9. Natural Environment

Introduction

Through the development of the Metropolitan Transportation Plan (MTP), the GHMPO took the opportunity to consult with environmental agencies and conduct a system-wide review of potential environmental impacts. The MTP consultation process is an initial step in identifying impacted areas and adjusting project alignments to avoid or minimize impacts to natural resources. It also allowed the MPO to make informed decisions when setting project priorities for the urban area. The consultation process ensures a transportation plan that minimizes negative impacts on the natural environment and is more efficient, timely and cost-effective.

Federal regulations require that:
The MPO shall consult, as appropriate, with state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of the transportation plan. The consultation shall involve, as appropriate,

> *(1) a comparison of transportation plans with state conservation plans or maps, if available; or*
> *(2) a comparison of transportation plans to inventories of natural or historic resources, if available* (23 CFR450.322).

This consultation plan not only meets the intent of the FAST Act, but ensures that the GHMPO develops a transportation system that protects and enhances the environment and maintains the quality of life in our community.

Plan

The Greater Hickory MPO encouraged the participation of resource agencies throughout the development of the MTP. The following actions were taken by Greater Hickory MPO to coordinate review of potential impacts to area resources:

- The Greater Hickory MPO compared the proposed transportation plan to available maps, inventories, plans, policies and strategies as listed by the agency contacts. The MPO provided resource agencies with an opportunity for review and comment prior to decision points where agencies' input was significant.
- The Greater Hickory MPO provided the resource agencies with an outline or schedule for the development of the MTP.
- The Greater Hickory MPO used e-mail, website, telephone, private face-to-face and public meetings to ensure that our process was accessible to resource agencies.
- The Greater Hickory MPO provided written or email notice to the resource agencies of upcoming public review meetings or public comment periods being held on the draft and final MTP and TIP, and transportation conformity process.
- Amendments to the MTP and TIP requiring a transportation conformity determination and/or analysis (additions or deletions of regionally significant projects) followed the same consultation notification as listed above.

Land Use Management

The Greater Hickory MPO has sought to integrate land use management into the transportation planning process on an ongoing basis. The goals and objectives of the 2045 MTP are consistent with those of the adopted land use plans of jurisdictions in the MPO. In addition, the MPO

maintains continuous consultation with land use planning departments in the MPO area, since planning staff from municipalities and the four counties in the region serve as members of the MPO's Technical Coordinating Committee (TCC).

Air Quality

Air Quality and Emissions

Ozone and particulate matter (PM) are two pollutants found in air that can cause harm to the health of people. The Clean Air Act of 1990 passed by Congress directed the Environmental Protection Agency (EPA) to issue regulations regarding these and other air quality issues. During the 1990's, the EPA conceived regulatory mechanisms requiring the states to submit plans and abatement strategies for ozone and PM to the EPA. Suites challenging the legality of EPA regulations were filed in the courts; thus, enforcement by the federal agency was delayed until the U.S. Supreme Court upheld EPA ozone and PM standards and clarified regulatory processes.

With the legal certification of the EPA's scientific methods and enforcement powers by the Court, the EPA directed the states to submit plans, which included designation of "non- attainment" and "attainment areas" within their borders. These "State Improvement Plans" must be approved by the Federal EPA. The N.C Division of Air Quality (NCDAQ), part of the NC Department of Environment and Natural Resources (DENR) is the state agency with the authority and responsibility for plan submission to the Federal government.

Ozone-Sources

Ozone is not usually emitted directly into the air, but at ground-level is created by a chemical reaction between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Sources of the NOx and VOCs that contribute to ozone formation include utilities, motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources.

Ozone-Health Impacts

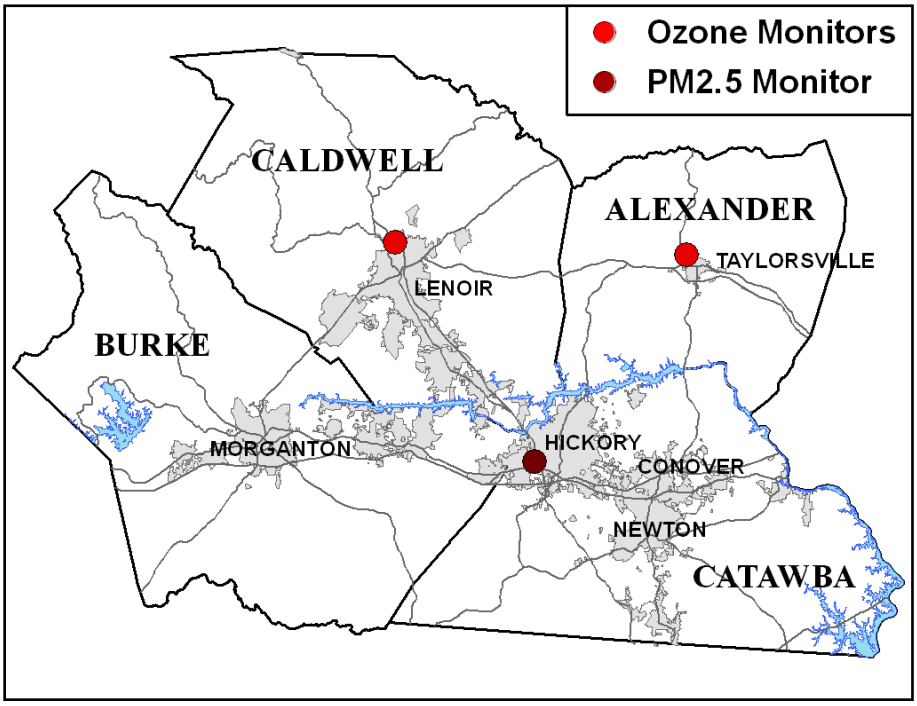
Ozone can harm people's lungs, and EPA is particularly concerned about individuals with asthma or other lung diseases, as well as those who spend a lot of time outside, such as children or construction workers. Ozone exposure can aggravate asthma, resulting in increased medication use and emergency room visits, and it can increase susceptibility to respiratory infections.

The United States has made significant progress reducing ground-level ozone across the country. Since 1980, ozone levels have dropped more than 20 percent as EPA, states and local governments have worked together to improve the quality of the nation's air. EPA expects improvement to continue, because of landmark regulations such as the Clean Air Interstate Rule, to reduce emissions from power plants in the Eastern United States, and the Clean Diesel Program, to reduce emissions from highway, nonroad and stationary diesel engines nationwide.

Assessment of Ozone Trends

The region has two ozone air monitors; one near Lenoir and the other in Taylorsville (Map 9- 1). Currently, the three-year average of ozone concentrations is under the 1997 8-hour air standard for both monitors. However, previous three-year averages (calendar year 2001-2003 and 2002-2004) indicated ozone levels above the acceptable federal level (see graphs). Therefore, the EPA designated the region as a "non-attainment" area in April 2004. The designation leads to penalties

involving the loss of federal and state grant funds for road and transportation improvements as well as, additional requirements for locating new industry/business in the area. Beyond the direct economic impacts, the "non-attainment" label can cause people not to move to geographic location, which can hurt economic growth and employment opportunities, etc. The successful completion of the EAC process kept the region from dealing with the penalties of nonattainment status.



The NCDAQ is required to evaluate design value (DV) trends and ozone exceedance trends to determine if any of the State's monitors show increases in ozone formation. Specifically, the NCDAQ evaluates the following data as part of the air quality analyses:

- 8-hour Ozone Design Value Trends – Most recent design values (1 and 3 year average of the 4th highest 8-hour ozone average), compared to the trend in design values from the 2006 timeframe to present.
- 8-Hour Ozone Exceedances – Number of exceedances of the 8-hour ozone standard at each monitor in the EAC areas for the most recent ozone season, compared to the number of exceedances at each monitor from 2006 to present.

8-Hour Ozone Design Value Trends

The Federal standard for ozone until 2008 was 85 parts per billion (ppb). The standard was lowered in 2009 to 75 ppb. In 2015, the ozone standard was lowered again to 70 ppb. Table 9-1 below shows the trend in 8-hour ozone values at monitors in Alexander and Caldwell County. The design values are presented in ppm, with design values exceeding the standard highlighted in gray with bold lettering.

Ozone values at the Taylorsville monitor have decreased from 81 parts per billion in 2007 to 66 ppb in 2016. At the Lenoir site, ozone values have fallen from 77 ppb in 2007 to 66 ppb in 2016. Since 2011 ozone values have been well below the federal standards, which could be attributed to multiple factors, including traffic improvements, mobile source emission reductions, alternative fuels and technologies, more favorable weather patterns, and poor economic conditions.

Table 9-1.
Fourth Highest 8-Hour Ozone Values (parts per billion), 2006-2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Taylorsville (Alexander Co).	76	81	76	63	71	67	67	63	64	65	66
Lenoir (Caldwell Co.)	76	77	72	63	71	66	64	62	61	65	66

Source: USEPA and NCDAQ, 2017.
Note: Data based on 85 ppb 8-hour federal ozone standard in 2006 to 2008, the 75 ppb standard in 2009 to 2014, and the 70 ppb standard in 2015 to 2016.

8-Hour Ozone Exceedance Trends

Table 9-2 below shows the number of 8-hour ozone exceedances at monitors in Alexander and Caldwell County. There have been no exceedances of the 8-hour ozone NAAQS in the last ten years (2006-2016) at either monitor.

Table 9-2.
Number of 8-Hour Exceedances at Regional Ozone Monitors, 2006-2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Taylorsville (Alexander Co).	0	0	0	0	0	0	0	0	0	0	0
Lenoir (Caldwell Co.)	0	0	0	0	0	0	0	0	0	0	0

Source: USEPA and NCDAQ, 2017.
Note: Data based on 85 ppb 8-hour federal ozone standard in 2006 to 2008, the 75 ppb standard in 2009 to 2014, and the 70 ppb standard in 2015 to 2016.

4th Highest Value Trends

The design value is calculated by averaging the 4th highest 8-hour ozone value for each of three years. Since the design value is an average of three years, a decrease may be the result of one good air quality year; or conversely, an increase may be the result of one bad air quality year. Therefore, looking at the trends of the 4th highest value can give insight as to how the air quality in an area is improving.

Table 9-3 displays the 4th highest 8-hour ozone 3-year averages for the region. The 3-year averages at both monitor sights fell significantly between 2006-2008 and 2011-2013. Since 2011-2013, the 3-year averages at both sites has been between 62 and 65 parts per billion.

Table 9-3.
Fourth Highest 8-Hour Ozone 3-Year Averages (or Design Values) (parts per billion), 2006-2016

	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016
Taylorsville (Alexander Co).	78	73	70	67	68	65	64	64	65
Lenoir (Caldwell Co.)	75	71	69	67	67	64	62	62	64

Source: USEPA and NCDAQ, 2017.
Note: Data based on 85 ppb 8-hour federal ozone standard in 2006 to 2008, the 75 ppb standard in 2009 to 2014, and the 70 ppb standard in 2015 to 2016.

PM 2.5 (Fine Particulate Matter)

Sources-PM 2.5

Fine particle pollution, also called PM 2.5, consists of suspended fine particles that are less than or equal to 2.5 micrograms in diameter. PM 2.5 is composed of a variety of microscopic solids and liquid droplets such as allergens, dust, nitrates, organic chemicals and sulfates. Unlike ozone, PM 2.5 emissions can occur throughout the year, although the amount and chemical compositions of PM 2.5 depends on location, time of year and local weather conditions.

The formation and transportation of PM 2.5 is still under considerable study, however, it is known that PM 2.5 has both primary sources and secondary sources. The primary sources of PM 2.5 pollution are many and varied: wood smoke from residential or commercial combustion; automobile exhaust in the form of oxides of nitrogen; coal-fired power plants; small engines; open burning of trash or construction debris; and dust from agricultural operations or open areas. Secondary sources of PM 2.5 can be generated from fuel combustion working in conjunction with sunlight and water vapor.

Health Impacts-PM 2.5

Health studies indicate a correlation between elevated PM 2.5 levels and premature death from heart or lung disease. High PM 2.5 levels have also been associated with heart attacks and respiratory symptoms such as asthma attacks and bronchitis. This can in turn lead to increased levels of hospitalization as well as school and work absences.

Although PM 2.5 has not been regulated for as long a time period as "coarse" particulates (PM 10), it is considered to be an even graver threat to human health since the finer particles are more readily absorbed deeper in lung tissue. The health effects of being exposed to high levels of PM 2.5 are serious, and include decreased lung function, irregular heart function including heart attacks, and exacerbating pre-existing asthma conditions.

History of the PM 2.5 Standard

After several years of analyzing various health and scientific research studies, EPA issued fine particle standards in 1997. After adding 1,200 monitors across the country between 1997 and 2003, EPA issued a memorandum to state governments in April 2003 showing the schedule for designating areas that were either in attainment or in non-attainment for the new standard. EPA would "designate an area non-attainment if it has violated the fine particle standards over a three-year period, or if relevant information indicates that it contributes to violations in a nearby area." EPA defined the three-year period from 2001 to 2003.

The PM 2.5 standards were then revised in 2006. The yearly standard was set at 15 micrograms per cubic meter based on a three-year average of annual PM 2.5 concentrations. The 24-hour standard was 35 micrograms per cubic meter. In 2012, the yearly standard was revised to 12 micrograms per cubic meter.

Hickory Water Tower Monitor Historical Trends

Within the region, only one official monitor tracks PM 2.5 levels (Map 9-1). The monitor is located one block west of US 321 close to the water tank owned by the City of Hickory. Additional monitoring related to the official monitor is also taking place on the site. The three-year average between 2001 and 2003 equaled 15.36, or just slightly above the standard.

Since the monitor was above the standard EPA initially recommended Catawba and a portion of Burke and Caldwell counties be deemed non-attainment for PM 2.5. In February 2004, the NC Division of Air Quality (NCDAQ) recommended that only the part of Catawba County (defined as the portion of Catawba County within the boundary of the Greater Hickory Metropolitan Planning Organization) be deemed for non-attainment since Burke, Caldwell and the rural portion of Catawba County was not contributing the PM 2.5 problem. In December 2004, EPA made its final designations. It placed all of Catawba County in non-attainment status for PM 2.5 based on the three-year average between 2001 and 2003 being slightly above the 15.0 standard. In April 2005, the PM 2.5 designation for Catawba County was consequently published in the federal register. Davidson and Guilford counties in North Carolina were also placed in non-attainment status.

Once an area has been designated as non-attainment with regard to EPA standards for a controlled pollutant, the area's local and state governments typically respond to have the designation overturned or lessened (geographically in size or in severity of the designation). If it is clear that the designation cannot be ameliorated, they must work to develop and implement a plan to bring the area back into attainment with the national standard.

The NCDAQ is required to evaluate PM 2.5 to determine if Catawba County is in attainment for the Federal Standards for PM 2.5. Specifically, the NCDAQ evaluated the following data yearly as part of the air quality analyses:

- Annual PM 2.5 Averages – Average daily reading during the course of one calendar year.
- PM 2.5 3-year Averages – Average of the last three years used to determine change over longer period of time.
- PM 2.5 98th Percentile Daily Reading – 6th or 7th highest reading during the course of a year.

Catawba County was in nonattainment for the 15 micrograms per cubic meter standard until the 2006-2008 three-year average finally reached 14.2 micrograms per cubic meter. The region was placed in "maintenance" status for PM 2.5 in December 2012.

Annual PM 2.5 Averages

The current annual standard for PM 2.5 is 12 micrograms per cubic meter. Table 9-4 shows the trend in PM 2.5 averages at the monitor in Catawba County. The design values are presented in micrograms per cubic meter. Between 2006 and 2016, annual monitor readings at the Hickory monitor have dropped from 15.2 micrograms per cubic meter to 9.0 micrograms per cubic meter. The monitor has been below the 1997 standard of 15 micrograms per cubic meter since 2007 and

below the 2012 standard of 12 micrograms per cubic meter over the past several years. The significant drop in fine particulate matter in the region could be attributed to multiple factors; including scrubbers at Duke Energy's coal fired Marshall Steam Station, traffic improvements, more precipitation, and economic conditions.

Table 9-4.
Annual PM 2.5 Averages (micrograms per cubic meter), 2006-2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hickory Water Tower	15.2	14.6	12.8	10.3	11.2	10.4	9.3	8.9	9.1	8.7	9.0

Source: USEPA and NCDAQ, 2017.
Note: Data based on 15 micrograms per cubic meter federal PM 2.5 standard in 2006 to 2011 and the 12 micrograms per cubic meter standard in 2012 to 2016.

PM 2.5 3-year Averages

The PM 2.5 three year average is a health based standard and is used to see how air quality is changing over time. It is calculated by averaging the annual value for each of three years. Since the design value is an average of three years, a decrease may be the result of one good air quality year; or conversely, an increase may be the result of one bad air quality year. Therefore, looking at the trends of the 3-year average can give insight as to how the air quality in an area is improving.

Table 9-5 displays the 3-year averages for the region. The region has been in attainment of the federal PM 2.5 standards for the past decade. Three monitor averages have decreased from 14.2 micrograms per cubic meter in 2006-2008 to 8.9 micrograms per cubic meter in 2014-2016.

Table 9-5.
PM 2.5 3-year Averages (micrograms per cubic meter), 2006-2016

	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016
Taylorsville (Alexander Co).	14.2	12.6	11.4	10.6	10.3	9.5	9.1	8.9	8.9

Source: USEPA and NCDAQ, 2017.
Note: Data based on 15 micrograms per cubic meter federal PM 2.5 standard in 2006 to 2011 and the 12 micrograms per cubic meter standard in 2012 to 2016.

PM 2.5 Daily Monitor Reading Trends

Besides setting an annual standard, EPA also has a daily PM 2.5 standard to protect public health. The annual federal standard is currently 35 micrograms per cubic meter. The standard is calculated at the 98th percentile for each year (EPA uses a three-year average for the standard), which is equivalent to the 6th or 7th highest daily reading at the monitor site in a given year. The PM 2.5 98th Percentile Daily Reading has been below the standard every year except in 2006 (Table 9-6). The three-year average has never violated the daily standard.

Table 9-6.
Annual PM 2.5 Averages (micrograms per cubic meter), 2006-2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hickory Water Tower	33	31	25	21	23	22	16	20	18	17	22

Source: USEPA and NCDAQ, 2017.
Note: Data based on 35 micrograms per cubic meter federal PM 2.5 daily monitor reading (98th percentile) standard in 2006 to 2016.

The Western Piedmont Air Quality Committee (WPAQC)

Back in 1999, when the WPCOG learned that the Region's ozone levels would violate the new EPA 8- Hour Standard, public meetings were held with local governments, the North Carolina Division of Air Quality, Economic Development Corporations, Chambers of Commerce and other interested groups. In November 1999, the Catawba Air Quality Committee (CAQC) was formed. During the next four years, the CAQC was expanded to include other regional members to form the Unifour Air Quality Coalition. The coalition eventually evolved into more formal Unifour Air Quality Committee (UAQC) and the Unifour Air Quality Oversight Committee (UAQOC). In 2016, the committees' names were changed to the Western Piedmont Air Quality Committee (WPAQC) and the Western Piedmont Air Quality Oversight Committee (WPAQOC).

The Western Piedmont Air Quality Committee consists of stakeholders from the private and public sector dedicated to improving the air quality in the region. The Western Piedmont Air Quality Oversight Committee members are elected officials from throughout the region. The Western Piedmont Council of Governments (WPCOG) provides staff support for the WPAQC and WPAQOC. The Greater Hickory Metropolitan Planning Organization (GHMPO) provides funding for the WPAQC/WPAQOC activities.

To fully integrate air quality impact analysis into the transportation process, the Greater Hickory MPO has developed an ongoing consultation relationship with the agency responsible for air quality monitoring and permitting in Alexander, Burke, Caldwell and Catawba Counties. In December 2002, the UAQC/UAQOC developed an agreement between Federal, State, and local governments to address ozone pollution in a more expedient manner than what is required in the Clean Air Act through an Early Action Compact (EAC). The Unifour EAC has been recognized by EPA as one of the most successful programs in the United States. The EAC helped the region to obtain attainment status for ozone in 2008.

WPAQC/WPAQOC Accomplishments and Commitments

The WPAQC and WPAQOC meet monthly and are committed to improving air quality in the region through various strategies. Measures already taken include:

- Unifour Early Action Compact (EAC) - In December 2002 the UAQC/UAQOC assisted in an agreement between Federal, State, and Local governments to address ozone pollution in a more expedient manner than what is required in the Clean Air Act through an Early Action Compact (EAC). The Unifour EAC has been recognized by EPA as one of the most successful programs in the United States.
- Hiring Technical Consultants - the WPAQC/WPAQOC gets assistance from consultants to provide guidance and expertise to the committee. For example, in 2003 the UAQC/UAQOC commissioned a study with the Louis Berger Group to determine the local causes of PM 2.5 in the region.
- Air Awareness Programs - The North Carolina Air Awareness Program is a public outreach and education program of the North Carolina Division of Air Quality. The goal of the program is to reduce air pollution though voluntary actions by individuals and organizations.

For the past decade, NCDAQ has supported and collaborated with local Air Awareness Coordinators throughout the state including the Greater Hickory Area. WPCOG staff acts as regional Air Awareness Team members in conjunction with NCDAQ's Air Awareness Program, providing air quality outreach to the region, including students, teachers and the general public.

- Air Quality Brochures - The main local print based outreach item produced by the WPAQC is brochures. They were originally produced in 2008 in two forms; one on overall local air quality issues and the other more focused on PM 2.5. Both brochures are in a tri-fold format printed on heavy glossy cardstock paper and contain a pocket for insert sheets that can be updated or focused for a particular target audience and message. These can be mailed, but most have been distributed through events and at local government offices.
- Unifour Strategic Air Quality Plan -The WPCOG completed the Air Quality Plan in 2010. The WPAQC wanted to build on all of the previous work by having a regional planning document that explained ongoing strategies to improve air quality.

Multiple air quality strategies were gathered from multiple sources to be included in the Unifour Strategic Air Quality Plan, including the Ozone Early action Compact strategies and the PM 2.5 Source Apportionment Study recommendations, as well as materials and guidance documents prepared by NCDAQ. The intent was to gather any strategy that may be applicable to the area and present them to multiple groups in order to determine what the most applicable strategies may be. Implementation of the final strategies, as described in Table 9-7, is described in detail within the plan.

Table 9-7
Unifour Air Quality Plan Recommendations

	Transportation Mitigation Strategies
1	Airport Ground Equipment Emissions
2	Alternative Fuel and the Clean Cities Program
3	Diesel Retrofit Technologies
4	Diesel Truck Anti-Idling and Truck Stop Electrification
5	Encourage Bicycle and Pedestrian Development and Usage
6	Gas Cap Check and Replacement Program
7	Public Transportation Benefit Programs
8	Reduce Locomotive Idling
9	Transportation Design and Operations
10	Two-Stroke Engine Restrictions/Buy-Back Program
11	Voluntary Non-Peak Refueling of Vehicles
12	Anti-idling Program
	Major Stationary Source Mitigation Strategies
1	Best Workplaces for Commuters Campaign
2	Compressed Work Weeks or Flexible Hours

3	Fuel Switching
4	Stationary Controls
5	Voluntary Stationary Source Operations
	Site Control Measures
1	Promote Energy Audits/Efficiency
2	Enhanced Burning Restrictions
3	Implement Smart Growth, Mixed Use and Infill Development Policies
4	LEED for New, Rehabilitated, or Expanded Buildings
5	Tree Planting Programs and Landscaping Standards
6	Urban Forestry

The Western NC Air Quality Conference (Formerly the Unifour Air Quality Conference)
Organizing this annual spring conference has been the primary event sponsored by the WPAQC. The purpose of the conference is to educate the public, government officials and the private sector on current air quality issues important to Western North Carolina. The conference regularly attracts near 100 attendees representing local municipalities, local industries, public health organizations, public education agencies, environmental advocacy groups, state and federal agencies staff and other public groups and private citizens. The first conference was held in 2007, and it has been an annual event ever since. In 2013, the name of the Conference was changed from the "Unifour Air Quality Conference" to the "Western North Carolina Air Quality Conference."

The conference has been held on the Lenoir-Rhyne University campus located in the City of Hickory. The Western North Carolina Air Quality Conference is free of charge to attendees.
Lenoir-Rhyne's Reese Institute for Conservation of Natural Resources has graciously sponsored the complementary luncheon portion of the conference and organizes the online registration. Duke Energy, Shurtape Technologies and local Chambers of Commerce have provided additional support for the conference. The UAQC has been successful at soliciting a variety of excellent speakers from various state and federal agencies as well as from medical, business, industrial professions and academia.

The opening and plenary sessions of the conference have taken place in Belk Centrum auditorium on the Lenoir Rhyne campus. The past plenary sessions have been an opportunity to hear from senior staff of our state and federal environmental regulatory agencies. Morning and afternoon breakout sessions take place at locations throughout campus.

In 2013, the National Association of Development Organizations (NADO) chose the Western North Carolina Annual Air Quality Conference project for their Innovation Award. NADO recognized the Western Piedmont Council of Governments (WPCOG) during the 2013 National Rural Transportation Conference in Greenville, SC.

Water Quality

Water quality in the Catawba River basin's mountain headwater streams and upper lakes is generally good, but downstream areas are experiencing increasing amounts of pollution from runoff and wastewater. For example, Lake James, the river's cleanest lake, lies close to the Catawba's headwaters.

Local Efforts

The Water Resource Committee is the key interface that the Western Piedmont Council of Governments (WPCOG) uses to interact with local governments on the issue of water resources. Formed in 1986, this Committee is staffed by the WPCOG serves in an advisory role for 28 local governments within the Greater Hickory Metro on issues including water quality, water supply, water safety and recreation, and watershed issues within the Upper Catawba River Basin. The Water Resource Committee consists of individuals representing local governments, nonprofit organizations, educational institutions and businesses from Alexander, Burke, Caldwell, and Catawba Counties in Western North Carolina. Regular Water Resource Committee meetings are held to encourage regional cooperation and coordination of watershed activities. Meetings include networking opportunities, special presentations information sharing, coordination and program updates.

Storm water

Almost two-thirds of water pollution in North Carolina is caused by polluted runoff. When it rains, water washes over lawns, sidewalks, and streets. Besides litter, this water picks up chemicals found in lawn fertilizers, bacteria found in pet waste, and oil from cars. This polluted water then enters roadside ditches and the storm drains found in our streets. Large pipes under the ground connect the storm drains to the closest lake or stream.

Road construction can increases the amount of impervious surface which in turn can increase water flow by not allowing the water to properly infiltrate into the ground. This can cause flash flooding, and can increase erosion of sediment.

As well as muddying the water, sediment tends to bind to and carry other pollutants across the landscape and into waterways. Sediment also covers the spawning beds of fish, and by decreasing the depth of lakes, adds to invasive weed, mosquito and water-warming problems. Agriculture, as well as home or road construction, are typical sources of sediment pollution.

Sediment contains excessive amounts of nutrients such as phosphorus and nitrogen. In small amounts, these nutrients are beneficial to aquatic life. But excessive amounts can trigger algae blooms that reduce dissolved oxygen levels and sometimes cause fish kills.

Stormwater Permits

In 1972, The National Pollutant Discharge Elimination System (NPDES) program was established under authority of the federal Clean Water Act and then delegated to the Division of Water Quality for implementation in North Carolina. Phase I of the NPDES stormwater program was established in 1990, and it focused on site and operations planning to reduce pollutant sources. **Phase I** covered industrial activities in 10 categories; construction activities that disturbed five or more acres; and municipalities with populations of 100,000 or more that owned or operated a municipal separate storm sewer system (MS4) (North Carolina had six). **Phase II** of the program expanded permit requirements to construction disturbing an acre or more and to smaller communities (< 100,000 pop.) and public entities that own or operate an MS4.

Stormwater programs are administered by DOT and local governments to deal with excessive runoff of impervious surfaces. These programs utilize best management practices (BMPs) which are becoming common practice. BMPs help to capture pollutants from roadways such as oil, break dusts and other contaminants.

Stormwater Partnership

The Stormwater Parnership is made up of five local governments in the region who contract out with the Western Piedmont Council of Governments to perform outreach to better inform the general public about stormwater issues. The program focuses on getting the information to teachers and students through workshops and STEM Tours. The Annual Western Piedmont Annual Water Quality Conference is another method of providing Stormwater Education to the public.

Western NC Water Quality Conference

On July 31st 2014, The Western Piedmont Council of Governments held the 1st Annual Western NC Water Quality Conference in conjunction with the Reese Institute for the Conservation of Natural Resources. The conference was similar to the Air Quality Conference, but focused exclusively on water quality. The conference is now in its Fifth year. This year's Western NC water quality conference will be held on July 26, 2018.

Stormwater is a huge focus for this conference, and is one of the main reasons for putting it on. The conference will focus on local officials, planners, and members of the public.

The conference has been held on the Lenoir-Rhyne University campus located in the City of Hickory. Lenoir-Rhyne's Reese Institute for Conservation of Natural Resources has graciously sponsored the complementary lunch and breakfast. The Western North Carolina Water Quality Conference is free of charge to attendees.

Watershed Planning

Runoff from rainwater or snowmelt can contribute significant amounts of pollution into the lake or river. Watershed management helps to control pollution of the water and other natural resources in the watershed by identifying the different kinds of pollution

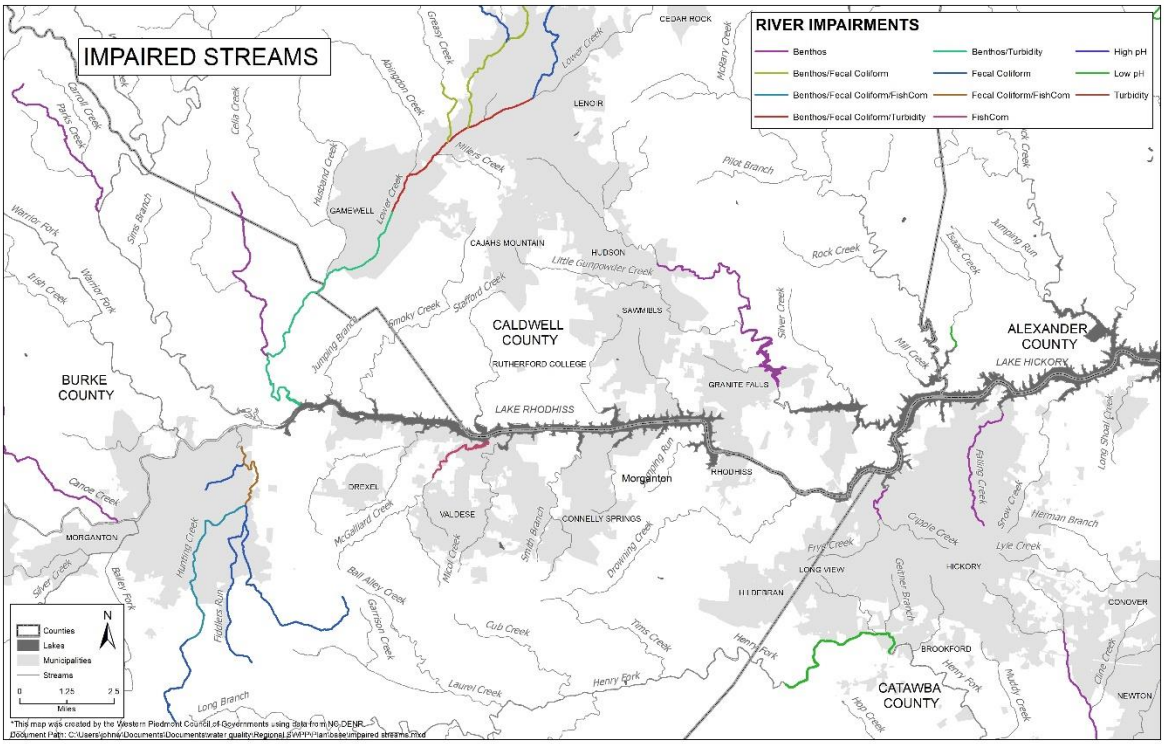
present in the watershed, how those pollutants are transported, and recommending ways to reduce or eliminate those pollution sources.

All activities that occur within a watershed will somehow affect that watershed's natural resources and water quality. New land development, runoff from already-developed areas, agricultural activities, and household activities such as gardening/lawn care, septic system use/maintenance, water diversion and car maintenance all can affect the quality of the resources within a watershed. Watershed management planning comprehensively identifies those activities that affect the health of the watershed and makes recommendations to properly address them so that adverse impacts from pollution are reduced.

Watershed management is also important because the planning process results in a partnership among all affected parties in the watershed. That partnership is essential to the successful management of the land and water resources in the watershed since all partners have a stake in the health of the watershed. It is also an efficient way to prioritize the implementation of watershed management plans in times when resources may be limited.

Watersheds that are targeted for restoration efforts are done so because of the presence of an impaired body of water (Map 9-1). An impaired stream is designated as such by the NC Division of Water Resources using standards set forth by US Environmental Protection Agency.

Map 9-1 Impaired Streams in the Region



The Lake Rhodhiss Watershed Management Plan

Nearly a decade ago, DWR realized the need to develop a nutrient management plan for Lake Rhodhiss (NC DWR, 1999). In the 2004 Catawba Basinwide Plan, DWR recommended that a locally developed watershed management plan for Lake Rhodhiss be produced as a first step toward reducing future nutrient loadings to the reservoir. In 2005, Carolina Land and Lakes Resource, Conservation and Development, a non-profit natural resource management organization headquartered in Catawba County, applied for a grant to begin this process. In 2007, funding was secured from multiple sources to develop a watershed restoration plan for the Lake Rhodhiss watershed. Most notably funding came from Federal 319 allocations, NC Clean Water Management Trust Fund and local governments' contributions through Water Quality dues managed by the Western Piedmont Council of Governments. In addition, a significant amount of in-kind technical assistance was donated by various agencies, non- government organizations and local governments.

This project had four main components: Stream Monitoring to determine Nutrient Loading; Application of Best Management Practices (BMP's) on wholesale ornamental nurseries to control pollutants; Watershed Restoration Plan Development as a roadmap for improving water quality conditions within the watershed; and Education and Outreach to better inform the general public and elected officials about water quality in the region.

Western Piedmont Council of Governments (WPCOG) staff worked primarily on the latter two objectives. The Lake Rhodhiss Watershed Management Plan is one of the results of this effort. The WPCOG worked with local stakeholders to better understand the condition of the watershed and identify opportunities for reducing inputs of nitrogen and phosphorus into the Lake from both point and nonpoint sources as well as agriculture and non-agriculture. The current planning document builds upon earlier work done by WPCOG and its partners to reduce nutrient loading to Lake Rhodhiss. Local governments were encouraged to adopt and begin implementation of the 22 recommendations in that Plan.

The Hunting Creek Watershed Protection Plan

The Hunting Creek Watershed Restoration Project was completed in 2011. Equinox Environmental Consulting worked with the Carolina Land and Lakes Resource Conservation and Development and the Hunting Creek Partners to develop a local watershed plan for the 25.5-square-mile Hunting Creek Watershed. This two-year project was funded by the 319 program and the Clean Water Management Trust Fund with the intention of improving the impaired section of Hunting Creek, ultimately removing it from the state impaired list. Project partners collected fish and chemical data and walked the entire impaired section of Hunting Creek to look at potential impacts. They also identified potential stormwater BMP opportunities to implement throughout the watershed. An additional component of the project was developing a land

cover classification dataset for the 25.5-square-mile watershed by digitizing land uses as seen in 2005 aerial orthophotos.

The Lower Creek Watershed Management Plan

In 1998, the Western Piedmont Council of Governments published the Lower Creek Watershed Plan which documented water quality problems and listed watershed protection recommendations and urban stormwater recommendations. This effort included a study of fecal coliform bacteria levels, stormwater outfall mapping and benthic macroinvertebrate monitoring. Stakeholders were involved in early stages of identifying problems areas and potential management strategies.

In 2003, the North Carolina Ecosystem Enhancement Program (EEP) started follow-up planning in the Lower Creek watershed. The EEP's plan was to expand on the efforts of the previous work, developing more information on the health of streams in the watershed and identifying causes of degradation. Its goals were: (1) to assess stream quality in the watershed, identifying key sources of degradation and pollution, and (2) to develop a comprehensive strategy to address watershed needs. The NC EEP's Lower Creek Watershed Management Plan is the result of three years of effort involving in-stream data collection on water quality, habitat, and channel stability; Geographic Information System (GIS) data analysis; and development of ecologically and locally relevant management strategies to restore and preserve stream health. A Technical Advisory Committee (TAC) aided the planning team in reviewing data, identifying plan recommendations and developing implementation priorities. The TAC, comprised of natural resource and planning staff from Lenoir, Caldwell and Burke Counties, non-profit organizations and regional and state government entities, was essential to the development of a watershed plan that incorporates priorities of the local communities.

The Lower Creek Source Water Protection Plan

The purpose of the Lower Creek Source Water Protection Plan (LCSWPP) was to build on the Lower Creek Watershed Management Plan that was written in 2006 by providing updated information on monitoring; listing Potential Contaminant Sources in the Watershed, and providing new strategies and priorities in the watershed that improve water quality for drinking water sources. The plan acts as a first step for the larger, more comprehensive Source Water Protection Plan for the region.

The LCSWPP provided methods to address previously known water quality issues (nutrients and fecal coliform) as well as previously unaddressed contaminants to drinking water in the Lower Creek Watershed. Existing strategies in the Lower Creek Watershed Management Plan also relate to source water protection, so they were further emphasized in the new LCSWPP. The plan also re-emphasized priority projects from the Lower Creek Watershed Management Plan, and provided updates on what had been accomplished so far as well as recommending new strategies that apply directly to Source Water Protection.

The Western Piedmont Source Water Protection Plan

Drinking water, which may be derived from ground water, surface water, or both, is vulnerable to contamination. If the drinking water source is not protected, contamination can place the public's health in danger and cause a community significant expense. Cleaning up contamination or finding a new source of drinking water is complicated, costly and sometimes impossible. Consequently, preventing contamination of drinking water source makes sense from an economic as well as a public health and environmental standpoint.

Source water is untreated water from lakes, streams, reservoirs or ground water that is used as a drinking water supply. Source water quality can be threatened by everyday activities and land uses, ranging from industrial wastes to the chemicals applied to lawns. Source Water Protection (SWP) is the process of identifying and managing potential sources of contamination that may impact a drinking water supply. The ultimate goal of SWP is to prevent contaminants from entering a source of public drinking water (NC DEQ 2006).

In 2016, the WPCOG completed the Western Piedmont Source Water Protection Plan (WPSWPP). The purpose of the WPSWPP was to build on past and current efforts within the Lake Rhodhiss and Lake Hickory Watershed; list potential contaminant sources in the Watershed, and provide new strategies and priorities that improve water quality as it relates to drinking water sources. The WPSWPP provided methods to address previously known water quality issues (nutrients and fecal coliform) as well as previously unaddressed contaminants to drinking water in the Lower Creek Watershed from potential contaminant sources provided by NC Department of Environmental Quality's (NC DEQ) Drinking Water Protection branch.

The McGalliard Creek Watershed Protection Plan

In 2017, The Western Piedmont Council of Governments and the Town of Valdese collaborated to complete the McGalliard Creek Watershed Protection Plan. The purpose of the Plan wass to build on the Lake Rhodhiss Watershed Management Plan that was written in 2009 by providing updated and more specific information on McGalliard Creek and providing new strategies and priorities in the Watershed that improve the water quality in the creek.

McGalliard Creek is approximately six miles long and drains residential, commercial, industrial, agricultural and forested land cover into Lake Rhodhiss. The Town of Valdese and some of its residents had expressed concern over the amount of sedimentation that can be found in the Creek. Water that was once deep and used as a place for recreational fishing has seen a great deal of its banks eroded and once deep areas of the creek become shallow. The creek is currently on the 303d list of impaired streams for a poor fish community.

The goal of the McGalliard Creek Plan was to identify sources of impairment through data and stakeholder meetings, outline strategies to aid in watershed restoration, identify restoration activities and best management practices that best address the issues, and compile a project atlas of identifiable properties that best meet the goals of the project.

Funding Watershed Activities

The WPCOG continues to seek funding for planning and restoration grants, grant applications to 205j, 319h, Clean Water Management Trust Fund and other available grant sources.

Boating

Marinas and public access areas serve as important entry points to lakes and rivers in North Carolina. Twenty-nine marinas are situated on the Catawba River alone in North Carolina, while another 33 Duke Power access areas are distributed among seven reservoirs in the state (Duke Power, 2005). On Lake Norman alone, over two million people utilized marinas and public access areas during a 12-month period in 2004-05. Duke Power estimates that usage at these facilities will increase by 11% per decade through 2050.

According to the US EPA (2016): "Because marinas are located right at the water's edge, there is a strong potential for marina waters to become contaminated with pollutants generated from the various activities that occur at marinas—such as boat cleaning, fueling operations and marine head discharge—or from the entry of stormwater runoff from parking lots and hull maintenance and repair areas into marina basins."

Part of the challenge in managing pollutants originating at marinas is that these areas typically experience frequent use by humans. Another important factor is because marinas are located at the water's edge, there is typically no filtering that occurs following the release of pollutants near lakes or rivers. EPA identifies five adverse environmental impacts that may result from the following sources of pollution associated with marinas and recreational boating.

1. Poorly flushed waters near boat ramps where dissolved oxygen may become critically low.
2. Pollutants, like sewage, discharged directly from boats.
3. Pollutants transported in stormwater runoff from parking lots and other impervious surfaces.
4. The physical alteration or destruction of important fish and wildlife habitat during the construction and operation of marinas, ramps and related facilities.
5. Pollutants generated from boat maintenance activities on land and in the water.

Environmental Analysis and Mitigation

Overview

The impacts of specific transportation projects on communities and the natural environment have been assessed for many years as key elements of project development, environmental documentation and design. Federal law also includes requirements for planning-level environmental review. This section, then, discusses the MPO's generalized analysis of potential environmental impacts and identifies potential mitigation strategies to restore or maintain environmental functions affected by projects. It also summarizes the MPO's consultation with federal and state environmental regulatory agencies relative to the plans, inventories, policies and concerns.

A preliminary environmental impact screening can identify potentially serious impacts that could end up stopping a project. Recognizing such issues at the earliest stage of planning provides the opportunity to avoid or mitigate undesirable impacts through modification or elimination of the project. Early "fatal flaw" analysis of this type helps reduce the possibility that subsequent, more detailed analyses will uncover unexpectedly serious environmental impacts. This approach helps reduce the inherent risks in an uncertain planning process and helps ensure that time and resources are not unnecessarily expended.

A systems-level environmental screening allows consideration of the interactions between various projects. Rarely does a project stand independent of other projects. The combined impacts of several projects can vary substantially from the sum of each project's individual impacts. Similarly, modification or elimination of one project due to environmental considerations can significantly alter the performance and impacts of other projects. It is important to be able to assess project impacts in the context of the entire MTP. Although system-level environmental screening does not substitute for detailed, project-specific review, this assessment can identify and highlight issues requiring further analysis. This knowledge not only reduces the likelihood of unexpected environmental impacts; it also allows future environmental studies to focus on critical issues. The result is a transportation plan that minimizes negative impacts on the natural and man-made environments and is ultimately more efficient, timely and cost-effective.

This environmental screening process and its results reflect the reality that the overwhelming majority of the recommended MTP's environmental impacts are associated with roadway projects. Once a few critical decisions are made, constraints on roadway cross sections and alignments (due to safety factors and design criteria) limit opportunities to avoid or reduce these negative impacts.

Sidewalks and bicycle facilities are much more limited in the magnitude of their environmental and community impacts, due to smaller cross-sections and greater flexibility in design. Furthermore, pedestrian and bicycle facilities are most often built in conjunction with roadway facilities and have only marginal environmental impacts beyond those of the roadway itself. Bicycle and pedestrian travel is also inherently less disruptive to the environment than travel by automobile, especially regarding air pollution, noise and energy consumption.

Most of the transit elements in the MTP are associated with bus route and service expansions, which typically involve no new construction and have minimal negative impacts on either natural or man-made environments. In general, transit impacts tend to be positive, since increased service tends to reduce vehicle-miles traveled and typically improves accessibility in disadvantaged neighborhoods. It is difficult to identify environmental impacts for these facilities in the context of this MTP update.

Environmental Screening Analysis

A generalized screening was performed to assess the potential environmental impacts of the roadway projects recommended for inclusion in the Greater Hickory Area 2045 MTP. To identify environmentally sensitive areas and features for analysis, the Greater Hickory MPO used existing GIS data and consulted with resource agencies for their recommendations on additional data sets to use for analysis.

This analysis consisted of overlaying street and highway project alignments and locations onto maps depicting sensitive natural and cultural resources. MPO staff created three maps, a Hydrological Factors Map (9-2), Environmental Factors Map (9-3) and a Historic, Cultural and Agricultural Factors Map (9-4).

Impacts in the following categories were assessed, based on project and environmental, historic, cultural and agricultural factors. To fully assess each category, further consideration was given to elements listed below each heading and illustrated on maps 9-2 through 9-4.

Hydrological Factors Map

Hydrography
303(d) Listed Streams
Floodplains
Wetlands (National Wetlands Inventory)
Regulated Water Supply Watersheds

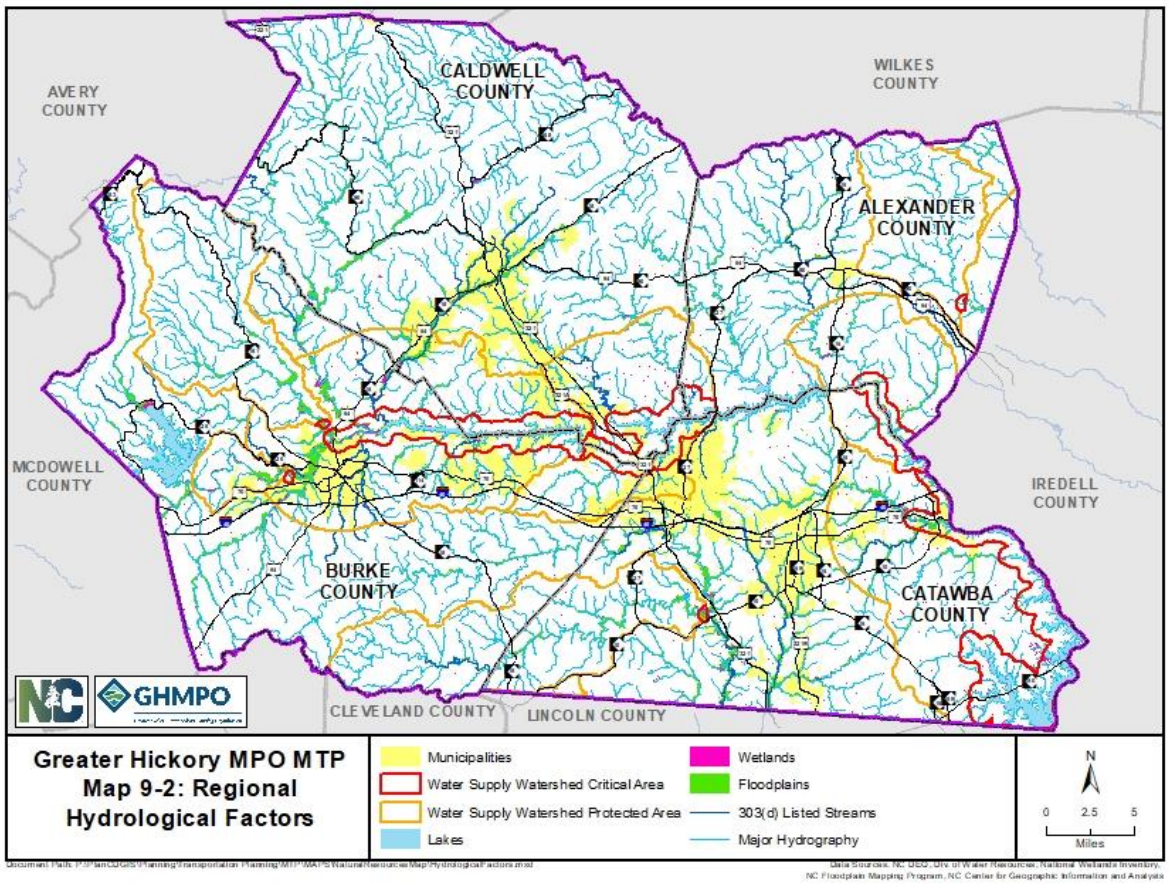
Environmental Factors Map

Significant Natural Habitat Areas
Hazardous Substance Disposal Sites
Land Trust Conservation Properties
Land Managed for Conservation and Open Space
Conservation Tax Credit Properties

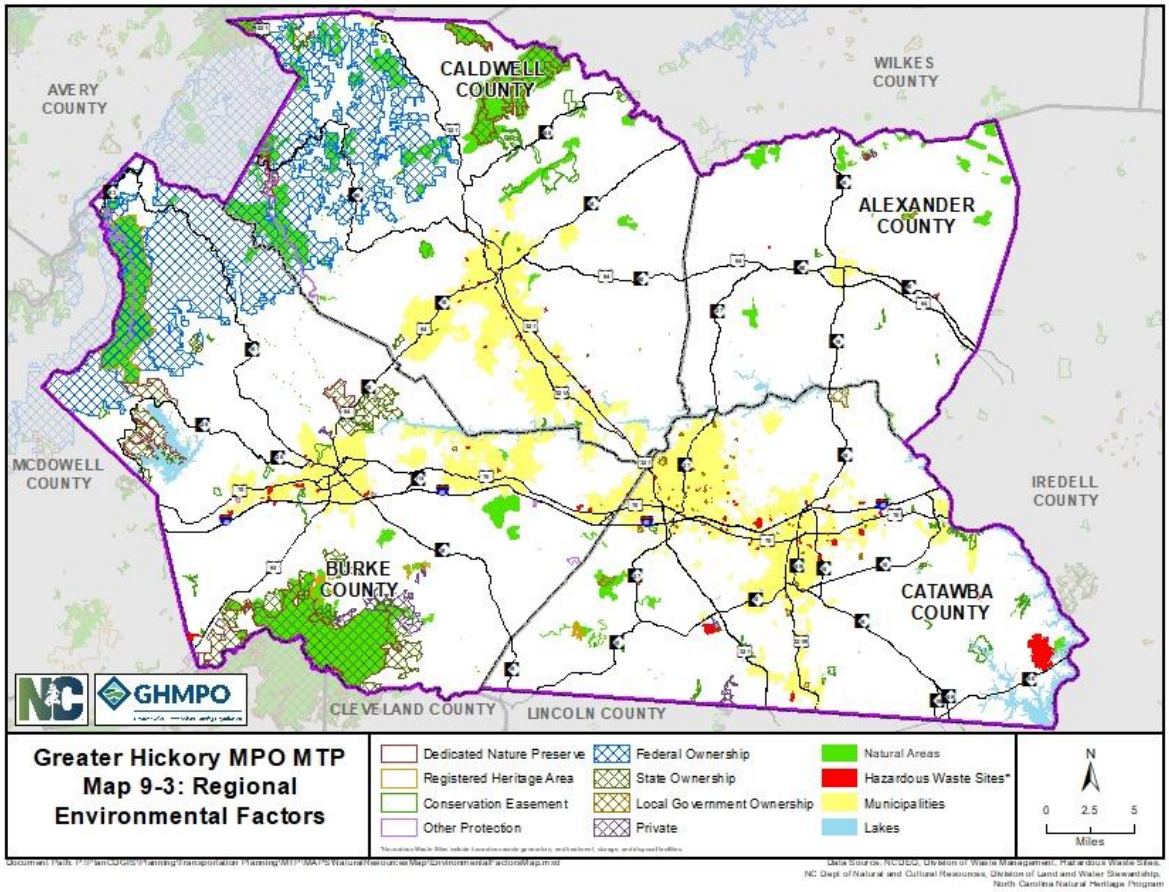
Historic, Cultural and Agricultural Factors Map

Historic Areas
Schools
Public Parks
Voluntary Agriculture Districts
Farmland Preservation

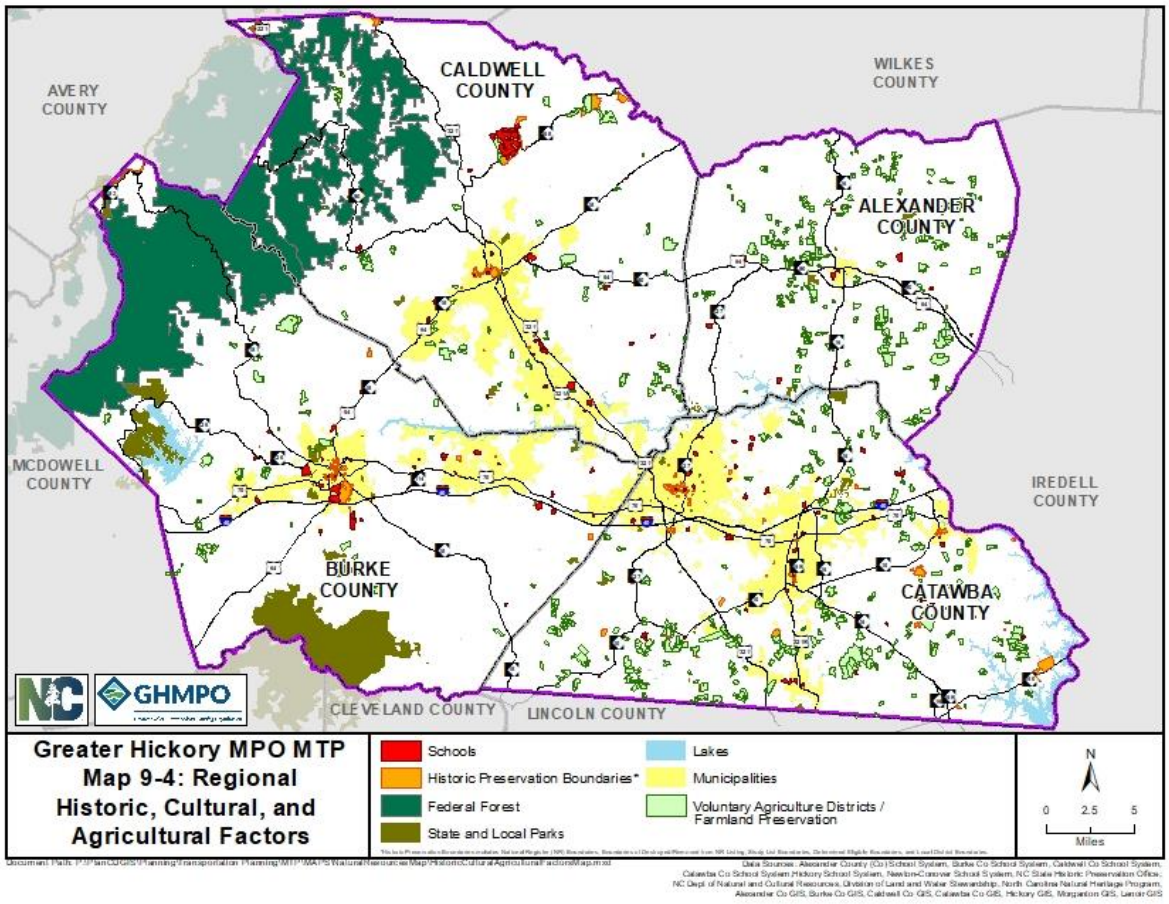
Map 9-2 Hydrological Factors



Map 9-3 Environmental Factors



Map 9-4 Historic, Cultural and Agricultural Factors



Since this was a system-wide, planning-level screening, no formal field investigation was conducted, and screening was performed only on those features for which GIS coverage was available. The screening process allowed early identification of impacts and areas of uncertainty that will need to be investigated further as a particular project moves forward through detailed planning and design. For some of the projects in the MTP, environmental studies based on federal guidelines were already underway or completed. When a project is ready to move from the MTP into the project planning/design/engineering phases, the project sponsor will conduct any necessary analysis as required by state and federal regulations.

Environmental Mitigation

Overview

Since the transportation planning activities of the MPO are regional in scope, this environmental mitigation discussion does not focus on each individual project within the Metropolitan Transportation Plan but rather offers a summary of environmentally mitigation strategies that could be considered in an effort to minimize any negative affect that a project may have on an environmentally sensitive area.

The FAST Act includes provisions for environmental mitigation, specifically, State DOTs and MPOs need to include in their metropolitan transportation plans (MTP) and transportation improvement programs (TIP) a discussion in the planning process that addresses:

"types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan. This discussion shall be developed in consultation with federal, state, and tribal wildlife, land management, and regulatory agencies."

In order to meet these requirements, it is essential to know how federal regulations actually define mitigation:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Sequencing

An ordered approach to mitigation, known as "sequencing," involves understanding the affected environment and assessing transportation effects throughout project development. Effective mitigation starts at the beginning of the environmental process, not at the end. Mitigation must be included as an integral part of the alternatives development and analysis process.

AVOID ► MINIMIZE ► REPAIR/RESTORE ► REDUCE OVER TIME ► COMPENSATE

NEPA's mitigation policy, when the project moves forward from planning to implementation, states: "Measures necessary to mitigate adverse impacts will be incorporated into the action and are eligible for Federal funding when the Administration determines that:

- The impacts for which mitigation is proposed actually result from the Administration action; and

• The proposed mitigation represents a reasonable public expenditure after considering the impacts of the action and the benefits of the proposed mitigation measures. In making this determination, the Administration will consider, among other factors, the extent to which the proposed measures will assist in the compliance with a Federal statute, Executive Order, or Administration regulation or policy.

Mitigation Strategy

The Greater Hickory MPO is committed to minimizing and mitigating the negative effects of transportation projects on the natural and built environments in order to preserve our quality of life. In doing so, the MPO recognizes that not every project will require the same type or level of mitigation. Some projects, such as new roadways and roadway widening, involve major construction with considerable earth disturbance. Others, like intersection improvements, street lighting and resurfacing projects, involve minor construction and minimal, if any, earth disturbance.

The mitigation efforts used for a project should be dependant upon how severe the impact on environmentally sensitive areas is expected to be. The following three-step process was used to determine the type of mitigation strategy to apply for any given project:

1. Identify and confirm environmentally sensitive areas throughout the project study area.

2. Determine how and to what extent the project will impact these environmentally sensitive areas.

3. Develop and review appropriate mitigation strategies to lessen the impact these projects have on the environmentally sensitive areas.

The three-step mitigation planning process is designed to solicit public input and offer alternative designs or alignments and mitigation strategies for comment by the environmental review agencies, MPO, and local governments.

To the extent possible, transportation projects should minimize off-site disturbance in sensitive areas and develop strategies to preserve air and water quality, limit tree removal, minimize grading and other earth disturbance, provide erosion and sediment control, and limit noise and vibration. Where feasible, alternative designs or alignments are developed that would lessen the project's impact on environmentally sensitive areas. For major construction projects, such as new roadways, or for projects that may have a region-wide environmental impact, a context-sensitive solution process with considerable public participation and alternative design solutions should be used to lessen the impact of the project. The table below details mitigation activities and measures that could be considered when dealing with environmental impacts during the project development phase.

Impacts	Mitigation Measures
Air Quality	Designate pedestrian/Transit Oriented Development areas Develop energy efficient incentive programs Adopt air quality enhancing design guidelines
Archaeological	Design modifications to avoid area Archaeological excavation Educational activities
Community Impacts	Sidewalks Bike lanes Develop recreational areas Traffic calming Context sensitive design View corridors/sheds
Environmental Justice	Property owners paid fair market value for property acquired Continuous public involvement Continuous systems level analysis of EJ populations
Communities	Residential and commercial relocation
Farmland	Protect one to one farmland acre for every acre converted Agricultural conservation easement on farmland Compensation
Fragmented Animal Habitats	Construct overpasses with vegetation Construct underpasses, such as culverts/viaducts Other design measures to minimize potential fragmenting of animal habitats
Historic Sites	Relocation of historic property Design modification

	Landscaping to reduce visual impacts Photo documentation Historic archival recording for public presentations View corridors/sheds
Light Impacts	Direction of lighting Low level lighting
Noise	Depressed roads Noise barriers Planting trees Construct tunnels Berms/vegetation
Park Impacts	Construct bike/pedestrian pathways Dedicate land Compensation for park dedication fees Replace impaired functions
Streams	Stream restoration Vegetative buffer zones Strict erosion and sedimentation control measures Best management practices for stormwater management, particularly with potential impact on 303(d) listed waters Ecosystem Enhancement Program (EEP)
Threatened & Endangered Species	Preservation Enhancement or restoration of degraded habitat Creation of new habitats Establishment of buffer areas around existing habitats Modifications of land use practices Restrictions on land access
Viewshed	Vegetation and landscaping

	Screening Buffers Earthen berms Camouflage Lighting
Wetlands	Compensation Wetland restoration Ecosystem Enhancement Program (EEP) Creation of new wetlands Strict erosion and sedimentation control measures Stream buffers