development currently served by private wells. With the requested removal of Condition 3 from the IBT Certificate, land use plans for the Town of Mint Hill can be updated and CMUD could begin appropriately planning for additional water infrastructure.

4.1.2 Development in the Goose Creek Watershed

Mecklenburg County's existing policies accommodate urban growth over the entire County. The regional transportation improvements planned for the receiving basin, including the new I-485, the planned I-74 Bypass, and local thoroughfare improvements, have been collectively planned to accommodate growth. With removal of Condition 3 from the IBT Certificate, CMUD would also begin plans to accommodate the growth with adequate infrastructure.

¹ "Indirect Effects" (secondary impacts) are "caused by and result from the proposed activity although they are later in time or further removed in distance, but they are still reasonably foreseeable." (15A NCAC 1C .0101(d)(4))

² "Cumulative Effects" are defined as "resulting from the incremental impact of the proposed activity when added to other past, present, and reasonably foreseeable future activities regardless of what entities undertake such other activities." (15A NCAC 1C .0101(d)(2))

Development within the Mecklenburg County portion of the Goose Creek Watershed falls under the Town of Mint Hill's planning jurisdiction. Although some urban development has occurred in the Goose Creek Watershed without public water and sewer access (through the installation of private or community wells and septic tanks or package treatment plants), the provision of water conveyance infrastructure may lead to more intense land use types and densities than are currently possible on limited capacity private systems. Current plans within the watershed include the addition of additional private water system infrastructure to facilitate more dense development in concurrence with the Town's zoning than would occur using individual wells (pers.comm. Barry Shearin/CMUD, August 22, 2012).

Future land uses for the Goose Creek Watershed are indicated on the Proposed Land Use Maps in Appendix B, which were included in the draft EA prepared by CH2M HILL in 2001. Given the uncertainty of water service as a result of Condition 3 of the IBT Certificate, these land use plans have not been updated. The Town of Mint Hill began updating its Comprehensive Land Use Plan in 2009; however, the process is not complete at this time. A site-specific plan for the Lawyers Road and I-485 interchange has been approved, as this area may undergo a rapid change of land uses if the proposed The Bridges shopping mall is constructed. Updated plans will be provided to support future environmental review of any planned infrastructure improvements.

Therefore, the most significant indirect impact of the proposed IBT modification is predicted to be increased growth and development in the basin, though it is not projected to be significant given the mitigation measures that have been implemented as discussed in Section 6.

4.2 Cumulative Impacts

Cumulative impacts, related to growth, are expected to be essentially the same as those identified as secondary impacts in the previous section. Removal of Condition 3 of the IBT Certificate would likely result in only modest increases in growth, as discussed previously. This proposed action, when cumulatively considered with other actions such as the construction of I-485, is likely to result in land use and population density changes. As such, without mitigation measures in place, smaller actions such as construction of new homes, water line connections, slowly occurring land use changes, increases in watershed impervious areas, and other impacts could cumulatively lead to significant impacts.

The major concern with cumulative impacts is that as land uses change and open spaces are developed and cut off from other open areas, fish and wildlife habitat would be lost and fragmented, and species diversity potentially diminished. Loss of terrestrial natural communities to urban development is a particular concern for the sensitive vascular plant species living on marginal habitats (such as the Schweinitz's sunflower) in the receiving basin (USFWS, 1994). Sensitive terrestrial and aquatic species and their habitats may be lost to development or may be degraded over time by the negative impacts of urban uses in close proximity, especially as a result of degradation of water and air resources.

Without mitigation, both the water quality and sensitive species habitat in the Goose Creek Watershed may be significantly impacted through the cumulatively increasing storm water flows, increased sedimentation and erosion, loss of streambanks, and increased amount of

nonpoint source pollutants entering into the surface waters from urban land uses (USFWS, 1997; CH2M HILL, 2001).

Groundwater may also be reduced with the cumulative increase in impervious surface areas, which may negatively impact stream base flows. However, the potential for shallow groundwater resources to be impacted by pollution from failing septic systems and other urban sources would be reduced by the potential to add sewer infrastructure to the watershed.

Other cumulative impacts resulting from greater population density facilitated by available public water supply include increases in usage of roads and public natural areas. Of particular concern in Mecklenburg County is air pollution due to the cumulative additional vehicle miles traveled. A potential impact due to increased population growth is higher concentrations of ozone formed during the hot summer months. In addition, public and recreational lands could receive additional use from an increased population, creating stress on wildlife trying to occupy the few natural areas remaining. Urbanization will also increase the base level of noise in the receiving basin, potentially impacting wildlife behavior.

Therefore, the most significant cumulative impact of the proposed IBT modification is predicted to be increased land use densities and development in the basin in the Town of Mint Hill's jurisdiction. However, it is not projected to be significant given the mitigation measures that have been implemented as discussed in Section 6.

Section 5

Alternatives Analysis

As noted previously, the purpose of this EA is to request the removal of Condition 3 from the IBT Certificate. As such, there are two alternatives: no action and the proposed action, which is the removal of Condition 3.

5.1 No Action Alternative

Under the no action alternative, CMUD would not provide additional water services to residents within the Mecklenburg County portion of the Goose Creek Watershed. While development within this watershed (with its lack of access to public water and sewer services) has been slower than in the surrounding area, urban growth has still occurred and would continue to occur. Since 2000 the Town of Mint Hill has grown at a slower rate than the neighboring Goose Creek Watershed communities of Stallings, Indian Trail, and Fairview (Muni Net Guide, accessed 2011). Table 6 summarizes population growth over the last decade in the municipalities in the Goose Creek Watershed.

Public water supply and wastewater disposal needs would continue to be met by private water wells and septic systems. Maintenance of septic systems is important under this alternative, as water quality impacts associated with fecal coliform pollution from failing septic systems has historically been a problem in the watershed.

Table 6 Population Growth over the Last Decade for Municipalities in the Goose Creek Watershed

Municipality	County	2000	2010	Percent Increase
Mint Hill	Mecklenburg	14,922	22,722	52.3
Stallings	Union	3,189	13,381	333.7
Indian Trail	Union	11,905	33,518	181.5
Fairview	Union	2,495	11,111	345.3

5.2 Removal of Condition 3 from the IBT Certificate

The alternative to remove Condition 3 from the IBT Certificate is defined in Sections 1 and 2 of this EA. This approach does not include new construction, but rather would facilitate individual connections to existing water service and would allow the Town of Mint Hill to further conduct land use planning and CMUD to plan for future water infrastructure. Connections to existing water lines are not expected to generate significant direct environmental impacts. Secondary and cumulative impacts related to growth and development in the watershed, facilitated by available water supply, are expected to be mitigated through actions described in Section 6. This is the preferred alternative.

Section 6

Mitigation of Adverse Impacts

The proposed addition of the Goose Creek Watershed to the existing IBT Certificate via elimination of Condition 3 would not have the potential to cause significant direct or indirect impacts to the environment, as discussed in Sections 3 and 4. This conclusion is based on implementation of the NC DENR Plan approved by the EMC in 2009, which outlined the local actions necessary to sufficiently mitigate potential impacts. This was accomplished by incorporation of the Plan recommendations into the Town of Mint Hill's PCO, with the revised version approved in March 2010, and enforcement of PCO components. Full copies of both documents are included in Appendix A-1. A comparison of these documents is included in Table 7. References to specific sections of the PCO are included in the table to aid in review. The Town of Mint Hill, as evidenced by its timely incorporation of the Plan into its development ordinance and its dedication of resources for such tasks as increased developer plan reviews and enforcement activities, is committed to protection of water quality in the Goose Creek Watershed. Thus, no further significant secondary and cumulative impacts to the Goose Creek Watershed are expected.

Since the IBT increase was approved in 2002, other policies and plans have been enacted to help mitigate the secondary and cumulative effects of urban growth within the Goose Creek Watershed:

- 2009 Goose Creek Watershed Management Plan (Charlotte-Mecklenburg Storm Water Services)
- 2009 Goose Creek Water Quality Recovery Program Plan for the Fecal Coliform TMDL (Charlotte-Mecklenburg Storm Water Services)

6.1 Site Specific Water Quality Management Plan for the Goose Creek Watershed

The purpose of NC DENR's Site Specific Mitigation Plan for the Goose Creek Watershed, approved by the EMC in 2009, is to protect the habitat of the Carolina heelsplitter. To achieve this goal, the intent is to mitigate future impacts to water quality from new development. The Plan focuses on the habitat and water quality conditions required to sustain and recover the Carolina heelsplitter species. Strategies to achieve this goal include (as outlined in Table 7):

- Control of storm water for projects disturbing 1 acre or more
- Control of wastewater discharges (no new discharges in watershed)
- Control of toxicity to streams supporting the Carolina heelsplitter
- Establishment and maintenance of riparian buffers

Table 7 Comparison of Site Specific Water Quality Management Plan and Town of Mint Hill PCO

Entity	Site Specific Requirements	Town of Mint Hill Post-Construction Storm Water Control Ordinance
	NC Environmental Management Commission	Town of Mint Hill
Date	February 1, 2009	March 11, 2010
Management Strategy		
General purpose	Maintenance and recovery of the water quality conditions required to sustain and recover the federally endangered Carolina heelsplitter	To establish storm water control measures in response to Phase II rules and to protect the Carolina heelsplitter
Control of storm water for projects disturbing 1 acre or more of land	Trigger: any new development activity that disturbs 1 acre or more and will result in increased impervious area	Storm Water Management Permit is required for 1 acre disturbance, triggering review, approval, and inspection to ensure compliance with PCO
	Control and treat difference in runoff from pre- to post-development conditions for 1-year, 24-hr storm	Meets requirement. Design Manual includes this language. See Sections 304 (B)5 and 305 (A)3, 5: Development Standards for Goose Creek District. Peak control exceeds the Plan [Section 305 (B)6].
	Promote infiltration of flows and groundwater recharge to maintain base flow	Section 305(A)4 addresses this goal
	Remove 85 percent total suspended solids (TSS)	Meets requirement. See Section 305(A)4; Section 501 (D): annual inspection of BMPs; 503: inspection program
	Draw down treatment volume no faster than 48 hrs	Exceeds volume requirement. See Sections 304(B)5 and 305(A)5: runoff volume shall be the difference between pre- and post-construction and drawdown time shall be a minimum of 24 hrs but no more than 120 hours.
	Meet design of storm water management measures in 15A North Carolina Administrative Code (NCAC) 02H. 1008	Meets requirement. See Section 305.
		Additional measure: See Section 501 (B). Compliance after construction is assured by maintenance provision of PCO. Town of Mint Hill accepts maintenance responsibility following a 2 -year warranty period. Operation and maintenance shall occur so as to preserve and continue a BMP's design functions.
Control wastewater discharges	No new NPDES wastewater discharges or expansions to existing discharges	Meets requirement. Implemented by NC DWQ, ordinance documents this.
	No new onsite sanitary sewage systems within riparian buffers	Meets requirement. Implemented by Mecklenburg County Health Department.

Entity	Site Specific Requirements	Town of Mint Hill Post-Construction Storm Water Control Ordinance
	NC Environmental Management Commission	Town of Mint Hill
Date	February 1, 2009	March 11, 2010
Control toxicity to streams supporting the Carolina heelsplitter	No activity that would result in direct or indirect discharge is allowed if it causes toxicity to Carolina heelsplitter	Meets requirement, stated in Section 305 (B)
	If possible, action shall be taken to reduce ammonia to achieve 0.5 mg/L or less of total ammonia based on chronic toxicity defined in 15A NCAC 02B .0202	Meets requirement. See Section 305(B); complies with the Plan and 15A NCAC 02B .0202. NC DWQ holds authority with this provision.
Maintain riparian buffers	As delineated on USGS 1:24,000 topo maps or finer scale maps	Exceeds requirement. See Section 305 (C) 3. Intermittent & perennial streams as defined by NC DWQ methodology (more inclusive method). Includes ponds, lakes & reservoirs.
	Undisturbed riparian buffers within 200 feet of waterbodies within the 100-year floodplain	Meets requirement. See Section 305 (C) 4
	Undisturbed riparian buffers within 100 feet of waterbodies not within the 100-year floodplain	Meets requirement. See Section 305 (C) 4
	Diffuse flow of runoff shall be maintained by dispersing concentrated flow and reestablishing vegetation	Language included. See Section 306; techniques specified in Town's standards manual and CMLDSM
	Redevelopment is allowed for residential structures	Meets requirement. See exceptions included in Section 305 (C) 2
	Redevelopment is allowed provided that less than an additional half acre is disturbed during the redevelopment of non-residential activity	Meets requirement. See exceptions included in Section 305 (C)
	Establishment of variance, exempt, potentially allowable, and prohibited activities within riparian buffers and associated mitigation	Meets requirements. See Section 305 (C), Table begins on page 38
Other Requirements	Sewer line construction	Meets requirement. See language in Section 308: Sewer lines and associated structures must be a minimum of 50 feet from jurisdictional wetlands associated with the floodplain.
	Undisturbed Open Space	Requirements apply to new development. Preferred where it will provide maximum water quality benefit by providing a reduction in the negative impacts from storm water runoff through non-structural means.

Acronyms and Abbreviations

CMLDSM: Charlotte-Mecklenburg Land Development Standards Manual

NC DWQ: North Carolina Division of Water Quality

NPDES: National Pollutant Discharge Elimination System

WLA: Waste Load Allocation

Local governments may be given the authority to implement and enforce the protection requirements outlined in the Plan. The Town of Mint Hill has this authority via Mecklenburg County. Mecklenburg County's letter requesting authority and explaining its PCO that meets most of the measures in this 2009 Plan is included in Appendix A-1. Also included in Appendix A-1 is the letter from the EMC documenting that NC DWQ recommended that local authority for implementation of this plan be delegated and that the EMC approved this recommendation. The letter is dated February 3, 2010. The following items were delegated to Mecklenburg County:

- Storm water controls (15A NCAC 02.B .0602)
- Riparian buffer widths (15A NCAC 02.B .0605)
- Variance activities within riparian buffers (15A NCAC 02.B .0606)
- Buffer types and managing activities within riparian buffers (15A NCAC 02.B .0607)
- Mitigation requirements for buffer activities (15A NCAC 02.B .0609)

Following this notification, the Town of Mint Hill moved forward with approving its draft ordinance, discussed in the following section. To track compliance, the EMC also required NC DWQ to perform an audit of Mecklenburg County's delegated responsibilities a minimum of once every 5 years. The first audit has not yet occurred and is planned for 2015.

6.2 2007 Post-Construction Ordinance for the Town of Mint Hill

The Goose Creek Watershed within Mecklenburg County is contained within the Town of Mint Hill's planning boundaries. The Town of Mint Hill's 2007 PCO is similar to the County's PCO and includes development standards and storm water control requirements. However, now a more stringent portion (Section 3.5) of the ordinance specifically addresses water quality protection measures for the Goose Creek Watershed. In 2010, the Town (via Mecklenburg County) was delegated the authority to implement NC DENR's Plan for the Goose Creek Watershed. The Town's Storm Water Administrator both implements and enforces storm water control requirements. The ordinance's requirements in the Goose Creek Watershed are detailed and compared to the Site-Specific Plan in Table 7.

Storm water treatment systems include:

- Control and treatment of the difference in the storm water runoff from the predevelopment and post-development conditions for the 1-year, 24-hour storm
- Removal of a minimum of 85 percent average annual TSS
- Storm water volume control as well as peak control, maintaining outflow hydrographs closer to predevelopment conditions

Other water quality and habitat protection measures include:

- Limitations on direct or indirect discharges that may cause ammonia toxicity to the Carolina heelsplitter (facilitated through NC DWQ)
- Establishment of stream buffers for intermittent and perennial streams as well as ponds, lakes, and wetlands with hydrologic connections to streams of either 200 feet within the 100-year floodplain or 100-feet when outside the 100-year floodplain
- Mitigation measures if buffers are compromised and variance procedures

Table 7 does show a few differences in draw-down time for BMPs. In the letter from Rusty Rozzelle at Mecklenburg County to NC DWQ dated April 13, 2009, differences between the 2009 Plan and the (at the time) draft ordinance are outlined with explanations. This letter is included in Appendix A-1.

One difference, language concerning volume control for structural BMPs, is defined in the ordinance consistently with the Town's Phase II Permit and the Charlotte-Mecklenburg BMP Design Manual, which was approved by NC DWQ. The PCO requirements exceed the definitions of required actions in the Plan: the full post-development volume for the 1-year 24-hour storm is greater than the Plan's requirement of treating the difference between the pre- and post-development volumes. This approach is more beneficial to downstream aquatic habitat, further protecting streams from erosion and sediment loading.

Another difference is the definition of peak control. The Plan stops at requirements for the 1-year 24-hour storm, while the PCO adds peak control requirements for the larger 10-year 6-hour and the 25-year 6-year storms, consistent with the 2007 version of the PCO.

Overall, the PCO meets or exceeds the measures defined in the NC DWQ developed and EMC approved Plan as mitigation for urban growth in the Goose Creek Watershed.

6.3 Other Local Programs

Other local programs targeted at the Goose Creek Watershed are focused on planning ways to improve water quality in the watershed, mitigating against potential impacts from development, and tracking watershed conditions over time.

2009 Goose Creek Watershed Management Plan

CMSWS developed a management plan for the Goose Creek Watershed in 2009. The management plan presents an adaptive strategy to monitor water quality and fecal coliform levels and to implement BMP and BMP retrofit projects, stream channel and stream buffer restoration activities, and preservation of land.

The watershed management plan first describes existing conditions in the watershed including the extent of the PCO buffers, public property, stream water quality, and physical conditions such as bank stability and erosion. Future efforts guided by the Plan will include development of a minimum of two detailed Master Plans to guide restoration, retrofit, and preservation projects. Annual reporting will document progress toward the Plan goals.

2009 Goose Creek Water Quality Recovery Program

The purpose of the Goose Creek Water Quality Recovery Program (WQRP) is to achieve and maintain compliance with the Town of Mint Hill's NPDES Storm Water discharge permit requiring the development of this plan and its implementation in response to the fecal coliform TMDL in the watershed. Each year, an annual report will be issued to document the activities and milestones associated with WQRP implementation. The annual report for fiscal year 2009-2010 is also included in Appendix A. Activities within this period included continued implementation of the monitoring plan in the WQRP, septic system inspections, continued staff and public education programming, and annual reporting.

2011 Lawyers Road and I-485 Small Area Plan by Town of Mint Hill

The Town of Mint Hill is responsible for land use planning within the Goose Creek Watershed and works cooperatively with CMUD and Mecklenburg County's Land Use and Environmental Services Agency (LUESA). An example of these efforts is the Small Area Plan created for the area at the intersection of Lawyers Road and I-485. The main stem of Goose Creek flows through this planning area. The Bridges shopping mall has approvals to be constructed in this area; however, the recent economic downturn has delayed construction. This shopping mall will include CMUD water and sewer service. This service cannot presently be extended beyond the shopping mall area. The full small area plan is available on the Town's website; the plan minus its appendices is included in Appendix A-1 (HNTB, 2011).

6.4 Summary and Conclusions

The potential for secondary and cumulative impacts resulting from growth in the Goose Creek Watershed is limited by mitigation measures in place at the local level. Efforts to track water quality and biological integrity in the watershed have not recently detected downturns. Improvements in fecal coliform levels in the watershed's streams have been measured. Implementing the water quality improvement strategies listed above has prompted the downgrading of portions of Goose Creek in Mecklenburg County from Category 5 to Category 4 on the 2010 303(d) list. The Town of Mint Hill has implemented and is enforcing its PCO, which includes specific measures targeted for the Goose Creek Watershed. These measures include storm water treatment measures, significantly sized riparian buffers, and other actions. With PCO meeting or exceeding the items outlined in the EMC's 2009 Site Specific Water Quality Management Plan for the Goose Creek Watershed, it is not expected that significant secondary and cumulative impacts will occur with the requested removal of Condition 3 from CMUD's IBT Certificate.

References

Allan, C.J., 2003, Water Quality and Stream Stability Monitoring for Goose Creek Mecklenburg and Union Counties, North Carolina 2001-2003, Department of Geography and Earth Sciences, UNC Charlotte.

Brunson, Allan. 2012. Personnel communication with Allan Brunson of CMUD, September 21, 2012.

Charlotte-Mecklenburg Storm Water Services (CMSWS), 2009. Goose Creek Watershed Management Plan. Version 1. Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2003, Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2007, Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2008, Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2009, Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2010, Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

Charlotte-Mecklenburg Utilities Department (CMUD), 2011, DRAFT Charlotte-Mecklenburg Utilities Interbasin Transfer Report, Czerr, D.W., Charlotte, NC.

CH2M HILL, 2001, Environmental Assessment for Charlotte-Mecklenburg Utilities for the Increase in Interbasin Transfer from the Catawba River Subbasin to the Rocky River Subbasin, Charlotte, NC.

Corbitt, Lisa. 2012. Personnel communication with Lisa Corbitt of Mecklenburg County Groundwater and Wastewater Services, October 1, 2012.

Fridell, J.A., U.S. Fish and Wildlife Service: Carolina heelsplitter in North Carolina, <http://www.fws.gov/nc-es/mussel/carolheel.html>, Accessed 2011.

HNTB. 2011. Lawyers Road and I-485 Small Area Plan. Prepared for the Town of Mint Hill, North Carolina. Adopted May 2011.

Keferl, Eugene P. and Shelley, Rowland M., 1988. The Final Report on a Status Survey of the Carolina heelsplitter, *Lasmigona decorata* and the Carolina Elktoe, *Alasmidonta robusta*, prepared for the US Fish and Wildlife Service and NC State Museum of Natural Science.

LandDesign, 2003, Preliminary Engineering Report for Clear Creek/Irvin Creek Basin Study. Prepared for Charlotte-Mecklenburg Utilities, Charlotte, NC.

Mecklenburg County Department of Environmental Protection (MCDEP). 2010. State of the Environment Report. Charlotte, NC.

Mecklenburg County Groundwater and Wastewater Services. 2012. Well Information System. <http://Groundwater.charmeck.org>. Accessed October 2012.

Mecklenburg County Storm Water Services (MCSWS). 2009A. Goose Creek Water Quality Recovery Program Plan for the Fecal Coliform TMDL V.2, Kroening, D., Charlotte, NC.

Mecklenburg County Storm Water Services (MCSWS). 2009B. Goose Creek Watershed Management Plan V.1, Kroening, D., Charlotte, NC.

Mecklenburg County Storm Water Services (MCSWS), 2010. Goose Creek Recovery Plan Final Report for Fiscal Year 2009-2010, Kroening, D., Charlotte, NC.

Miller, Steve. 2011 and 2012. Personnel communication with Steve Miller of CMUD, November 7, 2011 and June 2012.

Mint Hill, Town of. 2007. Post-Construction Controls Ordinance. Mint Hill, North Carolina.

Mint Hill, Town of. 1998B. Zoning Ordinance. Mint Hill, North Carolina.

Mint Hill, Town of. 1986. Land Use Plan. Mint Hill, North Carolina.

Mint Hill, Town of. 1998A. Subdivision Ordinance. Mint Hill, North Carolina.

Moreau, D. H., 2002, Charlotte-Mecklenburg Utilities Proposed to Increase Their Transfer of Water from the Catawba River basin to the Rocky River basin Hearing Officers Report, Environmental Management Commission and North Carolina Division of Water Resources, Raleigh, NC.

Muni Net Guide Your Hub for Municipal Related Research, 2011, RICIC, L.L.C. Muni Net Guide, P.O. Box 533, Hinsdale, IL 60522-0533 / (847) 337-3106
http://www.muninetguide.com/states/north_carolina/municipality/Mint_Hill.php
http://www.muninetguide.com/states/north_carolina/stallings/
http://www.muninetguide.com/states/north_carolina/indiantrail/
http://www.muninetguide.com/states/north_carolina/fairview/

North Carolina Department of Environment, Health and Natural Resources (DEHNR). 1997. Basinwide Assessment Report Support Document: Yadkin River Basin. Raleigh, NC

North Carolina Department of Environment and Natural Resources (NC DENR), 2008. Yadkin-Pee Dee River Basinwide Water Quality Plan. Raleigh, NC.

North Carolina Department of Environment and Natural Resources (NC DENR), 2009. Site Specific Water Quality Management Plan for the Goose Creek Watershed Yakin-Pee Dee River Basin, February 2009, Raleigh, NC, Website accessed June 2011: <http://h2o.enr.state.nc.us/csu/GooseCreek.html>

North Carolina Department of Transportation (NCDOT), Metrolina Regional Model Planning Team. 2005. Metrolina Regional Model.

North Carolina Natural Heritage Program (NHP). 2011. Element Occurrences Database. <http://www.ncnhp.org/Pages/heritagedata.html>.

North Carolina Wetlands Restoration Program (WRP), Division of Water Quality. 1998. “Basinwide Wetlands and Riparian Restoration Plan for the Yadkin-Pee Dee River Basin”

North Carolina Wildlife Resources Commission (WRC). 2011. North Carolina Atlas of Freshwater Mussels and Endangered Fish. http://216.27.39.101/Wildlife_Species_Con/WSC_FWMussels_EndFish_Atlas.htm. Accessed November 2011.

Schafale, Michael P. and Alan S. Weakley. 1990. “Classification of the Natural Communities of North Carolina”. Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation. NC DENR.

Shearin, Barry. 2012. Personal communication with Barry Shearin of Charlotte-Mecklenburg Utilities Department on August 22, 2012.

U.S. Census Bureau. 2010 Demographic Profile Data, Town of Mint Hill, North Carolina. <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>. Accessed May 2012.

U.S. Department of Agriculture (USDA), 1980. Soil Survey of Mecklenburg County, North Carolina. U.S. Government Printing Office. Washington, DC

U.S. Fish and Wildlife Service (USFWS), 2002. Critical habitat designation for Carolina heelsplitter (*Lasmigona decorata*). July 2, 2002, Federal Register, 67:44501-44522.

U.S. Fish and Wildlife Service (USFWS). April 1994. “Recovery Plan for Schweinitz’s sunflower (*Helianthus schweinitzii*).”

U.S. Fish and Wildlife Service. January 1997 (USFWS). “Recovery Plan for Carolina heelsplitter (*Lasmigona decorata*) Lea.”

U.S. Fish and Wildlife Service (USFWS), 2010. Endangered and Threatened Species in North Carolina. <http://www.fws.gov/nc-es/es/countyfr.html>. Accessed November 2011.

Appendices

Appendix A

A-1 Supporting Documents

- IBT Certificate
- Figures 1, 2, 3, and 4 (Location Maps and Water Lines)
- NC DENR Site Specific Water Quality Management Plan for the Goose Creek Watershed Yadkin-Pee Dee River Basin
- Town of Mint Hill Post-Construction Storm Water Ordinance
- Submittal Cover Letter, Draft Post-Construction and Goose Creek Management Ordinance for the Town of Mint Hill
- State Delegation Letter for the Goose Creek Watershed Management Plan
- Town of Mint Hill Small Area Plan: Lawyers Road and I-485
- Goose Creek Watershed Management Plan
- Goose Creek Water Quality Recovery Program Plan for the Fecal Coliform TMDL
- Mecklenburg County Parks and Recreation Greenway Plan Update 2008
- South Park Region Map
- Parcel Maps & Information for park property in Goose Creek Watershed
- FY 09-10 Goose Creek Recovery Program Final Report for Fiscal Year 2009-2010
- IBT Annual Reports 2008-2011

A-2 Supporting Data

- NC Integrated Report 2010
- Mecklenburg County Water Quality Data
- Charts showing Fecal Coliform trends at Goose Creek monitoring sites

Appendix B

CH2M HILL's 2001 EA prepared for CMUD regarding the Increase in IBT

Appendix C

- Finding of No Significant Impact
- Meeting Summary – U.S. Fish and Wildlife Service and Wildlife Resources Commission
- Comments Summary and Responses Matrix
- Agency Comments