
APPENDIX A

Air Quality Analysis

Contents

Conformity Analysis and Conformity Determination Report
For the Triad MPOs' Metropolitan Transportation Plans
and
2016-2025 Metropolitan Transportation Improvement Program



**Triad
Air Quality Conformity Determination Report
2040 Metropolitan Transportation Plan
and
2016-2025 Transportation Improvement Plan (TIP)**

- **Burlington-Graham Metropolitan Planning Organization (Guilford County)**
- **Greensboro Metropolitan Planning Organization (Guilford County)**
- **High Point Metropolitan Planning Organization (Guilford, Davidson and Forsyth Counties)**
- **Winston-Salem Metropolitan Planning Organization (Forsyth and Davidson Counties)**

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Report
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The Piedmont Authority for Regional Transportation (PART),

In Partnership with the:

**Burlington-Graham Metropolitan Planning Organization,
Greensboro Metropolitan Planning Organization,
High Point Metropolitan Planning Organization,
Winston-Salem Metropolitan Planning Organization,**

and

In cooperation with
The North Carolina Department of Environment and Natural Resources
Division of Air Quality

and

The North Carolina Department of Transportation - Transportation Planning Branch

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TABLE OF CONTENTS

CONFORMITY DETERMINATION REPORT

OVERVIEW..... 1

EXECUTIVE SUMMARY 3

1. INTRODUCTION..... 6

2. AIR QUALITY PLANNING..... 11

2.1 Emissions Budget and Baseline Emissions

3. METROPOLITAN TRANSPORTATION PLANS..... 12

3.1 Consultation

3.2 Financial Constraint Assumptions

3.3 Latest Planning Assumptions

3.4 Future Year Roadway Projects

3.5 Transit Network

3.6 Congestion Mitigation/Air Quality (CMAQ) Projects

3.7 Travel Demand Model

3.8 Mode Split / Mode Choice

3.9 Method of Reporting VMT and Speed

4. REGIONAL EMISSIONS ANALYSIS..... 17

4.0.1 Sub-area motor vehicle emission budgets

4.0.2 Emissions analysis source

4.0.3 Emission comparison Years (CO)

4.0.4 Emission comparison Years (PM2.5)

4.1 Emission Model

4.1.1 Development of Emission factors

4.2 Transportation Conformity Measures

4.3 Emission Comparison Test by location and Pollutant

5. PUBLIC INVOLVEMENT AND INTERAGENCY CONSULTATION.....24

6. CONCLUSION 25

List of Appendices
(All contained in electronic format)

- Appendix A: Triad Area Federal Register Notices
- CO Limited Maintenance SIP
 - PM2.5 SIP
- Appendix B: Interagency Consultation
- 12/8/14
 - 1/26/15
 - 2/23/15
 - 3/23/15
 - 4/27/15
 - 5/26/15
 - Triad Consensus Plan
 - Conformity Process Schedule
- Appendix C: Lists of Roadway and Transit Projects
- C1: Greensboro MPO 2040 MTP Projects
 - C2: Greensboro MPO 2016-2020 TIP
 - C3: High Point MPO 2040 MTP Projects
 - C4: High Point MPO 2016-2020 TIP
 - C5: Winston-Salem MPO 2040 MTP Projects
 - C6: Winston-Salem MPO 2016-2020 TIP
 - C7: Burlington-Graham MPO 2040 MTP Projects
 - C8: Burlington-Graham MPO 2016-2020 TIP
- Appendix D: CMAQ Projects
- Appendix E: MOVES2014 Emissions
Full MOVES2014 Emissions Computer Run files can be obtained by request from the NC Division of Air Quality from Todd Pasley, Environmental Engineer Phone: 919-707-8713, and PART from Scott Rhine 336-662-0002
- Appendix F: VMT and Speeds
- Appendix G: Regional Emissions Analysis Results by County
- Appendix H: Public Participation Policies / Advertising Affidavits (*This will be added to the CDR by 9/1/15*)
- Appendix I: Public Comments and Responses (*This will be added to the CDR by 9/1/15*)
- Appendix J: Agency Comments and Responses (*This will be added to the CDR by 9/1/15*)
- Appendix K: MPO TAC Conformity Determination Resolutions (2040 MTPs, 2016-20 TIP) (*This will be added to the CDR in by 9/23/15*)
- Greensboro MPO 2040 MTP and 2016-20 TIP
 - High Point MPO 2040 MTP and 2016-20 TIP
 - Winston Salem MPO 2040 MTP and 2016-20 TIP
 - Burlington-Graham MPO 2040 MTP and 2016-20 TIP

Appendix L: MPO TAC 2040 MTP Adoptions *(This will be added to the CDR by 9/23/15)*

- Greensboro MPO 2040 MTP
- High Point MPO 2040 MTP
- Winston Salem MPO 2040 MTP
- Burlington-Graham MPO 2040 MTP

Appendix M: USDOT Conformity Determination *(This will be added to the CDR by 10/1/15)*

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List of Acronyms and Abbreviations

<i>Reference</i>	<i>Full Term</i>
BGMPO	Burlington-Graham Metropolitan Planning Organization.
Conformity Analysis	Demonstration that when the projects planned in the TIP and LRTP are implemented the area will not exceed allowable motor vehicle emissions thresholds (emissions budgets).
Conformity Finding	Statement that the projects contained in the MTIP are essentially consistent with those listed in the LRTP and that no new Conformity Analysis is needed to account for noted differences.
CMS	Congestion Management System. A program of strategies for monitoring, evaluating, and addressing traffic congestion. Required for Transportation Management Areas.
CMAQ	Congestion Mitigation and Air Quality Program. A federal highway fund category for projects that will improve air quality.
DAQ	Division of Air Quality.
DENR	North Carolina Department of Environment and Natural Resources.
Emissions Budget	See Conformity Analysis.
EIS	Environmental Impact Statement. Federally required environmental study for projects with potentially significant environmental effects.
FHWA	Federal Highway Administration (USDOT)
FCEAP	Forsyth County Environmental Assistance and Protection.
FTA	Federal Transit Administration (US Department of Transportation)
GUAMPO	Greensboro Urban Area Metropolitan Planning Organization.
HPMPO	High Point Metropolitan Planning Organization.
LRTP	Long Range Transportation Plan: 25 year planning document identifying long and short term transportation investment needs.
MAB	Metropolitan Area Boundary. The boundary of the area within the transportation planning jurisdiction of an MPO.
MPO	Metropolitan Planning Organization.
MTIP	Metropolitan Transportation Improvement Program.
MVEB	Motor Vehicle Emission Budgets.

List of Acronyms and Abbreviations (cont'd)

NCDOT	North Carolina Department of Transportation.
NEPA	National Environmental Policy Act. Federal law that requires consideration of environmental impacts for all major expenditures of federal funds.
NOx	Oxides of Nitrogen: key precursor to smog. According to NCDAQ, roadway sources produce around 31% of total NC NOx emissions.
PART	Piedmont Authority for Regional Transportation.
PTRM	Piedmont Triad Regional Model.
Prospectus	Document outlining responsibilities and procedures for carrying out the cooperative transportation planning process. Defines ongoing work tasks cited in the Planning Work Program.
PWP- Planning Work Program	Accounting document for use of planning grant funds; lists approved activities that these funds may reimburse. The PWP thus guides transportation planning activities for the year.
RPO	Rural Planning Organization. RPOs are partnerships among non-MPO counties, established to provide rural areas a greater voice in state transportation decisions affecting those areas.
Section 104(f) PL	Funds distributed through the Federal Highway Administration for transportation planning tasks.
SIP	State Implementation Plan. The modeling analysis and the state and federal regulations demonstrating that the air in an area will meet National Ambient Air Quality Standards.
STIP	State Transportation Improvement Program
TCM	Transportation Control Measures. Specific projects or programs enumerated in the SIP that are designed to improve air quality are implemented in a timely fashion.
TDM	Travel Demand Model.
TMA	Transportation Management Area: urbanized area over 200,000 in population.
US EPA	United States Environmental Protection Agency.
WSMPO	Winston-Salem Metropolitan Planning Organization.

Conformity Determination Report

**2040 Metropolitan Transportation Plan (MTP); and
2016-2020 Transportation Improvement Plan (TIP):**

- **Burlington-Graham Metropolitan Planning Organization (Guilford County)**
- **Greensboro Metropolitan Planning Organization (Guilford County)**
- **High Point Metropolitan Planning Organization (Guilford, Davidson and Forsyth Counties)**
- **Winston-Salem Metropolitan Planning Organization (Forsyth and Davidson Counties)**

Overview

Transportation Conformity ("conformity") ensures that Federal funding and approval is distributed to those transportation activities that are consistent with air quality goals. Conformity applies to Metropolitan Transportation Plans (MTPs), Transportation Improvement Programs (TIPs), and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in areas that do not meet or previously have not met air quality standards for ozone, carbon monoxide, particulate matter, or nitrogen dioxide.

These areas are known as "nonattainment areas" or "maintenance areas," respectively. A conformity determination demonstrates that the total emissions projected for a plan or program are within the emissions limits ("budgets") established by the air quality plan or State Implementation Plan (SIP) for air quality, and that transportation control measures (TCMs) – specific projects or programs enumerated in the SIP that are designed to improve air quality – are implemented in a timely fashion.

Conformity Determination

Regional emissions are estimated based on highway and transit usage according to the MTPs and TIPs. The projected emissions for the MTPs and the TIPs must not exceed the emissions limits (or "budgets") established by the SIP. Where TCMs are included, responsible Metropolitan Planning Organizations (MPOs) and the North Carolina Department of Transportation (NCDOT) are required to demonstrate that TCMs are implemented in a timely fashion to obtain conformity.

The Decision Process

A formal interagency consultation process involving the Environmental Protection Agency (EPA), FHWA, FTA and State and Local transportation and air quality agencies is required in developing SIPs, TIPs, MTPs, and in making conformity determinations. MPO policy boards make initial conformity determinations in metropolitan areas.

Four organizations are responsible for making the conformity determinations in four distinct parts of the Triad Maintenance Area:

- a. the Burlington-Graham MPO (BGMPO) within its portion of the metropolitan area boundary in Guilford County;
- b. the Greensboro MPO (GMPO) within the metropolitan area boundary of Guilford County;
- c. the High Point MPO (HPMPO) within its metropolitan area boundary part in Guilford,

Davidson and Forsyth Counties;

- d. the Winston-Salem MPO (WSMPO) within its portion of the metropolitan area boundary in Forsyth and Davidson Counties

Each of these responsible organizations must make a conformity determination for its respective area in order for all of the areas to be designated in conformity.

Conformity determinations must also be made at the Federal level by FHWA and FTA. These determinations must be made at least every four years, or with the updating of MTPs or TIPs, or within one year of the effective date of a non-attainment designation.

Conformity analysis is made available to the public as part of the MPO and/or State DOT planning processes. MPOs are required to make MTPs, TIPs, and conformity determinations available to the public, accept and respond to public comments, and provide adequate notice of relevant public meetings. Project sponsors of specific transportation projects within the MTPs and TIPs must also include appropriate public involvement during project development.

Emissions Budget

The SIP places limits on emissions of each pollutant for each source type (mobile, stationary, and area sources). Projected emissions from highway and transit usage must be less than or equal to the emissions limits for on-road mobile vehicles that are established by the SIP. These emissions limits for motor vehicle emissions sources are called "budgets." Budgets are developed as part of the air quality planning process by State air quality/environmental agencies, and approved by EPA. Transportation agencies participate in this process.

Transportation Control Measures (TCMs)

Areas can include TCMs in their SIPs. TCMs are specific programs designed to reduce emissions from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. North Carolina does not have any TCM's included in their SIPs.

Executive Summary

The purpose of this report is to comply with the provisions of the Clean Air Act Amendments of 1990 and the Moving Ahead for Progress in the 21st Century Act (MAP-21) of July 6, 2012. This report demonstrates that the activities resulting from the implementation of the fiscally constrained metropolitan transportation plans (MTPs) will not “cause or contribute to any new violation of any standard in any area, increase the frequency or severity of any existing violation of any standard in any area, or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.” of the following jurisdictions:

- The portion of Guilford County within the Burlington-Graham Metropolitan Planning Organization (BGMPO)
- The portions of Guilford County within the Greensboro Metropolitan Planning Organization (GMPO)
- The portions of Guilford, Davidson and Forsyth Counties within the High Point Metropolitan Planning Organization (HPMPO)
- The portions of Forsyth and Davidson Counties within the Winston-Salem Metropolitan Planning Organization (WSMPO)

This conformity determination is based on a regional emissions analysis that uses the transportation network approved by the above-named Metropolitan Planning Organizations (MPOs) for the 2040 MTPs, VMT and Speed input data developed by NCDOT, and emissions developed by the North Carolina Division of Air Quality (NCDAQ).

Based on this analysis, the 2040 MTPs for the Piedmont Triad Region (BGMPO, GMPO, HPMPO, and WSMPO) are consistent with the intent of conformity requirement.

The USEPA designated Forsyth County for carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as moderate non-attainment area for CO. However, due to improved monitoring data, this area was re-designated as maintenance for CO on November 7, 1994. A CO limited maintenance plan was approved on June 20, 2013 with an effective date of July 22, 2013. In accordance with the transportation conformity rule, approval of a limited maintenance plan removes the requirement to conduct a regional emissions analysis as part of the conformity determination. The requirement to demonstrate conformity per the other requirements in Table 1 (which is based on Table 1 of 40 CFR 93.109) still applies. The Federal Register notice for the CO limited maintenance plan is found in [Appendix A](#).

The USEPA designated Davidson and Guilford Counties, in their entirety, as a non-attainment area for the 1997 PM 2.5 Standard with an effective date of April 5, 2005. This area was re-designated from non-attainment to maintenance for the 1997 PM 2.5 Standard effective on December 19, 2011.

The Triad Area MTPs have the following horizon years: 2021, 2030 and 2040. Each analysis year includes anticipated population, employment data, and roadway projects that are expected open. The MTPs are fiscally constrained meaning that funding sources for roadway projects are identified.

NCDAQ prepared base and future emissions rates for the MOVES2014 model. These rates were applied to VMT from the Piedmont Triad Regional Model (PTRM). There are State Implementation Plan (SIP) motor vehicle motor vehicle emission budgets (MVEB) for the PM 2.5 standard.

Table 1 summarizes the conformity requirements of 40 CFR Part 51 and 93 and gives the status of

the MTPs in relation to each of these requirements. Table 2 contains results from the regional emissions analysis for the Triad Maintenance Area (Davidson, and Guilford Counties). In every horizon year for every pollutant in each geographic area, the emissions expected from the implementation of the MTP and TIP are less than the emissions budgets established in the SIP. Table 3 contains a cross-reference index for the report.

Table 1. Status of Conformity Requirements

Criteria (√ indicates the criterion is met)	Burlington -Graham MPO	Greensboro MPO	Winston -Salem MPO	High Point MPO
Less Than Emissions Budget(s)	√	√	√	√
TCM Implementation	N/A	N/A	N/A	N/A
Interagency Consultation	√	√	√	√
Latest Emissions Model	√	√	√	√
Latest Planning Assumptions	√	√	√	√
Fiscal Constraint	√	√	√	√

Table 2. Emissions Comparison Summaries

Guilford and Davidson County Emissions Comparison Summary

PM 2.5 (NO_x): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
GUILFORD MVEB (NO_x)	6,309,650	6,309,650	6,309,650
GUILFORD Emission Model Results	2,167,370	1,170,330	858,806
DAVIDSON MVEB (NO_x)	2,148,938	2,148,938	2,148,938
DAVIDSON Emission Model Results	932,797	418,735	246,068

PM 2.5 (PM 2.5): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2025	2035
GUILFORD MVEB (PM 2.5)	421,841	421,841	421,841
GUILFORD Emission Model Results	61,384	40,264	31,901
DAVIDSON MVEB (PM 2.5)	153,313	153,313	153,313
DAVIDSON Emission Model Results	22,611	13,714	10,004

Table 3. Cross-reference Index

Conformity Determination Report for the Metropolitan Transportation Plan in the Triad Area Maintenance Area

Conformity Requirement – Federal Register	Appendix A
Formal findings of conformity.	to be added
Table of Contents.	iii
The purpose of this report is to comply with the requirements of the CAAA, MAP-21, and 40 CFR 51 and 93.	p. 3
The former and current classification of the air shed and the pollutants for which the air shed was classified as non-attainment/maintenance.	p. 9
The date the region was designated non-attainment/maintenance under the PM 2.5 standard.	p. 13
The emissions expected from implementation of the long-range plan are equal to, or less than, the base year emissions generated	p. 13
The adopted long-range plan is fiscally constrained (§93.108).	p. 13
The latest planning assumptions were used in the conformity analysis (§93.110).	p. 13 Appendix B
The latest emissions model was used in the conformity analysis (§93.111).	p. 20
The list of federally funded T.C.M. activities included. (§93.113).	NA
Conformity determined according to §93.105 and the adopted public involvement procedures.	p. 25
Dates of the Technical Coordinating Committee reviews of the conformity determination and the recommendation.	to be added
SIP emissions budget test or baseline comparison demonstrates conformity of the adopted long-range transportation plan.	p. 22
Listing of Roadway and Transit projects in each analysis year.	Appendix C
VMT & Speeds Summary	p. 18, Appendix F
Significant comments of reviewing agencies addressed by the MPO, or a statement that no significant comments were received.	Appendix B
Regional Emissions Calculations.	Appendix G
MOVES2014	Appendix E

Conformity Determination Report

2040 Metropolitan Transportation Plans; and

2016-2020 Transportation Improvement Plan (TIP):

- **Burlington-Graham Metropolitan Planning Organization (Guilford County)**
- **Greensboro Urban Area Metropolitan Planning Organization (Guilford County)**
- **High Point Urban Area Metropolitan Planning Organization (Guilford, Davidson and Forsyth Counties)**
- **Winston-Salem Urban Area Metropolitan Planning Organization (Forsyth and Davidson Counties)**

1 Introduction

The Clean Air Act requires the United States Environmental Protection Agency (USEPA) to set limits on how much of a particular pollutant can be in the air anywhere in the United States. National Ambient Air Quality Standards (NAAQS) are the pollutant limits set by the USEPA; they define the allowable concentration of pollution in the air for six different pollutants – Carbon Monoxide, Lead, Nitrogen Dioxide, Particulate Matter, Ozone, and Sulfur Dioxide.

The Clean Air Act specifies how areas within the country are designated as either “attainment” or “non-attainment” of an air quality standard, and provides USEPA the authority to define the boundaries of non-attainment areas. For areas designated as non-attainment for one or more NAAQS, the Clean Air Act defines a specific timetable to attain the standard and requires that non-attainment areas demonstrate reasonable and steady progress in reducing air pollution emissions until such time that an area can demonstrate attainment. Each state must develop and submit a State Implementation Plan (SIP) that addresses each pollutant for which it fails to meet the NAAQS. Individual State air quality agencies are responsible for defining the overall regional plan to reduce air pollution emissions to levels that will enable attainment and maintenance of the NAAQS. This strategy is articulated through the SIP.

In North Carolina, the agency responsible for SIP development is the North Carolina Division of Air Quality (NCDAQ). The delineation and implementation of strategies to control emissions from on-road mobile sources is a significant element of the state plan to improve air quality, thereby creating a direct link between transportation and air quality planning activities within a non-attainment area. The process of ensuring that a region’s transportation planning activities contribute to attainment of the NAAQS, or “conform” to the purposes of the SIP, is referred to as transportation conformity. In order to receive federal transportation funds within the non-attainment area, the area must demonstrate through a federally mandated conformity process that the transportation investments, strategies and programs, taken as a whole, contribute to the air quality goals defined in the state air quality plan.

In order to ensure the conformity requirements are met, Section 176 (c) of the Clean Air Act authorizes the USEPA Administrator to “promulgate criteria and procedures for demonstrating and assuring conformity in the case of transportation plans, programs, and projects.” This is accomplished through the Transportation Conformity Rule; developed by the USEPA to outline all federal requirements associated with transportation conformity. The Transportation Conformity Rule in conjunction with the Metropolitan Planning Regulations direct transportation plans and program development as well as the conformity process.

The purpose of this report is to comply with the provisions of the Clean Air Act Amendments of 1990 and the Moving Ahead for Progress in the 21st Century Act (MAP-21) of July 6, 2012. This report demonstrates that the activities resulting from the implementation of the fiscally constrained MTPs and the TIPs will not “cause or contribute to any new violation of any standard in any area, increase the frequency or severity of any existing violation of any standard in any area, or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.” The following jurisdictions apply:

- The portion of Guilford County within the Burlington-Graham Metropolitan Planning Organization (BGMPO)
- The portion of Guilford County within the Greensboro Metropolitan Planning Organization (GUAMPO)
- The portions of Guilford, Davidson and Forsyth Counties within the High Point Urban Metropolitan Planning Organization (HPMPO)
- The portions of Forsyth and Davidson Counties within the Winston-Salem Metropolitan Planning Organization (WSMPO)

This conformity determination is based on a regional emissions analysis that uses the transportation network approved by the above-named Metropolitan Planning Organizations (MPOs) for the 2040 MTPs, VMT and Speed input data developed by PART in coordination with NCDOT, and emissions developed by the North Carolina Division of Air Quality (NCDAQ). The Triad Maintenance Area for Guilford, Forsyth and Davidson Counties for the CO and PM 2.5 standard are shown as a map on Figure 1.

All Federally funded projects in areas designated by the United States Environmental Protection Agency (USEPA) as air quality non-attainment or maintenance areas must come from a conforming metropolitan transportation plan and transportation improvement program (TIP). Triad MPO maintenance areas are required by 23 CFR 134 and 40 CFR 51 and 93 to make a conformity determination on any adopted or amended fiscally constrained metropolitan transportation plan and related TIP. In addition, the United States Department of Transportation (USDOT), specifically, the Federal Highway Administration (FHWA) must make a conformity determination on four MPO Plans in the Triad region and the related TIPs for the maintenance areas.

Figure 1A. Triad PM 2.5 Maintenance Area

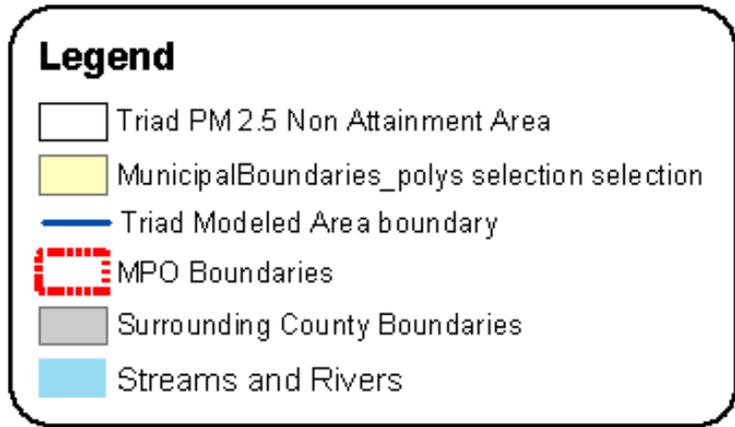
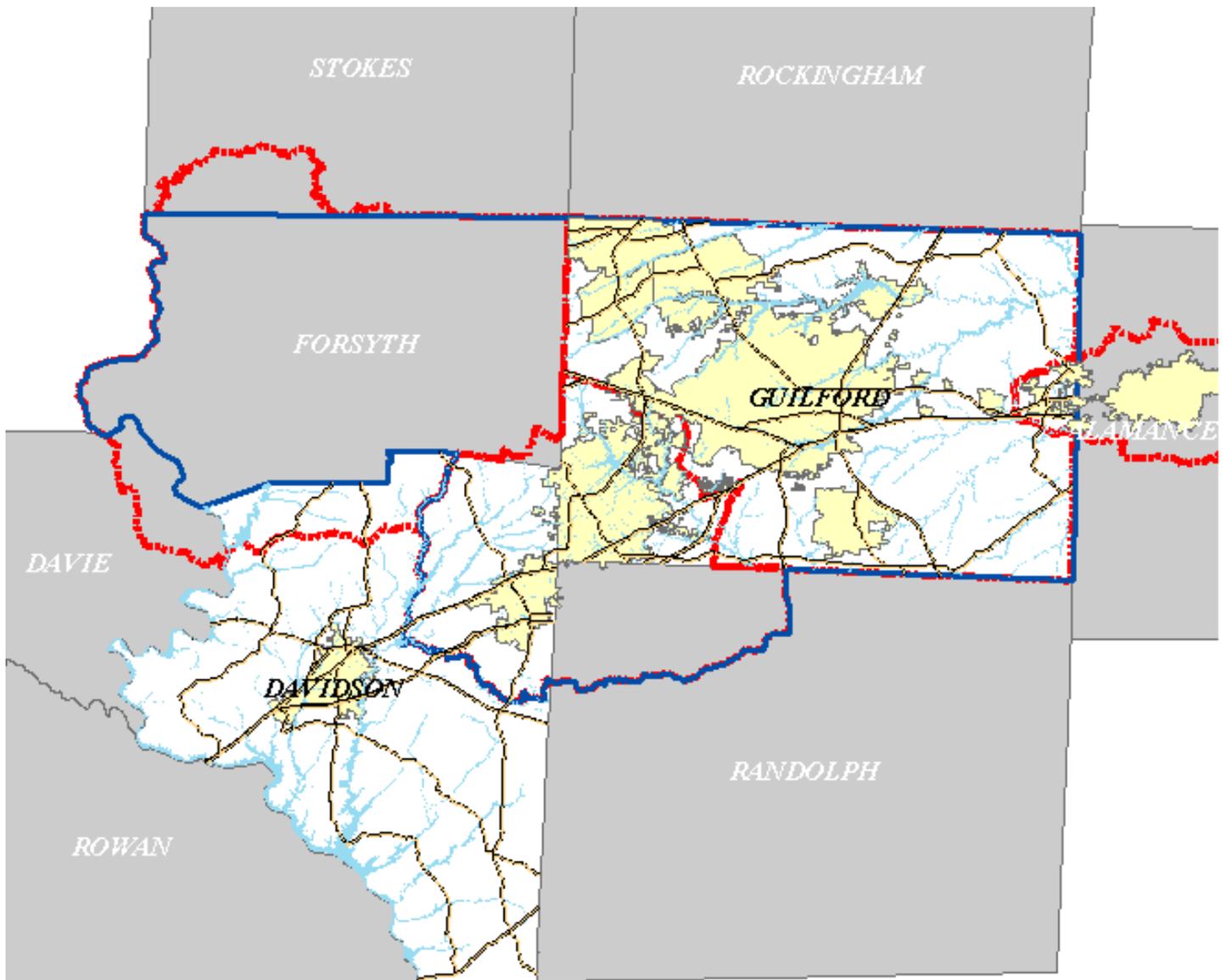
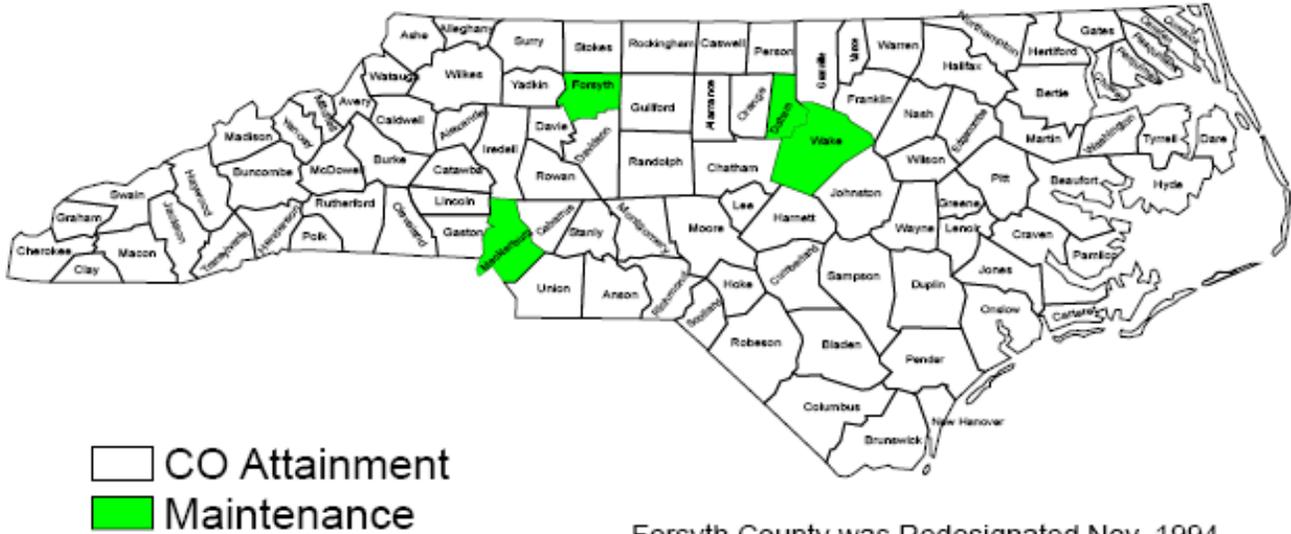


Figure 1 B. State of North Carolina CO Maintenance Areas

North Carolina CO Maintenance Areas



Forsyth County was Redesignated Nov, 1994
Redesignation was projected Sept. 18, 1995
for Mecklenburg, Durham and Wake Counties

Note: Not to Scale
April 6, 2004

In order to assist the Triad Area in making a conformity determination on the adopted 2040 fiscally constrained MTPs, the following agencies shared leading roles composing substantial portions of this document:

Table 4. Listing of Leading Role Agencies

<i>Agency</i>	<i>Counties</i>
Burlington-Graham MPO	Guilford (part)
Greensboro MPO	Guilford (part)
High Point MPO	Guilford (part) , Davidson (part) and Forsyth (part)
Winston-Salem MPO	Forsyth and Davidson (part)

This analysis is consistent with the set of amendments to 40 CFR Part 93. Based on the regional emissions emission budget test documented in this report, the following MTPs conform to the purpose of the North Carolina SIP:

- Burlington-Graham MPO 2040 MTP & 2016-2020 TIP Projects
- Greensboro MPO 2040 MTP & 2016-2020 TIP Projects
- High Point MPO 2040 MTP & 2016-2020 TIP Projects
- Winston-Salem MPO 2040 MTP & 2016-2020 TIP Projects

This report documents the regional emissions budget test, interagency consultation process, public involvement process, and analysis methodology used to demonstrate transportation conformity for each MPO and the donut portion of each county outside the MPOs.

40 CFR Part 93 requires that a conforming transportation plan satisfy five conditions:

- The transportation plan must be consistent with the motor vehicle emissions budget(s) in an area where the applicable implementation plan or implementation plan submission contains a budget (*40 CFR Part 93.118*).
- The transportation plan, TIP, or FHWA/FTA project not from a conforming plan must provide for the timely implementation of TCMs from the applicable implementation plan (*40 CFR Part 93.113b*).
- The MPO must make the conformity determination according to the consultation procedures of *40 CFR Part 93.105* and the implementation plan revision required by *40 CFR Part 93.390* (*40 CFR Part 416*).
- The conformity determination must be based on the latest emissions estimation model available (*40 CFR Part 93.111*).
- The conformity determination must be based on the latest planning assumptions (*40 CFR Part 93.110*).
- The transportation Plan, TIP, or FHWA/FTA project must meet the interim emissions tests where applicable (*40 CFR Part 93.119*).

This report shows that the MPOs 2040 MTPs meets each condition. Each condition is discussed in the following sections of this report.

2 Air Quality Planning

The USEPA designated Forsyth County for carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as moderate non-attainment area for CO. However, due to improved monitoring data, this area was redesignated as maintenance for CO on November 7, 1994. A CO limited maintenance plan was approved on June 20, 2013 with an effective date of July 22, 2013. In accordance with the transportation conformity rule, approval of a limited maintenance plan removes the requirement to conduct emissions analysis as a part of the conformity determination. The requirement to demonstrate conformity per the other requirements in Table 1 (which is based on Table 1 of 40 CFR 93.109) still applies. The Federal Register notice for the CO limited maintenance plan is found in Appendix A.

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. This area was re-designated from non-attainment to maintenance for the 1997 PM 2.5 Standard effective on December 19, 2011.

The Federal Register notice containing the Triad Maintenance PM2.5 SIP MVEBs is provided in Appendix A.

2.1 Emissions Budget

For the PM 2.5 and CO standard there are approved SIP MVEBs and comparisons will be made to the MVEBs to demonstrate conformity.

Section 4 of this report provides the regional emissions analysis and comparisons to the MVEBs where applicable.

Forsyth County is maintenance for the Carbon Monoxide (CO) standard. A MVEB was established for 2021 and emission limits based on the MVEB is indicated below:

Table 5: Motor Vehicle Emission Budgets

PM 2.5 (NO_x): The PM 2.5 Redesignation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
GUILFORD MVEB (NO_x)	6,309,650	6,309,650	6,309,650
DAVIDSON MVEB (NO_x)	2,148,938	2,148,938	2,148,938

PM 2.5 (PM 2.5): The PM 2.5 Redesignation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
GUILFORD MVEB (PM 2.5)	421,841	421,841	421,841
DAVIDSON MVEB (PM 2.5)	153,313	153,313	153,313

***The MVEB for 2021 will be used for the 2030 and 2040 comparison since 2021 is the last year that a MVEB is provided for VOC and NO_x*

3 Metropolitan Transportation Plans

Federal law *40 CFR part 93.104(b)(3)* requires a conformity determination on MTPs no less frequently than every four years. As required in *40 CFR 93.106*, the horizon years for the MTPs are no more than ten years apart.

The BGMPO includes a small portion Guilford County. The GMPO includes the majority portion of Guilford County. The HPMPO includes portions of Guilford, Davidson, and Forsyth Counties. WSMPO includes Forsyth and a portion of Davidson County.

3.1 Consultation

The 2040 MTP is consistent with consultation requirements discussed in *40 CFR 93.105*.

Consultation on the development of this conformity determination was accomplished through interagency consultation meetings held on 12/8/14, 1/26/15, 2/23/15, 3/23/15, 4/27/15, and 5/26/15. A summary of the topics discussed and a list of the attendees at each of these meetings is included in [Appendix B](#).

3.2 Financial Constraint Assumptions

The MTPs are fiscally constrained as discussed in *40 CFR 93.108*. The GMPO, HPMPO, WSMPO and the BGMPO MTPs are fiscally constrained to the year 2040. All projects included in the 2016-2020 TIPs are fiscally constrained, and funding sources have been identified for construction and operation. The estimates of available funds are based on historic funding availability and include federal, state, private, and local funding sources. Additional detail on fiscal constraint is included in each MPO MTP. It is assumed that the projects listed for each horizon year will be completed and providing service by the end of the indicated calendar year (December 31). These transportation networks are described in the respective 2040 MTPs. They are also described in greater detail in [Appendix C](#).

3.3 Latest Planning Assumptions

The 2040 MTPs were developed with the latest planning assumptions as discussed in *40 CFR 93.110*. The Piedmont Travel Demand Model (PTRM) was developed by NCDOT, Triad MPOs, and PART for the urbanized portion of the Triad maintenance area. The MPOs provided housing, employment, and population projections, and a set of highway and transit projects consistent across jurisdictional boundaries was developed through regional MPO coordination. Additional detail on these planning assumptions is provided below.

Land use and demographic data were collected by regional planning agencies and staff members of BGMPO, GMPO, HPMPO and WSMPO. A regional methodology was agreed upon that included updating residential and employment data to the end of 2013, and preparing growth forecasts to 2040.

Residential data included population, dwelling units, households, average income and university-related group quarters population (dormitories, fraternities and sororities). Residential data was based on Block level 2010 U.S. Census data from Summary File 1.

Forecasts were prepared by local planning department staff with guidance from staff at the four MPOs. A regional methodology was applied to maintain consistency between residential and employment forecasts and adopted land use plans. Data and forecasts were submitted for public review by each MPO, and adopted for use in developing travel demand and air quality forecasts

by each MPOs Transportation Advisory Committee. Additional detail of arriving at these planning assumptions can be found in **Appendix B** for the Triad Transportation Conformity Consensus Plan.

The Piedmont Triad Regional Model (PTRM) uses the basic four-step process (trip generation, trip distribution, mode choice and assignment). All four steps of the process are discussed in greater detail in the sections below.

The PTRM TransCAD model was developed by the PTRM Model Team, and adopted by the Executive Committee, and is housed at PART. The PTRM TransCAD model covers the contiguous boundaries of Guilford and Forsyth Counties (including the portions within the BG MPO) and a portion of Davidson County (including the portion within the HPMPO, and WSMPO)

There are no court orders or special agreements that apply to conformity (*40 CFR 93.109*).

3.4 Future Year Roadway Projects

Roadway improvements used for conformity modeling were developed in the 2040 MTP process in each MPO. Outside of the MPO boundaries, TIP projects from the 2016-2020 TIP served as the future year roadway projects. For the 2040 MTPs, lists of needed projects were developed based on modeled congestion and identified local needs. Improvements were coded into the PTRM and analyzed. Intermediate analyses for the years 2021, 2030 and 2040 were performed to assist in prioritizing the 2040 roadway needs. The final 2021, 2030 and 2040 networks are fiscally constrained. Projects were added from MPO priority lists until estimated project costs equaled the expected funding available. The base network (2013) and the four future networks (2021, 2030, and 2040) used for the conformity determination are the same as the networks used for the 2040 MTPs. Throughout the process to develop the roadway networks, the MPOs and NCDOT identified any initial inconsistencies in project timing and characteristics (e.g. cross-section) for those projects crossing jurisdictional boundaries and reached consensus on consistent solutions.

Figure 2. Regional Significance

The following criteria is used to identify major existing and future regional roadway systems that may produce significant impacts to air quality emissions with respect to the Triad region.

Regional Significance Criteria

1. The facility serves regional transportation needs (i.e. facilities that provide access to and from the region or that provide access to major destinations in the region);
2. The facility is functionally classified higher than a minor arterial (minor arterials may be regionally significant if their main purpose is to provide access to major facilities in the region);
3. The facility is a fixed guideway transit facility; and
4. The facility is included in the travel model for the region (In many cases collector streets are modeled that are not regionally significant).

To be regionally significant a facility should meet one or more of the criteria in this checklist. 40 CFR Part 93.101

Appendix C includes lists of the future year roadway projects in the Triad area as indicated below, including indications of which projects are regionally significant and which projects are exempt.

Table 6. Listing of Appendices of Triad MPOs MTP and TIP

Area	Roadway Project List Appendix C
Greensboro MPO	2040 MTP (Appendix C1) 2016-2020 TIP (Appendix C2)
High Point MPO	2040 MTP (Appendix C3) 2016-2020 TIP (Appendix C4)
Winston-Salem MPO	2040 MTP (Appendix C5) 2016-2020 TIP (Appendix C6)
Burlington-Graham MPO	2040 MTP (Appendix C7) 2016-2020 TIP (Appendix C8)

The exempt projects listed in Appendix C, both highway and transit, will serve as the MTPs/TIPs for the region in the event of a conformity lapse. A conformity lapse is when an area develops a MTP that does not pass the conformity test or a conformity update deadline is missed. The TAC must adopt a MTP of exempt projects (40 CFR 93.126, 127 & 128) that will serve as the MTP/TIP for the area in the event of conformity lapse.

3.5 Transit Networks

Each MPO developed transit projects for its MTP. The base year network was modeled from existing routes and fares for the transit systems in 2013. Future year networks were based on fiscally-constrained projected new or expanded services from regional transit plans, local bus system short range plans, corridor transit plans and other projected bus service expansion estimates, where available. The MPOs and NCDOT identified and rectified any initial inconsistencies in project characteristics or implementation years where transit projects crossed jurisdictional boundaries.

Table 7. Listing of Appendices of Triad MPOs Transit Project List

Area	Transit Project List Appendix C
Greensboro MPO	2040 MTP (Appendix C1)
High Point MPO	2040 MTP (Appendix C3)
Winston-Salem MPO	2040 MTP (Appendix C5)
Burlington-Graham MPO	2040 MTP (Appendix C7)

3.6 Congestion Mitigation/Air Quality (CMAQ) Projects

The NC Department of Transportation has established an allocation and review process for CMAQ projects. Each MPO and RPO in a non-attainment or maintenance area receives an allocation of CMAQ funds based on population and air quality status. In addition, a statewide

pool of CMAQ funds will be allocated to projects serving more than one non-attainment area on a competitive basis. MPO and RPO project priorities and project applications for statewide funding is reviewed on an annual basis. This conformity report includes a listing of funded CMAQ projects in the Triad Area in [Appendix D](#), for those projects within the maintenance areas.

3.7 Travel Demand Model:

Vehicle Miles Traveled (VMT) and speeds used in the emission estimation process are generated by the Piedmont Triad Regional Model (PTRM). The PTRM is housed at PART.

The PTRM completely covers the Metropolitan Area Boundaries (MABs) for the WSMPO (Forsyth, Davidson), the HPMPO (Davidson, Guilford and Forsyth), the GMPO (Guilford) and the BGMPO (Alamance, Guilford and Orange). Alamance, Guilford and Forsyth counties are completely within the Piedmont Triad Regional Model (PTRM) boundary.

Forecasted speeds and VMT generated by the PTRM are incorporated into the EPA MOVES2014 emissions model, which is used to generate emissions for the relevant counties and pollutants

3.8 Mode Split / Mode Choice:

The PTRM forecasts travel for 12 major purposes including; home-based work (subdivided into three income groups), home-based school, home-based shopping, home-based other, non-home-based work, non-home-based other, home-based college/university, and airport passenger trip (subdivided into air travel purposes). In addition, the PTRM forecasts travel for three classes of commercial vehicles. Each of these major purposes and commercial vehicle classes are distributed for each potential origin and destination in the region, as defined by the regional network and zone system. After distribution of the trips, the PTRM nested logit model estimates the probability of selecting each of the seven travel modes for each of 12 major purposes (commercial vehicles are not subject to mode choice). Travel modes include: drive alone, shared ride 2, shared ride 3+, walk to transit, drive to transit, walk, and bike. School bus trips are estimated outside the mode choice model. The top level of the nested logit model structure contains major modes including passenger vehicle, transit, and non-motorized.

3.9 Method of Reporting VMT and Speed

The PTRM was developed in 2002 and enhanced most recently in 2015 with 2013 ground counts. After the vehicle trips are assigned, the PTRM must be separated by the designated non-attainment/maintenance region to be analyzed independently.

For each designated non-attainment/maintenance 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 MOVES2014 emissions model.

The MOVES2014 model calculates emissions (See [Appendix E](#)). The VMT and Speed data summary are found in [Appendix F](#).

4. Regional Emissions Analysis

In areas with an USEPA approved attainment demonstration or maintenance plan, an emissions budget comparison satisfies the emissions test requirement of 40 CFR Part 93.118. For pollutants for which an emissions budget has been submitted, the estimated emissions from the transportation plan must be less than or equal to the emissions budget values. Emissions were provided by NCDAQ.

Table 8 The Triad Area Transportation Conformity Analysis Matrix shows the counties to be analyzed, the PTRM coverage, the comparison years and the pollutants for which the REA will be done.

The Triad maintenance area is completely within the PTRM boundary (Guilford, Davidson and Forsyth).

4.0.1. Sub-area motor vehicle emission budgets

All of Guilford, Davidson and Forsyth Counties are maintenance areas under the PM 2.5 and CO standard and have motor vehicle motor vehicle emission budgets (MVEBs) by county.

4.0.2 Emissions analysis source

Vehicle Miles of Travel (VMT) and speeds for the emissions analysis were derived from the PTRM

Table 8. Triad Area Transportation Conformity Analysis Matrix

County	Area model status	Area emissions budget status	Emissions analysis source	Comparison Year		
				2021 (modeled)	2030 (modeled)	2040 (modeled)
Guilford	modeled all	¹ The PM2.5 Redesignation Nonattainment to Attainment Effective 12/19/11	PTRM	NOx Direct PM2.5	NOx Direct PM2.5	NOx Direct PM2.5
Davidson	modeled all	¹ The PM2.5 Redesignation Nonattainment to Attainment Effective 12/19/11	PTRM	NOx Direct PM2.5	NOx Direct PM2.5	NOx Direct PM2.5

Footnotes for table:

¹ The Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes; North Carolina: Re-designation of the Greensboro-Winston –Salem-High Point 1997 Annual Fine Particulate Matter Nonattainment Area to Attainment will be referred to in this document as the PM2.5 Redesignation Nonattainment to Attainment Effective 12/19/11.

Additional table notes and explanations:

County:

- CO: The Triad CO limited maintenance area consists of one whole county (Forsyth)
- PM 2.5: The Triad PM 2.5 maintenance area consists of 2 counties (Guilford and Davidson)

4.0.3 Emission comparison years (CO)

The USEPA designated Forsyth County for carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as moderate non-attainment area for CO. However, due to improved monitoring data, this area was re-designated as maintenance for CO on November 7, 1994. A CO limited maintenance plan was approved on June 20, 2013 with an effective date of July 22, 2013. In accordance with the transportation conformity rule, approval of a limited maintenance plan removes the requirement to conduct a regional emissions analysis as part of the conformity determination. The requirement to demonstrate conformity per the other requirements in Table 1 (which is based on Table 1 of 40 CFR 93.109) still applies. The Federal Register notice for the CO limited maintenance plan is found in Appendix A.

4.0.4 Emission comparison years (PM 2.5)

Guilford and Davidson County has a PM 2.5 maintenance SIP. The SIP provides a 2015 and 2021 budget.

- SIP Budget Years: 2015 and 2021 (Guilford and Davidson County)
- Comparison Years for PM2.5 SIP:
 - 2021 MVEB will be compared to the analysis years of 2021, 2030 and 2040

4.1 Emissions Model

MOVES2014 was used to calculate emissions. Motor vehicle emission controls considered in the MOVES2014 include the following:

Strategy

*I/M Program
Tier 2 vehicle's Emission Standards
Low Sulfur Gasoline and Diesel fuels
Heavy Duty Vehicle Rules 2004 and 2007
Low RVP Gasoline
On board vapor recovery*

Methodology/Approach

*Accounted for in MOVES model
Accounted for in MOVES model*

Also, area specific information is used for such items as vehicle age distribution and vehicle type distribution rather than national default values, as documented below.

4.1.1 Development of Emissions Factors

The following MOVES2014 model-input parameters will be used in the conformity analysis.

CO Maintenance Area: Forsyth County

PM_{2.5} Maintenance Area: Davidson and Guilford Counties

Parameter	Details	Data Source
a. Emissions Model Version(s):	MOVES2014	
b. Emission Model Runs:	County-level domain modeling in inventory mode; pollutant emissions reported in kilograms (kg)	
c. Time Periods:	Annually for NO _x and Direct PM _{2.5}	
d. Pollutants Reported:	NO _x (for PM _{2.5}) and Direct PM _{2.5}	
e. Emissions Budget Years:	CO: not applicable CO limited maintenance Plan-regional emissions analysis not required PM 2.5: 2011 & 2021	
f. Emissions Analysis Years:	2021, 2030, 2040	
g. Vehicle Classes:	13	
h. Temperature and Relative Humidity:	Hourly average temperature and relative humidity calculated for each month. Meteorological data is from the GSO Triad Regional Airport.	
i. VMT Mix:	Statewide mix based on 2013 data using the method in the August 2004 USEPA Guidance.	
j. Speeds:	From PTRM	
k. Vehicle Age Distribution:	Based on 2013 or latest available vehicle registration data provided by NCDOT.	
l. I/M Program:	2021, 2030, 2040: OBD-II for Davidson and Guilford Counties.	
m. Anti-tampering Applicability:	Not included in MOVES	
n. RVP:	Calendar Monthly	
		RVP
		Jan, Dec 15
		Feb, March, April, Oct, Nov 13.5
		May, June, July, Aug, Sept 9.0
o. Strategies:	See item #12 above	
p. I/M Compliance Factor Coverage (CFC):	<i>This input to MOVES accounts for the I/M compliance rate, waiver rate, and regulatory coverage adjustment for applicable vehicles. When calculated by MOVES guidance methods this value is 91.2% for passenger cars, 85.73% for passenger trucks, and 85.26% for light commercial trucks for both counties.</i>	
q. Evaluation Month:	12 month annual emissions or any part There of (output can be disaggregated at the user's discretion)	
r. VMT:	PTRM	
s. Fuel Sulfur Content:	MOVES considers all recent rulemakings (Tier 2, ultra low sulfur diesel, Tier 3 low sulfur gasoline, etc). The default data in MOVES can	

be relied on here. Default database values are by month and fuel region and can be requested by the MPO.

t. Source type (vehicle type) population:

For each county, vehicle population estimates will be developed for each future modeling year based on the latest available (2013 or later) vehicle registration data provided by NCDOT. This data includes the total number of registered vehicles in each county, divided into nine source type categories. The data will first be reorganized into thirteen source type categories (i.e. passenger cars, light commercial trucks, combination long-haul trucks, etc.) as required for MOVES2014. These source type population estimates will then be projected for each required modeling year, using the same base and future year-county-level human population data that were used in the PTRM model, according to the following formula:

Future year total vehicle population = Base year total vehicle population * $\frac{\text{Future year human population}}{\text{Base year human population}}$

u. Source type (vehicle type) age distribution:

The latest available (2013 or later) vehicle registration data provided by NCDOT, which also includes a breakdown of the number of vehicles by model year, will be used to create the required source type age distribution input file for each county. As per EPA guidance, the source type age distribution will not be projected for future years.

4.2 Transportation Control Measures

The North Carolina State Implementation Plan lists no transportation control measures pertaining to the Triad.

4.3 Emissions Comparison Tests by Location and Pollutant

The USEPA designated Forsyth County for carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as moderate non-attainment area for CO. However, due to improved monitoring data, this area was re-designated as maintenance for CO on November 7, 1994. A CO limited maintenance plan was approved on June 20, 2013 with an effective date of July 22, 2013. In accordance with the transportation conformity

rule, approval of a limited maintenance plan removes the requirement to conduct a regional emissions analysis as part of the conformity determination. The requirement to demonstrate conformity per the other requirements in Table 1 (which is based on Table 1 of 40 CFR 93.109) still applies. The Federal Register notice for the CO limited maintenance plan is found in [Appendix A](#).

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. This area was re-designated from non-attainment to maintenance for the 1997 PM 2.5 Standard effective on December 19, 2011.

The maintenance designations cover the following geographic areas:

- Guilford County (PM 2.5)
- Davidson County (PM2.5)
- Forsyth County (CO)

Four organizations are responsible for conformity determinations; each must make a conformity determination for its respective area in order for all of the areas to be designated in conformity:

- the Burlington-Graham MPO (BGMPO) within its portion of the metropolitan area boundary in Guilford County;
- the Greensboro MPO (GUAMPO) within the metropolitan area boundary of Guilford County;
- the High Point MPO (HPMPO) within its metropolitan area boundary in Guilford, Davidson and Forsyth Counties;
- the Winston-Salem MPO (WSMPO) within its portion of the metropolitan area boundary in Forsyth and Davidson Counties;

Table 9 summarizes the emissions test used and decision-making responsibility for conformity findings in each County.

Table 9. Emissions Test and Responsibility for Conformity Findings

Location	Pollutant(s)	Emissions Test	Conformity Finding Responsibility
Guilford County	PM 2.5	Budget	Greensboro MPO, High Point MPO & Burlington Graham MPO
Davidson County	PM 2.5	Budget	Winston Salem MPO, High Point MPO
Forsyth County	CO	Not required-CO limited maintenance plan	Winston Salem MPO & High Point MPO

The results of the emission comparisons are summarized by County in Tables 10 and 11. Detailed emissions analysis results by County are contained in [Appendix G](#).

Table 10. Guilford County Emissions Comparison Summary

PM 2.5 (PM 2.5): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
GUILFORD MVEB (PM 2.5)	421,841	421,841	421,841
GUILFORD Emission Model Results	61,384	40,264	31,901

PM 2.5 (NO_x): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
GUILFORD MVEB (NO_x)	6,309,650	6,309,650	6,309,650
GUILFORD Emission Model Results	2,167,370	1,170,330	858,806

Table 11. Davidson County Emissions Comparison Summary

PM 2.5 (NO_x): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
DAVIDSON MVEB (NO_x)	2,148,938	2,148,938	2,148,938
DAVIDSON Emission Model Results	932,797	418,735	246,068

PM 2.5 (PM 2.5): The PM 2.5 Re-designation Effective 12/19/11 (kg/year)			
Area	Comparison Year		
	2021	2030	2040
DAVIDSON MVEB (PM 2.5)	153,313	153,313	153,313
DAVIDSON Emission Model Results	22,611	13,714	10,004

5. Public Involvement and Interagency Consultation

The 2040 MTPs are consistent with consultation requirements discussed in *40 CFR 93.105*. Interagency consultation was a cooperative effort on the part of the Burlington-Graham MPO, the Greensboro MPO, the High Point MPO, the Winston-Salem MPO, the Piedmont Triad Area RPO, the North Carolina Department of Transportation, the North Carolina Division of Air Quality, the Environmental Protection Agency, the Federal Transit Administration, and the Federal Highway Administration. The process was administered by the Piedmont Authority for Regional Transportation (PART) on behalf of the partners and was organized according to the sections in the document titled *Triad Region Transportation Conformity*:

Consensus Plan, a document agreed to at the initial interagency consultation meeting on December 8, 2014 and updated periodically. Subsequent interagency consultation meetings were held on January 26, 2015, February 23, 2015, March 23, 2015, April 27, 2015, and May 26, 2015. A copy of the latest version of the Consensus Plan, written agency comments and agendas and summaries of the interagency consultation meetings are included in Appendix B.

Public review of this report was handled in accordance with each MPO, PART and RPO public participation policy for the MTPs. Copies of all public participation policies are included in [Appendix H](#). Comments from the general public participation process and interagency review are incorporated into the final Conformity Determination Report. All written comments on the draft report from the general public and interagency review are included in [Appendices I and J](#) of the final report.

6. Conclusion

Based on the analysis and consultation discussed above the following transportation plans and TIPs conform to the purpose of the North Carolina State Implementation Plan. In every horizon year for every pollutant in each geographic area, the emissions expected from the implementation of the metropolitan plans and TIPs are less than the emissions budgets established in the SIP.

Table 12: Summary of Conformity Status of Triad MTPs

Criteria (√ indicates the criterion is met)	Burlington-Graham MPO 2040 MTP	Greensboro MPO 2040 MTP	High Point MPO 2040 MTP	Winston-Salem MPO 2040 MTP
Less Than Emissions Budget(s) or Baseline	√	√	√	√
TCM Implementation				
Interagency Consultation	√	√	√	√
Latest Emissions Model	√	√	√	√
Latest Planning Assumptions	√	√	√	√
Fiscal Constraint	√	√	√	√

In the final Transportation Conformity Determination Report, please refer to the resolutions of conformity finding, approval, and/or endorsement by the metropolitan planning organizations of the Piedmont Triad region in **Appendices' K, L and M.**