

# Air Quality Trends and Environmental Mitigation

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**TABLE C-1 | POTENTIAL MITIGATION STRATEGIES**

ENVIRONMENTAL FEATURE	POTENTIAL MITIGATION STRATEGY
Archaeological	Conduct archaeological excavations to ensure artifacts are not lost
	Realign and/or relocate the project to avoid the affected resource
Community Impacts	Construct a bridge to help maintain community cohesiveness
	Construct sidewalks and bike lanes
	Install traffic calming devices
	Construct sound barriers
Farmland	Work with local land conservancies or the North Carolina Agricultural Department
	Farmland Preservation Trust Fund to determine ways to preserve the resource
Fragmented Animal Habitats	Build overpasses with vegetation or underpasses to allow animals to cross safely
	Realign and/or relocate projects to avoid impacted habitats
Historic Sites	Realign and/or relocate the project to avoid the affected site
	Install landscaping to reduce visual impacts
	Relocation
Noise	Erect noise barriers
	Depress the facility
	Install landscaping to reduce impacts
Threatened and Endangered Species	Realign and/or relocate the project to avoid the affected species
	Enhance or restore degraded habitat
	Create new, off-site habitats
Stream and Lake Buffers	Re-vegetate disturbed areas with native planting
	Ensure diffuse stormwater flow provided through the buffer from storm drain pipes
	Install stormwater treatment structures as mitigation either on-site or off-site
	Pay impact fees to jurisdictions

**TABLE C-2 | STORMWATER MANAGEMENT PRACTICES**

WATER QUALITY RESOURCES	PARTICIPATING JURISDICTIONS IN CRTPO PLANNING AREA	MAJOR REQUIREMENTS
Goose Creek Watershed Site Specific Water Quality Management Program (SSWQMP)	Union County	Best Management Practices (BMPs) and buffer requirements
	Charlotte	
	Mint Hill	
Catawba River Riparian Buffer Rules	Mecklenburg County	Buffers: 50 ft. along Catawba River
	Iredell County	
	Charlotte	
	Cornelius	
	Davidson	
	Huntersville	
Watershed Rules	Mecklenburg County	BMPs, buffers and built-upon area (BUA) caps
	Iredell County	
	Union County	
	Charlotte	
	Cornelius	
	Davidson	
	Huntersville	
	Indian Trail	
	Monroe	
	Troutman	
Post-Construction	Mecklenburg County	BMPs
	Iredell County	
	Union County	
	Charlotte	
	Cornelius	
	Davidson	
	Indian Trail	
	Lake Park	
	Matthews	
	Mint Hill	
	Monroe	
	Mooresville	
	Pineville	
	Stallings	
	Statesville	
Troutman		

Source: Mecklenburg County Water Quality Program; Union County Public Works; Iredell Soil and Water Conservation District (SWCD)

**TABLE C-2 | STORMWATER MANAGEMENT PRACTICES (CONTINUED)**

WATER QUALITY RESOURCES	PARTICIPATING JURISDICTIONS IN CRTPO PLANNING AREA	MAJOR REQUIREMENTS
Low Impact Development (LID) / Post-Construction	Huntersville	BMPs and buffers
Charlotte-Mecklenburg Stormwater Regulations Program	Charlotte	Soil Erosion and Sedimentation Control Ordinances
	Cornelius	Post-Construction Stormwater Control Ordinances
	Davidson	Surface Water Improvement and Management (SWIM) Ordinances
	Huntersville	Watershed Supply Watersheds Ordinances
	Matthews	Floodplain Regulations
	Mint Hill	Stormwater Pollution Control Ordinances
	Pineville	
	Mecklenburg County	

**Other Resources:**

- Iredell County Best Management Practices
- Iredell Soil and Water Conservation District
- Mecklenburg County Water Quality Program
- Union County Development Ordinance
- Union County Public Works
- Union County Stormwater and Floodplain

Sources:

- <http://charlottenc.gov/StormWater/SurfaceWaterQuality/Pages/default.aspx>
- <http://www.co.union.nc.us/departments/public-works>
- [http://www.co.union.nc.us/application/files/8515/2000/1643/UDOWWithAmendments\\_through\\_1-16-2018.pdf](http://www.co.union.nc.us/application/files/8515/2000/1643/UDOWWithAmendments_through_1-16-2018.pdf)
- <http://www.co.iredell.nc.us/302/Soil-Water-Conservation-District>
- <http://charlottenc.gov/StormWater/Regulations/Pages/default.aspx>
- <https://www.co.iredell.nc.us/271/Best-Management-Practices>
- <http://www.co.union.nc.us/departments/planning-building-development/stormwater>

**TABLE C-3 | CONNECT OUR FUTURE RESOURCES**

AIR QUALITY IMPROVEMENT STRATEGY	RESOURCES
Growth Management and Cooperation	Lincoln Institute of Land Policy
	UNC Charlotte Urban Institute
	Municipal Research and Services Center
Green Infrastructure	EPA: Green Infrastructure
	EPA: Low Impact Development
	Green Infrastructure Center
	The Trust for Public Land (TPL): Greenprinting
	United Nations’ Green Infrastructure Guide for Water Management
	Agricultural Development and Farmland Preservation Trust Fund
	Clean Water Management Trust Fund
	Natural Heritage Trust Fund (repealed in 2013)
	Parks and Recreation Trust Fund
Indoor Air Quality Improvement	USGBC Indoor Air Quality Best Management Practices (LEED)
	Healthy School Environment Resources
	Siting of School Facilities
	The Framework for Effective School IAQ Management: Six Key Drivers of Success
	Green Building EPA Region 4: Henry Slack at (404) 562-9143 or henry@epa.gov.
	EPA’s Building Air Quality guidance (BAQ)
	US Consumer Product Safety Commission Indoor Air Quality
	Energy Savings Plus Health (EPA)
	I-BEAM
	EPA Care For Your Air
Regional GIS Data Center	North Carolina One Map
	One Map Implementation Plan
	North Carolina Geographic Information Coordinating Council
	South Carolina Geographic Information Systems
	Federal Geographic Data Committee
	GeoMAPP Geospatial Multistate Archive and Preservation Partnership
	ESRI
	Urban and Regional Information Systems Association (URISA)

**TABLE C-3 | CONNECT OUR FUTURE RESOURCES (CONTINUED)**

AIR QUALITY IMPROVEMENT STRATEGY	RESOURCES
Stormwater Best Management Practices	Stormwater Management – U.S. EPA
	Stormwater Management – Philadelphia Water Department
	EPA’s National Stormwater Calculator (SWC)
	Connect Our Future – Regional Scan Document
	Sample Local Law for Stormwater Management and Erosion & Sediment Control
	Map of green infrastructure projects in North Carolina
	North Carolina Clean Water State Revolving Fund (CWSRF)
	South Carolina State Revolving Fund
	Low Impact Development - A Guidebook for North Carolina (NC State University, 2009)
Tree Canopy Preservation	US Conference of Mayors. “Protecting and Developing the Urban Tree Canopy.”
	American Forests
	Tree City USA
	Trees Charlotte
Inventory of Local Sustainability Policies and Programs	Municipality Policies Summary
	CONNECT Our Future – Climate Change Planning Assessment
Freight Transportation Planning	FHWA Freight and Land Use Handbook (2012)
	The Innovative MPO – A Guidebook for Metropolitan Transportation Planning (Transportation for America)
	National Cooperative Freight Research Program (NCFRP) Synthesis of Freight Research in Urban Transportation Planning
Transportation Demand Management	CONNECT our Future, Regional Scan Document, 2013
	Employee Trip Reduction Resource Book – San Joaquin Valley, Air Pollution Control District
	Commute Connection – Links employers and commuters to incentives and programs
	Triangle COG Transportation Demand Management Program
	North Carolina DOT Travel Demand Management Program
Idling Reduction	US Department of Energy, Idling is not the way to go
	IdleBox Toolkit for Idle-Reduction Projects
	School Bus Idling Restrictions (NC)
	Centralina Clean Fuels Coalition C. Division of Air Quality, Idle Reduction

**TABLE C-3 | CONNECT OUR FUTURE RESOURCES (CONTINUED)**

AIR QUALITY IMPROVEMENT STRATEGY	RESOURCES
Energy Efficient Residential Practices and Funding	NEPDEER Report
	US Department of Energy Residential Buildings Integration
	Include “practices” resources written for consumers or at a consumer level...will be very helpful for local governments or others wanting to promote home energy efficiency
	Financial Incentives for North Carolina
	Financial Incentives for South Carolina
	North Carolina Energy Efficiency Alliance
	Federal Tax Credits for Energy Efficiency
	<a href="http://www.usgbc.org/advocacy/campaigns/greening-mls">http://www.usgbc.org/advocacy/campaigns/greening-mls</a>
	Home Energy Audits
	Home Energy Rating System (HERS) Index
	Energy Star
Health Impact Assessments	APA, Planning for Healthy Places with Health Impact Assessments
	A Health Impact Assessment Toolkit: A Handbook to Conducting HIA
	Centers for Disease Control and Prevention, Healthy Places
	Health Impact Assessments in North Carolina: Promoting Public Health Through Informed Decisions
	Health Impact Assessment (HIA) of Proposed “Road Diet” and Re-Stripping Project on Daniel Morgan Avenue in Spartanburg, South Carolina.
	A Health Impact Assessment (HIA) of Park, Trail, and Green Space Planning in the West Side of Greenville, South Carolina.
	Andrew Dannenberg, Howard Frumkin, and Richard J. Jackson. Making Healthy Places: A Built Environment for Health, Well Being and Sustainability , 2011; ISBN-13:978-1-59726-726-7 (Book): 417 pages
Land Use Modeling	US Environmental Protection Agency
	Consortium for Atlantic Regional Assessment
	Imagine Austin
	Connections 2040
	Transportation/Land Use Modeling, “The Geography of Transport Systems”

**TABLE C-3 | CONNECT OUR FUTURE RESOURCES (CONTINUED)**

AIR QUALITY IMPROVEMENT STRATEGY	RESOURCES
Active Living	Active Living by Design
	Let's Move! Cities, Towns and Counties Guide, National League of Cities
	Let's Move!
	Healthy Eating Active Living Cities Campaign, Oregon Public Health Institute
	Partners for Active Living, Spartanburg, SC
	Eat Smart Move More SC Health + Planning Toolkit
	A Healthy Community = A Strong Local Economy
Preserving and Building Parks	City Parks Alliance
	The Official Guide to Tactical Urbanism
	Measuring the Economic Value of a City park System
Fare-Free Transit Service	Implementation and outcomes of Fare-Free Transit Systems
	How Free Transit Works in the United States
	American Public Transportation Association
	NCDOT Division of Public Transportation
	SCDOT Office of Public Transit
	FTA Rural Transit Assistance Program
	FTA Formula Grants for Other than Urbanized Areas Volunteer Transportation Services (VTS)
Wayfinding For Trails and Transit (Active Wayfinding)	Active Living Research
	Aetna Foundation – Regional Grants
	Let's Move! Cities, Towns and Counties Guide, National League of Cities
	Let's Move!
	The League of American Bicyclists The Signage Foundation
Alternative Fuels and Energy Efficient Vehicles	CONNECT Climate Change Planning Assessment (link to Air Quality WG Report)
	Multi-Alternative Fueling Station Feasibility Study
	Clean Air Carolina
	Centralina Clean Fuels Coalition
	NC Clean Energy Technology Center EPA Green Vehicle Guide
Complete Streets	Introduction to Complete Streets Presentation, Smart Growth America
	Complete Streets: Best Policy and Implementation Practices, American Planning Association
	Complete Streets Resource Toolkit, SACOG and Complete Streets Coalition



**TABLE C-3 | CONNECT OUR FUTURE RESOURCES (CONTINUED)**

AIR QUALITY IMPROVEMENT STRATEGY	RESOURCES
Clean Construction Assessment	CONNECT Diesel Construction Equipment Emissions Assessment Tool
	CONNECT Diesel/Black Carbon Technical Assessment and Feasibility Study
	National Clean Diesel Campaign
	Congestion Mitigation and Air Quality Improvement Program
	Grants to Replace Aging Diesel Engines (GRADE), Administered by Mecklenburg County
	Green Roads Rating System
	The Southeast Diesel Collaborative
	CleanDieselClearinghouse
	LEED
Energy Management Plans for Public Buildings	CONNECT Local Government & Public Site Renewable Energy Blueprint
	American Council for an Energy-Efficient Economy
	DSIRE database (funded by the US DOE and maintained by the NC Clean Energy Technology Center)
	North Carolina Performance Standards for Sustainable, Energy-Efficient Public Buildings (NC S 668 (2007) (Revised by NC S 1946, 2008)
	South Carolina Energy Office

Source: <http://www.connectourfuture.org/improve-air-quality/>

**TABLE C-4 | RESOURCE AGENCY CONSULTATION STAKEHOLDERS**

AGENCY	CONTACT	CONTACT TITLE
<b>NON-GOVERNMENT AGENCIES</b>		
Clean Air Carolina	June Blotnick	Executive Director
Sierra Club-Central Piedmont	George Pfeffer	Group Chair
Sierra Club-Central Piedmont	Roger Diedrich	Group & NC Chapter Transportation Chair
Catawba Riverkeeper	Emilee Syrewicze	Executive Director
Southern Environmental Law Center-NC Office	Kym Hunter	Staff Attorney
Catawba Lands Conservancy	Tom Okel	Executive Director
Davidson Lands Conservancy	Autumn Rierson Michael	Executive Director
Carolina Thread Trail	Tom Okel	Executive Director
Sustain Charlotte	Shannon Binns	Executive Director
NC Wildlife Federation	Ernie McLaney	Chapter President
<b>HISTORIC PRESERVATION-LOCAL</b>		
Davidson Historic Preservation Commission	Jason Burdette	Planning Manager, Town of Davidson
Charlotte-Mecklenburg Historic Landmarks Commission	Stewart Gray	Preservation Planner
Monroe Historic District Commission	Doug Britt	Senior Planner
Charlotte Historic District Commission	John Howard	Administrator
Cornelius Historic Preservation Commission	Becky Partin	Communications Specialist
Union County Historic Preservation Commission	Barbara Moore	Chairman
Waxhaw Historic Preservation Commission	Leslie Kellam	Chair
Iredell County Historic Properties Commission	Lewis Alexander	Chairman
Mooresville Historic Preservation Commission	Tim Brown	Senior Planner
Statesville Historic District Commission	Sherry Ashley	Planning Director
<b>MECKLENBURG COUNTY</b>		
Air Quality	Jason Rayfield	Program Manager
Park & Recreation-Greenway Services	Gwen Cook	Division Director
Park & Recreation-Main	Jim Garges	Division Director
Park & Recreation-Planning	W. Lee Jones	Division Director
Park & Recreation-Nature Preserves & Natural Resources	Chris Matthews	Division Director
Mecklenburg Sustainability	Dylan Kirk	Mecklenburg County Sustainability Coordinator
Livable Meck	Marcus Carson	Mecklenburg County Sustainability manager

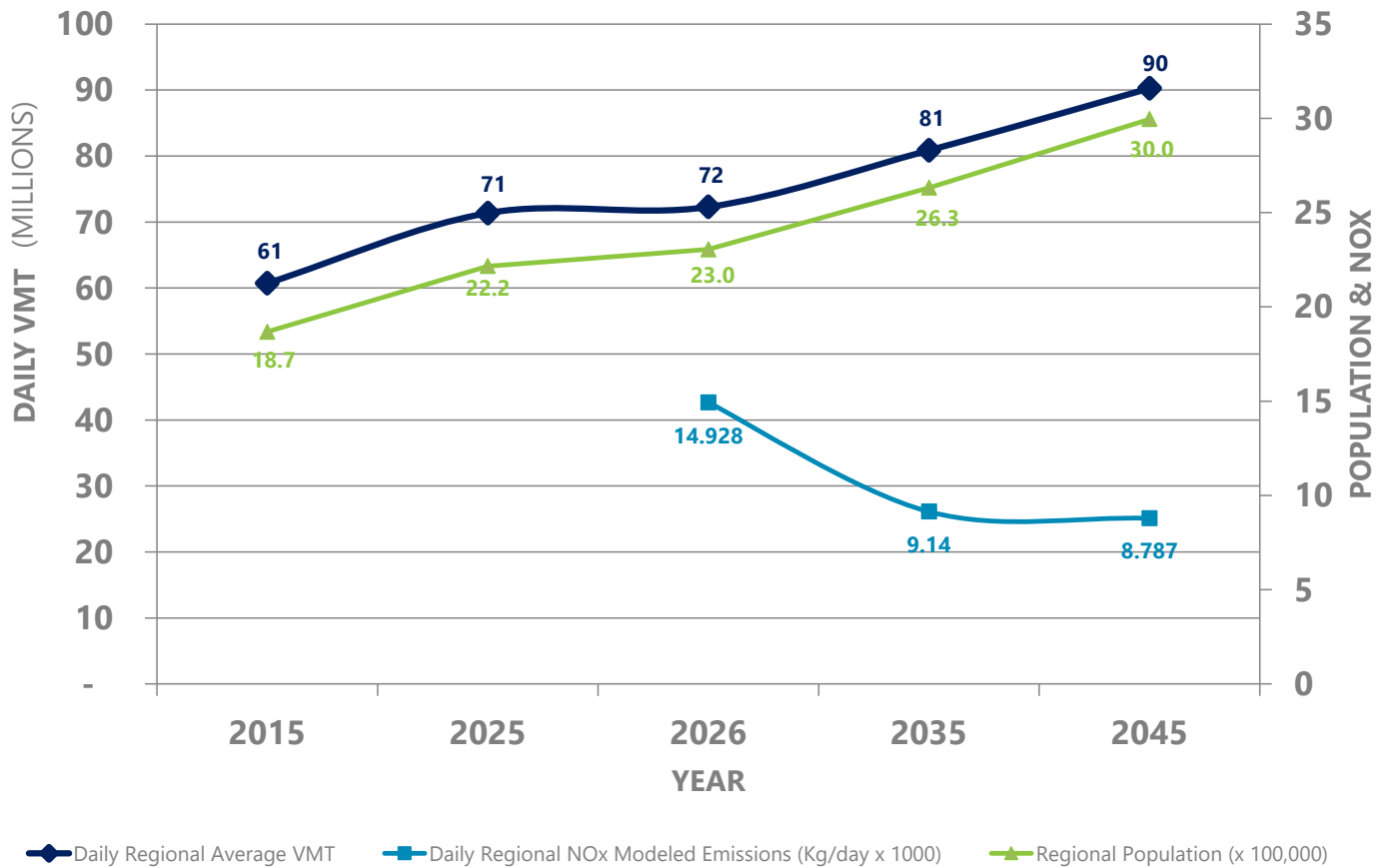
**TABLE C-4 | RESOURCE AGENCY CONSULTATION STAKEHOLDERS (CONTINUED)**

AGENCY	CONTACT	CONTACT TITLE
<b>NORTH CAROLINA</b>		
Regional Air Quality Supervisor	Bruce Ingle	Regional Air Quality Supervisor
Public Water Supply	Britt Setzer	Public Water Supply Section Supervisor
Land Quality	Zahid Kahn	Land Quality Section Supervisor
Inactive Hazardous Sites	George Adams	Environmental Engineer II
Water Quality	Corey Basinger	Water Quality Supervisor
Aquifer Protection	Andrew Pitner	Aquifer Protection Supervisor
Division of Water Quality	John Hennessy	Nonpoint Source Assistance & Oversight Supervisor
Division of Air Quality	Phyllis D. Jones, EIT	Transportation Conformity Engineer, Diesel Emissions Reduction Grant Administrator
Wildlife Resources Commission	Marla Chambers	Western NCDOT Permit Coordinator
Agricultural Development & Farmland Preservation Trust	Dewitt Hardee	Program Director
Division of Community Assistance-Piedmont Office	Darren Rhodes	Chief Planner
Natural Heritage Program	Misty Buchanan	Director
Natural Heritage Program	Suzanne Mason	Conservation Data Manager & NCDOT Project Specialist
Division of Mitigation Services	Tim Baumgartner	Acting Director
Division of Mitigation Services	Anjie Ackerman	Planning Specialist
Clean Water Management Trust Fund	Walter Clark	Executive Director
Clean Water Management Trust Fund-Western Field Office	Damon Hearne	Western Field Representative
Soil & Water Conservation	Ralston James	Area 8 Coordinator
Soil & Water Conservation District	Jim Summers	Department Head
Division of Water Resources	Donna Hood	Economic Analysis Rules Reviewer
NC Sustainable Communities Task Force	Brian Byfield	Program Director

**TABLE C-4 | RESOURCE AGENCY CONSULTATION STAKEHOLDERS (CONTINUED)**

AGENCY	CONTACT	CONTACT TITLE
<b>HISTORIC PRESERVATION</b>		
State Historic Preservation Office	Renee Gledhill-Earley	Environmental Review Coordinator
Office of State Archeology	John J. Mintz	Asst. State Archaeologist
<b>FEDERAL</b>		
Fish & Wildlife Service-Asheville Field Office - Review of FHWA & NCDOT projects	Marella Buncick	
EPA-Region 4 Office of Environmental Responsibility NEPA Program Office	Cynthia F. Van Der Wiele	Senior Environmental Scientist
EPA-Region 4 Wetlands	Todd Bowers	Region 4, Wetlands Regulatory & NCDOT
Army Corps of Engineers - Wetlands & Streams	David Shaeffer	Project Manager - Mecklenburg Co.
Army Corps of Engineers - Wetlands & Streams	Jason Randolph	Regulatory Specialist - Union Co.
Army Corps of Engineers - Wetlands & Streams	Catherine Janiczak	Regulatory Specialist - Iredell Co.
Army Corps of Engineers	Crystal Amschler	Project Manager - Asheville Regulatory Field Office
FHWA	Loretta Barren	Planning & Environmental Specialist (Div 10-12)
FTA - Region 4	Keith Melton	Acting Director, Office of Planning & Program Development

**FIGURE C-1 | PROJECTED TREND OF METROLINA VMT, NOX EMISSIONS, AND POPULATIONS**

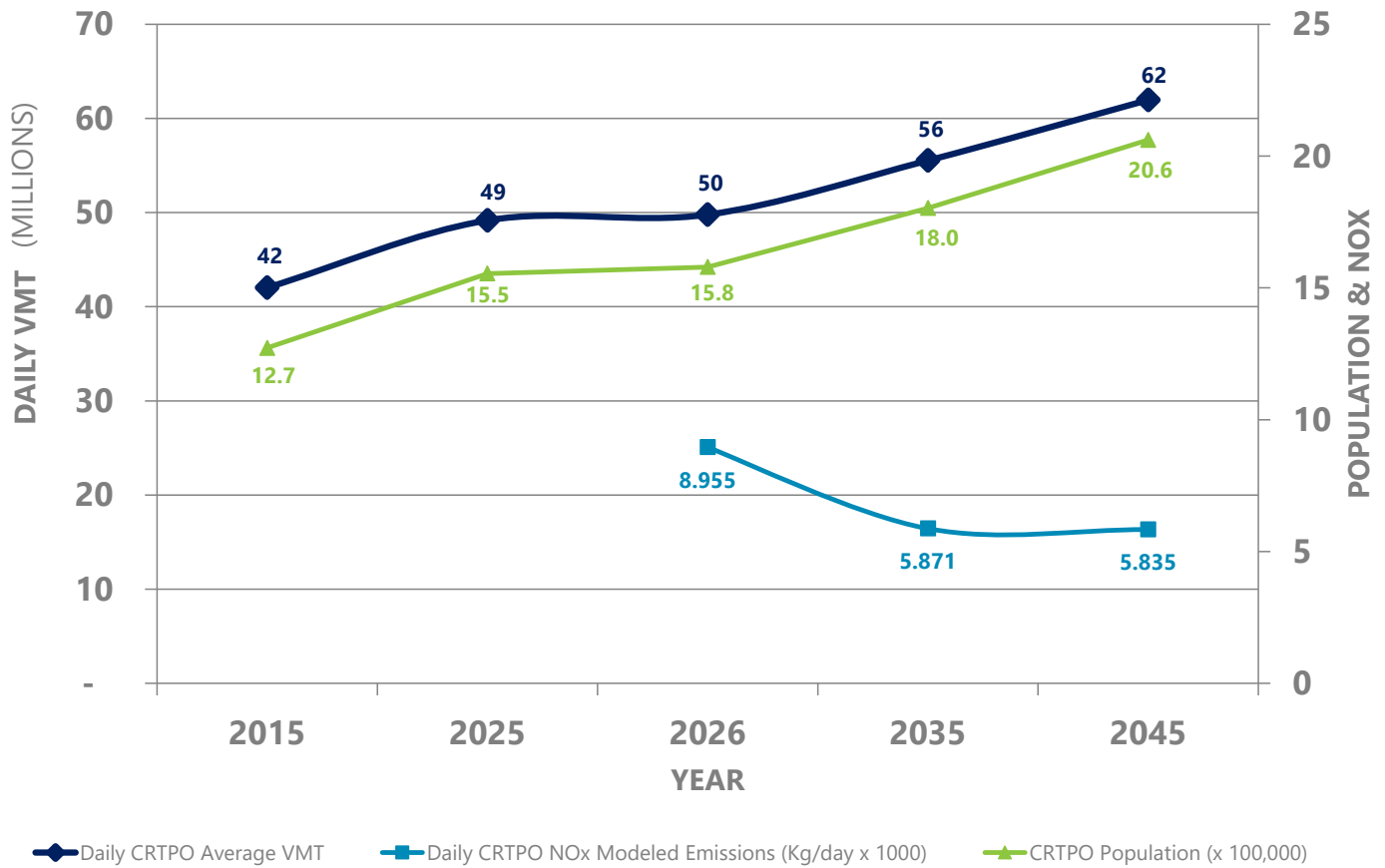


Source: Charlotte Department of Transportation

Ozone emissions have been in a downward trend since 1997, and technological improvements over the past decade have had a positive impact on Oxides of Nitrogen (NOx) emissions. Many new federal and state controls should continue to reduce emissions from autos and light duty trucks, in addition to emissions from heavy-duty diesel vehicles and point sources.

While the region has experienced air quality improvements, it should be noted that by 2045, the emission reductions from technology improvements with equipment designed to reduce formation of ozone precursors such as NOx and volatile organic compounds (VOC) are at risk of being overcome by rapid growth and increases in vehicle miles of travel (VMT). These three trends are shown for the Metrolina region in **Figure C-1**.

**FIGURE C-2 | PROJECTED TREND OF MECKLENBURG COUNTY VMT, NOX EMISSIONS, AND POPULATIONS**



Source: Charlotte Department of Transportation

Figure C-2 displays the same trends as Figure C-1, for Mecklenburg County.

**FIGURE C-3 | METROLINA ANNUAL 4TH HIGHEST OZONE TREND**



Source: Charlotte Department of Transportation

The majority of the CRTPO planning area is classified as maintenance for ozone; however, air quality in the region has steadily improved over the past 30 years for all pollutants, including ozone. **Figure C-3** shows the downward trend of 8-hour ozone from 1997 to 2017.

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