

Chapter 11

Planning Assumptions and Air Quality Conformity

Introduction

Federal and state regulations require air quality to be an important consideration for the LRTP. Guilford County was first designated as an air quality non-attainment area in 1992. Federal guidelines currently classify the area as maintenance for 1-hour ozone and non-attainment 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.

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. The County was redesignated based on air quality monitors that were now below the federal standards.

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.

As a result of the 1-hour ozone maintenance and PM 2.5 designations, the MPO must show that the projects in the MTIP and LRTP 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 LRTP would 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 2035 Long Range Transportation Plan*, is included in the LRTP 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. The MTIP is the main mechanism for funding the construction of projects included in the LRTP.

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 LRTP and Conformity Analysis and require that the latest planning assumptions be used. The assumptions reflected in the LRTP and

Conformity Analysis are 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 2035 LRTP 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 include 2009, 2010, 2012, 2015, 2025, and 2035. 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, and Alamance County in their entirety. It also includes the urbanized areas of Davidson, 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.

The trip generation and trip distribution models are calibrated using the Triad origin destination survey conducted in 1994. The 1994 survey data was expanded or extrapolated to 2002 for the calibration. The network assignment is validated or checked using state and local traffic counts for 2002 and 2003. The transit assignment is validated using an onboard transit survey done in 2004.

One aspect developed for the Triad Regional Model was Mode choice, which predicts the amount of travel that will be made by each mode of transportation, excluding freight. The mode choice model allows estimation of

mode shares for the region, including non-motorized (walk and bike) and transit modes. Walk and drive access to transit and transit line-haul modes of local and express are included. The mode choice model also has capabilities of estimating light rail transit, commuter rail, and bus rapid transit services. The model is developed to include over 28 modal alternatives because PART is using the travel model for a Federal Transit Administration (FTA) **Alternatives Analysis**.

PART is conducting an Alternatives Analysis for potential high speed transit services for the region. The analysis is evaluating the feasibility of a high speed rail alternative or bus rapid transit alternative. Please visit PART's website for more information: <http://www.partnc.org/masstransit.html>

Detailed information on the development of the travel model can be found in the report, *Piedmont Triad Regional Model*.

Emissions Model

A critical element of any emissions analysis is the development and utilization of the emissions factors applied to the travel estimates. **Forsyth County Environmental Affairs Department** used MOBILE 6.2 to develop the emissions factors under the guidance of NCDAQ and NCDOT. 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 MOBILE model. Area specific information such as vehicle age and vehicle type distribution is used rather than national default values. FCEAD provided motor vehicle emissions factors by federal functional classification of the roadway system.

Forsyth County Environmental Affairs Department is a local agency that performs technical air quality analysis for Forsyth County. Recently, FCEAD served as an extension to NCDAQ and performed emissions analysis for the Triad Conformity Determination process.

Development of VMT mix for Mobile6 model was statewide mix based on 2006 data using the method in the August 2004 USEPA Guidance.

The PTRM was developed in 2007 with 2004 ground counts and projected to 2008 model counts using an equilibrium loading method. This method assigns

vehicle trips based on equalizing the capacity on the network links. After the vehicle trips are assigned, the PTRM must be separated by designated non-attainment region 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 MOBILE6.2 emissions model. The fiscally constrained year networks are used as inputs into a link analysis tool called “Truspeed”. “Truspeed” is a post processor that calculates link travel speeds based on assigned traffic volume, number of through lanes, and number of signals per mile. “Truspeed” is based on Chapters 3 and 11 of The Highway Capacity Manual. Truspeed calculates and aggregates the vehicle miles traveled (VMT) and travel speeds by functional classification for each analysis year network.

Since the PTRM transportation networks are in NAD83 meters, the Truspeed travel units were in vehicle kilometers of travel (VKT), but then converted to vehicle miles of travel (VMT). All VMT and Speed data used in the conformity determination are from the last iteration of the PTRM. The VMT for each functional class is then multiplied by emissions factors from the MOBILE6.2 model.

VMT and speeds for the portions of Davidson and Davie outside the modeled area came from the NCDOT rural spreadsheet factored by the percentage of each county’s population in the rural area, a method that has been used in prior analyses.

Vehicle Age Distributions

The vehicle age distribution is based on the North Carolina Department of Motor Vehicles’ 2005 (DMV) registration records for the in-use fleet in the Triad area, which includes Davidson County. The data is modified and arranged to comply with Mobile6.2.

Budget Test by Pollutant

The USEPA designated the counties of Guilford, Davidson, Forsyth and Davie for the one hour ozone (O₃) standard. On April 2, 2008, the USEPA revoked the one-hour standard for the Triad Area counties of Guilford, Davidson, Forsyth and Davie under

rulemaking effective on April 15, 2008. As of April 15, 2009, the Triad Area will no longer have to demonstrate conformity for the one-hour ozone (O₃) standard.

The USEPA designated Davidson and Guilford Counties, in their entirety, as a non-attainment area for the PM 2.5 Standard with an effective date of April 5, 2005. The SIP budget for PM 2.5 was being developed during the LRTP update; therefore a methodology known as less than baseline emissions was used to determine conformity.

**Figure 11.1 – Emissions Comparison Summary for Guilford County
– One Hour Ozone**

Guilford County Emissions Comparison (Tons/Day) ¹				
Analysis Year	NOX		VOC	
	L RTP Emissions (Tons/Day)	SIP Budget Amount (Tons/Day)	L RTP Emissions (Tons/Day)	SIP Budget Amount (Tons/Day)
2010	20.63	20.87	12.45	14.86
2012	16.81	17.66	11.41	13.46
2015	12.46	13.28	10.01	12.17
2025	6.53	13.28	6.34	12.17
2035	6.28	13.28	7.34	12.17

Figure 11.2 – Emissions Comparison Summary for Guilford County – PM 2.5

Guilford County Interim Test (Less than Baseline) Emissions Comparison (KG/Year)		
Analysis Year	PM2.5	
	L RTP Emissions (KG/Year)	2002 Baseline Emission (KG/Year)
2002	226,008	
2010	145,979	226,008
2015	110,036	226,008
2025	85,712	226,008
2035	101,175	226,008

Analysis Year	Guilford County NOx (for PM 2.5)	
	L RTP Emissions (KG/Year)	2002 Baseline Emission (KG/Year)
2002	14,142,913	
2010	7,812,825	14,142,913
2015	4,436,572	14,142,913
2025	2,247,062	14,142,913
2035	2,157,763	14,142,913

Early Action Compact

Guilford County originally was declared non-attainment for ozone (O₃) on January 6, 1992. At that time, Guilford County was classified as moderate non-attainment for ozone. On November 8, 1993, Guilford County was re-designated as maintenance under the 1-hour ozone standard.

The Clean Air Rules of 2004 were effective on April 15, 2004 and included a new 8-hour ozone standard. The Greensboro/Winston-Salem/High Point MSA was found to be in moderate non-attainment for the new 8-hour ozone standard. In anticipation of the new designation, the Triad formed an Early Action Compact (EAC) in 2002. This process allows the Triad to achieve clean air earlier and with more local control than the schedule imposed by the Federal Clean Air Act.

The EAC is an option offered by the EPA that defers a region's designation as nonattainment for the 8-hour standard from December 31, 2004 to December 31, 2007 as long as all milestones are met. Compliance with the new standard must be achieved before 2007. If any milestones are not met or the air quality does not meet the 8 hour standard, the deferral will be revoked and the date of nonattainment rolled back. Until such time the Triad is still subject to the controls of the 1-hour standard.

Members of the Triad Early Action Compact include all counties and municipalities in the following eleven counties: Alamance, Caswell, Davidson, Davie, Forsyth, Guilford, Randolph, Rockingham, Stokes, Surry, and Yadkin.

The EAC submitted its Plan to EPA on March 31, 2004 and received approval. The EAC met all the required milestones. As a result the member Counties have been designated as attainment for the 2004 8-hour ozone standard on April 15, 2008.

It is important to note that EPA did release tougher standards for the 8-hour ozone on March 15, 2008. The new standard is now .75 parts per million and the final designation is expected March 12, 2010.

Air Quality Conformity

The Greensboro MPO, NCDOT Transportation Planning Division, High Point MPO, Winston-Salem MPO, 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 LRTP. The purpose of the analysis was to verify compliance with provisions of the Clean Air Act Amendments of 1990 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. The purpose of the analysis was to confirm that the fiscally constrained LRTP eliminates, reduces or does not worsen the violations of national ambient air quality standards (NAAQS) in Guilford County. This group completed the assessment of the LRTP and MTIP in June 2008 and determined that the plan accomplishes the intent of the North Carolina State Implementation Plan (SIP). A copy of the conformity report can be found 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 2035 Transportation Plan and the emissions factors developed by FCEAD. It is also based on the analysis for the 2009, 2010, 2012, 2015, 2025, and 2035 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 Long Range Transportation Plan and 2009-2015 MTIP conforms to the North Carolina 1-hour ozone SIP and the interim test requirements for PM 2.5.

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