

AIR QUALITY CONFORMITY ANALYSIS FOR THE 2008 AND 2015 8-HOUR OZONE NAAQS

Amended FY2023–2025 Transportation Improvement
Program

And

2050 Regional Transportation Plan – 2023 Update

Cecil County Portion
of the PA-NJ-MD-DE Ozone Non-attainment Area

Final Report

March 2023

SUBMITTED BY

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INTERNATIONAL

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In Conjunction with



Maryland
Department of
the Environment

AIR QUALITY CONFORMITY ANALYSIS

For the 2050 Regional Transportation Plan and the Fiscal Year 2023-2026 Transportation Improvement Program for Cecil County, MD Portion of the PA-NJ-MD-DE 8-Hour Ozone Non-attainment Area

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INTRODUCTION

This report demonstrates transportation conformity of the Wilmington Area Planning Council's (WILMAPCO) Fiscal Year (FY) 2023-2026 Transportation Improvement Program (TIP) and 2050 Regional Transportation Plan (RTP) for the Cecil County, Maryland portion of the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE non-attainment area under the 2008 and 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS).

WILMAPCO is the Metropolitan Planning Organization (MPO) for New Castle County, Delaware and Cecil County, Maryland. It is designated by the governors of both states to plan for, coordinate, and program the many transportation investments in the region. Under federal law and regulation, all plans and programs that involve federal funds or are of regional significance must be reviewed and approved through WILMAPCO.

WILMAPCO is responsible for developing a Transportation Improvement Program (TIP) and a Regional Transportation Plan (RTP) in cooperation with the Maryland Department of Transportation (MDOT), the Delaware Department of Transportation (DelDOT) and affected transit operators. In accordance with federal planning requirements, a collaborative process has been developed wherein state, county, and local governments and transportation providers are partners in the planning and programming process.

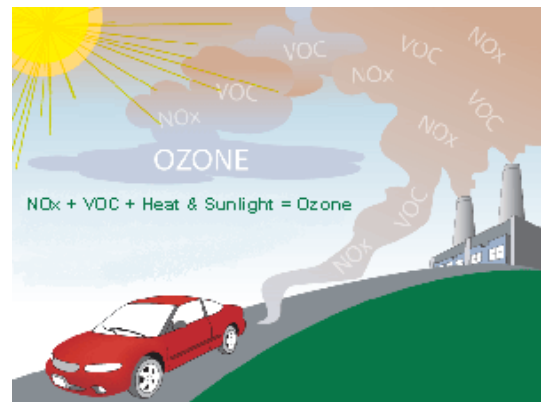
As the federally-designated MPO for New Castle County, DE and Cecil County, MD, WILMAPCO is required by law to demonstrate that the RTP and TIP conform to the transportation emission budgets set forth in the Statewide Implementation Plan (SIP) for each state. If emissions generated from the projects programmed in the TIP and RTP are equal to or less than the emission budgets in the SIPs, then conformity has been demonstrated.

8-hour Ozone Background

Ozone is an odorless, colorless, gas and is created by a reaction between Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOC) in the presence of sunlight. While ozone in the stratosphere forms a protective layer, shielding the earth from the sun's harmful rays, ground level ozone is a key contributor to smog. Motor vehicle exhaust, industrial emissions, gasoline vapors, chemical solvents, and natural sources all contribute to NO_x and VOC emissions. Since ozone is formed in the presence of heat and sunlight, it is considered a summertime pollutant.

The health effects of ozone vary. Ozone can irritate lung airways and cause inflammation similar to sunburn. Other symptoms include wheezing, coughing, and pain when taking a deep breath and breathing difficulties during exercise or outdoor activities. People with respiratory problems, children, and the elderly are most vulnerable, but even healthy people that are active outdoors can be affected when ozone levels are high. Even at very low levels, ground-level ozone triggers a variety of health problems including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses such as pneumonia and bronchitis.

In addition to adverse health effects, ground-level ozone also interferes with the ability of plants to produce and store food, which makes them more susceptible to disease, insects, other pollutants, and harsh weather. Furthermore, ozone damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas.



8-Hour Ozone National Ambient Air Quality Standards (NAAQS)

1997, 2008 and 2015 NAAQS

The EPA published the 1997 8-hour ozone NAAQS on July 18, 1997 (62 FR 38856), with an effective date of September 16, 1997. An area was in non-attainment of the 1997 8-hour ozone NAAQS if the 3-year average of the individual fourth highest air quality monitor readings, averaged over 8 hours throughout the day, exceeded the NAAQS of 0.08 parts per million (ppm). On May 21, 2013, the EPA published a rule revoking the 1997 8-hour ozone NAAQS, for the purposes of transportation conformity, effective one year after the effective date of the 2008 8-hour ozone NAAQS area designations (77 FR 30160). As of July 20, 2013, Cecil County no longer needs to demonstrate conformity to the 1997 8-hour ozone NAAQS.

The EPA published a final rule (77 FR 65488), which became effective on November 28, 2012, approving the attainment demonstration for the 1997 8-hour ozone NAAQS for the Maryland portion of the non-attainment area. The same ruling found adequate the 2009 motor vehicle emission budgets (MVEBs) associated with the attainment demonstration. Since the area was designated as marginal under the 2008 ozone standards, new MVEBs are not required and the previously approved, 2009 MVEBs must be used for conformity purposes.

The EPA published the 2008 8-hour ozone NAAQS on March 27, 2008 (73 FR 16436), with an effective date of May 27, 2008. EPA revised the ozone NAAQS by strengthening the standard to 0.075 ppm. Thus, an area is in non-attainment of the 2008 8-hour ozone NAAQS if the 3-year average of the individual fourth highest air quality monitor readings, averaged over 8 hours throughout the day, exceeds the NAAQS of 0.075 ppm. On May 21, 2012, the Environmental Protection Agency (EPA) issued a final rule via the Federal Register (77 FR 30088) establishing initial air quality designations for the 2008 primary and secondary NAAQS for ozone.

The PA-NJ-MD-DE area is classified as a marginal non-attainment area under the 2008 ozone NAAQS, resulting in an attainment date of July 20, 2015. The PA-NJ-MD-DE did not attain the standard by the attainment date. However, EPA granted a 1-year extension to July 20, 2016 by meeting the criteria of CAA section 181(a)(5) of compliance with all commitments and requirements in the SIP, and “clean” data in 2014 (81 FR 26697). On November 2, 2017, EPA released a final rule determining that the PA-NJ-MD-DE has attained the 2008 8-hour ozone NAAQS by the July 20, 2016 attainment date with an effective date of December 4, 2017. The determination of attainment is not equivalent to a redesignation and the States in the area must still meet the statutory requirements for redesignation in order to be redesignated to attainment. This determination is also not a clean data determination.

The EPA published the 2015 8-hour ozone NAAQS on October 26, 2015 (80 FR 65291), with an effective date of December 28, 2015. EPA revised the ozone NAAQS by strengthening the standard to 0.070 ppm. Thus, an area is in non-attainment of the 2015 8-hour ozone NAAQS if the 3-year average of the individual fourth highest air quality monitor readings, averaged over 8 hours throughout the day, exceeds the NAAQS of 0.070 ppm. The PA-NJ-MD-DE area is classified as a marginal non-attainment area under the 2015 8-hour ozone NAAQS, effective August 3, 2018 (83 FR 25776).

Areas that have failed to meet the standards outlined above have been designated as non-attainment areas and, as a result, are subject to transportation conformity. Transportation conformity requires non-attainment and maintenance areas to demonstrate that all future transportation projects will not hinder the area from reaching and maintaining its attainment goals. In particular, the projects will not:

- *Cause or contribute to new air quality violations,*
- *Worsen existing violations or*
- *Delay timely attainment of the relevant NAAQS.*

PA-NJ-MD-DE 8-Hour Ozone Non-attainment Area

The PA-NJ-MD-DE 8-hour ozone non-attainment area is made up of 16 counties spanning four states. Figure 1 illustrates the entire non-attainment area and the location of the areas covered by WILMAPCO (New Castle and Cecil Counties) for both the 2008 and 2015 ozone standards.

Status of the 2050 RTP & 2023-2026 TIP

As the regional transportation-planning agency for Cecil County, Maryland and New Castle County, Delaware, WILMAPCO is charged with authoring a long-range transportation plan with at least a 20-year planning horizon. The Plan presents recommendations for enhanced transportation efficiency and functionality, including the construction of new facilities, improved connectivity to multiple travel modes, and the enhancement of existing highway, transit, and bicycle/pedestrian facilities. Transportation projects that address challenges faced by the region are identified in this plan and placed on the four-year Transportation Improvement Program (TIP) that corresponds to that project's development timetable.

The 2050 update of the Regional Transportation Plan and the Fiscal Year 2023 – 2026 TIP were created by the WILMAPCO staff and member agencies. The TIP and RTP were formally adopted by the WILMAPCO Council on March 9, 2023.

Figure 1: Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Non-attainment Areas



INTERAGENCY CONSULTATION

As required by the federal transportation conformity rule (40 CFR 93.105) the conformity process includes a significant level of cooperative interaction among the federal, state, and local agencies. Interagency consultation requirements include coordination with the local county representatives, the MPO, and representatives from both state and federal agencies including:

- Wilmington Area Planning Council (WILMAPCO)
- Maryland Department of the Environment (MDE)
- Maryland Department of Transportation (MDOT)
- MDOT Transportation Business Units (TBU): Maryland State Highway Administration (SHA), Maryland Transit Administration (MTA), and Maryland Transportation Authority (MDTA) (responsible for the State's toll facilities)
- Delaware Transit Corporation (DTC)
- Delaware Department of Transportation (DelDOT)
- Delaware Department of Natural Resources and Environmental Control (DNREC)
- Cecil County,
- New Castle County
- Federal Highway Administration (FHWA)
- Environmental Protection Agency (EPA)
- Federal Transit Administration (FTA)

As part of the interagency consultation, the Technical Advisory Committee (TAC) and Air Quality Subcommittee (AQS) groups met and collaborated in order to achieve the following goals related to the transportation conformity process:

- Determine planning assumptions
- Develop a definitive list of future year projects to be analyzed
- Develop a format for presenting determination
- Develop and standardize the public participation process

Meeting minutes and notes are available at the following website: <http://www.wilmapco.org/aqs/>

Determine Planning Assumptions

8-Hour Ozone Regional Emissions Test

The emissions resulting from the implementation of regionally significant transportation projects (those which do not qualify as exempt under 40 CFR 93.126 and 127) will be compared to the 2009 Motor Vehicle Emissions Budgets (MVEB), set forth in the document: *Cecil County, Maryland 8-Hour Ozone State Implementation Plan and Base Year Inventory SIP Revision: 07-05*, for conformity purposes. The document was submitted to EPA in June 2007. EPA found the 2009 MVEBs adequate for conformity purposes, effective on November 28, 2012 (77 FR 65488).

Analysis Years

EPA regulations, as outlined in the Final Transportation Conformity Rule, Section 93.118, Criteria and Procedures: Motor Vehicle Emissions Budget, state that the regional emissions analysis may be performed for any years in the timeframe of the conformity determination provided that they:

- Include a near-term year, one to five years in the future;
- Are not more than ten years apart;
- The analysis is performed for the attainment year (if it is in the timeframe of the transportation plan and conformity determination);
- Include the last year of the timeframe of the conformity determination.

The attainment year for the 2008 standard, is 2015, which is not within the timeframe of the transportation plan. 2025 was chosen so that the first analysis year is no more than five years beyond the year in which the conformity determination is being made. 2035 and 2045 were selected as the intermediate years so that the analysis years are no more than 10 years apart. The last year of the plan is 2050, making the analysis years 2025, 2035, 2045 and 2050.

Components of the Regional Emissions Analysis

As discussed above, ozone formation is a direct result of VOC and NO_x emissions reacting with each other in the presence of sunlight. The EPA has ruled that both precursor emissions, VOC and NO_x, must be included in a regional analysis of 8-hour ozone for transportation conformity.

Future Year Projects

The projects listed in Table 3, in the Travel Demand Modeling section of this document, were found to be regionally significant through the interagency consultation process and are analyzed in this conformity determination.

ANALYSIS RESULTS

The results of the motor vehicle emissions budget tests are presented below in Tables 1 and 2. Table 1 presents the results of the budget test for VOC emissions. Table 2 outlines the results of the budget test for NOx emissions. The results show that all analysis years are below the established and approved 2009 MVEB and show a positive conformity determination. The regionally significant projects located in the Cecil County portion of the non-attainment area will not cause or contribute to any new violation of the air quality standard.

Table 1: VOC Emissions Test Results – MVEB Test (tons/day)

	2025	2035	2045	2050
	Modeled	Modeled	Modeled	Modeled
Cecil County Total	0.81	0.52	0.48	0.48
2009 Conformity Budget	2.2	2.2	2.2	2.2
Conformity Result	Pass	Pass	Pass	Pass

Table 2: NOx Emissions Test Results – MVEB Test (tons/day)

	2025	2035	2045	2050
	Modeled	Modeled	Modeled	Modeled
Cecil County Total	1.95	1.23	1.22	1.25
2009 Conformity Budget	7.3	7.3	7.3	7.3
Conformity Result	Pass	Pass	Pass	Pass

TRAVEL DEMAND MODELING METHODOLOGY

A travel demand model has been used to estimate future roadway traffic volumes and diversions related to regionally significant transportation improvement projects. The travel model was originally developed in 2006 for the upper eastern shore of Maryland including Cecil County. This model has been updated and revalidated in 2022 to a new base year of 2019. The updates include a new highway network and an expanded zone system.

The Upper Eastern Shore (UES) model uses the CUBE/Voyager software platform and encompasses Kent, Queen Anne's, and Cecil Counties in Maryland, as well as New Castle County, Delaware. This model is a traditional three-step model incorporating trip generation, trip distribution, and traffic assignment. The regional travel model does not contain a formal mode choice or transit assignment module. The model produces vehicle trips for 795 traffic analysis zones and assigns them to highway networks consisting of key regional roadway segments. The base year model is validated against survey data and traffic counts collected for the year 2019. A summary of the model components and validation are presented in a final report available from MDOT.

Highway Networks

For the purpose of this conformity analysis, model highway networks are created for each analysis year: 2025, 2035, 2045 and 2050. The networks are comprised of link segments representing freeways, principal arterials, minor arterials, and collectors within the non-attainment region (Figure 2). Links in the network are coded with attributes that portray the facilities' respective capacities and travel speeds. For each horizon year, projects from the RTP and TIP are coded onto the networks by adding links for new construction projects and adjusting the link capacities for

projects that add lanes to existing roadways. A list of regionally significant highway projects (as defined in section 93.101 of the Final Transportation Conformity Rule) is shown in Table 3. Figure 3 shows the location of the regionally significant highway projects for both counties and Figure 4 shows the Cecil County highway projects. The primary products of the model used in the air quality analysis are estimated volumes, link distances, free-flow speeds, and link capacities.

Table 4 identifies the planned transit projects for the region. The transit projects are not included in the travel demand modeling, but the impacts of transit on regional vehicle trips are accounted for in the validation count data.

Figure 2: Upper Eastern Shore Model Network Map

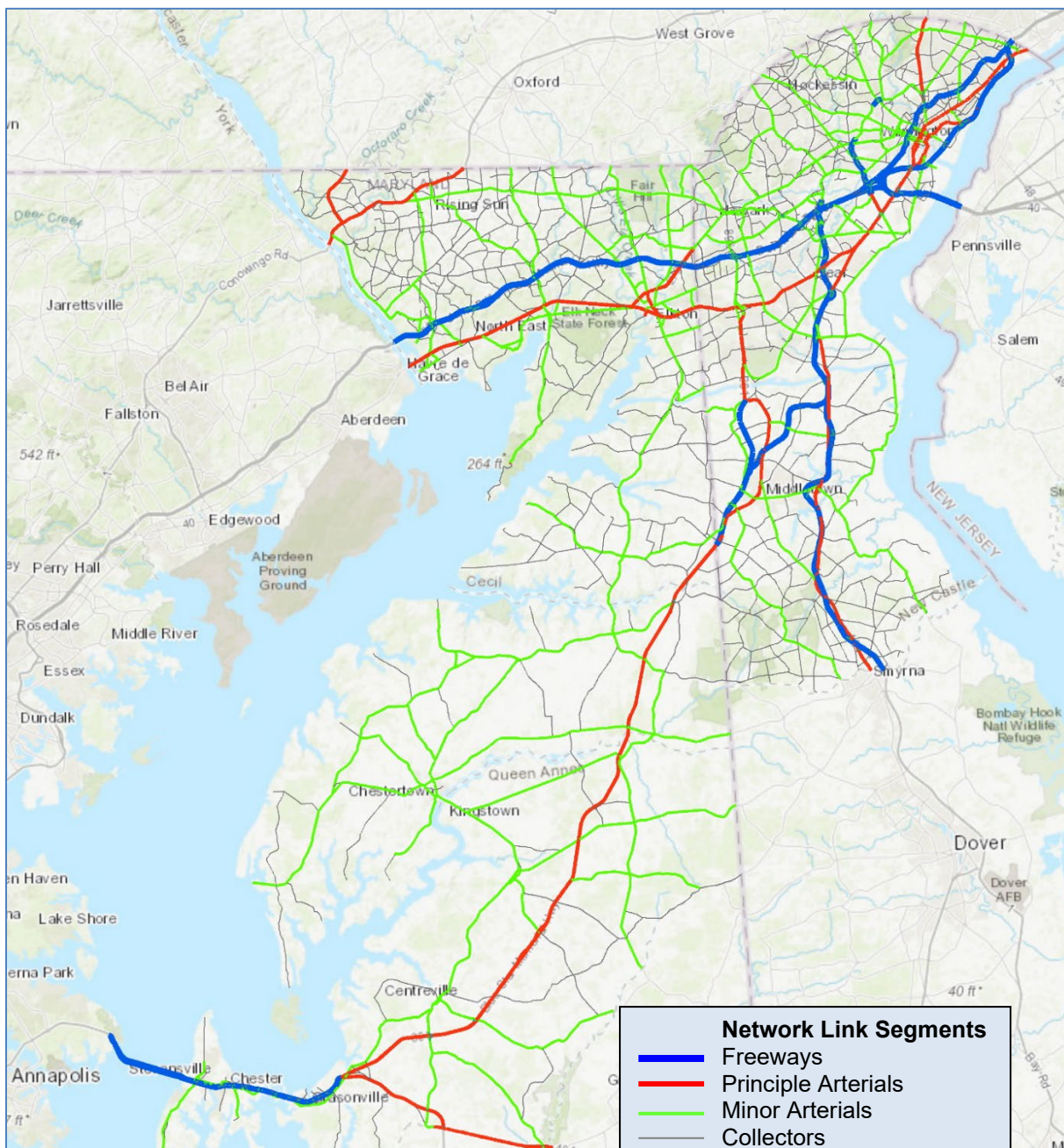


Table 3: Cecil and New Castle Counties Regionally Significant Projects

No.	Project Name	County	Description	Horizon Year
1	I-95/Belvidere Road Interchange	CC	New expressway interchange	2025
2	Belvidere Road: US 40 to I-95/ Belvidere Road Interchange	CC	Widen to 4 lanes (2 lanes in each direction)	2035
3	I-95/SR 222 Interchange	CC	Two to four lanes on the SR 222 bridge	2045
4	MD 222: US 40 to MD 276	CC	Add a lane in each direction	2045
5	I-95 Susquehanna River to DE Line	CC	Add a lane in each direction, plus bridge expansion	2050
6	MD 213: Frenchtown Road to US 40	CC	Two to four-lane divided highway	2050
7	MD 272: US 40 to Lums Road	CC	Two to four-lane divided highway	2050
8	SR 299: SR 1 - Catherine Street (widening)	NCC	Expand roadway, improve pedestrian access	2025
9	SR 72: McCoy Road - SR 71 (two to four lanes)	NCC	Expand roadway, improve nonmotorized access	2025
10	Boyd's Corner Rd: Cedar Lane - US 13 (widening -- two to four lanes)	NCC	Expand roadway, improve nonmotorized access	2035
11	I-295 Northbound (add third lane)	NCC	Add highway capacity	2035
12	SR 896 / Bethel Church Rd (Grade Separated Interchange)	NCC	Construct grade separated intersection, safety improvements	2035
13	SR 4: SR 2 - SR 896 (widening -- two to four lanes)	NCC	Eliminate bottleneck, improve non-motorized access	2035
14	I-95 / SR 896 Interchange (expansion)	NCC	Improve/reconfigure interchange	2035
15	SR 896: US 40 - I-95 (widening to six lanes)	NCC	Road widening to six lanes	2035
16	US 40 / SR 896 (Grade Separated Interchange)	NCC	Construct grade separated intersection, safety improvements	2035
17	US 40: Salem Church Rd - Walther Road (widening four to six lanes)	NCC	Improve roadway, improve non-motorized access	2035
18	US 40/SR 7 (Grade Separated Intersection)	NCC	Grade separated intersection	2035
19	Center Boulevard extended to Churchmans Rd	NCC	Multimodal road as part of NCC Transit Center	2035
20	SR 1 Widening, Road A to Tybouts Corner (including Newtown Road Ramps)	NCC	Reconstruct roadway	2035
21	SR 1 at Tybouts Corner (interchange reconstruction)	NCC	Interchange improvement	2035
22	SR 1 Widening, Road A to US 40	NCC	Expand and reconstruct roadway	2045
23	Tyler McConnell Bridge, SR 141: Montchannin Road - Alapocas Road (expansion)	NCC	Bridge replacement and multimodal improvements	2045
24	Eagle Run Rd to Continental Drive Connector	NCC	New multimodal roadway	2045
25	US 301: Spur (new two lane road)	NCC	New limited access highway	2050
26	Add 3rd Lane on 273 from SR 1 to I-95	NCC	Churchmans Crossing Plan Update 2022	2045
27	I-95: MD Line to SR 1	NCC	Widening	2045
28	Hares Corner Grade Separation (US 13 & SR 273)	NCC	GSI	2045

No.	Project Name	County	Description	Horizon Year
29	SR 1 Widening (Odessa to North Smyrna)	NCC	Widening	2045
30	SR 1 Widening, Tybouts Corner to US 301	NCC	Widening	2045
31	SR 1 Widening, US 301 to Kent County Line	NCC	Widening	2045
32	GBC Drive Opening	NCC	Public opening of 1.5 mi 2 lane	2045
33	Glasgow/George Williams Way (overpass of SR 896)	NCC	New 2 lane road	2050
34	Pigeon Point Extension Option 1 - Lambson Ln. to Uniquema Blvd.	NCC	Road extension	2050
35	Pigeon Point Extension Option 2 - Davidson Ln to Cherry Ln.	NCC	Road extension	2050
36	SR 896: C & D Canal to US 40	NCC	Widening to 6 lanes	2050
37	SR 72 Widening - Wyoming Rd to just north of Chestnut Hill Rd	NCC	Widening from two lanes to four lanes	2050
38	SR 72 Widening - Del Laws Drive to Willamette Drive	NCC	Widening from two lanes to four lanes	2050
39	SR 72 Widening - South of Old Baltimore Pike to Broadleaf Dr.	NCC	Widening from two lanes to four lanes	2050
40	Levels Road Widening, US301 to north of Patriot Drive	NCC	Install additional through and turn lanes	2050
41	Levels Rd / Patriot Dr and rest of Levels Rd. widening	NCC	Install additional through and turn lanes and signalize int.	2050
42	Middletown-Warwick Rd / Summit Bridge Rd	NCC	Widening and turn lanes	2050

Note NCC = New Castle County
 CC = Cecil County

Table 4: Cecil and New Castle Counties Transit Projects

No.	Project Name	County	Description	Horizon Year
1	Elkton Train Station	CC	New commuter rail station	Not Modeled
2	Maryland Commuter Rail: Perryville to Newark	CC	Expand MARC commuter rail	Not Modeled
3	Elkton Bus Service Circulator	CC	Community bus service expansion	Not Modeled
4	North East Transit Hub/ Train Station	CC		Not Modeled
5	MARC Maintenance Facility	CC		Not Modeled
6	Newport Rail Station	NCC	New commuter rail station	Not Modeled
7	Rail - Newark to Elkton	NCC	Expand commuter rail service	Not Modeled
8	Transit service expansion and frequency enhancements - Short-term	NCC	Transit improvements	Not Modeled
9	Transit service expansion and frequency enhancements - Mid-term	NCC	Transit improvements	Not Modeled
10	Transit service expansion and frequency enhancements - Long-term	NCC	Transit improvements	Not Modeled
11	Wilmington Transit Hub	NCC	New bus transit center	Not Modeled

Note NCC = New Castle County
 CC = Cecil County

Figure 3: Regionally Significant Highway Project Map

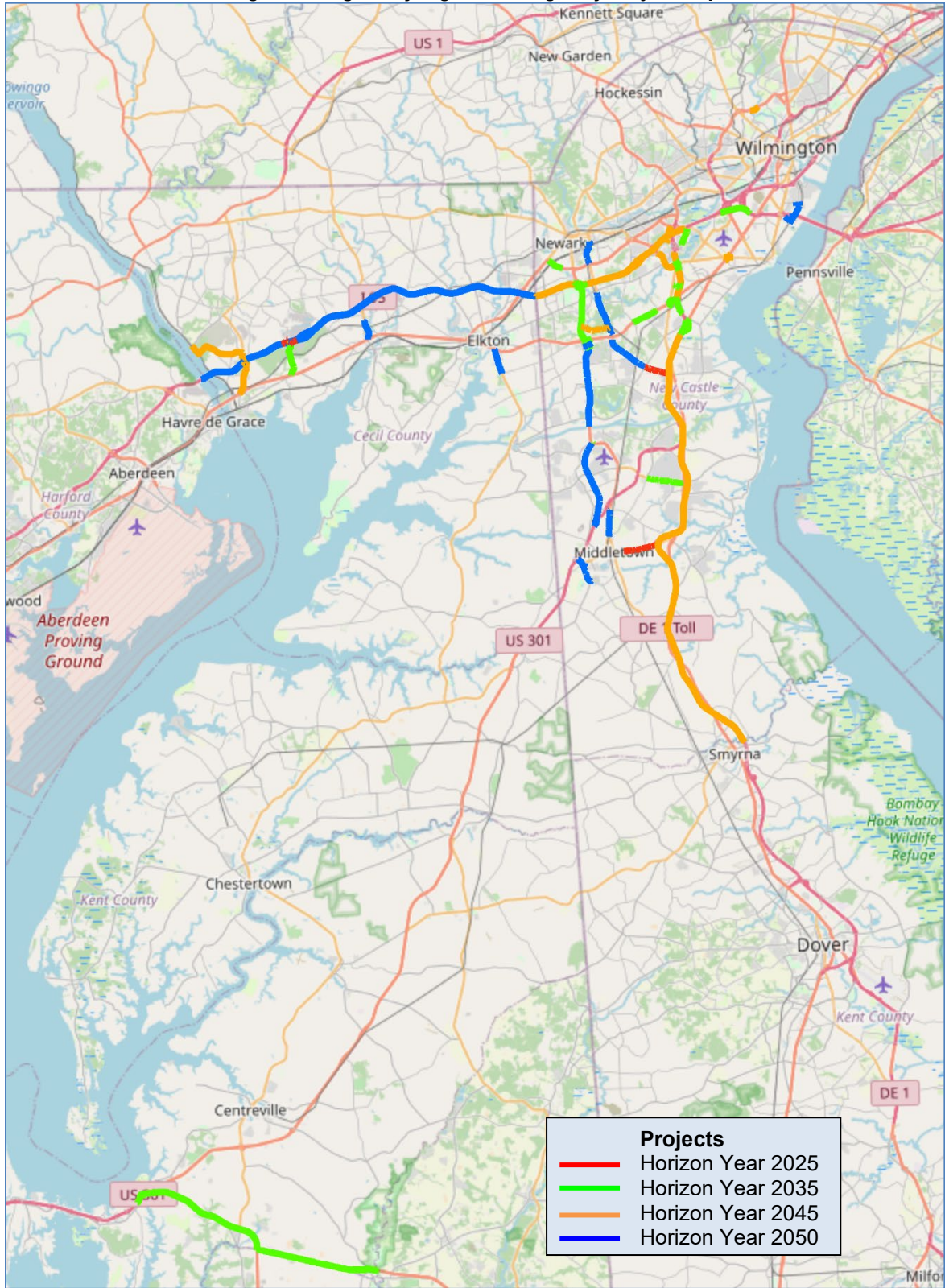
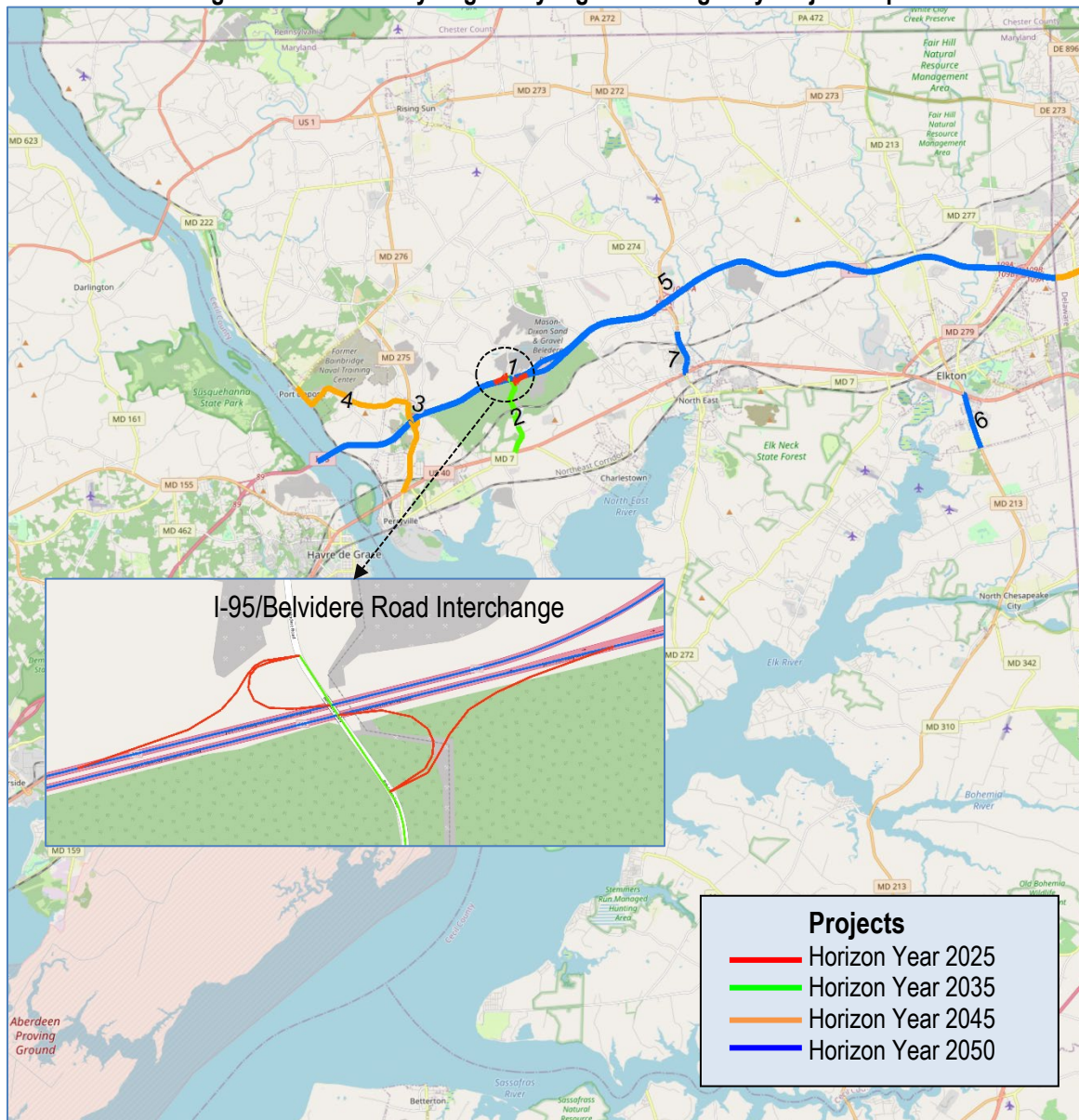


Figure 4: Cecil County Regionally Significant Highway Project Map



Land Use Forecast Methodology

Land use estimates for the base and future years for the UES Model are developed from existing data sources and county comprehensive plans, as well as through coordination with state and local planning agencies. The land use data for this model is comprised of data describing the population, households, workforce, and employment for the region.

Land use for Cecil County, Maryland and New Castle County, Delaware at the zonal level came directly from the land use demographics approved by WILMAPCO. WILMAPCO demographic projections for New Castle County was adopted in June 2022. The zonal level data for Cecil County was adjusted to match the Maryland Department of

Planning (MDP) projections. Table 5 summarizes the land use data used for traffic modeling for the analysis years 2025, 2035, 2045, and 2050 for Cecil County.

Table 5: Summary of Land Use Data Used for Modeling Runs

Cecil County						
Year	Population*	Households*	Labor Force*	Total* Employment	Retail* Employment	Non-Retail* Employment
2025	106,104	40,378	57,052	52,201	5,603	46,598
2035	119,199	45,925	61,761	56,103	6,003	50,100
2045	131,549	50,974	68,571	61,854	6,539	55,315
2050	136,988	53,478	70,727	64,578	6,797	57,781

Note: * Data Source: Maryland Department of Planning Projections (December 2020)

ESTIMATION PROCESS FOR MOBILE SOURCE EMISSIONS

This conformity analysis uses MOVES3 model, EPA's latest official version of Motor Vehicle Emission Simulator (MOVES) for estimating emissions from highway vehicles. MOVES3, released in January 2021, incorporates the latest data on vehicle populations, travel activity and emission rates as well as updated fuel data at the county level.

Analysis Methodology

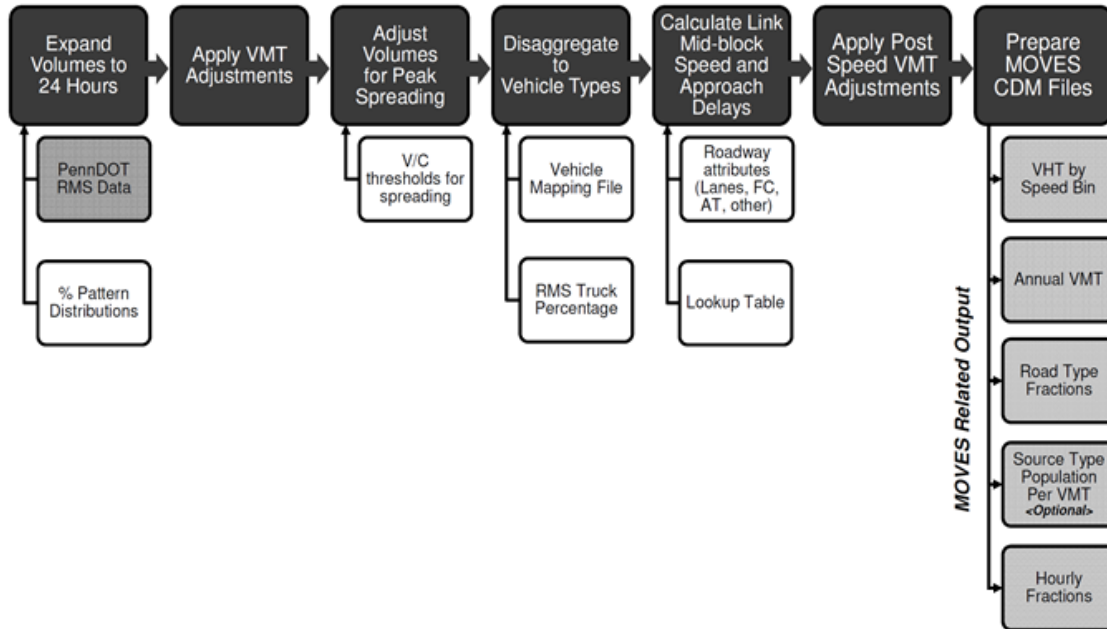
The methodology used to produce the emission data conforms to the recommendations provided in EPA's technical guidance. A mix of local data and national default (internal to MOVES3) data has been used for the conformity analysis. Local data inputs to the analysis process reflect the latest available planning assumptions using data obtained from the Maryland Department of Environment (MDE), Motor Vehicle Administration (MVA), WILMAPCO, and other local/national sources.

The analysis methodology includes the use of regional travel model outputs (as described above) for 2025, 2035, 2045 and 2050 to estimate the regional Vehicle Miles Traveled (VMT) along with custom post-processing software (PPSUITE) to prepare key input files to the MOVES3 emission model. PPSUITE consists of a set of programs that perform the following functions:

- Analyzes highway operating conditions.
- Calculates highway speeds.
- Compiles VMT and vehicle type mix data.
- Prepares MOVES runs and processes MOVES outputs.

The PPSUITE system has been used for previous inventory and conformity submissions in Maryland and in other states including Pennsylvania, Virginia, New Jersey, and New York. The software has gone through a significant revision to ensure consistency with the MOVES emissions model. The PPSUITE process is also integral to producing other key input files to the MOVES emission model. Figure 5 summarizes the key functions of PPSUITE and the traffic-related input files prepared for MOVES.

Figure 5: Summary of Emission Calculation Process



Description of Input Data

A large number of inputs to MOVES are needed to fully account for the numerous vehicle and environmental parameters that affect emissions. These include traffic flow characteristics, vehicle descriptions, fuel parameters, inspection/maintenance (I/M) program parameters, and environmental variables. MOVES includes a default national database of meteorology, vehicle fleet, vehicle activity, fuel, and emissions control program data for every county; but EPA cannot certify that the default data is the most current or best available information for any specific area. As a result, local data is recommended for use when completing a regional conformity analysis. Local data sources are used for all inputs that have a significant impact on calculated emission rates. These data items are discussed in the following sections.

Roadway Data

The emission calculation process uses key traffic data from the regional travel demand model to estimate regional VMT and speeds. This data includes individual roadway traffic volumes and physical roadway descriptive characteristics including area type, facility type, lanes, distances, capacity, and free-flow speeds. Travel demand model runs are produced for future analysis years and include the impact of regionally significant transportation projects. The model provides a key resource for estimating the impact of population and employment growth on roadway volumes and calculating the diversions due to transportation projects.

VMT was determined for each roadway class/setting by multiplying the length of road by the number of vehicles using the road per day. Additional adjustments to VMT included: seasonal adjustments to reflect an average weekday for the summer season and Highway Performance Monitoring System (HPMS) adjustments used to align annual VMT estimates with HPMS reported totals for the base year.

Speed data was calculated for each highway segment and hour of the day based on roadway capacity, traffic volume, and other physical roadway features (e.g. traffic signals) using the post processing software. Thus, average speeds reflect physical highway conditions and congestion caused by traffic volume. For future conditions, congestion (and

thereby speed) is affected by traffic growth and changes in physical conditions due to transportation improvement projects.

Vehicle Class Data

Emission rates within MOVES vary significantly by vehicle type. The MOVES model produces variable emissions and rates by thirteen MOVES vehicle source types. However, VMT is inputted into MOVES by five HPMS vehicle groups.

For this emissions analysis, vehicle type pattern data was developed for the county by functional class based on State Highway Administration (SHA) classification counts and internal MOVES defaults. As the first step, SHA count data was used to develop percentage splits to the four vehicle groups: Autos, Heavy trucks, Motorcycles and Buses. Then the vehicle groups were expanded to the 13 MOVES source types using MOVES3 default VMT distributions for Maryland, which were recombined to the HPMS vehicle groups as inputs to MOVES.

Vehicle type pattern data, developed from 2020 SHA TMS database and hourly traffic volumes, is used by PPSUITE to distribute the hourly roadway segment volumes among the thirteen MOVES source types. This data contains percentage splits to each source type for every hour of the day.

The vehicle type percentages are also provided to the capacity analysis section of PPSUITE to adjust the speeds in response to trucks. That is, a given number of larger trucks take up more roadway space than a given number of cars, and this is accounted for in the speed estimation process by adjusting capacity using information from the Highway Capacity Manual.

Vehicle Age

Vehicle age distributions are input to MOVES for the county by the thirteen source types. The distributions reflect the percentage of vehicles in the fleet up to 31 years old. The vehicle age distributions were prepared by MDE based on 2020 MDOT MVA registration data.

The development process of the age distribution inputs includes removal of duplicate, expired, and non-emitting vehicles such as truck trailers and the farm tractors. The data was subjected to VIN decoding to obtain vehicle information at a finer resolution and then transformed into vehicle age mixes following the EPA's guidance. Mapping of vehicle classes from the registration data to the MOVES vehicle types was based on the EPA's MOVES3 technical guidance using the existing MVA data fields and fine-tuned data obtained via VIN decoding.

The age distributions for combination long-haul and short-haul trucks (source types 61 and 62) were developed using MOVES3 default data as it is difficult to distinguish short-haul and long-haul trucks in the MVA data.

Vehicle Population Data

Vehicle fleet information such as the number and age of vehicles has an impact on the forecasted start and evaporative emissions within MOVES. The MOVES model requires the population of vehicles to be separated by the thirteen source type categories. The 2020 baseline data was prepared and provided by MDE utilizing SAS-based computer program and MS-Access. Maryland county vehicle registration data was used to estimate vehicle population for light-duty vehicles, buses, refuse trucks, and motor homes for Cecil County. The vehicle population for heavy-duty trucks (source types 52, 53, 61 and 62) were estimated using Cecil County VMT and MOVES3 default VMT/population ratios for those source types.

For the analysis years 2025, 2035, 2045 and 2050, the vehicle population was forecasted based on projected household and population growth obtained from state and MPO sources. The growth rate methodology included:

- Choosing the highest growth factors developed from Woods & Poole forecast data (e.g. population, households, or employment) and VMT growth.
- Default VMT/Population ratio for trucks, i.e., truck population growth based on Truck VMT.

Environmental and Fuel Data

Information on environmental, fuel, vehicle technology, and other control strategy assumptions were determined based on a review of MOVES3 default information by MDE.

Fuel Data: MDE obtains monthly fuel data reports regularly from the Maryland Fuel Laboratory, which is under the jurisdiction of Maryland Fuel Tax Division of the Office of the Comptroller of Maryland. In 2020, due to COVID-19 restrictions and subsequent lack of data for a few months, MDE decided to use the fuel data provided by the Maryland Comptroller's Office from Maryland's bulk terminals for all the counties in Maryland. The 2020 bulk terminal fuel data was compiled, and fuel data parameters were developed separately for all 14 counties required by EPA which use only reformulated gasoline and the remaining counties dispensing conventional gasoline.

Three out of four sets of fuel data inputs (Fuel Formulation, Fuel Supply, and AVFT tables) required by the MOVES model were developed by MDE for every county in MD. The fuel parameters changed from the MOVES3 defaults are as follows:

Fuel Parameter	Source
fuelFormulationID	Unique ID used for easy recognition
fuelSubtypeID	Selected per guidance based on ethanol content of gasoline
sulfurLevel	Computed from the local fuel data
ETOHVolume	Computed from the local fuel data
aromaticContent	Computed from the local fuel data
olefinContent	Computed from the local fuel data
benzineContent	Computed from the local fuel data
E200	Computed from the local fuel data
E300	Computed from the local fuel data

The Alternate Vehicle and Fuel Technology (AVFT) tables were developed individually for all the MD jurisdictions from the 2020 MVA data. They include vital information such as vehicle type, model year, fuel type, engine technology, and fuel engine fractions. Emission benefits from electric vehicles come from this input.

For the remaining fuel table 'Fuel Usage Fractions', MDE adopted MOVES3 defaults for lack of data on E85 vehicle fractions in the fleet.

Meteorological Data: Evaporative emissions are influenced significantly by the temperatures of the surrounding air. Meteorological data for MOVES inputs, including hourly average temperature and relative humidity, are compiled on a triennial basis for every county in MD. The data used for this analysis was prepared using the 2020 month by month raw hourly-data sets from the National Climate Data Center of NOAA based on weather data collected at the airport situated closest to the county modeled. Hourly average temps and humidity computations were developed from the

24-hourly values for every day in each month. The meteorological data for Cecil County came from the NOAA station at the Philadelphia International (PHL) Airport.

Other Vehicle Technology and Control Strategy Data

The MOVES3 default I/M data was reviewed and updated by MDE for all the I/M counties in the state.. The current I/M program known as the Vehicle Emission Inspection Program (VEIP) was utilized for these analysis runs and is described below.

MD Vehicle Emission Inspection Program (VEIP): This program tests gasoline powered vehicles weighing up to 26,000 lb. The following vehicles receive the OBD test: (1) MY 1996 and newer light duty vehicles (up to 8,500) lbs and (2) 2008 and newer vehicles (between 8,501 and 14,000 lbs).

The following vehicles receive the Idle test: (1) MY 1977- 2007 vehicles (between 8,501-14,000 lbs) and (2) 1977 and newer vehicles (between 14,001 and 26,000 lbs). The idle test includes a gas cap pressure test and a visual check for the presence of a catalytic converter. The VEIP test is done biennially, and on change of ownership.

New vehicles and qualified hybrids are exempted from emissions testing for the first three years (36 months), after titling and registration.

The compliance factors reflect the observed failure and waiver rates observed in the program, combined with an assumed 96% compliance rate for vehicles showing up for testing. Heavy duty vehicles have an additional factor, reflecting the fraction of vehicles in the weight range covered by the program. This was derived from documentation comparing the MOVES and MOBILE vehicle classes. The significantly higher compliance rate for the gas cap check reflects the much higher retest pass rate for this check.

Federal Programs: Current federal vehicle emissions control and fuel programs are incorporated into the MOVES3 software. In addition to the federal programs included in the previous versions of MOVES (including National Program standards covering light duty vehicles through model year 2026, heavy duty greenhouse gas standards for model year 2014-2018 vehicles, and Tier 3 standards), MOVES3 incorporates the following new federal emission standard rules:

- *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2 (HD GHG2) Rule:* MOVES3 accounts for the HD GHG2 rule published in 2016. The rule set stricter fuel economy standards for HD vehicles which reduce CO₂ emissions, but also impact other pollutants through changes in glider sales, hoteling activity, vehicle mass and road load coefficients.
- *Safe Affordable Fuel Efficient (SAFE) Vehicles Rule:* MOVES3 also accounts for the March 2020 SAFE standards for light-duty vehicles. These standards were less stringent than the preceding fuel economy standards, and thus increased fuel consumption and CO₂ emissions.

Modifications of default emission rates are required to reflect the early implementation of the National Low Emission Vehicle Program (NLEV) in Maryland. To reflect these impacts, EPA has released instructions to develop input files that can be used to model these impacts. The NLEV input database was created for Maryland per EPA's instructions and was used for this inventory.

State Vehicle Technology Program:

MD Clean Car Program: Maryland Clean Car Program: Maryland adopted California's Advanced Clean Car Programs (formerly the CAL-LEV II and CAL-LEV III programs) in 2007 and 2012, respectively. The Advanced

Clean Car Program (CAL-LEV II) became effective in model year 2011 and was made more stringent (CAL-LEV III) effective with the model year 2015-2025 vehicles. The Advanced Clean Car Program includes a Zero Emissions Vehicle (ZEV) mandate. These programs were included in the modeling process following the guidelines provided in the MOVES3 Technical Guidance. A LEV input database was created to reflect a 2011 beginning model year for the State of Maryland.

2050 RTP AND FY 2023-2026 TIP CONFORMITY DETERMINATION

Financial Constraint

The planning regulations, Sections 450.322(b) (11) and 450.324(e) require the transportation plan to be financially constrained while the existing transportation system is being adequately operated and maintained. Only projects for which construction and operating funds are reasonably expected to be available are included. As shown in the Regional Transportation Plan, WILMAPCO has developed an estimate of the cost to maintain and operate existing roads and bridges in the MPO area and has compared that with the estimated revenues and maintenance needs of the new roads. WILMAPCO has found that the projected revenues are sufficient to cover the costs, therefore satisfying the financial constraint requirement.

Public Participation

This conformity document has undergone the public participation requirements set forth in the Final Conformity Rule, and Final Statewide / Metropolitan Planning Rule. The draft analysis was made available for formal public review and comment beginning on January 18, 2023, through March 6, 2023. The public review and comment period was announced using the following outlets:

- Notices in the Delaware News Journal and Cecil Whig Newspapers
- WILMAPCO website (www.wilmapco.org)
- WILMAPCO E-NEWS (monthly electronic newsletter)
- WILMAPCO Transporter (quarterly electronic newsletter)
- Public Workshop held in Newark, DE on February 8, 2023

The documentation of the observed 30-day public comment period, comments, and the responses to comments can be found in Appendix E.

Conformity Statement

The conformity rule, as it applies to the Cecil County, MD portion of the PA-NJ-MD-DE 8-hour ozone non-attainment area, requires the RTP and TIP to conform to the motor vehicle emissions budgets established in the SIP. Appendix A contains a matrix, which provides responses to all of EPA's criteria as applicable to this conformity determination.

The results of the conformity analysis for the Cecil County portion of the PA-NJ-MD-DE 2008 and 2015 8-hour ozone non-attainment area indicate that the projected mobile source emissions are below the EPA-approved motor vehicle emission budgets for the established analysis years of 2025, 2035, 2045 and 2050. Based on the conformity analysis, WILMAPCO, in its capacity as the MPO, has concluded that the implementation of the 2050 RTP and 2023-2026 TIP will not worsen the region's air quality or delay the timely attainment of the National Ambient Air Quality Standards.

REFERENCES

Transportation Conformity Regulations as of April, 2012, EPA-420-B-12-013;
<http://www.epa.gov/otaq/stateresources/transconf/conf-regs.htm>

FHWA, 23 CFR PART 450 – Planning Assistance and Standards, Subpart C -- Metropolitan Transportation Planning and Programming; <http://www.ecfr.gov/>

FY 2017-2020 Transportation Improvement Program; Wilmington Area Planning Council;
<http://www.wilmapco.org/tip/>

Regional Transportation Plan, 2050 Update; Wilmington Area Planning Council;
<http://www.wilmapco.org/rtp/>

Modeling Page within EPA's Office of Mobile Sources Website (<http://www.epa.gov/omswww/models.htm>) contains a downloadable model, MOVES users guide and other information.

Policy Guidance on the Use of MOVES3 for State Implementation Plan Development, Transportation Conformity, General Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-20-044, November 2022.

MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity, US EPA Office of Transportation and Air Quality, EPA-420-B-20-052, November 2020.

Highway Capacity Manual 2010, Transportation Research Board, January, 2010.

Traffic Monitoring System, 2020 Data, Maryland State Highway Administration.

Appendix A

Conformity Question Checklist

Table A-1: Conformity Questions Matrix

Section	Requirement	Y/N	Response
40 CFR 93.110	Is the conformity determination based on the latest planning assumptions?	Y	See below.
	(a) Is the conformity determination, with respect to all other applicable criteria in §§93.111 - 93.119, based upon the most recent planning assumptions in force at the time of the conformity determination?	Y	The conformity analysis uses the UES travel demand model that is validated (checks the accuracy of the model) to 2019 conditions. Assumptions regarding vehicle mix, hourly patterns, monthly/seasonal factors, and vehicle fleet registration data are based on the latest available (2020) information from the Maryland Department of the environment (MDE) & State Highway Administration (SHA).
	(b) Are the assumptions derived from the estimates of current and future population, employment, travel, and congestion most recently developed by the MPO or other designated agency? Is the conformity determination based upon the latest assumptions about current and future background concentrations?	Y	Land use for Cecil County, Maryland and New Castle County, Delaware at the zonal level came directly from the land use approved by WILMAPCO. WILMAPCO demographic projections for New Castle County were adopted in June 2022. The zonal level data for Cecil County was adjusted to match the Maryland Department of Planning (MDP) projections.
	(c) Are any changes in the transit operating policies (including fares and service levels) and assumed transit ridership discussed in the determination?	Y	The impact of transit on regional vehicle trips is accounted for in the validation count data. Any future changes to transit service can be accounted for using off-model or sketch analysis tools, such as MAQONE. However, there are not any regionally significant transit projects in this analysis.
	(d) The conformity determination must include reasonable assumptions about transit service and increases in transit fares and road and bridge tolls over time.	Y	See above regarding transit. Tolls are included in the validated UES travel demand model.
	(e) The conformity determination must use the latest existing information regarding the effectiveness of the TCMs and other implementation plan measures, which have already been implemented.	N/A	There are no TCMs identified in the SIP.

Section	Requirement	Y/N	Response
	(f) Key assumptions shall be specified and included in the draft documents and supporting materials used for the interagency and public consultation required by §93.105.	Y	Summary provided in Interagency Consultation Section with supporting documents in Appendix D & E.
40 CFR 93.111	Is the conformity determination based on the latest emissions model?	Y	MOVES3, EPA's latest version of Motor Vehicle Emissions Simulator (MOVES) was used for this conformity determination.
40 CFR 93.112	Did the MPO make the conformity determination according to the consultation procedures of the conformity rule or the state conformity SIP?	Y	Consultation procedures were followed in accordance with the Federal Transportation Conformity Rule. WILMAPCO consulted appropriate agencies and provided a scope of work to the following agencies: MDOT, MDE, DelDOT, DNREC, FHWA, FTA, and EPA.
40 CFR 93.106 (a) (1)	Are the horizon years correct?	Y	The years chosen: 2025, 2035, 2045 and 2050, represent the appropriate horizon years needed for the 8-hour ozone NAAQS conformity determinations.
93.106(a) (2)(i)	Does the plan quantify and document the demographic and employment factors influencing transportation demand?	Y	A summary is provided in the Land Use Forecast Methodology section and the relevant data is summarized in Table 4 of this document.
93.106(a) (2)(ii)	Is the highway and transit system adequately described in terms of the regionally significant additions or modifications to the existing transportation network that the transportation plan envisions to be operational in the horizon years?	Y	A summary of regionally significant projects can be found in the land use section and Table 3 of this document.
93.108	Is the Transportation Plan Fiscally Constrained?	Y	See Financial Constraint Section.
93.113(b)	Are TCMs being implemented in a timely manner?	N/A	There are no TCMs in the SIP.
40 CFR 93.118	Is the Transportation Plan consistent with the motor vehicle emissions budget in the applicable SIP?	Y	The conformity determination was performed using the 2009 motor vehicle emissions budgets contained in the SIP and found adequate by EPA.

Appendix B

Conformity Results Detailed VMT and Emissions By County By Road Type By Analysis Year

Table B-1: 2025 Emissions Budget Test Results

2025 Analysis				
Road Type	VMT	Speed (mph)	VOC (tons/day)	NOX (tons/day)
Off-Network	-	-	0.55	0.31
Rural Restricted Access	976,233	62.1	0.05	0.40
Rural Unrestricted Access	2,560,021	40.7	0.18	1.04
Urban Restricted Access	660,920	59.3	0.03	0.18
Urban Unrestricted Access	42,826	29.6	0.00	0.02
Non-attainment Area Total	4,239,999		0.81	1.95
	2009 Budgets (Submitted)		2.2 PASS	7.3 PASS

Table B-2: 2035 Emissions Budget Test Results

2035 Analysis				
Road Type	VMT	Speed (mph)	VOC (tons/day)	NOX (tons/day)
Off-Network	-	-	0.37	0.24
Rural Restricted Access	1,001,153	62.2	0.02	0.21
Rural Unrestricted Access	2,824,760	40.3	0.10	0.69
Urban Restricted Access	686,501	59.2	0.02	0.08
Urban Unrestricted Access	46,404	27.6	0.00	0.01
Non-attainment Area Total	4,558,818		0.52	1.23
	2009 Budgets (Submitted)		2.2 PASS	7.3 PASS

Table B-3: 2045 Emissions Budget Test Results

2045 Analysis				
Road Type	VMT	Speed (mph)	VOC (tons/day)	NOX (tons/day)
Off-Network	-	-	0.34	0.25
Rural Restricted Access	1,035,307	62.0	0.02	0.19
Rural Unrestricted Access	3,065,598	39.9	0.10	0.70
Urban Restricted Access	715,723	59.0	0.01	0.07
Urban Unrestricted Access	86,382	28.9	0.00	0.02
Non-attainment Area Total	4,903,011		0.48	1.22
	2009 Budgets (Submitted)		2.2 PASS	7.3 PASS

Table B-4: 2050 Emissions Budget Test Results

2050 Analysis				
Road Type	VMT	Speed (mph)	VOC (tons/day)	NOX (tons/day)
Off-Network	-	-	0.34	0.25
Rural Restricted Access	1,065,180	62.9	0.02	0.19
Rural Unrestricted Access	3,170,393	39.8	0.10	0.71
Urban Restricted Access	735,582	59.8	0.01	0.07
Urban Unrestricted Access	89,942	28.3	0.00	0.02
Non-attainment Area Total	5,061,097		0.48	1.25
	2009 Budgets (Submitted)		2.2 PASS	7.3 PASS

Appendix C

MOVES Input Files and Parameters For Cecil County, MD

Traffic/Air Quality Data Checklist for Cecil County

Data Item	Inputs Assumptions
MOVES RunSpec	
Emission Model	MOVES3 (default database: MOVESDB20220105)
Scale/Calculation Type	County Scale Inventory Run
Analysis Years	2025, 2035, 2045, 2050
Analysis Season	July Weekday
Pollutants	VOC, NOx
Fuel Types	Gasoline, Diesel, CNG, Electricity, E-85
Traffic Data	
Highway Network	Cecil Model Networks (2025, 2035, 2045, 2050): Use socio-economic forecast and latest network inputs updated for 2050 LRTP
Seasonal/Daily Adjustments	Factors to develop MOVES daily and monthly VMT fraction files as inputs. Seasonal adjustment factors developed from 2020 Factors to Convert Volume to AADT report from the SHA Traffic Monitoring System.
County HPMS VMT Adjustments	Apply HPMS Adjustments to ensure Model VMT is consistent with reported HPMS
Mapfile	Use MOVES3 national defaults VMT distributions for Maryland to disaggregate light duty vehicles/buses/trucks to MOVES 13 source types; consistent with 2020 NEI.
Hourly Patterns	Developed based on 2020 SHA 24-hour count data.
Vehicle Mixes	MOVES VMT required by 5 HPMS vehicle classes. Use 2020 SHA traffic count data (TMS database & hourly volumes) to split model traffic volumes into motorcycles, light duty vehicles, buses and trucks, and use MOVES default VMT distributions for the state to divide the four vehicle groups into MOVES 13 source types, which are recombined to the 5 HPMS vehicle classes.
MOVES Inputs	
Annual VMT	Calculated by PPSUITE from Model network / seasonal factors / vehicle mapping
Month VMT Fractions	Calculated based on 2020 seasonal adjustment factors
Day VMT Fractions	Calculated based on 2020 seasonal adjustment factors
Avg. Speed Distribution	Calculated by PPSUITE (Minimum Speed = 2.5 mph); Based on Model volumes and speed post processing by hour of day.
Road Type Distribution	Calculated by PPSUITE; a RoadType field must be added to the Model network based on FC.
Source Type Population	1. Non-trucks: 2020 Inputs provided by MDE --> Adjust/grow to 2025, 2035, 2045, and 2050 by applying growth factors developed from Woods & Poole population/households forecast data and VMT growth. 2. Heavy duty trucks: 1) For source type 51: Applying growth factors developed from Woods & Poole population/households/employment forecast data and VMT growth. 2) For source type 52, 53, 61 & 62: Use Cecil county VMT and MOVES3 default VMT/Population ratios to estimate truck population.
Vehicle Age Distribution	1. Use MOVES3 national default age distribution inputs for combination trucks (source type 61 & 62). 2. Use MDE-prepared 2025, 2035, 2045 and 2050 inputs for light duty vehicles, buses and remaining heavy duty truck source types (source type 11, 21, 31, 32, 41, 42, 43, 51, 52, 53 & 54).
Fuel Supply	Provided by MDE
Fuel Formulation	Provided by MDE
Fuel Usage Fraction	Provided by MDE
AVFT	Provided by MDE
Temperatures/Humidity	2020 inputs provided by MDE
IM Parameters	Provided by MDE
Control Programs	
Early NLEV / CALLEVIII	Include databases for early NLEV implementation and MD-specific CALLEVIII program developed for MOVES3 per EPA guidance.

SUMMER DAY OZONE MOVES SAMPLE INPUT FILES

Cecil County

Sample Cecil County MOVES Run Specification File Settings for Analysis Year 2025

Sample xml file format

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Sample mrs file format

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Appendix D

Interagency Consultation

Please Visit:

<http://www.wilmapco.org/aqs>

The WILMAPCO Air Quality Subcommittee has 13 members representing federal, state, and local agencies in Delaware and Maryland. The AQS assesses the air quality impacts of transportation projects in WILMAPCO's Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP). Their recommendations help our region attain its air quality goals.

Appendix E

Public Participation Materials

Please Visit:

<http://www.wilmapco.org/aq>

Air Quality Conformity is a process which ensures federal funding and approval goes to transportation activities that are consistent with our air quality goals. This process applies to both the long range Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP). Known as “non-attainment areas” or “maintenance areas,” respectively, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) jointly determine conformity within these regions which do not meet air quality standards to ensure that federal actions conform to the purpose of the State Implementation Plan (SIP). The US Department of Transportation cannot fund, authorize, or approve federal actions to support projects that do not conform to Clean Air Act requirements governing the current National Ambient Air Quality Standards (NAAQS).

While ozone and fine particulate emissions have and continue to drop dramatically, the WILMAPCO region still does not meet the rigorous federal air quality standards. Both New Castle and Cecil Counties are designated in moderate non-attainment for ozone. New Castle County is considered in maintenance for fine particulate matter (PM_{2.5}). WILMAPCO is responsible for ensuring a plan in place to meet the attainment levels in these counties

<http://www.wilmapco.org/rtp>

Every four years, MPOs must update their long-range transportation plan with at least a 20 year planning horizon. This long-range plan must be financially reasonable and conform to air-quality standards. Significantly, no transportation projects in the region may be funded with federal money unless the projects are found in an approved long-range transportation plan. Our long-range plan is called the Regional Transportation Plan, or RTP.