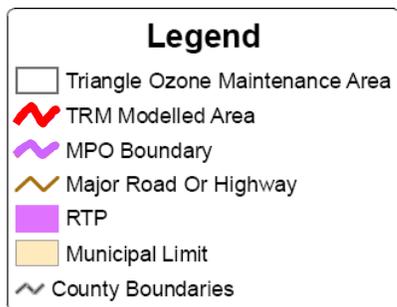
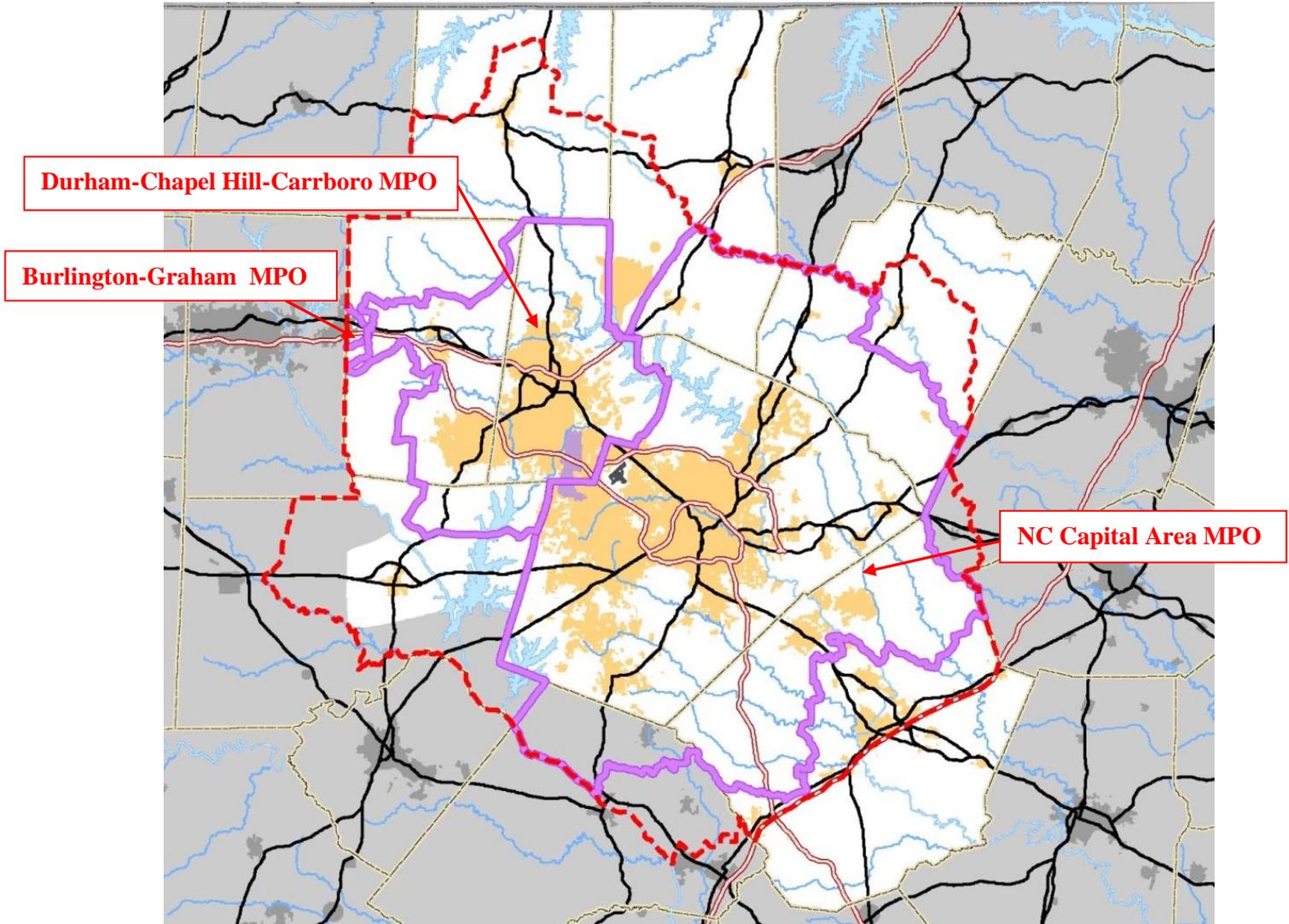


RESEARCH TRIANGLE REGION
Conformity Determination Report

2045 Metropolitan Transportation Plan
2018–2027 Transportation Improvement Program



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List of Acronyms

BG MPO:	Burlington-Graham Metropolitan Planning Organization
CAAA:	Clean Air Act Amendments of 1990 (United States)
CAMPO:	Capital Area Metropolitan Planning Organization
CFR:	Code of Federal Regulations
CMAQ:	Congestion Mitigation/Air Quality
CO:	Carbon Monoxide
DAQ:	Division of Air Quality (North Carolina)
DCHC MPO:	Durham-Chapel Hill –Carrboro Metropolitan Planning Organization
DENR:	Department of Environment and Natural Resources (North Carolina)
DMV:	Division of Motor Vehicles
DOT:	Department of Transportation (North Carolina)
EPA:	Environmental Protection Agency (United States)
FAST Act:	Fixing America’s Surface Transportation Act – 2015 federal transportation legislation
FHWA:	Federal Highway Administration
FTA:	Federal Transit Administration
HBO:	Home Based Other (trip purpose)
HBS:	Home Based Shopping (trip purpose)
HBW:	Home Based Work (trip purpose)
HOV:	High Occupancy Vehicle
HPMS:	Highway Performance Management System
I/M:	Inspection/Maintenance
ISTEA:	Intermodal Surface Transportation Efficiency Act
ITRE:	Institute for Transportation Research and Education
KT RPO:	Kerr-Tar Rural Transportation Planning Organization
MAP-21:	Moving Ahead for Progress in the 21 st Century
MPO:	Metropolitan Planning Organization
MTIP:	Metropolitan Transportation Improvement Program (regional equivalent of the STIP)
MTP:	Metropolitan Transportation Plan
NAAQS:	National Ambient Air Quality Standards
NCDOT:	North Carolina Department of Transportation
NHB:	Non Home Based (trip purpose)
NO _x :	Nitrogen Oxides
RPO:	Rural Transportation Planning Organization
RTAC:	Rural Transportation Advisory Committee
RTCC:	Rural Technical Coordinating Committee
RVP:	Reid Vapor Pressure
SAFETEA-LU:	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SIP:	State Implementation Plan
STIP:	State Transportation Improvement Program (statewide equivalent of the MTIP)
TAC:	Transportation Advisory Committee
TAZ:	Traffic Analysis Zone
TARPO:	Triangle Area Rural Transportation Planning Organization
TCC:	Technical Coordination Committee
TCM:	Transportation Control Measure
TDM:	Transportation Demand Management
TIP:	Transportation Improvement Program
TRM:	Triangle Regional Model
UCPRPO:	Upper Coastal Plain Rural Transportation Planning Organization
USEPA:	United States Environmental Protection Agency
VKT:	Vehicle Kilometers of Travel
VMT:	Vehicle Miles of Travel
VOC:	Volatile Organic Compound

Conformity Analysis and Determination Report

2045 Metropolitan Transportation Plans:

- **Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO)**
- **NC Capital Area Metropolitan Planning Organization (NC CAMPO)**
- **Burlington-Graham MPO (2040 MTP)**

FY 2018 – 2027 Transportation Improvement Programs

- **NC Capital Area Metropolitan Planning Organization**
- **Durham-Chapel Hill-Carrboro Metropolitan Planning Organization**
- **Burlington-Graham Metropolitan Planning Organization (BG MPO)**

Projects from the FY 2018-2027 State Transportation Improvement Program:

- **the portions of Chatham, Franklin, Granville, Johnston, Orange and Person Counties that are within the Triangle Ozone Maintenance Area but Outside the NC Capital Area and Durham-Chapel Hill-Carrboro Metropolitan Planning Organization Areas**

Executive Summary

- This report addresses the 2045 Metropolitan Transportation Plan and projects in the FY2018-27 MTIP; Appendix D gives project details.
- A regional emissions analysis is required (6-18-18 interagency consultation meeting).
- The following organizations will be responsible for making the conformity determinations in four distinct parts of the Triangle Ozone Maintenance Area:
 - the NC Capital Area MPO within the CAMPO metropolitan area boundary – all of Wake County plus parts of Franklin, Granville and Johnston Counties.
 - Adopt amendments to the 2045 MTP and the 2018-2027 TIP
 - Make conformity finding on the 2045 MTP and the 2018-27 TIP
 - the Durham-Chapel Hill-Carrboro MPO within its metropolitan area boundary – all of Durham County and parts of Orange and Chatham counties.
 - Adopt amendments to the 2045 MTP and the 2018-2027 TIP
 - Make conformity finding on the 2045 MTP and the 2018-27 TIP
 - the Burlington-Graham MPO within its portion of the metropolitan area boundary in western Orange County.
 - Make conformity finding on the 2040 MTP and conforming 2018-27 TIP
 - the NCDOT conducts a regional emissions analysis for the rural areas comprised of those portions of Chatham, Orange, Person, Franklin, Granville and Johnston Counties that remain outside of any MPO metropolitan area boundary.

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 authorizes USEPA 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 violates 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 Department of Environment and Natural Resources, Division of Air Quality (NC DENR/DAQ). 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, which links transportation and air quality planning activities within a non-attainment or maintenance 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 a non-attainment or maintenance 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 plan and program development as well as the conformity process.

This conformity process was initiated resulting from the decision on February 16, 2018, by the US Court of Appeals for the DC Circuit in the South Coast AQ Management District v EPA, No. 15-1115. In that decision, the Court struck down portions of the 2008 Ozone National Ambient Air Quality Standards (NAAQS) State Implementation Plan Requirements Rule which vacated the revocation of transportation conformity requirements for the 1997 8-hour Ozone NAAQS. On October 1, 2018, FHWA issued Updated Interim Guidance on Conformity Requirements for the 1997 Ozone NAAQS which stated that conformity determinations for the 1997 ozone NAAQS would be required on MTP, TIP and project actions after February 15, 2019, and agencies needed to plan and make sure that they were prepared to make those determinations.

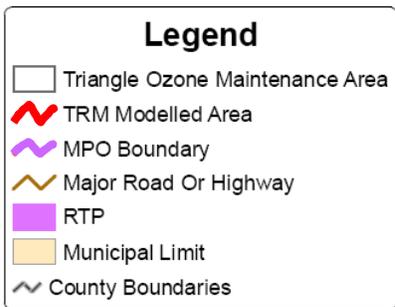
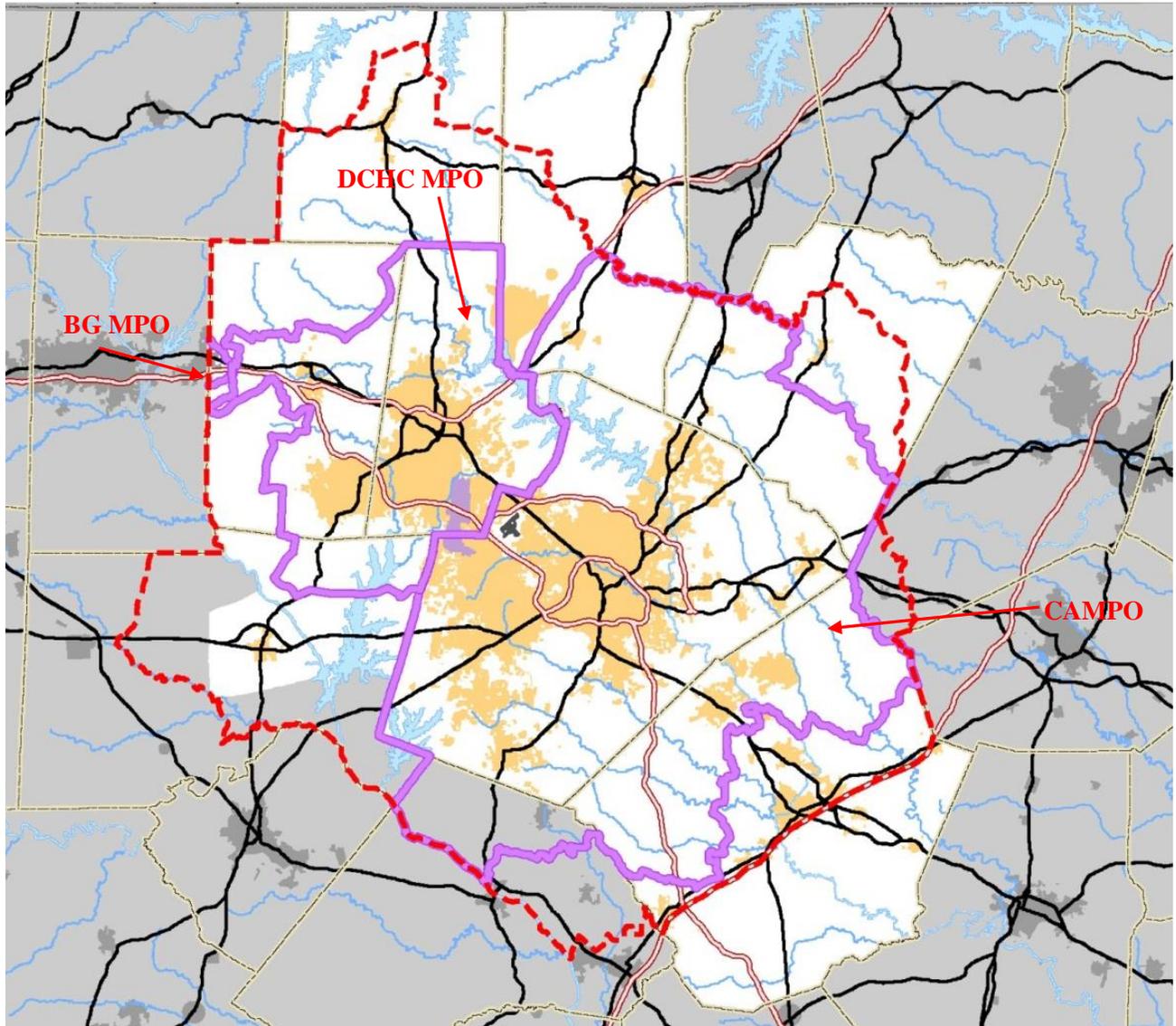
The purpose of this report is to comply with the provisions of the Clean Air Act Amendments of 1990 in concurrence with all conformity requirements as detailed in 40 CFR Parts 51 and 93 (the Transportation Conformity Rule) and 23 CFR Part 450 (the Metropolitan Planning Regulations). It demonstrates that the financially constrained metropolitan transportation plans and the transportation improvement programs (TIPs) eliminate or reduce future violation of the National Ambient Air Quality Standards (NAAQS) in the following jurisdictions:

- The NC Capital Area Metropolitan Planning Organization (CAMPO)
- The Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO)
- The Burlington-Graham Metropolitan Planning Organization (BG MPO)
- The rural “donut” portions of the Triangle Ozone Maintenance Area outside of the MPOs in four townships in Chatham County and Orange, Franklin, Granville, Johnston and Person Counties

The above-named MPOs and rural areas combine to form a region known as the “Triangle.” The entire Triangle maintenance region is shown as a map in Figure 1.

All Federally funded projects and regionally significant projects, regardless of funding source, 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). The Triangle region is required by 40 CFR 51 and 93 to make a conformity determination on any newly adopted or amended fiscally constrained metropolitan transportation plan and TIP. In addition, the United States Department of Transportation (USDOT), specifically, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), must make a conformity determination on MPO Plans in the Triangle region and the related TIPs in all non-attainment and maintenance areas.

Figure 1. Triangle Ozone Maintenance Area



BG MPO is Burlington-Graham MPO (small part of Orange County in the maintenance area).

CAMPO is Capital Area MPO (all of Wake County and parts of Franklin, Granville, Harnett and Johnston Counties)

DCHC MPO is Durham-Chapel Hill-Carrboro MPO (all of Durham and parts of Orange and Chatham Counties)

40 CFR Part 93 requires that a conforming transportation plan satisfy six 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*.
- 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*).

This report shows that each MPO's 2045 Transportation Plan (2040 Plan for Burlington-Graham MPO), the 2018-27 MTIPs and projects from the 2018-27 STIP in the donut areas meets each condition. Each condition is discussed in subsequent sections of this report. This report documents the interagency consultation process, public involvement process, and analysis used to demonstrate transportation conformity for the 2045 MTP and 2018-27 TIP.

These analyses are consistent with the Transportation Conformity Regulation (40 CFR Parts 51 and 93). Based on the analysis documented in this report, the following Transportation Plans and TIPs conform to the purpose of the Triangle Area SIP:

- NC Capital Area MPO 2045 MTP and the 2018-27 MTIP
- Durham-Chapel Hill-Carrboro MPO 2045 MTP and the 2018-27 MTIP
- Burlington-Graham MPO 2040 MTP and the 2018-27 MTIP
- Projects from the 2018-2027 STIP in the donut areas of the Triangle Maintenance Area

The Transportation Plan and 2018-27 TIP accomplish the intent of the North Carolina State Implementation Plan (SIP). This conformity determination is based on the regional emissions analysis that uses the transportation network approved by each of the above-named Metropolitan Planning Organizations (MPOs) and NCDOT, in coordination with the affected Rural Planning Organizations (RPOs), for the 2045 transportation plan, and the emissions developed in cooperation with the North Carolina Department of Environment Quality (DEQ).

2. Air Quality Planning

USEPA originally declared Durham County, Wake County and Dutchville Township in Granville County non-attainment for ozone (O₃) under the 1-hour ozone standard and Durham County and Wake County non-attainment for Carbon Monoxide (CO) on November 15, 1990. Ozone, the primary component of smog, is a compound formed when volatile organic compounds (VOC) and oxides of nitrogen (NO_x) mix together in the atmosphere with sunlight. NO_x and VOC are referred to as ozone “precursors.” Durham County, Wake County and Dutchville Township were redesignated by USEPA to attainment with a maintenance plan for ozone under the 1-hour standard on June 17, 1994 and Durham County and Wake County were redesignated by USEPA to attainment with a maintenance plan for CO on September 18, 1995. The 20-year CO maintenance requirements for the Triangle expired in 2015.

In 1997 the NAAQS for ozone was reviewed and revised to reflect improved scientific understanding of the health impacts of this pollutant. When the standard was revised in 1997, an eight-hour ozone standard was established that was designed to replace the one-hour standard. The USEPA designated the entire Triangle area as a “basic” non-attainment area for ozone under the eight-hour standard with an effective date of June 15, 2004; the designation covered the following geographic areas:

- Durham County
- Wake County
- Orange County
- Johnston County
- Franklin County
- Granville County
- Person County
- Baldwin, Center, New Hope and Williams Townships in Chatham County

On December 26, 2007, the Triangle Area was redesignated as attainment with a maintenance plan for ozone under the eight-hour standard. The USEPA direct final rule for ozone is provided in Appendix B.

The US Court of Appeals for the DC Circuit in the South Coast AQ Management District v EPA, No. 15-1115, issued a decision on February 16, 2018. In that decision, the Court struck down portions of the 2008 Ozone National Ambient Air Quality Standards (NAAQS) State Implementation Plan Requirements Rule which vacated the revocation of transportation conformity requirements for the 1997 8-hour Ozone NAAQS.

On October 1, 2018, FHWA issued Updated Interim Guidance on Conformity Requirements for the 1997 Ozone NAAQS which stated that conformity determinations for the 1997 ozone NAAQS would be required on MTP, TIP and project actions after February 15, 2019, and agencies needed to plan and make sure that they were prepared to make these determinations.

2.1 Emissions Budgets

DEQ prepared emissions budgets as part of their 8-hour ozone maintenance plans for those areas subject to budgets. Each of the eight counties or portions of counties in the bulleted list above is part of the Triangle ozone maintenance area under the 8-hour ozone standard and has emissions budgets for NO_x. Emissions budgets were established for 2008 and 2017. The 2008 budgets applied for years up to and including 2016, while the 2017 budgets apply for 2017 and all subsequent years. The December 26, 2007 Federal Register notice establishing the NO_x budgets deemed VOCs insignificant, hence no VOC budgets apply to the region.

Each county (or portion for Chatham County) has a Motor Vehicle Emission Budget established for 2008 and 2017. Table 1 below shows the individual 2017 NO_x budgets which will be compared to future year emissions.

Table 1. NO_x Motor Vehicle Emission Budgets

NO _x MVEB Comparisons for Transportation Conformity				
Budget Area	MVEB (kg/day)	Comparison Year		
		2025	2035	2045
Chatham*	2017 NO _x Budget	2,112	2,112	2,112
Durham	2017 NO _x Budget	12,610	12,610	12,610
Franklin	2017 NO _x Budget	2,645	2,645	2,645
Granville	2017 NO _x Budget	3,278	3,278	3,278
Johnston	2017 NO _x Budget	11,838	11,838	11,838
Orange	2017 NO _x Budget	7,364	7,364	7,364
Person	2017 NO _x Budget	1,674	1,674	1,674
Wake	2017 NO _x Budget	38,441	38,441	38,441

* partial county, covering only the maintenance area within Chatham County

3. Metropolitan Transportation Plans

The 2045 Transportation Plans (2040 for Burlington-Graham MPO) were developed between 2015 and 2018. Federal law *40 CFR part 93.104(b)(3)* requires a conformity determination of transportation plans no less frequently than every four years. As required in *40 CFR 93.106*, the analysis years for the transportation plans are no more than ten years apart.

The CAMPO area includes all of Wake County and parts of Franklin, Granville, Harnett and Johnston Counties. The DCHC MPO area includes all of Durham and parts of Orange and Chatham Counties. The BGMPO area includes a small portion of Orange County within the 8-hour maintenance area for ozone. The remaining portions of the maintenance area are rural (donut) areas within the Triangle Area, Kerr-Tar and Upper Coastal Plain RPOs.

3.1 Consultation

The Transportation Plan and the FY2018-27 TIP are consistent with consultation requirements discussed in *40 CFR 93.105*. Consultation on the development of this conformity determination was accomplished through an interagency consultation meeting held on June 18, 2018 and subsequent consultations by phone and email as needed. A summary of the topics discussed and decisions reached is included in Appendix C.

3.2 Financial Constraint Assumptions

The Transportation Plans are fiscally constrained as discussed in *40 CFR 93.108*. The DCHC MPO, Capital Area MPO and Burlington-Graham Transportation Plans are fiscally constrained to the year 2045 (2040 for Burlington-Graham MPO). All projects included in the 2018-27 TIP 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 methods used in the NCDOT Strategic Transportation Investments legislation and policy, and include federal, state, private, and local funding sources. Additional detail on fiscal constraint is included in each MPO transportation plan. 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 MPO Transportation Plans.

3.3 Latest Planning Assumptions

The 2045 Transportation Plans used the latest adopted planning assumptions as discussed in *40 CFR 93.110*, and were adopted as part of the Plans. Four components combine to represent planning assumptions and translate them into travel:

- a. A single travel demand model was developed for the urbanized portion of the Triangle maintenance area. A new version of the model, termed TransCAD version 6, was adopted by the DCHC MPO and CAMPO and used for the modeled area.
- b. A single set of population, housing and employment projections was developed and adopted by the MPOs, using GIS-based growth allocation software (CommunityViz).
- c. A set of highway and transit projects that was consistent across jurisdictional boundaries was developed and refined through MPO and partner cooperation.
- d. Forecasts of travel entering and leaving the modeled area were updated to reflect the most recent traffic count data and a special study conducted for I-95; the updates were developed in consultation between the model service bureau, the MPOs, NCDOT, FHWA, DENR and other partners.

This collection of socioeconomic data, highway and transit networks and travel forecast tools and methods, representing the latest planning assumptions, was finalized through the adoption of their respective Transportation Plans by the MPOs. Additional detail on planning assumptions is available in the MPO Transportation Plan documents.

3.4 Future year roadway projects

Roadway improvements used for conformity modeling were developed in the Transportation Plan process in each MPO. Outside of the MPO boundaries, TIP projects from the 2018-2027 TIP served

as the future year roadway projects. For the MPO Transportation Plans, lists of projects were developed based on congestion and identified local needs. Improvements were coded into the TRM and analyzed. The final 2013 (modelling base year), 2025, 2035, and 2045 networks are fiscally constrained. Projects were added from MPO priority lists until estimated project costs equaled available funding. The base network (2013) and the three future networks (2025, 2035, and 2045) used for the conformity determination were the same as the networks used for the MPO Transportation Plans. 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.

Project details, including the proposed number of lanes, distance and air quality analysis year are listed in Appendix D, color-coded by MPO and grouped by analysis year.

The interagency partners also jointly developed lists of regionally significant and exempt projects. The checklist below was used to identify regionally significant projects. After the MPOs, RPOs and NCDOT generated initial lists, the lists were reviewed by DEQ, EPA, FTA and FHWA.

Regionally Significant Project Checklist

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.
4. The facility is included in the travel model for the region (in many cases collector streets are modeled and not regionally significant).

To be regionally significant a facility should meet one or more criteria. 40 CFR Part 93.101

3.5 Transit networks

Each MPO developed transit projects for its Plan. 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 and county plans, local bus system short range plans, and corridor transit plans. The MPOs and NCDOT rectified any initial timing or project characteristic inconsistencies where transit projects crossed jurisdictional boundaries.

3.6 Congestion Mitigation/Air Quality (CMAQ) Projects

The NC DOT 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 is allocated to projects serving more than one non-attainment or maintenance area on a competitive basis.

4. Regional Emission 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 DEQ.

All parts of the Triangle Ozone Maintenance Area under the 8-hour standard have emissions budgets. Table 2 shows what parts are covered by the Triangle Regional Model (TRM) and how each part was analyzed for each pollutant in each comparison year.

Four counties in the maintenance area are completely within the Triangle Regional travel demand Model (TRM) boundary: Durham, Orange, Wake and the four townships in Chatham County that are covered by the maintenance area. The other 4 counties, Granville, Franklin, Johnston and Person, have parts that are within the modeled area and parts that are outside of the modeled area.

4.0.1. *Sub-area emission budgets*

Each county or, in the case of Chatham County, county portion, have NO_x emission budgets. These Motor Vehicle Emission Budgets were used in performing the emissions analysis.

4.0.2 *Emissions analysis source*

Vehicle Miles of Travel (VMT) and speeds for the emissions analysis were derived from the TRM where it is available. VMT and speeds for the portions of Franklin, Granville, Person and Johnston Counties outside the modeled area came from the NCDOT non-modeled area analysis spreadsheet factored by the percentage of each county's population in the rural area, a method that has been used in prior analyses.

4.0.3 *Emissions comparison years (ozone)*

For affected *areas with budgets under the 8-hour standard* (Durham, Franklin, Granville, Johnston, Orange, Person and Wake Counties and the four townships in Chatham County), emissions must be analyzed for years where there is an 8-hour emissions budget, the attainment year (if a region is in non-attainment), the horizon year and intermediate years such that intervals do not exceed 10 years. The Triangle area is currently an attainment maintenance area, so no attainment year analysis is required. The following years were analyzed to meet the requirements: 2017 (8-hour budget year), 2025 and 2035 (intermediate years), 2040 (horizon year for BG MPO) and 2045 (MTP horizon year for DCHC MPO and CAMPO).

All analyzed years were modeled; interpolation was not used in the analysis. In accordance with 40 CFR 93.118, since there was no budget for the required analysis years 2025, 2035 and 2045, the 2017 budgets were used for these years.

Table 2. Triangle Area Transportation Conformity Analysis Matrix (2045 MTPs)

County	Area model status	Area emissions budget status	Emissions analysis source	Emissions comparison years			
				2025	2035	2040 ²	2045
Person	modeled area	emissions budget	TRM	O3	O3	O3	O3
	rural area	emissions budget	NMAA (factored) ¹	O3	O3	O3	O3
Granville	modeled area	emissions budget	TRM	O3	O3	O3	O3
	rural area	emissions budget	NMAA (factored) ¹	O3	O3	O3	O3
Franklin	modeled area	emissions budget	TRM	O3	O3	O3	O3
	rural area	emissions budget	NMAA (factored) ¹	O3	O3	O3	O3
Johnston	modeled area	emissions budget	TRM	O3	O3	O3	O3
	rural area	emissions budget	NMAA (factored) ¹	O3	O3	O3	O3
Chatham (part)	modeled (all)	emissions budget	TRM	O3	O3	O3	O3
Orange	modeled (all)	emissions budget	TRM	O3	O3	O3	O3
Durham	modeled (all)	emissions budget	TRM	O3	O3	O3	O3
Wake	modeled (all)	emissions budget	TRM	O3	O3	O3	O3

TRM: Triangle Regional Model NMAA: Non-Modeled Area Analysis O3: Ozone

¹ where part of a county is covered by the regional model, the remainder of the county was analyzed using the NCDOT rural spreadsheet, factored by the percentage of county’s population that lives outside of the modeled area.

² 2040 is modeled since it is the horizon year for the Burlington-Graham MPO Metropolitan Transportation Plan.

4.1 Emissions Model

MOVES 2014a was used to develop the emissions; the region has existing MOVES-based MVEBs. Motor vehicle emissions controls considered in the model include the following:

Strategy

- I/M Program*
- Tier 2/Tier 3 vehicle 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 the MOVES model*

4.1.1 MOVES Model Settings

A typical summer weekday for NOx was used, with July as the evaluation month. Travel periods were based on VMT and speed data availability from the Triangle Regional Model (TRM) and Non-Modeled Area Analysis (NMAA), processed according to USEPA guidance to generate hourly speed and VMT distribution data in the required MOVES input formats. Gasoline Reid Vapor Pressure was 9.0 psi for all counties. The following inspection/maintenance (I/M) program parameters were applied to applicable counties: compliance rate = 96%, waiver rate = 5% with an exemption for vehicles from the 3-year latest model years. I/M program does not apply to Person County.

4.1.2 Source Type (Vehicle Type) Population and Age Distributions, and VMT Mix

The 13 MOVES vehicle categories were used for the analysis. Vehicle population estimates were developed for each future modeling year based on the latest available 2016 vehicle registration data provided by NCDOT. This data includes the total number of registered vehicles by county, divided into nine source type categories. The data was first reorganized into thirteen source type categories (i.e. passenger cars, light commercial trucks, combination long-haul trucks, etc.) as required for MOVES2014a. These source type population estimates were projected for each required modeling year, using the same base and future year-county human population data that were used in the TDM model, according to the following formula:

$$\text{Total Vehicle Population}_{\text{future year}} = \text{Total Vehicle Population}_{\text{base year}} * (\text{Human Population}_{\text{future year}} / \text{Human Population}_{\text{base year}})$$

The latest available 2016 vehicle registration data provided by NCDOT, which also includes a breakdown of the number of vehicles by model year, was 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. For the VMT mix, the statewide mix based on 2016 data was used applying the method in the August 2004 USEPA Guidance.

4.2 Transportation Control Measures

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

4.3 Estimation of Vehicle Starts

A component of the emissions rates for each functional class is an estimate of the start-based emissions. This rate is based on an assumed number of starts per vehicle and is added to running emissions to produce a single rate to apply to vehicle miles traveled. MOVES includes national default rates. However, the use of default rates isn't the best practice for heavily urbanized areas with an updated Travel Demand Model. Area-specific rates were calculated by dividing the total number of trips from the travel demand model by the total number of registered vehicles. This methodology has been previously endorsed by USEPA and has been used in the prior conformity analysis in the Triangle.

4.4 Off-model Analysis

The Triangle Regional Model (TRM) does not include algorithms that can calculate the effects on VMT and speeds (and hence air quality) of certain transportation related activities designed to influence people's travel modes or affect the supply of or demand for transportation services. Two types of activities currently exist in the Triangle that have been shown to significantly affect VMT and speeds and which could be candidates for adjusting emissions results:

- The regional Transportation Demand Management (TDM) program jointly funded by the two MPOs and NCDOT and which covers approximately 10% of the region's workforce,
- Incident management programs conducted on the region's Interstate highways and other freeways in Wake and Durham Counties, including surveillance cameras, the Motorist Assistance Patrols, and traveler information activities.

In order to accurately account for the impacts of such activities, they can be reflected through “off-model” analyses. Although these and other programs are suitable for off-model analysis, this conformity determination did not include any off-model analyses, although it may be appropriate to include them in future conformity determinations. FHWA Region IV’s *Off-Model Air Quality Analysis: A Compendium of Practice* provides guidance on estimating these emissions effects.

4.5 Emissions Comparison Tests by Location and Pollutant

USEPA originally declared Durham County, Wake County and Dutchville Township in Granville County non-attainment under the 1-hour standard for ozone (O₃) and Durham County and Wake County non-attainment for Carbon Monoxide (CO) on November 15, 1990. Durham County, Wake County and Dutchville Township were redesignated by USEPA to attainment with a maintenance plan for ozone on June 17, 1994 and Durham County and Wake County were redesignated by USEPA to attainment with a maintenance plan for CO on September 18, 1995.

In 1997 the NAAQS for ozone was reviewed and revised to reflect improved scientific understanding of the health impacts of this pollutant. When the standard was revised in 1997, an eight-hour ozone standard was established. The USEPA designated the entire Triangle area as a “basic” non-attainment area for eight-hour ozone with an effective date of June 15, 2004. The Triangle Area was subsequently redesignated to a Maintenance Area for eight-hour ozone on December 26, 2007.

The current maintenance designation covers the following geographic areas:

- Durham County
- Wake County
- Person County
- Granville County
- Orange County
- Johnston County
- Franklin County
- Baldwin, Center, New Hope and Williams Townships in Chatham County

Both volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) are precursors of ozone. In the most recently approved maintenance plans for ozone for the areas listed above, the North Carolina Department of Environmental Quality (DEQ) prepared emissions budgets for only NO_x, as VOC was deemed insignificant. USEPA approved the most recent emissions budgets on December 26, 2007 with an effective date of the same day. The USEPA approval and promulgation ruling for ozone containing the budgets are in Appendix B.

Three 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 Capital Area MPO within the CAMPO metropolitan area boundary – currently all of Wake County, and portions of Franklin, Granville and Johnston Counties.
- the DCHC MPO within its metropolitan area boundary – all of Durham County and parts of Orange and Chatham counties.
- the Burlington-Graham MPO within its portion of the metropolitan area boundary in western Orange County. NCDOT conducts a regional emissions analysis for the rural areas comprised of those portions of Chatham, Orange, Person, Franklin, Granville and Johnston Counties that remain outside of any MPO metropolitan area boundary.

For this report, emissions were calculated and reported at the County level, or for part of a county if only a part is in the maintenance area (Chatham County). Table 3 summarizes the emissions test used and decision-making responsibility for conformity findings in each County.

Table 3. Emissions Test and Responsibility for Conformity Findings

Location	Pollutant(s)	Emissions Test	Conformity Finding Responsibility
Wake County	O3	budget	Capital Area MPO
Durham County	O3	budget	Durham-Chapel Hill-Carrboro MPO
Johnston County	O3	budget	Capital Area MPO NC DOT - conducts regional emissions analysis (consultation with Upper Coastal Plain RPO)
Chatham County (<i>Baldwin, Center, New Hope, Williams Townships</i>)	O3	budget	Durham-Chapel Hill-Carrboro MPO NC DOT - conducts regional emissions analysis (consultation with Triangle Area RPO)
Granville County	O3	budget	Capital Area MPO NC DOT - conducts regional emissions analysis (consultation with Kerr-Tar RPO)
Orange County	O3	budget	Durham-Chapel Hill-Carrboro MPO Burlington-Graham MPO NC DOT - conducts regional emissions analysis (consultation with Triangle Area RPO)
Person County	O3	budget	NC DOT - conducts regional emissions analysis (consultation with Kerr-Tar RPO)
Franklin County	O3	budget	Capital Area MPO NC DOT - conducts regional emissions analysis (consultation with Kerr-Tar RPO)

The results of the emission comparisons are summarized by County in Tables 4 through 11. Detailed emissions analysis results by county are contained in Appendix H.

Emissions from vehicles are expected to show decreases during the earlier analysis years, even with continuing increases in vehicle miles of travel (VMT), for several reasons:

- Fleet turnover. Older, more polluting vehicles (gasoline and diesels) continue to be retired and replaced with newer, cleaner vehicles.
- Newer vehicles have gotten cleaner with each model year. The most recent Federal tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all

classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. For more detail, including phase-in by vehicle type, see USEPA's Tier 2 Vehicle Standard Final Rule at: www.epa.gov/otaq/regs/ld-hwy/tier-2/finalrule.htm

- Gasoline fuels are improving. Refiners and importers of gasoline were required to meet stricter sulfur content requirements by 2006. Low sulfur gasoline enables better emission controls, and can lead to further emission reductions from today's catalyst-equipped fleet. See USEPA's Gasoline Sulfur Program Final Rule at: www.epa.gov/otaq/regs/ld-hwy/tier-2/finalrule.htm
- Emissions from heavy-duty on-highway vehicles are expected to decrease due to USEPA's Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements. Stricter NO_x emission standards were phased in between 2007 and 2010 for diesel engines. New standards for on-road diesel fuel (15 ppm sulfur content) were phased in at the terminal level by July 15, 2006 and at the retail stations by September 1, 2006. See: <http://www.epa.gov/otaq/diesel.htm#hd2007>

The combination of the technology/fuel improvements/vehicle maintenance and resulting emission reductions exceeds the effect of increased VMT in the Triangle area in the earlier analysis years. The trend in the Triangle area is not uncommon. On a national level this trend is also seen in data gathered by the Federal Highway Administration (FHWA). For additional detail, see the FHWA web site on vehicle miles traveled and vehicle emissions at: <http://www.fhwa.dot.gov/environment/vmtems.htm>

Table 4. Durham County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ²	12,610	2,354
2035 ³	12,610	1,296
2040 ⁴	12,610	1,226
2045 ⁴	12,610	1,261

Table 5. Wake County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ²	38,441	6,538
2035 ³	38,441	3,966
2040 ⁴	38,441	3,848
2045 ⁴	38,441	4,052

Table 6. Granville County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ²	3,278	1,312
2035 ³	3,278	734
2040 ⁴	3,278	691
2045 ⁴	3,278	700

Table 7. Franklin County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ³	2,645	634
2035 ³	2,645	265
2040 ⁴	2,645	233
2045 ⁴	2,645	231

Table 8. Johnston County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ³	11,838	3,325
2035 ³	11,838	2,178
2040 ⁴	11,838	2,114
2045 ⁴	11,838	2,180

Table 9. Orange County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ³	7,364	2,345
2035 ³	7,364	1,457
2040 ⁴	7,364	1,414
2045 ⁴	7,364	1,448

Table 10. Person County Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ³	1,674	531
2035 ³	1,674	195
2040 ⁴	1,674	161
2045 ⁴	1,674	154

Table 11. Chatham County (part) Emissions Comparison Summary (kg/day)

Year	NO _x	
	SIP Budgets	Metropolitan Transportation Plan or TIP Emissions
2025 ³	2,112	712
2035 ³	2,112	317
2040 ⁴	2,112	280
2045 ⁴	2,112	286

1. To obtain kilograms per day, multiply tons per day by 907.18
2. Budget year 3. MTP interim year 4. MTP Horizon year

5. Public Involvement and Interagency Consultation

The Transportation Plan is consistent with consultation requirements discussed in *40 CFR 93.105*. Interagency consultation was a cooperative effort on the part of the Capital Area MPO, the Durham-Chapel Hill-Carrboro MPO, the Burlington-Graham MPO, the North Carolina Department of Transportation and the Federal Highway Administration. The process was administered by the Triangle J Council of Governments on behalf of the partners and an interagency consultation meeting was held on June 18, 2018. The discussion summary is included in Appendix C.

Public review of this report is being handled in accordance with each MPO’s public participation policy. A copy of the public participation policies are available for review. Comments from the public participation process are incorporated into the final Conformity Analysis and Determination Report. Those comments are included in Appendix F 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 transportation plans and TIPs are less than the emissions budgets established in the SIP.

Table 12: Summary of Conformity Status of Triangle Transportation Plans

Criteria (√ indicates the criterion is met)	Burlington-Graham MPO 2040 MTP & 2018-27 TIP*	Durham-Chapel Hill-Carrboro MPO 2045 MTP & 2018-27 TIP*	Capital Area MPO 2045 MTP & 2018-27 TIP*	Rural (Donut) Area of the Triangle 2018-27 STIP
Less Than Emissions Budgets	√	√	√	√
TCM Implementation	The NC SIP includes no Transportation Control Measures in the Triangle Area			
Interagency Consultation	√	√	√	√
Latest Emissions Model	√	√	√	√
Latest Planning Assumptions	√	√	√	√
Fiscal Constraint	√	√	√	√

* The 2018-27 TIPs are direct subsets of the 2045 MTPs (2040 MTP for Burlington-Graham MPO)

Specific conformity findings for each of these areas are listed below:

Burlington-Graham MPO Ozone Conformity Finding for the 2040 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program

Based on the analysis and consultation and involvement processes described in this report, the Burlington-Graham 2040 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program are found to conform to the purpose of the North Carolina State Implementation Plan. The emissions expected from the implementation of the Burlington-Graham 2018-27 Transportation Improvement Program are in conformity with the 8-hour ozone standard.

Capital Area MPO Ozone and Carbon Monoxide Conformity Finding for the 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program

Based on the analysis and consultation and involvement processes described in this report, the Capital Area MPO 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program are found to conform to the purpose of the North Carolina State Implementation Plan. The emissions expected from the implementation of the Capital Area MPO 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program are less than the applicable budgets for NO_x; therefore the MTP and TIP are in conformity with the 8-hour ozone standard.

Durham-Chapel Hill-Carrboro MPO Ozone and Carbon Monoxide Conformity Finding for the 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program

Based on the analysis and consultation and involvement processes described in this report, the Durham-Chapel Hill-Carrboro MPO 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program are found to conform to the purpose of the North Carolina State Implementation Plan. The emissions expected from the implementation of the Durham-Chapel Hill-Carrboro MPO 2045 Metropolitan Transportation Plan and 2018-2027 Transportation Improvement Program are less than the applicable budgets for NO_x; therefore the MTP and TIP are in conformity with the 8-hour ozone standard.

NCDOT Triangle Rural (Donut) Area Ozone Conformity Finding for the 2018-2027 State Transportation Improvement Program

Based on the analysis and consultation and involvement processes described in this report, the 2018-2027 State Transportation Improvement Programs for the rural areas of counties in the Triangle that are outside of the MPO boundaries are found to conform to the purpose of the North Carolina State Implementation Plan. The emissions expected from the implementation of the 2018-2027 State Transportation Improvement Program are less than the applicable budgets for NO_x in the SIP; therefore the TIP is in conformity with the 8-hour ozone standard.