

CHAPTER 11 Planning Assumptions and Air Quality Conformity

Introduction

Federal and state regulations require air quality to be an important consideration for the MTP. Guilford County was first designated as an air quality non-attainment area in 1992. Federal guidelines currently classify the area as maintenance for fine particulate matter, called PM 2.5. An area is designated non-attainment once it does not meet standards set by the Environmental Protection Agency. Once a non-attainment area meets the standards, it is designated attainment; the maintenance classification indicates that the area was once in non-attainment and is still subject to the air quality conformity process.

Particulate Matter 2.5 is a complex mixture of extremely small particles and liquid droplets measuring 2.5 micrometers. A basis for comparison is a strand of hair which measures 70 micrometer. Sources of Particulate Matter include power plants, heavy duty diesel engines, cars and trucks, forest fires, construction equipment, and natural sources.

Guilford County was first designated by the Environmental Protection Agency (EPA) as non-attainment for 1-hour ozone on January 6, 1992. Guilford County was designated as non-attainment as a result of local air quality monitors exceeding the federal standards for ozone pollutants. However on November 8, 1993, the County was redesignated to maintenance for 1-hour ozone. April 15, 2008 EPA revoked the 1-hour ozone standard for Guilford County. Effective, April 15, 2009, the Triad Area no longer had to demonstrate conformity for the 1-hour ozone (O₃) standard.



**Mendenhall Ozone and Particle Monitoring Site
in Greensboro**

EPA later decided to strengthen the air quality standards by requiring analysis for 8-hour ozone. The air quality monitoring period was now extended from 1 hour to 8 hours. In April 2004, the EPA officially designated Guilford as non-attainment for 8-hour ozone. However, the MPO had previously entered into an agreement in 2002 with EPA, known as the Early Action Compact. The Compact pledged the County would meet the standard earlier than required by meeting certain criteria and milestones. As a result the County's non-attainment status was deferred until December 31, 2007, the date which all milestones were to be met. On April 15, 2008, Guilford, along with other Triad Counties, was designated as attainment for the 8-hour ozone for successfully meeting all requirements.

The County was also designated non-attainment for PM 2.5 along with Davidson County on April 5, 2005. Although, Guilford County air quality monitors were not exceeding the federal standard, EPA still designated the area non-attainment. Due to improved monitoring data, this area was redesignated as maintenance for the PM 2.5 standard on December 19, 2011.

As a result of the PM 2.5 maintenance designation, the MPO must show that the projects in the MTIP and MTP will not exceed federal standards. The formal name for this process is known as **Air Quality Conformity Determination**.

A key air quality requirement is a demonstration that the projects in the **Metropolitan Transportation Improvement Program (MTIP)** and MTP will not cause the area to exceed air-quality standards. The formal name for this process is Air Quality Conformity Determination. The Federal Highway Administration and Piedmont Authority for Regional Transportation (PART), in cooperation with other agencies, facilitate the Conformity Determination process and documentation. The documentation, *Conformity Analysis Report and Conformity Determination for the Triad Area 2040 Metropolitan Transportation Plan*, will be included in the MTP in Appendix A.

The Metropolitan Transportation Improvement Program or MTIP is a detailed listing of federal and state funded transportation projects planned for the Greensboro Urban Area MPO. The MTIP is the main mechanism for funding the construction of projects included in the MTP.

Air Quality Conformity Determination is based on the latest socioeconomic and land use trends. A tool known as the Travel Demand Model (TDM) is used to evaluate the impacts of the socioeconomic and land use trends on the transportation system. The implications of recommended transportation improvements and future travel conditions are used to determine the impacts on air quality.

Latest Planning Assumptions

Analysis relies on a range of assumptions regarding data and various parameters. Federal requirements govern these assumptions for the MTP and Conformity Analysis, and require that the latest planning assumptions be used. The MTP and Conformity Analysis reflect current assumptions and have been reviewed and endorsed by MPO and NCDOT staff. A discussion on the development of the socioeconomic data can be found in Chapter 2.

Travel Modeling

The travel model is used to support the transportation planning process with a series of analytical techniques to predict future demand. The 2040 MTP travel model networks are built from existing networks and planned improvements documented in the **financially constrained** transportation recommendations presented in Chapter 4. The travel model estimates traffic flow for specific horizon years determined by air quality regulations. The horizon years required includes 2013, 2021, 2030, and 2040. The Piedmont Triad Regional travel demand model area covers four Urban Area MPO regions. These MPOs are:

1. Winston-Salem Urban Area MPO
2. Greensboro Urban Area MPO
3. High Point Urban Area MPO
4. Burlington-Graham Urban Area MPO

Financially constrained means existing and future revenues are anticipated to cover the costs of existing and planned improvements through 2035.

The model area includes Forsyth, Guilford, Davidson, and Alamance County in their entirety. It also includes the urbanized areas of Randolph, Davie, Stokes, Rockingham, and part of Orange County. The Triad travel model is based on the four-step modeling process: trip generation, trip distribution, mode choice, and trip assignment. More information on the travel demand model can be found in Chapter 4.

Emissions Model

A critical element of any emissions analysis is the development and utilization of the emissions factors applied to the travel estimates. **North Carolina Division of Air Quality (NCDAQ)** used MOVES (2010b) to develop the emissions factors. PART and NCDOT provided inputs (speeds and vehicle miles traveled) for the Triad area. The Inspections and Maintenance Program (as required in the North Carolina SIP) is included as an input to the MOVES model. Area specific information such as vehicle age and vehicle type distribution is used rather than national default values. NCDAQ provides motor vehicle emissions factors by federal functional classification of the roadway system.

Development of VMT (Vehicles Miles Traveled) mix for MOVES model was a statewide mix based on 2013 data using the method in the August 2004 USEPA Guidance.

The PTRM was developed in 2014-2015 with a 2013 base year and calibrated with 2013 ground counts. This method assigns vehicle trips based on equalizing the volumes on the network links based on the link's capacity. After the vehicle trips are assigned, the PTRM must be separated by designated non-attainment counties to be analyzed independently.

For each designated non-attainment area, the PTRM has the capability to provide daily VMT and Speed output for each fiscally constrained analysis year network, corresponding to programmed TIP construction projects and post year construction projects. VMT and average speeds by functional classification derived directly from model link data are essential inputs required to the run the MOVES emissions model.

All VMT and Speed data used in the conformity determination are from the last iteration, version 4.1, of the PTRM. The VMT for each functional class is then multiplied by emissions factors from the MOVES model.

Vehicle Age Distributions

The vehicle age distribution is based on the North Carolina Department of Motor Vehicles' 2013 (DMV) registration records for the in-use fleet in the Triad area. The data is modified and arranged to comply with MOVES.

Budget Test by Pollutant

The conformity analysis is performed for each pollutant and any associated precursors based on specified years determined by federal requirements. The Greensboro Urban Area (Guilford County) is designated maintenance for PM 2.5 and therefore must show conformity for it

and its associated precursor, NO_x. The maintenance designation means the area will need to show NO_x conformity for PM 2.5 through 2025, unless regulations are modified. A State Implementation Plan (SIP) budget for PM 2.5 and NO_x was used to determine conformity. A SIP budget includes the allowable emission limits an area can have for any pollutant. A SIP budget for PM 2.5 and NO_x was developed by NCDAQ and approved by EPA. The previous MTP also included a conformity analysis for 1-hour ozone, however as noted before, that analysis is no longer required.

The following tables document the emissions budget comparison for PM 2.5 and the precursor, NO_x. The analysis years include 2021, 2030, and 2040.

Air Quality Conformity

The Greensboro MPO, NCDOT Transportation Planning Division, Burlington-Graham MPO, High Point MPO, Winston-Salem MPO, Piedmont Authority for Regional Transportation, and North Carolina Department of Environment and Natural Resources Division of Air Quality (NCDENR DAQ) worked cooperatively on the air quality conformity analysis for the MTP. The purpose of the analysis was to verify compliance with provisions of the Clean Air Act Amendments of 1990 and MAP-21. The purpose of the analysis was to confirm that the fiscally constrained MTP eliminates, reduces or does not worsen the violations of

national ambient air quality standards (NAAQS) in the Triad MPO coverage area, including Guilford County. This group completed the assessment of the MTP and MTIP in October 2012 and determined that the plan accomplishes the intent of the North Carolina State Implementation Plan (SIP). A copy of the conformity report will be included in the **Appendix A**.

The conformity determination is based on regional emissions analysis using the transportation network approved by the Greensboro Urban Area for the 2040 Metropolitan Transportation Plan and the emissions factors developed by NCDAQ. It is also based on the analysis for the 2021, 2030, and 2040 horizon years. Each analysis year accounted for projected population and employment data as well as roadway and transit projects that will be in operation during each period. The conformity analysis concludes that the Greensboro Urban Area Metropolitan Transportation Plan and 2016-2025 MTIP conforms to the North Carolina PM 2.5 SIP.

PM 2.5 (NO_x): The PM 2.5 Redesignation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
Analysis Year	2021	2025	2035
GUILFORD SIP Budget (NO _x)	6,309,650	6,309,650	6,309,650
GUILFORD Emission MTP Model Results	2,167,370	1,170,330	858,806

PM 2.5 (PM 2.5): The PM 2.5 Redesignation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
Analysis Year	2021	2025	2035
GUILFORD SIP Budget (PM 2.5)	421,841	421,841	421,841
GUILFORD Emission MTP Model Results	61,384	40,264	31,901

FIGURE 11-1
Emissions Comparison Summary for Guilford County – PM 2.5



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