Appendix C

Air Quality

8-Hour Ozone (2008) Nonattainment Areas

Data is current as of September 30, 2023

EXTREME
Los Angeles-South Coast Air Basin, CA
Riverside County (Coachella Valley), CA
San Joaquin Valley, CA

SEVERE 15
Dallas-Fort Worth, TX
Denver-Boulder-Greeley-Ft. Collins-Loveland, CO
Houston-Galveston-Brazoria, TX
Kern County (Eastern Kern), CA
Los Angeles-San Bernardino Counties (West Mojave Desert), CA
Morongo Band of Mission Indians, CA
New York-N. New Jersey-Long Island, NY-NJ-CT
Sacramento Metro, CA
San Diego County, CA

SERIOUS
Greater Connecticut, CT
Nevada County (Western part), CA
Ventura County, CA

MODERATE
Baltimore, MD
Imperial County, CA
Mariposa County, CA
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, CA
Phoenix-Mesa, AZ

MARGINAL
Allentown-Bethlehem-Easton, PA
Calaveras County, CA
Chico (Butte County), CA
Dukes County, MA
Jamestown, NY
Lancaster, PA
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE
Pittsburgh-Beaver Valley, PA
Reading, PA
San Francisco Bay Area, CA
San Luis Obispo (Eastern San Luis Obispo), CA
Seaford, DE
Tuscan Buttes, CA
Upper Green River Basin Area, WY

Lehigh County, Pennsylvania

CLEAN AIR ACT GENERAL CONFORMITY RULE APPLICABILITY and AIR EMISSIONS ANALYSES

October 2023

1. INTRODUCTION

The purpose of the Proposed Project is to meet future demand on the cargo service at the airport with construction of a new 20,000 square-foot cargo facility. It is anticipated that the construction of the facility would occur over three years between 2025 and 2027 and the expanded airside and landside cargo operations would begin from 2028 and reach to a full capacity in 2033.

The following air quality emissions analysis performed for the Proposed Action as part of the EA entails:

- Estimate foreseeable air pollutant emissions including criteria pollutants and greenhouse gases (GHG) during all phases of the Proposed Action, direct and indirect that can be reasonably estimated.
- Perform Clean Air Act (CAA) General Conformity Rule (GCR) analysis for the Federal approval action from Federal Aviation Administration (FAA).

1.1 Criteria Pollutants

The National Ambient Air Quality Standards (NAAQS) are the basis to measure the effects of mobile and stationary pollutant sources in ambient air to protect public health and welfare from the adverse impacts associated with ambient air pollutants, as required under the CAA. The US Environmental Protection Agency (USEPA) has established NAAQS for six contaminants, referred to as criteria pollutants, and they are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3, with nitrogen oxides (NO_x) and volatile organic compounds (VOCs) as precursors), particulate matter (including with diameters up to 10 µm [PM_{10}] and up to 2.5 µm [$PM_{2.5}$]), lead (Pb), and sulfur dioxide (SO_2).

The CAA requires geographic areas to be designated according to their ability to attain the NAAQS, and these areas are categorized for each criteria pollutant as:

- *Attainment Area* – Areas where no exceedance of NAAQS for a specific criteria pollutant occurred.
- *Nonattainment Area* – Areas where exceedance of NAAQS for a specific criteria pollutant occurred.
- *Maintenance Area* – Areas that have previously been designated as a nonattainment area but are still in need of efforts to maintain the improved conditions in the future. Most of the CAA rules for nonattainment areas are still applicable to a maintenance area.

If an area is designated as nonattainment for a criteria pollutant under the NAAQS, state governments must develop a specific State Implementation Plan (SIP) and implement control plans to reduce the emission level of that pollutant. The SIP provides for implementation, maintenance, and enforcement of the NAAQS; it includes emission limitations and control measures to attain and maintain the NAAQS.

The 1990 amendments to the CAA require federal agencies to ensure that their actions conform to the SIP in a nonattainment area. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of the standards. The federal agency responsible for a proposed action is required to determine if its proposed action conforms to the applicable SIP.

The USEPA has developed two sets of conformity regulations; federal actions are differentiated into transportation projects and non-transportation-related projects:

- Transportation projects funded or approved by Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) which are governed by the "transportation conformity" regulations (40 CFR Parts 51 and 93), effective on December 27, 1993 and revised on August 15, 1997.
- Non-FHWA/FTA projects or components of an FHWA/FTA transportation project requiring actions by other Federal agencies which are governed by the "general conformity" regulations (40 CFR Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* published in the *Federal Register* on November 30, 1993. The

GCR is applicable to the Federal Aviation Administration (FAA) approval action for the Proposed Action and a GCR applicability analysis is required.

1.3 Greenhouse Gases

GHG emissions trap heat in the atmosphere and contribute to global warming. Under Section 202(a) of the CAA, the USEPA has recognized the potential risks to public health and welfare and signed an endangerment finding regarding GHG emissions. The USEPA's finding states that six key current and projected concentrations of well-mixed GHG emissions in the atmosphere threaten the public health and welfare of current and future generations. These GHG pollutants include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Each GHG is assigned a global warming potential (GWP). The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. The equivalent CO_2 (CO_2e) rate is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emissions rate representing all GHGs.

2. GENERAL CONFORMITY

2.1 Attainment and Nonattainment Areas

The GCR applies to federal actions occurring in air basins designated as nonattainment areas for the NAAQS or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with the NAAQS are not subject to the conformity rule.

The Proposed Action would take place in Lehigh County, Pennsylvania, a part of the Allentown-Bethlehem-Easton marginal nonattainment area for 2008 8-hour O_3 and Allentown moderate nonattainment area for 2006 $PM_{2.5}$ NAAQS, and an attainment area for other criteria pollutants. O_3 is principally formed from nitrogen oxides (NO_x) and volatile organic compounds (VOC) through chemical reactions in the atmosphere in the presence of sunlight.

2.2 De Minimis Emission Levels

To focus general conformity requirements on those federal actions which have the potential for significant air quality impacts, threshold (*de minimis*) emissions rates were established in the final rule. A formal conformity determination is required when the annual net total of direct and indirect emissions from a federal action (occurring in a nonattainment or maintenance area) for a criterion pollutant would equal or exceed the annual *de minimis* level for that pollutant. Table 1 lists the *de minimis* levels for each pollutant based on the area designation.

Since Lehigh County where the proposed action would occur is in a marginal nonattainment area for O_3 within an O_3 transport region and moderate nonattainment area for $PM_{2.5}$ NAAQS, the de minimis levels of 100 tons per year of NO_x and $PM_{2.5}$, and 50 tons per year of VOC are applicable to the Proposed Action.

Table 1: *De Minimis* Emission Levels for Criteria Air Pollutants

Pollutant	Nonattainment Designation	Tons/ Year
Ozone*	Serious	50
	Severe	25
	Extreme	10
	Other nonattainment or maintenance areas outside ozone transport region	100
	Marginal and moderate nonattainment areas inside ozone transport region	50/100**

Carbon Monoxide	All	100
Sulfur Dioxide	All	100
Lead	All	25
Nitrogen Dioxide	All	100
Particulate Matter ≤ 10 microns	Moderate	100
	Serious	70
Particulate Matter ≤ 2.5 microns***	Moderate	100
	Serious	70
Notes: * Applies to ozone precursors – volatile organic compounds (VOC) and nitrogen oxides (NO_x). ** VOC/NO_x; *** Applies to $PM_{2.5}$ and its precursors.		

2.3 Analysis

The GCR applicability analysis was performed to determine whether a formal conformity analysis would be required. Pursuant to the GCR, all reasonably foreseeable emissions (both direct and indirect) associated with the implementation of the Proposed Action were quantified and compared to the applicable annual *de minimis* levels to determine if further analysis is required.

The conformity analysis for a federal action examines the combined impacts of the direct and indirect emissions from stationary and mobile sources. Direct emissions are emissions of a criterion pollutant or its precursors that are caused or initiated by a federal action and occur at the same time and place as the action. Indirect emissions, occurring later in time and/or further removed in distance from the action itself, must be included in the determination if both of the following apply:

- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control.
- The emissions caused by the federal action are reasonably foreseeable.

Increased direct and indirect emissions of NO_x, VOC, and $PM_{2.5}$ would result from the following potential construction and operational activities associated with the Proposed Action:

- Use of diesel and gas-powered construction equipment.
- Movement of trucks containing construction and removal materials.
- Earth disturbance associated fugitive dust.
- Commuting of construction workers.
- Aircraft engines, auxiliary power unit (APU), and ground support equipment (GSE).
- Movement of new commuter vehicles and trucks.

3. EMISSIONS ESTIMATE

Construction emissions were estimated from 2025 to 2027. For the Proposed Project's operations, emissions were estimated for two phases of operations: starting year of 2028 and 2033 when the Proposed Project will be in full service capacity.

3.1 Construction Emissions Estimate

There are two categories of engine sources for which emissions were estimated: nonroad equipment and on-road vehicles including trucks and commuter vehicles.

During the proposed cargo facility construction, emissions would be generated from equipment, including excavators, loaders, rollers, generators, impact drivers, and dump and concrete trucks, associated with

construction of cargo apron, access road, parking lot, building foundation and structure, etc.

After a consultation with Pennsylvania Department of Environmental Protection (Trowbridge, January 4, 2023), the FAA Airport Construction Emissions Inventory Tool (ACEIT-Version 1.0) was used to develop construction activity resource inputs such as sizes, types, operating hours, and number of units of construction engines to be used during each construction phase. These activity resource inputs were further used for construction air emissions estimate. The ACEIT tool default level (Level 1) options was elected for producing construction equipment activity data set.

Emission factors for each concerned pollutant including criteria pollutants and GHGs from on-site equipment engines were developed using the USEPA's "Motor Vehicle Emission Simulator" emission model (Version MOVES3) associated with the Lehigh County (where the Proposed Project is located) default model input parameters for each pollutant. The same model was also used to estimate on-site and off-site truck and commuter vehicle engine emission rates for each pollutant, including GHGs in terms of CO_2e.

The below USEPA-recommended formula was used to calculate hourly emissions from equipment engine sources including excavators, front end loaders, and other machines:

$$M_i = N \times HP \times LF \times EF_i$$

where:
M_i = mass of emissions of i^{th} pollutants during inventory period;
N = source population (units);
HP = average rated horsepower;
LF = typical load factor; and
EF_i = average emissions of i^{th} pollutant per unit of use (e.g., grams per horsepower-hour) predicted by MOVES3.

During construction, in addition to engine emissions, fugitive dust emissions would result from construction truck travel on-site over unpaved roads, unstabilized land via wind erosion, and soil handing. These emissions were calculated based on the ACEIT tool-predicted activity data set with the USEPA procedures provided in AP-42, *Compilation of Air Pollutant Emissions Factors* built into the ACEIT tool.

The combined annual construction emissions estimated for each criterial pollutant and GHGs in terms of CO2 are summarized in Table 2.

The evaluated mobile sources were motor vehicles traveling on roadways and parking facilities within the Study Area. Air emissions associated with motor vehicles are a function of site-specific data such as traffic volumes, speeds, travel distances, vehicle fleet mix, fuel type, and meteorological factors. Emission factors for criteria pollutants were developed using EPA's MOVES model. Vehicle mixes within MOVES were assumed to include passenger cars, combination short-haul trucks. Posted speeds of 35 miles per hour (mph) and 45 mph were assumed based on the type of roadway segment; and 55 mph were used for vehicles traveling within Route 22.

3.2 Operational Emissions Estimate

After the completion of cargo facility, new airside and landsite operational emissions would occur since cargo operational activities would be expanded.

The existing year 2023 airside emissions inventory was prepared for the following airport-related sources – aircraft engines during landing and takeoff (LTO) and taxiing, APUs, and GSE.

The FAA-Aviation Environmental Design Tool (AEDT, version 3e) was used based on the 2023 average annual day flight schedule associated with the stage lengths, fleet mix, and annual operations. Criteria pollutants emissions and GHGs in terms of CO_2 were calculated using AEDT default emission factors for each pollutant and the default mixing height of 3,000 feet for criteria pollutants and 10,000 feet for CO_2. The AEDT-estimated fuel consumption levels were used to estimate CH_4 and N_2O emissions using USEPA-provided CH_4 and N_2O emission factors applicable for jet fuel in *Inventory of U.S. Greenhouse Gas*

Emissions and Sinks: 1990-2018. The airside CO_2e levels were then derived by combing CO_2 emissions and CH_4 and N_2O emissions by multiplying the 100-year GWPs of 25 and 298 for CH_4 and N_2O, respectively.

GSE represent an array of specially designed vehicles and equipment that support and service aircraft in an airport's gate and terminal area. Some aircraft also have APUs that provide power to an aircraft when the engines are not on such as when gate-power/pre-conditioned air (PCA) are not available at an airport's gate). In this analysis, emissions from GSE, including any applicable APUs, were calculated using AEDT default parameters and emission factors.

The future build years of 2028 and 2033 airside emission inventories were determined using the same methodology described above by including additional aircraft operations associated with the Proposed Action.

The net increase in landside criteria pollutant and GHGs in terms of CO_2e emissions were estimated for motor vehicles traveling on roadways between the proposed cargo facility and local distribution centers within the Study Area. Air emissions associated with motor vehicles are a function of site-specific data such as traffic volumes, speeds, travel distances, vehicle fleet mix, fuel type, and meteorological factors. Emission factors for criteria pollutants and GHGs were developed using EPA's MOVES3 model in association with the national default parameters established for Lehigh County. Truck mix was conservatively assumed 100 percent of combination short-haul trucks resulting highest emissions. Post speeds of 35 miles per hour (mph) and 45 mph were assumed based on the type of roadway segment around the airport; and 55 mph were used for vehicles traveling along Route 22. For each landside vehicle, an average of three minutes of idling per trip on airport was assumed in estimating idling emission. An average travel distance of 15 miles for each vehicle trip was assumed in estimating on-road travel emissions.

Average annual daily traffic (AADT) was derived based on the peak hour traffic volume assumed to be 10 percent of AADT associated with the proposed cargo operation analyzed in the 2022 traffic study (The Pidcock Company, March 2022). The AADT for both passenger cars and combination short-haul trucks were assumed to occur during the full capacity year of 2033 with 50 percent them to occur during the starting year of 2028. These AADT volumes were multiplied by 365 days per year to predict total landside annual motor vehicle emissions.

4. GCR CONFORMITY COMPLIANCE

Table 2 presents estimated total annual emissions for NOx, VOC and PM2.5 under both construction and operational conditions which are below the corresponding *de minimis* levels. Therefore, the Proposed Action would be in compliance with the CAA GCR conformity requirements and would not be subject to the GCR determination.

5. OTHER POLLUTANT EMISSIONS

Table 2 also provides estimated construction emissions for NAAQS attainment pollutants and GHG emissions for NEPA disclosure purposes.

Table 2. Total Projected Annual Emissions (short tons)

Activity Year	Pollutant (tons/year)						
	NOx	VOC	$PM_{2.5}$	PM_{10}	CO	Sox	CO2e
Construction (Year 2025 – 2027)							
2025	0.07	0.06	0.00	0.02	0.83	0.00	109.5522
2026	0.58	5.25	0.02	0.23	5.52	0.01	1077.426
2027	0.82	0.16	0.06	0.84	2.00	0.00	929.2698
Operation (Year 2028)							
Aircraft LTOs	4.49	0.05	0.02	0.02	0.57	0.29	1193.49
Aircraft Taxi	0.95	0.12	0.02	0.02	1.56	0.21	559.32
Aircraft GSE	0.09	0.03	0.01	0.01	0.73	0.00	--
Aircraft APU	0.15	0.01	0.01	0.01	0.07	0.02	--
On-road Vehicles	18.25	0.62	0.19	0.32	10.95	0.02	5493.25
Total	23.93	0.83	0.25	0.38	13.88	0.53	7246.07
Operation (Year 2033)							
Aircraft LTOs	13.37	0.11	0.05	0.05	1.14	0.77	3470.97
Aircraft Taxi	1.91	0.25	0.04	0.04	3.09	0.41	1122.26
Aircraft GSE	0.26	0.09	0.01	0.02	2.01	0.00	--
Aircraft APU	0.40	0.02	0.04	0.04	0.18	0.04	--
On-road Vehicles	32.85	1.02	0.28	0.54	18.25	0.04	10238.25
Total	48.79	1.50	0.43	0.69	24.67	1.27	14831.48
GCR De Minimis Thresholds	100	50	100	N/A	N/A	N/A	N/A
Exceeding GCR De Minimis Thresholds	No	No	No	N/A	N/A	N/A	N/A
Notes: N/A: not applicable							

6. REFERNCES

The Pidcock Company. March 2022. Transportation Impact Assessment for the North Cargo Area Development.

Trowbridge, Brian, C., Pennsylvania Department of Environmental Protection, email correspondence on using ACEIT and MOVES3 for construction emissions analysis.

US Federal Aviation Administration (USFAA). May 2022. Aviation Environmental Design Tool (AEDT – Version 3e) Technical Manual.

USFAA. May 2022. Aviation Environmental Design Tool (AEDT – Version 3e) User Guide.

USFAA. 2014. Guidance for Estimating Airport Construction Emissions.

US Environmental Protection Agency (USEPA). November 30, 1993. 40 CFR Parts 6, 51, and 93. Determining Conformity of Federal Actions to State or Federal Implementation Plans. Final Rule.

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USEPA, 2020. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018.

USEPA, 2023. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021.

Oscarson, Bryan

From: Trowbridge, Brian <britrowbri@pa.gov>
Sent: Wednesday, January 4, 2023 1:51 PM
To: Oscarson, Bryan
Cc: Ryan Meyer (rmeyer@lnaa.com); FAA-Harrisburg Airports District Office (heather.f.davis-jenkins@faa.gov); Andrew Brooks (Andrew.Brooks@faa.gov); Trostle, Chris
Subject: RE: Lehigh Valley International Airport - Construction Emissions

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Bryon,

Thank you for the recent call with some additional information on the scope of the project and the ACEIT software.

To clarify my previous e-mail, the Bureau agrees that your proposed methodology using the current version of the ACEIT software to estimate construction equipment and activity, in combination with using the emissions factors from the current version of MOVES3, to estimate direct and indirect project emissions for the purposes of General Conformity applicability, is acceptable.

Please let me know if you have any additional questions.

Regards,
Brian

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From: Oscarson, Bryan <Bryan.Oscarson@aecom.com>
Sent: Friday, December 16, 2022 4:07 PM
To: Trowbridge, Brian <britrowbri@pa.gov>
Cc: Ryan Meyer (rmeyer@lnaa.com) <rmeyer@lnaa.com>; FAA-Harrisburg Airports District Office (heather.f.davis-

jenkins@faa.gov) <heather.f.davis-jenkins@faa.gov>; Andrew Brooks (Andrew.Brooks@faa.gov) <andrew.brooks@faa.gov>
Subject: [External] Lehigh Valley International Airport - Construction Emissions

ATTENTION: *This email message is from an external sender. Do not open links or attachments from unknown senders. To report suspicious email, use the Report Phishing button in Outlook.*

Good afternoon, Brian –

Heather Davis-Jenkins, with the FAA's Harrisburg Airports District Office, has referred me to you for consultation about a question that pertains to General Conformity. AECOM is preparing an environmental assessment for a development project at Lehigh Valley International Airport (ABE) in Allentown, PA, and we need to quantify the airport construction emissions for comparison to applicable de minimis thresholds for criteria pollutants.

Since 2014, our industry has largely relied on the methodology included in ACRP Report 102: Guidance for Estimating Airport Construction Emissions and its companion software—the Airport Construction Emissions Inventory Tool (ACEIT, v1, 2014). To bring consistency to airport construction emissions inventories, ACEIT enables users to rely on default information about the construction process for typical airport projects to develop on-road and non-road inventories using EPA emission factors embedded in the program.

The issue is that the EPA emissions factors embedded in the ACEIT program were superseded by the release of MOVES3 (2020). ACRP is in the process of updating the ACEIT model to include the new emissions factors, but v.2 is not expected to be released for another year or more. Because v1 is outdated and v2 is not ready, AECOM is proposing to 1) use the default construction equipment activity information in ACEIT (v1) and 2) prepare the emission inventories outside of ACEIT.

The primary source of emission factors will be the MOVES model, version 3.04. MOVES will be used for all on-road vehicle emission factors including brake and tire particulate matter and all nonroad equipment emission factors. Emission factors for disturbed soils, fugitive emissions from paving surfaces, fugitive emissions from building coatings, storage piles, and re-entrained dust from roadway surfaces will be estimated using factors and methodologies as contained in AP-42.

FAA is the lead federal agency responsible for making the air quality determination for this airport project. Therefore, on behalf of the FAA and the Airport, we are seeking PADEP review and concurrence to use the approach described herein. Please do not hesitate to let us know if you have any questions or need more information. We are happy to provide a detailed project information, air quality analysis protocol, and/or whatever other information might be helpful.

Thank you have a nice weekend.

Bryan

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Airport Construction Emissions Inventory Tool (ACEIT)
Version 1.0
Run Date & Time: 7/19/2022 10:02:28 AM

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STUDY

Study Name

LVIA Air Cargo Facility

Study Description

New air cai aircraft ap access roa employee parking and truck parking/staging area and a supplemental fuel farm.

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EMISSIONS INVENTORY - SUMMARY

Total Emissions by Year*
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton

Year	CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O
2022	0.825801	0.067812	0.000578	0.02295	0.003611	0.05872	98.68625	0.013536	0.001206
2023	5.521924	0.584748	0.007331	0.227655	0.024317	5.252931	970.2202	0.096409	0.016087
2024	1.99881	0.822247	0.003008	0.84113	0.05599	0.161224	836.9714	0.053513	0.015807

Total Emissions by Source Categories
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases Emission: Metric Ton

Year	Emission S	CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O
2022	NonRoad	0.0331	0.0276	0.0001	0.0027	0.0026	0.007	27.22	0.0002	--
2022	OnRoad	0.792701	0.040212	0.000478	0.00125	0.001011	0.05172	71.46625	0.013336	0.001206
2022	Fugitive	0	0	0	0.019	--	0	--	--	--
2022	TOTAL	0.825801	0.067812	0.000578	0.02295	0.003611	0.05872	98.68625	0.013536	0.001206
2023	NonRoad	0.097	0.2707	0.0013	0.0174	0.0168	0.0181	433.14	0.0014	--
2023	OnRoad	5.181374	0.298826	0.003233	0.009255	0.007517	0.333831	537.0802	0.095009	0.016087
2023	Fugitive	0.24355	0.015222	0.002798	0.201	--	4.901	--	--	--
2023	TOTAL	5.521924	0.584748	0.007331	0.227655	0.024317	5.252931	970.2202	0.096409	0.016087
2024	NonRoad	0.368	0.7322	0.002	0.0552	0.0535	0.063	641.04	0.0042	--
2024	OnRoad	1.63081	0.090047	0.001008	0.002912	0.00249	0.098224	195.9314	0.049313	0.015807
2024	Fugitive	0	0	0	0.783018	--	0	--	--	--
2024	TOTAL	1.99881	0.822247	0.003008	0.84113	0.05599	0.161224	836.9714	0.053513	0.015807

A 3-year construction schedule was evaluated at the start of the NEPA process in 2022 to estimate construction emissions. The results showed that the construction emissions were well below de minimis levels for each year. The project start date has been rescheduled (2025- 2027) but the construction duration has not changed and the results of the analysis remain the same.

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ASSUMPTIONS

Emission factors were developed from the following models:

On-Road Vehicles: MOVES2010b, revised January 2013

Non-Road Equipment: NONROAD2008a, July 2009

In addition to the overall project size dimensions (e.g., Length and width) provided by the user, an additional 10 ft length and 10 ft width is added to account for disturbance areas.

The number of employees is based on the higher of two methods: (1) number of equipment, and (2) multiply the project cost in million by 11.

The average employee travels 30 miles round-trip from home to construction site each day.

The average on-road material delivery round-trip distance per truck is 40 miles per day.

For calculating fugitive, re-entrained PM emissions from on-road and non-road material delivery and handling equipment, a nominal VMT of 5 miles is used for each vehicle per day.

In deriving emission factors from NONROAD, the horsepower for each equipment represents the most popular in each equipment category.

The total length of each modeled scenario is used to define the number of days associated with vehicle/equipment evaporative emissions.

The choice of location and season are assumed to adequately represent differences in fuel characteristics affecting emissions.

Only two seasons (Summer and Winter) are used to represent all seasons.

14 U.S. Counties are used to represent all other counties in the U.S. (all other counties are mapped to the 14).

The default methods assume that all construction equipment use diesel as well as heavy-duty on-road vehicles, while passenger vehicles (including motorcycles) use gasoline.

Fugitive emissions are only modeled for:

- Asphalt drying
- Asphalt storage and batching
- Concrete mixing/batching
- Soil handling
- Unstabilized land and wind erosion
- Material movement (unpaved roads)
- Material movement (paved roads)

On-Road vehicle speeds are not explicitly modeled. The associated emission factors for each modeled vehicle from MOVES represent averages over the driving cycles, the roadway type, and daily temperature variations.

The default equipment hours-of-use data are developed based on the overall size of the project provided by the user and activity rates based on expert engineering judgment.

Under the Construction Activity Type list (Activity Tab), when a choice between asphalt and concrete materials occurs, asphalt is always selected as default. To choose concrete, de-select the aphalt item and select the corresponding concrete item.

Two trips per day were assumed for each on-road material handling trucks.

Only CO2, CH4, and N2O are used to represent greenhouse gas emissions. Other potential greenhouse gases including air conditioning refrigerants were not included.

The following equipment are always modeled using diesel emission factors since gasoline-based emission factors are not available:

- Asphalt Deliveries/Ten Wheelers
- Bulldozer
- Concrete Ready Mix Trucks
- Concrete Ready Trucks Mix for Cores
- Concrete Truck
- Crack Filler (Trailer Mounted)
- Delivery of Tanks (3)
- Distributing Tanker
- Dozer
- Dump Truck
- Dump Truck (12 cy)
- Excavator
- Excavator for U/G Services/Tanks
- Flat Bed or Dump Trucks
- Flatbed Truck
- Grader
- Grout Wheel Truck
- Hoist Equipment with 40 Ton Rig
- Hydralic Hammer
- Hydroseeder
- Line Painting Truck and Sprayer
- Material Deliveries
- Off-Road Truck
- Pickup Truck
- Scraper
- Seed Truck Spreader
- Small Dozer
- Survey Crew Trucks
- Ten Wheelers
- Ten Wheelers- Material Delivery
- Tool Truck
- Tractor Trailer- Equipment Delivery
- Tractor Trailer- Material Delivery
- Tractor Trailer- Steel Deliveries
- Tractor Trailer- Stone Delivery
- Tractor Trailer- Topsoil & Seed
- Tractor Trailer- Truck Delivery
- Tractor Trailer with Boom Hoist- Curbs Del & Place
- Tractor Trailer with Boom Hoist- Delivery
- Tractor Trailers- Rebar Deliveries
- Tractor Trailers Temp Fac.
- Truck for Topsoil & Seed Del&Spread
- Water Truck
- Excavator with Bucket
- Excavator with Hoe Ram

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RICHARD MOLCHANY
Chair, Coordinating Committee

BRENDAN COTTER
Chair, Technical Committee

BECKY A. BRADLEY, AICP
Secretary,
Coordinating Committee +
Technical Committee

Lehigh Valley Transportation Study

Planning for the Future of Lehigh and Northampton Counties at 615 Waterfront Drive, Suite 201, Allentown, PA 18102 ■ (610) 264-4544 ■ lvpc@lvpc.org ■ www.lvpc.org

MEMORANDUM

DATE: July 2, 2024
TO: Ryan Meyer, Lehigh-Northampton Airport Authority
FROM: Ben Dinkel, Transportation Planner
CC: Becky Bradley, AICP, Executive Director
REGARDING: LVTS 2023-2026 Transportation Improvement Program Amendment

On Wednesday, June 12th, 2024, the Lehigh Valley Transportation Study held a regularly scheduled Metropolitan Planning Organization meeting in which the technical and coordinating committees voted to approve the *Allentown-Bethlehem-Easton (ABE) Airport Northside Logistics and Cargo Complex – Nationally Significant Multimodal Freight & Highway Projects Program (INFRA) Award* (MPMS 121443) amendment to the 2023-2026 Lehigh Valley Transportation Improvement Program.

The project is included in the region's air quality conformity determination conducted for the 2025-2028 Transportation Improvement Program (TIP) and 2050 Long Range Transportation Plan (LRTP). The programmed projects in the TIP and LRTP have been shown to be consistent with the region's air quality goals and targets for emission reductions.

The eSTIP approval e-mail, Fiscal Constraint Chart, and Air Quality Conformity Report are attached to this memo.

Date: 5/1/2024 1:35:20PM — Lehigh Valley MPO TIP - Highway & Bridge Projects — Page 31 of 54

PennDOT Project Id: 121443 — New To Planned TIP: Y — Air Quality Status: Non-Significant: Not included in regional conformity analysis

Project Administrator: PennDOT
Improvement Type: New Roadway
Municipality: Hanover (TWP)
Title: ABE Airport Northside Logistics & Cargo Complex
State Route: 0
Estimated Construction Bid Date:
Actual Construction Bid Date:
Location: ABE Airport Northside
Hanover Township
Lehigh County

Project Description: This project will construct a consolidated multimodal cargo facility at Lehigh Valley International Airport (ABE) with connectivity to the National Highway System. The facility will include a dedicated access road and intersection improvements; a cargo building; direct truck to aircraft loading operations area; and stormwater infrastructure enhancements.

Air Quality Description: New access road to airport being build.

Project Costs(In Thousands)

Phase	Fund	2025	2026	2027	2028	2029 - 2032	2033 - 2036
Construction	INFRA	$40,798	$0	$0	$0	$0	$0
Construction	LOC	$29,762	$0	$0	$0	$0	$0
Construction	OTH-F	$4,716	$0	$0	$0	$0	$0
	Federal:	$45514	$0	$0	$0	$0	$0
	State:	$0	$0	$0	$0	$0	$0
	Local/Other:	$29762	$0	$0	$0	$0	$0
		2025	2026	2027	2028	2029 - 2032	2033 - 2036
	Period Totals:	$75,276	$0	$0	$0	$0	$0
Total FFY 2025-2036 Cost		$75,276					

Ben Dinkel

From: Program Center <SP-NoReply@pa.gov>
Sent: Monday, June 24, 2024 2:30 PM
To: Becky A. Bradley
Cc: madolini@pa.gov; dalas@pa.gov; Ben Dinkel; Brian Hite; Evan Gardi; ngonzaleze@pa.gov; Becky A. Bradley; posei@lvpc.org; JERUTH@pa.gov; Eugene.Porochniak@dot.gov; jennifer.crobak@dot.gov; Jonathan.Crum@dot.gov; ronnique.bishop@dot.gov; KSMITHMYER@pa.gov; vanessa.shamberg@dot.gov; c-vvullise@pa.gov
Subject: eSTIP - Lehigh Valley MPO - Allentown-Bethlehem-Easton (ABE) Airport Northside Logistics and Cargo Complex – Nationally Significant Multimodal Freight & Highway Projects Program (INFRA) Award (MPMS 121443)

Good Day,

The eStip from Lehigh Valley MPO is approved.

Comments :

eSTIP approval is requested for the attached Amendment to the LVTS FFY 2023-2026 TIP/2023 Program STIP as approved by the LVTS Coordinating Committee on June 12, 2024 (eSTIP - Lehigh Valley MPO - Allentown-Bethlehem-Easton (ABE) Airport Northside Logistics and Cargo Complex – Nationally Significant Multimodal Freight & Highway Projects Program (INFRA) Award) --- by Reviewer;

This eSTIP has been approved. --- by Approver;

The amendment to the FY2023-2026 Lehigh Valley MPO TIP, as well as to the overall Pennsylvania FY2023-2026 STIP, is approved as submitted in the SharePoint fiscal constraint chart (FCC).
This amendment adds the ABE Airport Northside Logistics & Cargo Complex project (MPMS# 121443) to the 2023 Lehigh Valley MPO TIP. This is a new project with no existing obligations. The project sponsor is the Lehigh-Northampton Airport Authority (LNAA). The CON phase is being added in FFY 2025 to allow the project sponsor to move forward with the environmental process. The funds being programmed in FFY 2025 include $40,798,046 in Nationally Significant Multimodal Freight & Highway Projects Program (INFRA) Federal Grant funds, $4,715,887 in Federal Aviation Administration (FAA) funds (denoted as OTH-F, or Federal Other funds), and $29,761,794 in non-Federal matching funds from the LNAA. The INFRA Grant funding plus the local match amount equals the future eligible project cost as detailed in the INFRA award.
On September 29, 2022, the FHWA PA Division and FTA Region III jointly approved the

2023 STIP and issued the Pennsylvania FFY 2023-2026 Federal Planning Finding. Since the time of this approval, the planning process has not changed and the previous Federal Planning Finding is still valid.
Thank you for your time and attention,
Gene Porochniak, FHWA – PA Division
Senior Community Planner --- by FHWA

LVTS Metropolitan Planning Organization

FISCAL CONSTRAINT TABLE

FFY 2023-2026 TIP Highway Element

PMC Request/Administrative Action Request

MPO Tech Meeting: June 12, 2024 **MPO Coord Meeting: June 12, 2024**

Amendment				Fund Type		FFY 2023			FFY 2024			FFY 2025			FFY 2026			FFYs 2027-2030 and Beyond			Total	Remarks
Project Title	**MPMS**	**Phase**	**Amts**	**Fed.**	**Sta.**	**Fed. ($)**	**State ($)**	**Loc/Oth ($)**	**Fed. ($)**	**State ($)**	**Loc/Oth ($)**	**Fed. ($)**	**State ($)**	**Loc/Oth ($)**	**Fed. ($)**	**State ($)**	**Loc/Oth ($)**	**Fed. ($)**	**State ($)**	**Loc/Oth ($)**		
ABE Airport Northside Logistics & Cargo Complex			Before	INFRA								0									0.00	Add project to TIP to allow sponsor to move forward with environmental process, per FTA. Federal Other funds are FAA funds.
			Before	OTH								0		0							0.00	
- ABE	121443	CON	Adjust	INFRA								40,798,046		29,761,794							70,559,840.00	
			Adjust	OTH								4,715,887									4,715,887.00	
Lehigh County			After	INFRA								40,798,046		29,761,794							70,559,840.00	
			After	OTH								4,715,887									4,715,887.00	
Before FFY Totals						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	Actions do not affect the project delivery schedules or air quality conformity.
FFY Adjustment Totals						0	0	0	0	0	0	45,513,933	0	29,761,794	0	0	0	0	0	0	75,275,727.00	
After FFY Totals						0	0	0	0	0	0	45,513,933	0	29,761,794	0	0	0	0	0	0	75,275,727.00	

NOTES:

Created: 8/31/2021
Last Update: 8/31/2021

Air Quality Conformity Analysis Report

Lehigh Valley MPO 2025-2028 Transportation Improvement Program (TIP) and 2050 Long Range Transportation Plan (LRTP)

National Ambient Air Quality Standards (NAAQS) Addressed:

- 2008 8-Hour Ozone (Nonattainment)
- 2006 24-Hour $PM_{2.5}$ (Maintenance)

Prepared by:

The Lehigh Valley Planning Commission and
Pennsylvania Department of Transportation
for the
Lehigh Valley Transportation Study

Report Date: **May 2024**

Table of Contents

Table of Exhibits

Summary of Attachments

Attachment A: Project List
Attachment B: Detailed Emission Results
Attachment C: Sample MOVES Input Files

Overview

This report provides an analysis of the air quality implications of the Lehigh Valley Transportation Study (LVTS) MPO 2025-2028 Transportation Improvement Program (TIP) and 2050 Long Range Transportation Plan (LRTP). The analysis demonstrates transportation conformity under the 2008 8-hour ozone National Ambient Air Quality Standards (NAAQS) and the 2006 24-hour $PM_{2.5}$ NAAQS. The air quality conformity analysis reflects an assessment of the regionally significant, non-exempt transportation projects included in both the TIP and LRTP. Note that conformity for the LRTP is being reaffirmed as there are no changes to the LRTP from the previous conformity determination.

This document replaces the previously approved conformity demonstration of the TIP and LRTP and ensures that the findings meet all current criteria established by the U.S. Environmental Protection Agency (EPA) for the applicable NAAQS. A new conformity determination has been completed to provide a regional forecast of emissions based on planned air quality significant projects in the updated TIP and the latest available planning assumptions. All air quality significant projects for the LRTP remain the same as previous conformity determinations. The TIP and LRTP projects are listed in **Attachment A**.

Background on Transportation Conformity

Transportation conformity is a way to ensure that federal funding and approval are awarded to transportation activities that are consistent with air quality goals. Under the Clean Air Act (CAA), transportation and air quality modeling procedures must be coordinated to ensure that the TIP and the LRTP are consistent with the area's applicable State Implementation Plan (SIP). The SIP is a federally approved and enforceable plan by which each area identifies how it will attain and/or maintain the health-related primary and welfare-related secondary NAAQS.

In order to receive transportation funding and approvals from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA), state and local transportation agencies must demonstrate that the plans, programs, or projects meet the transportation conformity requirements of the CAA as set forth in the transportation conformity rule. Under the transportation conformity rule, transportation plans are expected to conform to the applicable SIP in nonattainment or maintenance areas. The integration of transportation and air quality planning is intended to ensure that transportation plans, programs, and projects will not:

- Cause or contribute to any new violation of any applicable NAAQS.
- Increase the frequency or severity of any existing violation of any applicable NAAQS.
- Delay timely attainment of any applicable NAAQS, any required interim emissions reductions, or other NAAQS milestones.

The transportation conformity determination includes an assessment of future highway emissions for defined analysis years, including the end year of the LRTP. Emissions are estimated using the latest available planning assumptions and available analytical tools, including EPA's latest approved on-highway mobile sources emissions model, the Motor Vehicle Emission Simulator

(MOVES). The conformity determination provides a tabulation of the analysis results for applicable precursor pollutants, showing that the required conformity test was met for each analysis year.

Report Contents

This document includes a summary of the methodology and data assumptions used for the conformity analysis. As shown in **Exhibit 1**, attachments containing additional detail have been provided with the document. In addition, modeling input and output files have been reviewed by the Environmental Protection Agency (EPA) Region III and the Pennsylvania Department of Environmental Protection (DEP).

EXHIBIT 1: SUMMARY OF ATTACHMENTS

Attachment	Title	Description
A	Project List	Provides a list of regionally significant highway projects for the TIP and LRTP.
B	Detailed Emission Results	Provides a detailed summary of emissions by roadway type.
C	MOVES Sample Run Specification	Provides example MOVES data importer (XML) and run specification (MRS) files.

National Ambient Air Quality Standard Designations

The CAA requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. A nonattainment area is any area that does not meet the primary or secondary NAAQS. Once a nonattainment area meets the standards and additional redesignation requirements in the CAA [Section 107(d)(3)(E)], EPA will designate the area as a maintenance area.

The Lehigh Valley MPO area (includes Lehigh and Northampton counties) is currently designated as a marginal nonattainment area under the 2008 8-hour ozone NAAQS and a maintenance area under the 2006 24-hour $PM_{2.5}$ NAAQS. The region is attaining the current 2012 annual $PM_{2.5}$ NAAQS. Transportation conformity requires nonattainment and maintenance areas to demonstrate that all future transportation projects will not prevent an area from reaching its air quality attainment goals.

Fine Particulate Matter

Fine particulate matter (PM2.5) can be emitted directly into the atmosphere (sources include exhaust and dust from brake and tire wear) or formed in the atmosphere by combinations of precursor pollutants (secondary formation). Sulfates and nitrates are two types of pollutants that contribute to secondary formation. Sulfate emissions are a result of power plant and industry emissions, while nitrate emissions result from automobiles, power plants, and other combustion sources. Scientific studies have shown a significant correlation between exposure to fine particulates and severe health issues such as heart disease, lung disease, and premature death.

The pollutants that could be analyzed in the conformity analysis are: [1] direct PM2.5 emissions (tail pipe emissions, brake and tire wear), [2] re-entrained road dust, and [3] precursors nitrogen oxides (NOX), volatile organic compounds (VOC), sulfur oxides (SOX) and ammonia (NH3). The EPA has ruled that until the EPA or DEP find that other precursor pollutants are significant contributors, and a SIP revision is approved stating such findings, direct PM2.5 emissions and NOX are the only pollutants that must be analyzed for transportation conformity (40 CFR 93.119(f)(8)–(10)).

1997 Annual PM2.5 and 2006 24-hour PM2.5 Standards

The EPA published the 1997 annual PM2.5 NAAQS on July 18, 1997, (62 FR 38652), with an effective date of September 16, 1997. An area is in nonattainment of this standard if the 3-year average of the annual mean PM2.5 concentrations (for designated monitoring sites within an area) exceed 15.0 micrograms per cubic meter (µg/m3). Berks County was designated as a nonattainment area under the 1997 annual PM2.5 NAAQS, effective April 5, 2005 (70 FR 944).

The EPA published the 2006 24-hour PM2.5 NAAQS on October 17, 2006, (71 FR 61144), with an effective date of December 18, 2006. The rulemaking strengthened the 1997 24-hour standard of 65 µg/m3 (62 FR 38652) to 35 µg/m3 and retained the 1997 annual PM2.5 NAAQS of 15 µg/m3. An area is in nonattainment of the 2006 24-hour PM2.5 NAAQS if the 98th percentile of the annual 24-hour concentrations, averaged over three years, is greater than 35 µg/m3. Berks County was designated as attainment under the 2006 24-hour PM2.5 NAAQS, effective December 14, 2009 (74 FR 58688).

A redesignation request and maintenance plan applicable to the 1997 annual PM2.5 NAAQS was approved by EPA and effective December 22, 2014 (79 FR 76251). The maintenance plan includes 2017 and 2025 PM2.5 and NOX mobile vehicle emission budgets (MVEBs) for transportation conformity purposes.

EPA took final action on the "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" rule on August 24, 2016 (81 FR 58010 effective on October 24, 2016). In that rulemaking, EPA finalized the option that revokes the 1997 primary annual PM2.5 NAAQS in areas that have always been designated as attainment and in maintenance of that NAAQS. After revocation, areas no longer have to expend resources on CAA air quality planning and conformity determination requirements associated with the 1997 annual PM2.5 NAAQS.

2012 Annual PM2.5 Standard

The EPA published the 2012 annual PM2.5 NAAQS on January 15, 2013, (78 FR 3086), with an effective date of March 18, 2013. The EPA revised the annual PM2.5 NAAQS by strengthening the standard from 15 µg/m3 to 12 µg/m3. An area is in nonattainment of this standard if the 3-year average of the annual mean PM2.5 concentrations for designated monitoring sites in an area is greater than 12.0 µg/m3. On December 18, 2014, EPA issued final designations for the standard that were revised on April 7, 2015 (80 FR 18535). Berks County is designated in attainment of the standard.

2024 Annual PM2.5 Standard

On February 7, 2024, EPA strengthened the annual PM2.5 standard at 9.0 µg/m3 to provide increased public health protection, consistent with the available health science. The nonattainment areas have not been designated yet for this new standard.

Ozone

Ozone is formed by chemical reactions occurring under specific atmospheric conditions. Precursor pollutants that contribute to the formation of ozone include VOC and NO_X, both of which are components of vehicle exhaust. VOCs may also be produced through the evaporation of vehicle fuel, as well as by displacement of vapors in the gas tank during refueling. By controlling VOC and NO_X emissions, ozone formation can be mitigated.

2008 8-hour Ozone NAAQS

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 nonattainment 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. The Lehigh Valley MPO area was designated as a nonattainment area under the 2008 8-hour ozone NAAQS, effective July 20, 2012 (77 FR 30088). The nonattainment area also includes Carbon County, which demonstrates conformity separately. Effective June 3, 2016, EPA determined that the Lehigh Valley MPO area has attained the 2008 ozone NAAQS by the applicable attainment date. This determination of attainment does not constitute a redesignation to attainment. Redesignations require states to meet a number of additional statutory criteria, including the EPA approval of a state plan demonstrating maintenance of the air quality standard for 10 years after redesignation.

2015 8-hour Ozone NAAQS

In 2015, based on its review of the air quality criteria for ozone and related photochemical oxidants, the EPA revised the primary and secondary NAAQS for ozone to provide requisite protection of public health and welfare, respectively (80 FR 65292). The EPA revised the levels of both standards to 0.070 ppm, and retained their indicators, forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours). On October 16, 2018 (83 FR 52163), EPA established designations to include Lehigh and Northampton Counties as attainment for the 2015 8-hour ozone NAAQS. However, a conformity determination is required as long as 2008 8-hour ozone standard is not revoked by EPA.

Interagency Consultation

As required by the federal transportation conformity rule, the conformity process includes a significant level of cooperative interaction among federal, state, and local agencies. For this air quality conformity analysis, interagency consultation was conducted as required by the Pennsylvania Conformity SIP. This included conference call(s) or meeting(s) of the Pennsylvania Transportation-Air Quality Work Group (including the Pennsylvania Department of Transportation (PennDOT), DEP, EPA, FHWA, FTA and representatives from larger MPOs within the state). A meeting was conducted on February 7, 2024 to review all planning assumptions and to discuss the template and content for transportation conformity analyses.

Analysis Methodology and Data

This transportation conformity analysis was conducted using EPA's MOVES model, which is the official model for estimating emissions from highway vehicles for SIP emission inventories and transportation conformity (75 FR 9411. MOVES3 has been used for this conformity determination and is (in addition to MOVES4) currently considered one of the latest approved model versions for SIP and transportation conformity purposes (88 FR 32167). After September 12, 2025, MOVES4 must be used for conformity determinations.

Planning assumptions are updated following EPA and FHWA joint guidance (EPA420-B-08-901) that clarifies the implementation of the latest planning assumption requirements in 40 CFR 93.110. This analysis utilizes the best available latest traffic, vehicle fleet and environmental data to estimate regional highway emissions.

PennDOT updates many of the key planning assumptions on a triennial basis to support EPA's National Emissions Inventory (NEI) and FHWA's latest planning assumption requirements for transportation conformity. The PennDOT triennial data update is typically used to inform the planning assumptions for the future analysis years used for transportation conformity.

Due to the impacts that COVID has had on the vehicle fleet turnover, PennDOT, in coordination with the Pennsylvania Air Quality Workgroup, has determined that the estimates of the vehicle fleet age for the most recent available data (2020-2022) may not be reflective of future conditions

or longer term trends. Thus, the vehicle age assumption relied on previous planning assumptions used for past conformity analyses.

All other data assumptions for the conformity analysis relied on the latest available planning assumptions or national/local defaults consistent with methods used for past conformity analyses and EPA's technical guidance. This includes information and characteristics related to fuels, inspection maintenance (I/M) program parameters, heavy-truck long duration idling, and environmental data (e.g. temperatures and humidity).

The analysis methodology and data inputs for this analysis were developed through interagency consultation and used available EPA guidance documents that included:

- Policy Guidance on the Use of MOVES3 for State Implementation Plan Development, Transportation Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-20-044, November 2020.

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

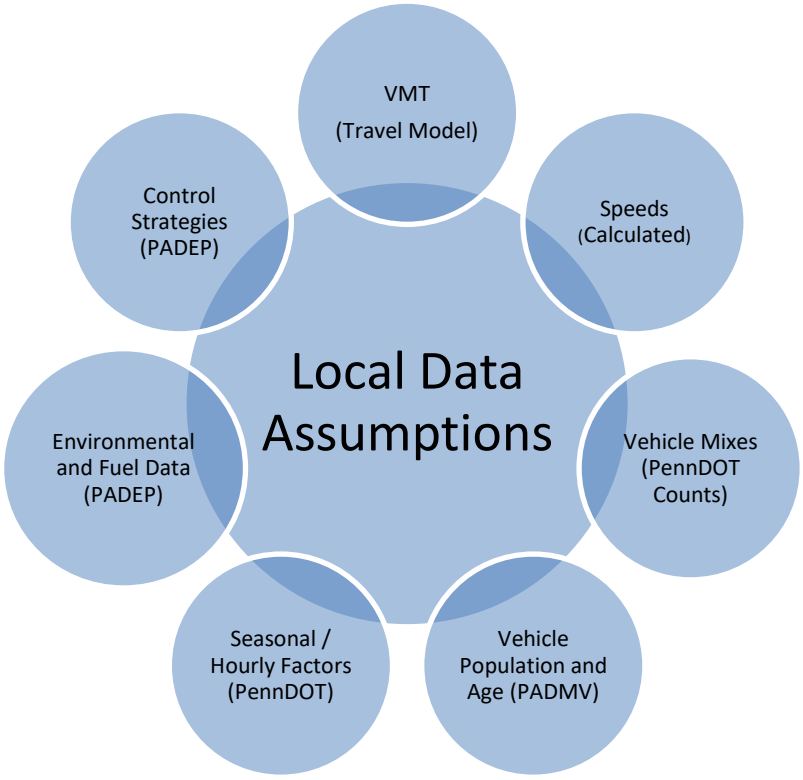
A mix of local and national default (internal to MOVES) data are used in the analysis. As illustrated in **Exhibit 2**, local data has been used for data items that have a significant impact on emissions, including: vehicle miles of travel (VMT), vehicle population, congested speeds, and vehicle type mix, as well as environmental and fuel assumptions. Local data inputs to the analysis process reflect the latest available planning assumptions using information obtained from PennDOT, DEP and other local/national sources.

The methodology used for this analysis is consistent with the methodology used to develop SIP inventories. This includes the use of custom post-processing software (PPSUITE) to calculate hourly speeds and prepare key traffic input files to the MOVES 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.

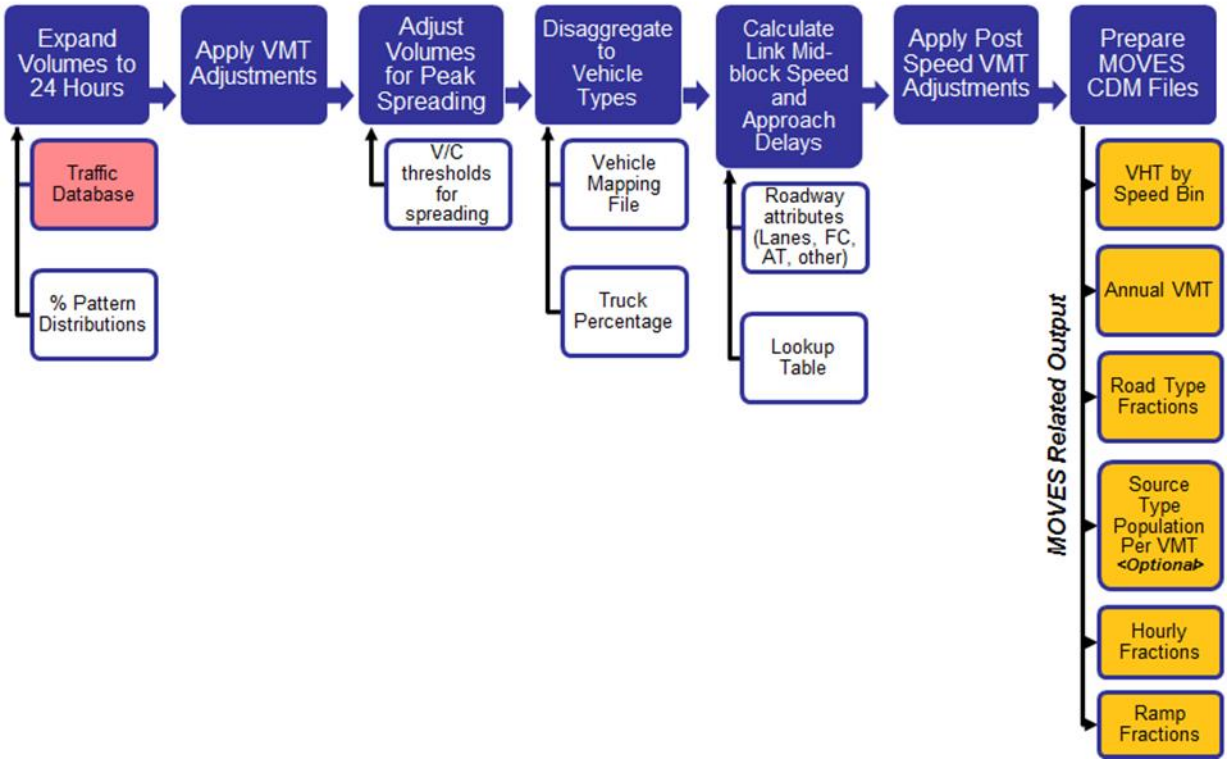
EXHIBIT 2: LOCAL DATA INPUTS USED FOR CONFORMITY RUNS



PPSUITE is a widely used and accepted tool for estimating speeds and processing emissions rates. The PPSUITE tool has been used for developing on-highway mobile source inventories in SIP revisions, control strategy analyses, and conformity analyses in other states. The software was developed to utilize accepted transportation engineering methodologies. The PPSUITE process is integral to producing traffic-related input files to the MOVES emission model. **Exhibit 3** summarizes the key functions of PPSUITE within the emission calculation process. Other MOVES input files are prepared externally to the PPSUITE software, including vehicle population, vehicle age, environmental and fuel input files.

The CENTRAL software is also used in this analysis. CENTRAL is a menu-driven software platform that executes the PPSUITE and MOVES processes in batch mode. The CENTRAL software allows users to execute runs for a variety of input options and integrates custom SQL steps into the process. CENTRAL provides important quality control and assurance steps, including file naming and storage automation.

EXHIBIT 3: EMISSION CALCULATION PROCESS



Key MOVES 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 inputs include traffic flow characteristics, vehicle descriptions, fuel parameters, I/M program parameters and environmental variables. MOVES includes a default national database of meteorology, vehicle fleet, vehicle activity, fuel and emission control program data for every county; EPA, however, cannot certify that the default data is the most current or best available information for any specific area. As a result, local data, where available, is recommended for use when conducting a regional conformity analysis. A mix of local and default data is used for this analysis. These data items are discussed in the following sections.

Travel Demand Model

The roadway data input to emissions calculations for this conformity analysis is based on information from the region's travel demand forecasting model. The travel demand model estimates roadway volumes based on input demographic forecasts and expected changes to the transportation roadway network.

The regional travel demand model follows the basic "four-step" travel demand forecasting process and utilizes the Cube Voyager (TP+) software platform. The model consists of 510 Traffic

Analysis Zones (TAZ's), approximately 9,000 links, and approximately 5,200 nodes. The network contains attributes such as distance, number of lanes, area type, facility type, free flow speed, capacity of the lane, and location of traffic signals.

The model was updated in December of 2023. This update includes preparation of a new socio-economic dataset developed using the Census 2020 data, updates to the external share model and through trip table, updates to trip generation rates, and revisions to model parameters and coefficients to reflect 2022 traffic patterns and conditions. The project team decided to utilize year 2022 traffic conditions due to the significant impact of COVID19 on 2020 traffic patterns. Using the projected traffic volume data from the model, conditions were evaluated for all applicable future analysis years. All significant air quality projects from the TIP and LRTP were coded into the travel demand model. Transit data was also generated as part of the travel demand model. Existing fixed transit routes and their associated attributes (i.e., stops, headways, fares, speeds) are included within a transit subroutine. Ridership estimates generated by this subroutine are fed back into the model stream as part of the overall network processing.

Traffic forecasts were projected based on the socioeconomic and land use data projections developed and adopted by the Lehigh Valley Planning Commission. This data includes total population, households, and employment. **Exhibit 4** summarizes the socioeconomic data for the base year and horizon years of the LRTP. Socioeconomic data for other analysis years were forecasted using interpolation.

EXHIBIT 4: SOCIOECONOMIC GROWTH ASSUMPTIONS TO THE TRAVEL MODEL

County	Year	Population	Household	Total Employment
Lehigh Valley	2025	702,202	277,082	402,086
	2030	719,113	283,771	413,159
	2035	736,023	290,460	424,233
	2045	769,844	303,838	446,380
	2050	786,755	310,527	457,453

The travel model network and assigned traffic volumes are processed by PPSUITE to prepare the traffic inputs needed to run the MOVES emission model. The following information is extracted from the model for emission calculations:

- Lanes
- Roadway capacity
- Distance
- Daily traffic volume
- Type of area abutting the roadway (e.g., urban, suburban, rural, etc.)
- Type of roadway facility (e.g., interstate, arterial, collector, local, etc.)

Other Supporting Traffic Data

Other traffic data is used to adjust and disaggregate traffic volumes. Key sources used in these processes include the following:

- *Highway Performance Monitoring System (HPMS VMT)*: According to EPA guidance, baseline inventory VMT computed from the regional travel model must be adjusted to be consistent with HPMS VMT totals. The VMT contained in the HPMS reports are considered to represent average annual daily traffic (AADT), an average of all days in the year, including weekends and holidays. Adjustment factors are calculated and used to adjust locally modeled roadway data VMT to be consistent with the reported HPMS totals and are applied to all county and facility group combinations within the region. These adjustments are important to account for local roadway VMT not represented within the regional travel demand model.

- *Seasonal Factors*: The traffic volumes estimated from the regional travel demand model are adjusted to summer or average monthly conditions (as needed for annual processing), using seasonal adjustment factors prepared by PennDOT's BPR in their annual traffic data report published on the BPR website (https://www.penndot.pa.gov/ProjectAndPrograms/Planning/TrafficInformation/Pages/default.aspx). The seasonal factors are also used to develop MOVES daily and monthly VMT fraction files, allowing MOVES to determine the portion of annual VMT that occurs in each month of the year.

- *Hourly Patterns*: Speeds and emissions vary considerably depending on the time of day. In order to produce accurate emission estimates, it is important to estimate the pattern by which roadway volume varies by breaking the data down into hourly increments. Pattern data is in the form of a percentage of the daily volumes for each hour. Distributions are provided for all the counties within the region and by each facility type grouping. The hourly pattern data has been developed from 24-hour vehicle count data compiled by PennDOT's BPR, using the process identified in PennDOT's annual traffic data report. The same factors are also used to develop the MOVES hourly fraction file.

Vehicle Class

MOVES produces emission rates for thirteen MOVES vehicle source input types. VMT, however, is input to MOVES by six HPMS vehicle groups (note that passenger cars and light trucks are grouped for input to MOVES3.1). **Exhibit 5** summarizes the distinction between each classification scheme.

EXHIBIT 5: MOVES SOURCE TYPES AND HPMS VEHICLE GROUPS

SOURCE TYPES		HPMS Class Groups	
11	Motorcycle	10	Motorcycle
21	Passenger Car	25	Passenger Car
31	Passenger Truck	25	Passenger/Light Truck
32	Light Commercial Truck	40	Buses
41	Other Buses	50	Single Unit Trucks
42	Transit Bus	60	Combination Trucks
43	School bus		
51	Refuse Truck		
52	Single Unit Short-haul Truck		
53	Single Unit Long-haul Truck		
54	Motor Home		
61	Combination Short-haul Truck		
62	Combination Long-haul Truck		

The emissions estimation process includes a method to disaggregate the traffic volumes to the thirteen source types and then to recombine the estimates to the five HPMS vehicle classes. Vehicle type pattern data is used by PPSUITE to distribute the hourly roadway segment volumes among the thirteen MOVES source types. Similar to the 24-hour pattern data, this data contains percentage splits to each source type for every hour of the day. The vehicle type pattern data is developed from several sources of information:

- PennDOT truck percentages from the RMS database.
- Hourly distributions for trucks and total traffic compiled by PennDOT's BPR.
- School bus registration data from PennDOT's Bureau of Motor Vehicles Registration Database.

Vehicle type percentages are also input into the capacity analysis section of PPSUITE to adjust the speeds in response to truck volume. Larger trucks take up more roadway space compared to an equal number of cars and light trucks, which is accounted for in the speed estimation process by adjusting capacity using information from the Transportation Research Board's fifth edition of the *Highway Capacity Manual* (http://hcm.trb.org/).

Vehicle Ages

Vehicle age distributions are input to MOVES for each of the thirteen source types. These distributions reflect the percentage of the vehicle fleet falling under each vehicle model year (MY), to a maximum age of 31 years. The vehicle age distributions were prepared from the most recently available registration download from PennDOT's Bureau of Motor Vehicles Registration Database. Due to data limitations, information for light duty vehicles, other buses and motor home (including source types 11, 21, 31, 32, 41 and 54) was used as local data for MOVES inputs, while heavy-duty vehicles (including source types 42, 43, 51, 52, 53, 61, and 62) used the internal MOVES national default age distribution data. The registration data download is based on MOBILE6.2 vehicle categories. The data was converted to source types using the EPA convertor spreadsheets provided with the MOVES emission model.

Vehicle Population

The vehicle population information, including the number and age of vehicles, impacts forecasted start and evaporative emissions within MOVES. Similar to vehicle ages, MOVES requires vehicle populations for each of the thirteen source type categories. County vehicle registration data was used to estimate vehicle population for light-duty vehicles, transit buses, and school buses. Other heavy-duty vehicle population values were based on VMT for each source type using the vehicle mix and pattern data discussed previously. PPSUITE automatically applies MOVES default ratios of VMT and source type population (e.g., the number of miles per vehicle by source type) to the local VMT estimates to produce vehicle population.

For the preparation of source type population for other required conformity analysis years, base values were adjusted using forecast population and household data for the area. Growth rates were limited so as to not exceed the Lehigh Valley VMT growth assumptions.

Meteorology Data

Average monthly minimum temperatures, maximum temperatures, and humidity values are consistent with the regional State Implementation Plan (SIP) modeling conducted by DEP. The data was obtained from AccuWeather, Inc. (www.accuweather.com). The 10-year (2010-2020) average minimum and maximum monthly temperature and relative humidity values were obtained for each of the 10 airport locations in Pennsylvania.

Fuel Parameters

The MOVES3 default data assumptions have been reviewed and determined adequate to be used as inputs to the MOVES emissions modeling. Key assumptions include:

- 10.0 RVP used for summer months.
- 100% market share of 10% ethanol throughout the year for analysis years 2025, 2035 and 2045 (based on MOVES3 defaults).

I/M Program Parameters

The inspection maintenance (I/M) program inputs to the MOVES model are based on current programs within each county (all PA I/M programs are based on county boundaries). All analysis years include Pennsylvania's statewide I/M program. The default I/M program parameters included in MOVES were examined for each county and necessary changes were made to the default parameters to match the 2021 I/M program performance.

In order to assure that emission controls are working properly, vehicle inspection and maintenance (I/M) programs have been adopted in some nonattainment areas. These programs have the added benefit of improving the fuel efficiency of vehicles. The Pennsylvania inspection and maintenance (I/M) program was upgraded and expanded throughout the state with a phase-in period starting in September 2003 and fully implemented by June 2004.

The I/M program requirements vary by region (five regions) and include on-board diagnostics (OBD) technology that uses the vehicle's computer for model years 1996 and newer to identify potential engine and exhaust system problems that could affect emissions. The program, named PAOBDII, is implemented by region as follows:

- Philadelphia Region - Bucks, Chester, Delaware, Montgomery and Philadelphia Counties
- [Includes tailpipe exhaust testing using ASM2015 or equipment for pre-1996 vehicles up to 25 years old]
- Pittsburgh Region - Allegheny, Beaver, Washington and Westmoreland Counties.
- [Includes tailpipe exhaust testing using PA 97 equipment for pre-1996 vehicles up to 25 years old]
- South Central and Lehigh Valley Region - Berks, Cumberland, Dauphin, Lancaster, Lebanon, Lehigh, Northampton and York Counties.
- [Includes gas cap and visual inspection only for 1975 through 1995 model years]
- North Region - Blair, Cambria, Centre, Erie, Lackawanna, Luzerne, Lycoming, and Mercer Counties.
- [Gas cap and visual inspection only – No OBD]
- Other 42 Counties – Includes the remaining 42 counties not included above.
- [Visual inspection only – No OBD]

Other Vehicle Technology and Control Strategy Data

<u>Federal Programs</u>

Current federal vehicle emissions control and fuel programs are incorporated into the MOVES3 software. The MOVES3 model includes the National Program standards covering light duty vehicles through model year 2026, heavy duty greenhouse gas standards for model year 2014-2018 vehicles, and the Tier 3 vehicle standards. Modifications of default emission rates are required to reflect the early implementation of the National Low Emission Vehicle (NLEV) program in Pennsylvania. To reflect these impacts, EPA has released instructions and input files that can

be used to model these impacts. The NLEV input database was created for Pennsylvania per EPA's instructions and was used for this inventory.

MOVES3 also 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.

State Programs

The Pennsylvania Clean Vehicles (PCV) Program, adopted in 1998, incorporated the California Low Emission Vehicle Regulations (CA LEV) by reference. The PCV Program allowed automakers to comply with the NLEV program as an alternative to this Pennsylvania program until MY2006. Beginning with MY2008, all "new" passenger cars and light-duty trucks with a gross vehicle weight rating (GVWR) of 8,500 pounds or less sold/leased and titled in Pennsylvania must be certified by the California Air Resources Board (CARB) or be certified for sale in all 50 states. For this program, a "new" vehicle is a qualified vehicle with an odometer reading less than 7,500 miles. DEP and PennDOT both work with the public, including manufacturers, vehicle dealers and consumers, to ensure that vehicles sold and purchased in Pennsylvania or vehicles purchased from other states by Pennsylvania residents comply with the requirements of the PCV Program, in order to be titled in Pennsylvania. Additionally, PennDOT ensures that paperwork for title and registration includes proof of CARB- or 50-state emission certification or that the vehicle owner qualifies for an exemption to the requirements, as listed on PennDOT's MV-9 form and in the PCV Program regulation. When necessary, information from PennDOT's title and registration process may be used to audit vehicle title transactions to determine program compliance.

The impacts of this program are modeled for all analysis years beyond 2008 using the same instructions and tools downloaded for the early NLEV analysis. EPA provided input files to reflect state programs similar to the CAL LEV program. Modifications to those files were made to reflect a 2008 program start date for Pennsylvania.

Analysis Process Details

The previous sections have summarized the input data used for computing speeds and emission rates for this conformity analysis. This section explains how PPSUITE and MOVES use that input data to produce emission estimates. **Exhibit 6** provides a more detailed overview of the PPSUITE analysis procedure using the available traffic data information described in the previous sections.

VMT Preparation

Producing an emissions inventory with PPSUITE requires a process of disaggregation and aggregation. Data is available and used on a very detailed scale – individual roadway segments for each of the 24 hours of the day. This data needs to be processed individually to determine the distribution of vehicle hours of travel (VHT) by speed and then aggregated by vehicle class to determine the input VMT to the MOVES emission model. Key steps in the preparation of VMT include:

- *Assemble VMT* - The regional travel demand model contains the roadway segments, distances and travel volumes needed to estimate VMT. PPSUITE processes each segment by simply multiplying the assigned travel volume by the distance to obtain VMT.
- *Apply Seasonal Adjustments* – PPSUITE adjusts the traffic volumes to the appropriate analysis season. These traffic volumes are assembled by PPSUITE and extrapolated over the course of a year to produce the annual VMT file input to MOVES.
- *Disaggregate to Hours* - After seasonal adjustments are applied, the traffic volumes are distributed to each hour of the day. This allows for more accurate speed calculations (effects of congested hours) and allows PPSUITE to prepare the hourly VMT and speeds for input to MOVES.
- *Peak Spreading* - After distributing the daily volumes to each hour of the day, PPSUITE identifies hours that are unreasonably congested. For those hours, PPSUITE then spreads a portion of the volume to other hours within the same peak period, thereby approximating the "peak spreading" that normally occurs in such over-capacity conditions. This process also helps prevent hours with unreasonably congested speeds from disproportionately impacting emission calculations.
- *Disaggregation to Vehicle Types* - EPA requires VMT estimates to be prepared by the six HPMS vehicle groups, reflecting specific local characteristics. As described in the previous section, the hourly volumes are disaggregated into thirteen MOVES source types based on data from PennDOT, in combination with MOVES defaults. The thirteen MOVES source types are then recombined into five HPMS vehicle classes.
- *Apply HPMS VMT Adjustments* - Volumes must also be adjusted to account for differences with the HPMS VMT totals, as described in previous sections. VMT adjustment factors are provided as inputs to PPSUITE and are applied to each of the roadway segment volumes. VMT adjustment factors are also applied to runs for future years.

Speed Estimation

Emissions for many pollutants (including VOC and NO_X) vary significantly with travel speed. VOC emissions generally decrease as speed increases, while NO_X emissions decrease at low speeds and increases at higher speeds, as illustrated in **Exhibit 7**. Because emissions are so sensitive to speed changes, EPA recommends special attention be given to developing reasonable and consistent speed estimates. EPA also recommends that VMT be disaggregated into subsets that have roughly equal speeds, with separate emission factors for each subset. At a minimum, speeds should be estimated separately by road type.

The computational framework used for this analysis meets and exceeds the recommendation above relating to speed estimates. Speeds are individually calculated for each roadway segment and hour. Rather than accumulating the roadway segments into a particular road type and calculating an average speed, each individual link hourly speed is represented in the MOVES vehicle hours of travel (VHT) by a speed bin file. This MOVES input file allows the specification of a distribution of hourly speeds. For example, if 5% of a county's arterial VHT operates at 5 mph during the AM peak hour and the remaining 95% operates at 65 mph, this can be represented in the MOVES speed input file. For the roadway vehicle emissions calculations, speed distributions are input to MOVES by road type and source type for each hour of the day.

To calculate speeds, PPSUITE first obtains initial capacities (i.e., how much volume the roadway can serve before heavy congestion) and free-flow speeds (speeds assuming no congestion) from a speed/capacity lookup table. As described previously, this data contains default roadway information indexed by the area and facility type codes. For areas with known characteristics, values can be directly coded to the database and the speed/capacity default values can be overridden. For most areas where known information is unavailable, the speed/capacity lookup tables provide valuable default information regarding speeds, capacities, signal characteristics, and other capacity adjustment information used for calculating congested delays and speeds. The result of this process is an estimated average travel time for each hour of the day for each highway segment. The average travel time multiplied by traffic volume produces vehicle hours of travel (VHT).

EXHIBIT 6: PPSUITE SPEED/EMISSION ESTIMATION PROCEDURE

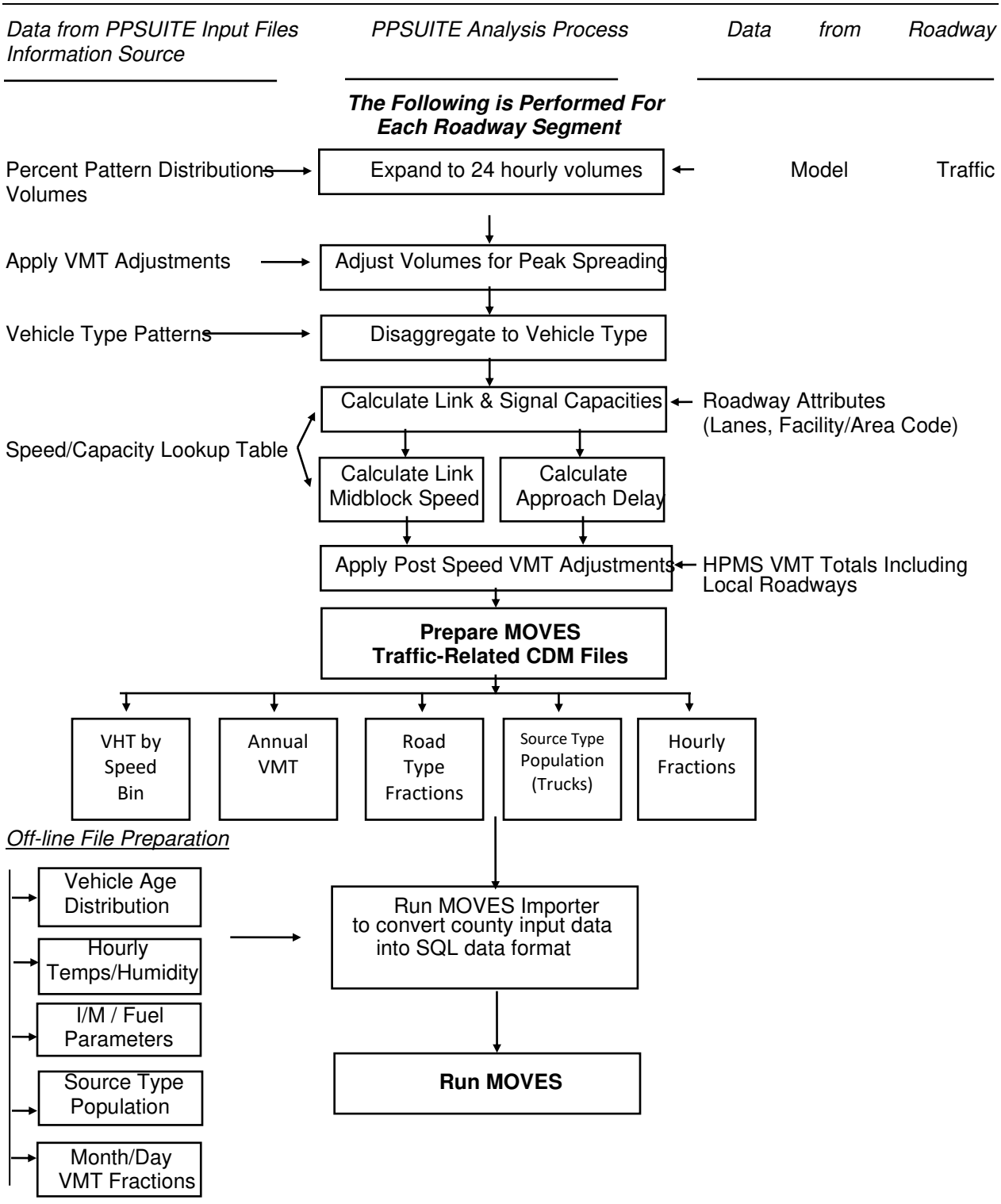
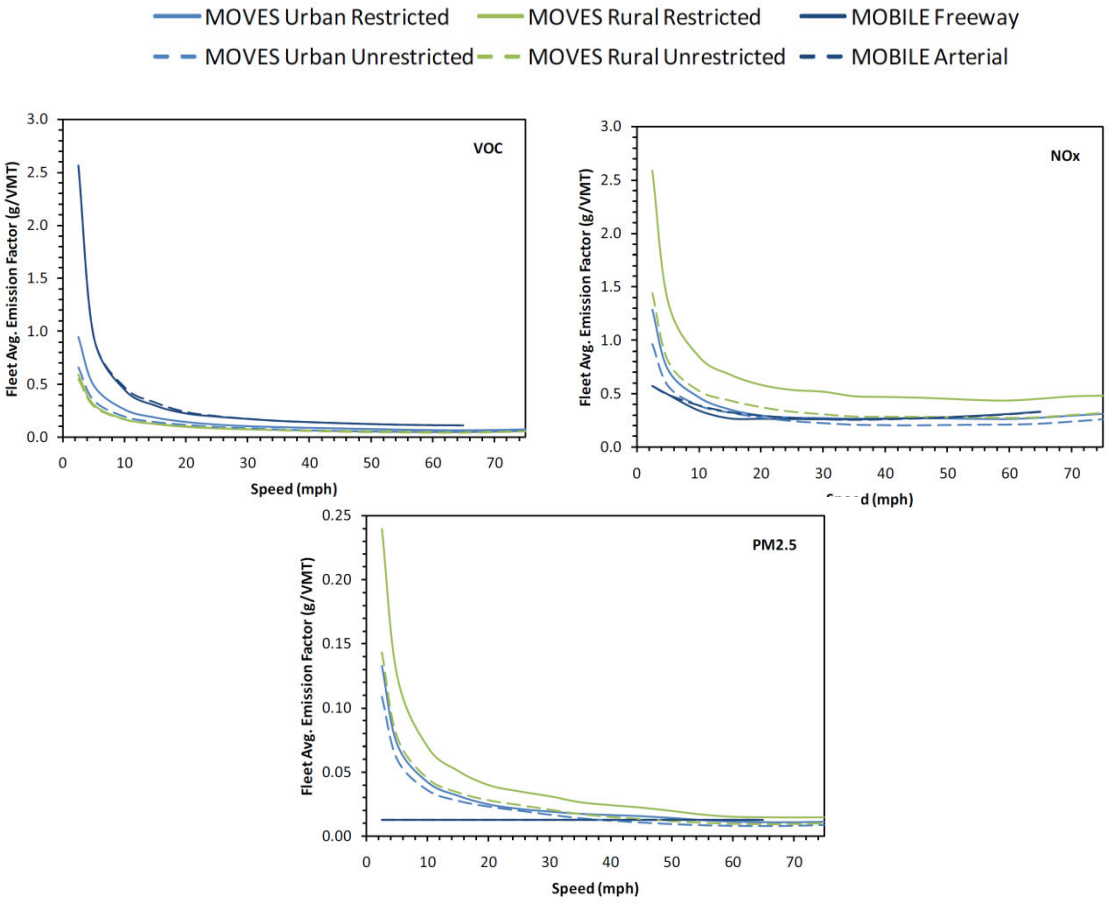


EXHIBIT 7: EMISSION FACTOR VS. SPEED VARIANCES (VOC, NO_X, AND $PM_{2.5}$)



Source: Figure 3 from Implications of the MOVES2010 Model on Mobile Source Emission Estimates, Air & Waste Management Association, July 2010.

Developing the MOVES Traffic Input Files

The PPSUITE software is responsible for producing the following MOVES input files during any analysis run:

- VMT by HPMS vehicle class.
- VHT by speed bin.
- Road type distributions.
- Hourly VMT fractions.

These files are text formatted files with a *.csv extension. The files are provided as inputs within the MOVES County Data Manager (CDM) and are described below:

- *VMT Input File*: VMT is the primary traffic input affecting emission results. The roadway segment distances, and traffic volumes are used to prepare estimates of VMT. PPSUITE performs these calculations and outputs the MOVES annual VMT input file to the County Data Manager (CDM). The annual VMT is computed by multiplying travel model roadway adjusted VMT by 365 days (366 days in a leap year).
- *VHT by Speed Bin File*: As described in the previous section, the PPSUITE software prepares the MOVES VHT by speed bin file, which summarizes the distribution of speeds across all links into each of the 16 MOVES speed bins for each hour of the day by road type. This robust process is consistent with the methods and recommendations provided in EPA's technical guidance and ensures that MOVES emission rates are used to the fullest extent.
- *Road Type Distributions*: Within MOVES, typical drive cycles and associated operating conditions vary by roadway type. MOVES defines five different roadway types as follows:

  1 Off-Network.
  2 Rural Restricted Access.
  3 Rural Unrestricted Access.
  4 Urban Restricted Access.
  5 Urban Unrestricted Access.

  For this analysis, the MOVES road type distribution file is automatically generated by PPSUITE using defined equivalencies. The off-network road type includes emissions from vehicle starts, extended idling, and evaporative emissions. Off-network activity in MOVES is primarily determined by the Source Type Population input.

MOVES Runs

After computing speeds and aggregating VMT and VHT, PPSUITE prepares traffic-related inputs needed to run EPA's MOVES software. Additional required MOVES inputs are prepared externally from the processing software and include temperatures, I/M program parameters, fuel characteristics, vehicle fleet age distributions, and source type population. The MOVES' county data importer is run in batch mode. This program converts all data files into the MYSQL format used by the MOVES model. At that point, a MOVES run specification file (*.mrs) is created which specifies options and key data locations for the run. The MOVES run is then executed in batch mode. A summary of key MOVES run specification settings is shown in **Exhibit 8**. MOVES can be executed using either an inventory or rate-based approach. For this analysis, MOVES is applied using the *inventory-based* approach. Using this approach, actual VMT and population are provided as inputs to the model; MOVES is responsible for producing the total emissions for the region.

EXHIBIT 8: MOVES RUN SPECIFICATION FILE PARAMETER SETTINGS

Parameter	Setting
MOVES Version	MOVES3.1
MOVES Default Database Version	movesdb20221007
Scale	COUNTY
Analysis Mode	Inventory
Time Span	**Annual Runs:** Single MOVES run with 12-month inputs including all days and hours **July Weekday Runs:** July month, Weekday, 24 hours
Time Aggregation	Hour
Geographic Selection	County [FIPS]
Vehicle Selection	All source types Gasoline, Diesel, CNG, E85
Road Type	All road types including off-network
Pollutants and Processes	All $PM_{2.5}$ categories, NO_X, VOC
Database selection	Early NLEV database PA-Specific CAL LEV program database
General Output	Units: Emission = grams; Distance = miles; Time = hours; Energy = Million BTU
Output Emissions	Time = Hour or Month, Emissions by Process ID, Source Type and Road Type

Conformity Analysis Results

Transportation conformity analyses of the current TIP and LRTP have been completed for the Lehigh Valley MPO area. The analyses were performed according to the requirements of the Federal transportation conformity rule at 40 CFR Part 93, Subpart A. The analyses utilized the methodologies, assumptions and data as presented in previous sections. Interagency consultation has been used to determine applicable emission models, analysis years and emission tests.

Emission Tests

There are currently no approved SIP MVEBs for the Lehigh Valley MPO area under 2008 8-hour ozone NAAQS. However, the Lehigh Valley MPO area has MVEBs approved by EPA under the 1997 8-hour ozone NAAQS using MOVES (79 FR 28435). The approved MVEBs are used in this analysis for the ozone conformity test. The ozone conformity analysis has been conducted to evaluate emissions in comparison to the applicable ozone MVEBs summarized in **Exhibit 9**.

EXHIBIT 9: 8-HOUR OZONE MOTOR VEHICLE EMISSION BUDGETS

County / Pollutant	2009 Budget (tons/day)	2018 Budget (tons/day)
VOC	20.65	12.43
NO_X	39.18	20.41

On April 13, 2015, EPA approved the Commonwealth of Pennsylvania's request to redesignate the Lehigh Valley MPO area to attainment for the 2006 24-hour $PM_{2.5}$ NAAQS. The MVEBs provided in the maintenance plans for the county are summarized in **Exhibit 10**. The MVEBs are specified as annual values in tons/year; and as a result, the conformity analyses are conducted for annual conditions.

EXHIBIT 10: ANNUAL $PM_{2.5}$ MOTOR VEHICLE EMISSION BUDGETS

.

County / Pollutant	2017 Budget (tons/year)	2025 Budget (tons/year)
$PM_{2.5}$	297	234
NO_X	8,081	5,303

Analysis Years

Section 93.119(g) of the Federal Transportation Conformity Regulations requires that emissions analyses be conducted for specific analysis years as follows:

- A near-term year, one to five years in the future.
- The last year of the LRTP's forecast period, horizon year 2050.
- All established MVEB years.
- Attainment year of the standard if within timeframe of TIP and LRTP.
- An intermediate year or years such that if there are two years in which analysis is performed, the two analysis years are no more than ten years apart.

All analysis years were determined through the interagency consultation process. **Exhibit 11** provides the analysis years used for this conformity analysis.

EXHIBIT 11: TRANSPORTATION CONFORMITY ANALYSIS YEARS

Analysis Year	Description
2025	Budget Year
2030	Interim Year
2035	Interim Year
2045	Interim Year
2050	Horizon Year of LRTP

Components of the $PM_{2.5}$ Regional Emissions Analysis

$PM_{2.5}$ can be the result of either direct or indirect emissions. Direct transportation emissions can be the result of brake or tire-wear, particulates in exhaust emissions, or dust raised by on-road vehicles or construction equipment. Possible indirect transportation related emissions of $PM_{2.5}$ include: NH_3, NO_X, SO_X, and VOC. The EPA has ruled that regional analysis of direct $PM_{2.5}$ emissions must include both exhaust and brake/tire-wear emissions. EPA's current regulations specify that road dust should be included in the regional analysis of direct $PM_{2.5}$ emissions only if the EPA or the state air agency have found it to be a significant contributor to the region's nonattainment. Neither the EPA nor the state air agency has determined road dust to be a significant contributor in the nonattainment area for this conformity determination.

Until a SIP revision is approved proving that NO_X is insignificant, EPA's current regulations state that indirect $PM_{2.5}$ emissions must be analyzed for NO_X. Conversely, VOC, SO_X and NH_3 must be analyzed only if the state(s) or the EPA determines one or more of these pollutants significant. Therefore, NO_X is the only indirect $PM_{2.5}$ component analyzed for the nonattainment area in this conformity determination.

Regionally Significant Highway Projects

For the purposes of the conformity analysis, model highway networks are created for each analysis year. For the horizon years, regionally significant projects from the TIP and LRTP were coded onto the networks. Detailed assessments were only performed for those new projects which may have a significant effect on emissions in accordance with 40 CFR Parts 51 and 93. Only those projects which would increase capacity or significantly impact vehicular speeds were considered. Projects such as bridge replacements and roadway restoration projects, which constitute the majority of the TIP and LRTP list, have been excluded from consideration since they are considered exempt under 40 CFR 93.126-127. A list of highway projects is shown in **Attachment A**.

Analysis Results

An emissions analysis has been completed for 2008 8-hour ozone and 2006 24-hour $PM_{2.5}$ NAAQS. The results of the analysis are summarized in the tables below. Forecast years have been estimated using the procedures and assumptions provide in this conformity report. A detailed emission summary is also provided in **Attachment B**. Example MOVES importer (XML) and run specification (MRS) files are provided in **Attachment C**.

2008 Ozone NAAQS

Exhibit 12 summarizes the Lehigh Valley MPO area ozone emission results for a summer weekday in each analysis year. The analysis year emission results are compared to the emission budgets in **Exhibit 9**. All years are lower than the applicable conformity budgets established in the regional maintenance plan for the 1997 ozone NAAQS.

EXHIBIT 12: OZONE EMISSION ANALYSIS RESULTS AND CONFORMITY TEST
(Summer Weekday)

Pollutant	*2018 BUDGET (tons/day)*	*2025 (tons/day)*	*2030 (tons/day)*	*2035 (tons/day)*	*2045 (tons/day)*	*2050 (tons/day)*
VOC	***12.43***	*4.43*	*3.56*	*3.15*	*2.68*	*2.48*
NO_X	***20.41***	*8.90*	*6.44*	*5.68*	*5.84*	*6.16*
Conformity Result		**Pass**	**Pass**	**Pass**	**Pass**	**Pass**

2006 24-hour NAAQS

Exhibit 13 summarizes the 24-hour $PM_{2.5}$ and NO_X emissions for annual conditions. The emissions are compared against the available 2017 and 2025 SIP MVEBs listed in **Exhibit 10**. The results illustrate that projected emissions are below the applicable MVEBs.

Exhibit 13: $PM_{2.5}$ Emission Analysis Results and Conformity Test
(Annual Analysis Runs)

Pollutant	*2025 (tons/year)*	*2030 (tons/year)*	*2035 (tons/year)*	*2045 (tons/year)*	*2050 (tons/year)*
$PM_{2.5}$	109	88	79	75	75
NO_X	2,721	1,952	1,713	1,737	1,822
MVEB - $PM_{2.5}$	***234***	***234***	***234***	***234***	***234***
MVEB - NO_X	***5,303***	***5,303***	***5,303***	***5,303***	***5,303***
Conformity Result	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**

Conformity Determination

Financial Constraint

The planning regulations, Sections 450.324(f)(11) and 450.326(j), requires the transportation plan and TIP 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. The Lehigh Valley MPO, in conjunction with PennDOT, FHWA and FTA, has developed an estimate of the cost to maintain and operate existing roads, bridges and transit systems in the Lehigh Valley MPO area and have compared the cost with the estimated revenues and maintenance needs of the new roads over the same period. The TIP and LRTP have been determined to be financially constrained.

Public Participation

The TIP and LRTP have undergone the public participation requirements as well as the comment and response requirements according to the procedures established in compliance with 23 CFR part 450, LVTS Public Participation Plan and Pennsylvania's Conformity SIP. The draft document was made available for a 30-day public review and comment period starting May 1st and included a public meeting.

Public Participation

The conformity rule requires that the TIP and LRTP conform to the applicable SIP(s) and be adopted by the MPO/RPO before any federal agency may approve, accept, or fund projects. Conformity is determined by applying criteria outlined in the transportation conformity regulations to the analysis.

The TIP and LRTP for the Lehigh Valley MPO are found to conform to the applicable air quality SIP(s) or EPA conformity requirements. This finding of conformity positively reflects on the efforts of the Lehigh Valley MPO and its partners in meeting the regional air quality goals, while maintaining and building an effective transportation system.

Resources

MOVES Model

Modeling Page within EPA's Office of Mobile Sources Website contains a downloadable model, MOVES users guide and other information. See (https://www.epa.gov/moves)

Policy Guidance on the Use of MOVES3 for State Implementation Plan Development, Transportation Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-20-044, November 2020.

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

Traffic Engineering

Highway Capacity Manual, sixth edition (HCM2016), Transportation Research Board, presents current knowledge and techniques for analyzing the transportation system.

Traffic Data Collection and Factor Development Report, 2022 Data, Pennsylvania Department of Transportation, Bureau of Planning and Research.

Highway Vehicle Emissions Analysis Glossary

AADT: Average Annual Daily Traffic, average of ALL days.

CAA: Clean Air Act as amended.

CARB: California Air Resources Board.

CFR: Code of Federal Regulations.

County Data Manager (CDM): User interface developed to simplify importing specific local data for a single county or a user-defined custom domain without requiring direct interaction with the underlying MySQL/MariaDB database in the MOVES emission model.

DEP: Pennsylvania Department of Environmental Protection

Emission rate or factor: Expresses the amount of pollution emitted per unit of activity. For highway vehicles, this is usually expressed in grams of pollutant emitted per mile driven.

EPA: Environmental Protection Agency

FC: Functional code. Applied to road segments to identify their type (freeway, local, etc.).

FHWA: Federal Highway Administration.

FR: Federal Register.

FTA: Federal Transit Administration.

Growth factor: Factor used to convert volumes to future years.

HPMS: Highway Performance Monitoring System.

I/M: Vehicle emissions inspection/maintenance programs are required in certain areas of the country. The programs ensure that vehicle emission controls are in good working order throughout the life of the vehicle. The programs require vehicles to be tested for emissions. Most vehicles that do not pass must be repaired.

LRTP: Long Range Transportation Plan

MOVES: Motor Vehicle Emission Simulator. The latest model EPA has developed to estimate emissions from highway vehicles.

MVEB: motor vehicle emissions budget.

NAAQS: National Ambient Air Quality Standard

NTD: National Transit Database

Pattern data: Extrapolations of traffic patterns (such as how traffic volume on road segment types varies by time of day, or what kinds of vehicles tend to use a road segment type) from segments with observed data to similar segments.

PPSUITE: Post-Processor for Air Quality. A set of programs that estimate speeds and prepares MOVES inputs and processes MOVES outputs.

Road Type: Functional code, applied in data management to road segments to identify their type (rural/urban highways, rural/urban arterials, etc.).

RMS: Roadway Management System.

Source Type: One of thirteen vehicle types used in MOVES modeling.

SIP: State Implementation Plan

TAZ: Traffic Analysis Zone System

TIP: Transportation Improvement Program

VHT: Vehicle hours traveled.

VMT: Vehicle miles traveled. In modeling terms, it is the simulated traffic volumes multiplied by link length.

ATTACHMENT A

Project List

The following FFY2025–2028 Transportation Improvement Program (TIP) and 2050 Long Range Transportation Plan (LRTP) air quality significant highway projects are included in this analysis. Project descriptions have been included with the associated TIP and LRTP documentation.

AIR QUALITY SIGNIFICANT PROJECTS BY ANALYSIS YEAR

MPMS #	AQ Significant Project Name
2025-2028 Highway-Bridge TIP Projects	
92780 (Interstate)	I-78 Reconstruction – Berks County Line to SR 100
109318 (Interstate)	I-78 WB - Easton Rd to SR 33 Truck Climbing Lane
57433	Lehigh & Race Street Intersection
11981	Linden Street
96432	SR 309 & Tilghman Interchange Reconfiguration
99697	7th Street Multimodal Corridor
120952	SR 248/Airport Road Intersection Improvements
110169	State Route 29 / Cedar Crest Boulevard Signal Upgrades
110170	MacArthur Road Signal Upgrade
110174	Mauch Chunk Road Signal Upgrade
109971	Route 145 Safety Improvements
102160	State Route 309/Center Valley Parkway Interchange
110076	Jordan Creek Bridge Replacement
110183	SR 29 Shimersville Hill Safety Improvements
117606	SR 22/ SR 191 Interchange Improvements
117509	Freemansburg Ave (SR 2018) Safety Improvements
116936	SR 191 Lower Nazareth Intersection Improvements
120976	Linden Steet Two-Way Conversion
2025-2028 Transit TIP Projects	
106530	LANTA Enhanced Bus / BRT

2050 LRTP Projects (Incorporates PennDOT 12-Year Program) **No Changes from Past Conformity Determination**
AQ Significant Project Name
Emmaus Avenue Adaptive Signal Upgrades
Hanover Avenue Adaptive Signal Upgrades at 7 Intersections - North Albert to North Wahneta Streets
State Route 512/Mill Street Intersection Improvements
Union Boulevard/Tilghman Street Adaptive Signal Upgrades at 27 Intersections
American Parkway intersections improvement at Hamilton, Linden & Gordon Streets
State Route 145/South Pike Avenue Betterment Project
Fullerton Avenue (State Route 1015) Betterment Project
State Route 145/7th Street Betterment Project
State Route 33 Betterment Project
State Route 378 Betterment Project
State Route 378 Betterment Project
State Route 248 Betterment Project
State Route 145 (MacArthur Road) Betterment Project, from Newburg Road to 7th Street
State Route 145 (MacArthur Road) Betterment Project, from Center Street to Clearview Road
US Route 22 Betterment Project
State Route 33 North/South Betterment Project
State Route 611 Betterment Project
State Route 248 Betterment Project
State Route 100 Betterment Project
State Route 412 Hellertown Corridor Improvements
State Route 145 (South 4th Street/Pike Avenue) Corridor Improvements
Adaptive Signal Updates
State Route 2002 (Emmaus Avenue) Signal Improvements
State Route 1009 (Schoenersville Road) Corridor Improvements
Lehigh Street and Union Street Intersection and Corridor Improvements
Hamilton Street/Hanover Avenue Corridor Study and Construction
State Route 512 Adaptive Signal Upgrade
State Route 222 (Jaindl Highway) at Krocks Road Intersection Improvements
State Route 29 (Cedar Crest Boulevard) Intersection Improvements.
Weaversville Road Curve Improvements
State Route 1002 (Tilghman Street) Improvements
Nestle Way/Grim Road Corridor and State Route 3012 (Schantz Road) Intersection Improvements
Old Route 22 & State Route 863 Intersection Widening
State Route 222 (Jaindl Highway/Hamilton Boulevard/Hamilton Street) Signal Improvements

State Route 222 (Jaindl Highway), Grim Road and Cetronia Road Intersection Improvements
State Route 100 and Industrial Boulevard Intersection Improvements
Bath Adaptive Traffic Signals
Advanced Signal Coordination System along State Route 512
Road Auxiliary Turn Lanes at Intersection of Vera Cruz Road and Pike Avenue
Downtown Easton Signal Improvements
State Route 1002 (Tilghman Street) Signal Improvements
Uhler Road/Sullivan Trail Intersection Improvement
Center Street One Way to Two Way Conversion
State Route 2020 (William Penn Highway) and State Route 33 Interchange
US Route 22 Widening from Mauch Chunk Road & Route 145
Jefferson Street Road Diet/Roundabout
State Route 309 Northbound Realignment
State Route 222 (Hamilton Boulevard) Breinigsville Road/Newtown Road Roundabout
State Route 2004 (Susquehanna Street/Seidersville Road), State Route 2002 (Emmaus Avenue/Broadway) Roundabout
Mauch Chunk Road/Elizabeth Avenue Roundabout
College Heights Boulevard Traffic Calming and Roundabout
State Route 248 (Lehigh Drive) and State Route 946 (Mountain View Drive) Intersection
State Routes 946 and 248 Intersection Improvements
State Route 512 (Market Street) Improvements, Bangor Borough
Male Road Bridge
Coffeetown Road Bridge Replacement
Water Street Culvert
Canal Park Bridge
Airport Road Corridor Phase 1 Infrastructure Implementation Line Item
Broad Street Traffic Signal Upgrades
State Route 378 (Wyandotte Street) Corridor Improvements
State Route 512 Slate Belt Corridor Improvements Study and Improvements
State Route 33 and Interstate 78 Interchange Reconstruction
State Route 1006 (Walbert Avenue) Betterment Project
17th Street Corridor Traffic Signal Modernization
Americans with Disabilities Act Traffic Signalization in Bath Borough

ATTACHMENT B

Detailed Emission Results

Ozone Analysis

Lehigh Valley Ozone Daily Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Summer Daily VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lehigh	Off-Network	N/A	N/A	1.5	0.81
	Rural Restricted	1,026,027	48.4	0.1	0.41
	Rural UnRestricted	1,778,058	31.5	0.1	0.64
	Urban Restricted	3,924,560	33.6	0.3	1.64
	Urban UnRestricted	5,041,565	23.8	0.5	1.89
	Subtotal	*11,770,209*		*2.46*	*5.38*
Northampton	Off-Network	N/A	N/A	1.4	0.67
	Rural Restricted	0	N/A	0.0	0.00
	Rural UnRestricted	1,626,513	39.5	0.1	0.51
	Urban Restricted	3,488,236	45.2	0.2	1.21
	Urban UnRestricted	3,228,113	25.9	0.3	1.13
	Subtotal	*8,342,862*		*1.98*	*3.52*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**20,113,071**		**4.43**	**8.90**
			(Kg/Day)	**4,023**	**8,077**

Lehigh Valley Ozone Daily Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Summer Daily VMT	Emissions (Tons/Day)	
			VOC	NOx
Lehigh	Motorcycle	69,862	0.2	0.05
	Passenger Car	5,951,958	0.8	0.32
	Passenger Truck	3,808,592	1.0	0.99
	Light Commercial Truck	967,855	0.3	0.44
	Intercity Bus	1,690	0.0	0.01
	Transit Bus	19,554	0.0	0.09
	School Bus	8,774	0.0	0.03
	Refuse Truck	5,611	0.0	0.02
	Single Unit Short-haul Truck	267,808	0.1	0.41
	Single Unit Long-haul Truck	37,964	0.0	0.05
	Motor Home	39,081	0.0	0.10
	Combination Short-haul Truck	251,968	0.0	1.09
	Combination Long-haul Truck	339,492	0.1	1.78
	Subtotal	*11,770,209*	*2.46*	*5.38*
Northampton	Motorcycle	49,689	0.1	0.03
	Passenger Car	4,236,769	0.7	0.25
	Passenger Truck	2,711,071	0.8	0.73
	Light Commercial Truck	688,948	0.2	0.32
	Intercity Bus	737	0.0	0.00
	Transit Bus	8,170	0.0	0.04
	School Bus	5,617	0.0	0.02
	Refuse Truck	3,795	0.0	0.01
	Single Unit Short-haul Truck	182,503	0.0	0.25
	Single Unit Long-haul Truck	25,887	0.0	0.03
	Motor Home	26,634	0.0	0.07
	Combination Short-haul Truck	171,771	0.0	0.67
	Combination Long-haul Truck	231,270	0.0	1.10
	Subtotal	*8,342,862*	*1.98*	*3.52*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**20,113,071**	**4.43**	**8.90**
		(Kg/Day)	**4,023**	**8,077**

Lehigh Valley Ozone Daily Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lehigh	Running Exhaust	0.50	4.81
	Start Exhaust	0.35	0.48
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.21	0.00
	Evap Fuel Vapor Venting	0.53	0.00
	Evap Fuel Leaks	0.83	0.00
	Crankcase Running Exhaust	0.03	0.04
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.01	0.06
	Auxiliary Power Exhaust	0.00	0.00
	Subtotal	*2.46*	*5.38*
Northampton	Running Exhaust	0.32	3.04
	Start Exhaust	0.32	0.42
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.19	0.00
	Evap Fuel Vapor Venting	0.46	0.00
	Evap Fuel Leaks	0.67	0.00
	Crankcase Running Exhaust	0.02	0.02
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.04
	Auxiliary Power Exhaust	0.00	0.00
	Subtotal	*1.98*	*3.52*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**4.43**	**8.90**
	(Kg/Day)	**4,023**	**8,077**

Lehigh Valley Ozone Daily Emission Summary

2030 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Summer Daily VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lehigh	Off-Network	N/A	N/A	1.2	0.64
	Rural Restricted	1,080,308	46.3	0.0	0.29
	Rural UnRestricted	1,821,028	30.5	0.1	0.45
	Urban Restricted	4,073,828	33.1	0.2	1.16
	Urban UnRestricted	5,243,579	23.4	0.4	1.40
	Subtotal	*12,218,743*		*1.97*	*3.94*
Northampton	Off-Network	N/A	N/A	1.1	0.52
	Rural Restricted	0	N/A	0.0	0.00
	Rural UnRestricted	1,669,571	39.3	0.1	0.35
	Urban Restricted	3,608,654	44.1	0.2	0.82
	Urban UnRestricted	3,303,870	25.2	0.2	0.81
	Subtotal	*8,582,095*		*1.59*	*2.50*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**20,800,839**		**3.56**	**6.44**
			(Kg/Day)	**3,230**	**5,839**

Lehigh Valley Ozone Daily Emission Summary
2030 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Summer Daily VMT	Emissions (Tons/Day)	
			VOC	NOx
Lehigh	Motorcycle	72,490	0.2	0.05
	Passenger Car	6,176,074	0.6	0.18
	Passenger Truck	3,952,005	0.8	0.43
	Light Commercial Truck	1,004,279	0.2	0.20
	Intercity Bus	1,747	0.0	0.01
	Transit Bus	20,401	0.0	0.07
	School Bus	9,155	0.0	0.02
	Refuse Truck	5,824	0.0	0.02
	Single Unit Short-haul Truck	279,522	0.0	0.36
	Single Unit Long-haul Truck	39,519	0.0	0.04
	Motor Home	40,730	0.0	0.08
	Combination Short-haul Truck	261,304	0.0	0.99
	Combination Long-haul Truck	355,693	0.0	1.50
	Subtotal	*12,218,743*	*1.97*	*3.94*
Northampton	Motorcycle	51,098	0.1	0.03
	Passenger Car	4,356,978	0.5	0.14
	Passenger Truck	2,787,987	0.7	0.33
	Light Commercial Truck	708,522	0.2	0.15
	Intercity Bus	742	0.0	0.00
	Transit Bus	8,445	0.0	0.03
	School Bus	5,800	0.0	0.01
	Refuse Truck	3,939	0.0	0.01
	Single Unit Short-haul Truck	188,482	0.0	0.22
	Single Unit Long-haul Truck	26,620	0.0	0.03
	Motor Home	27,466	0.0	0.05
	Combination Short-haul Truck	176,273	0.0	0.60
	Combination Long-haul Truck	239,743	0.0	0.90
	Subtotal	*8,582,095*	*1.59*	*2.50*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**20,800,839 (Kg/Day)**	**3.56 3,230**	**6.44 5,839**

Lehigh Valley Ozone Daily Emission Summary
2030 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lehigh	Running Exhaust	0.31	3.50
	Start Exhaust	0.25	0.35
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.13	0.00
	Evap Fuel Vapor Venting	0.40	0.00
	Evap Fuel Leaks	0.84	0.00
	Crankcase Running Exhaust	0.02	0.04
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.04
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.97*	*3.94*
Northampton	Running Exhaust	0.20	2.13
	Start Exhaust	0.23	0.31
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.12	0.00
	Evap Fuel Vapor Venting	0.35	0.00
	Evap Fuel Leaks	0.68	0.00
	Crankcase Running Exhaust	0.01	0.02
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.03
	Auxiliary Power Exhaust	0.00	0.00
	Subtotal	*1.59*	*2.50*
Off-Model Project Emission Benefits		0.00	0.00
Region Total	**(Kg/Day)**	**3.56 3,230**	**6.44 5,839**

Lehigh Valley Ozone Daily Emission Summary

2035 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Summer Daily VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lehigh	Off-Network	N/A	N/A	1.1	0.57
	Rural Restricted	1,129,613	45.4	0.0	0.25
	Rural UnRestricted	1,914,513	29.8	0.1	0.41
	Urban Restricted	4,212,387	32.4	0.2	1.02
	Urban UnRestricted	5,446,844	22.9	0.3	1.27
	Subtotal	*12,703,357*		*1.74*	*3.52*
Northampton	Off-Network	N/A	N/A	1.0	0.46
	Rural Restricted	0	N/A	0.0	0.00
	Rural UnRestricted	1,740,908	38.8	0.1	0.30
	Urban Restricted	3,714,405	43.4	0.1	0.69
	Urban UnRestricted	3,428,266	25.3	0.2	0.72
	Subtotal	*8,883,578*		*1.41*	*2.17*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**21,586,935**		**3.15**	**5.68**
			(Kg/Day)	**2,856**	**5,154**

Lehigh Valley Ozone Daily Emission Summary

2035 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Summer Daily VMT	Emissions (Tons/Day)	
			VOC	NOx
Lehigh	Motorcycle	75,315	0.2	0.05
	Passenger Car	6,417,338	0.5	0.12
	Passenger Truck	4,106,386	0.7	0.25
	Light Commercial Truck	1,043,509	0.2	0.09
	Intercity Bus	1,854	0.0	0.01
	Transit Bus	21,320	0.0	0.06
	School Bus	9,580	0.0	0.02
	Refuse Truck	6,111	0.0	0.02
	Single Unit Short-haul Truck	292,566	0.0	0.36
	Single Unit Long-haul Truck	41,218	0.0	0.04
	Motor Home	42,616	0.0	0.07
	Combination Short-haul Truck	272,717	0.0	1.00
	Combination Long-haul Truck	372,828	0.0	1.42
	Subtotal	*12,703,357*	*1.74*	*3.52*
Northampton	Motorcycle	52,860	0.1	0.03
	Passenger Car	4,507,632	0.5	0.10
	Passenger Truck	2,884,419	0.6	0.20
	Light Commercial Truck	733,007	0.2	0.07
	Intercity Bus	782	0.0	0.00
	Transit Bus	8,784	0.0	0.02
	School Bus	6,050	0.0	0.01
	Refuse Truck	4,077	0.0	0.01
	Single Unit Short-haul Truck	196,399	0.0	0.22
	Single Unit Long-haul Truck	27,666	0.0	0.02
	Motor Home	28,606	0.0	0.04
	Combination Short-haul Truck	183,030	0.0	0.59
	Combination Long-haul Truck	250,268	0.0	0.84
	Subtotal	*8,883,578*	*1.41*	*2.17*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**21,586,935**	**3.15**	**5.68**
		(Kg/Day)	**2,856**	**5,154**

Lehigh Valley Ozone Daily Emission Summary

2035 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lehigh	Running Exhaust	0.25	3.13
	Start Exhaust	0.20	0.30
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.10	0.00
	Evap Fuel Vapor Venting	0.33	0.00
	Evap Fuel Leaks	0.84	0.00
	Crankcase Running Exhaust	0.02	0.04
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.03
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.74*	*3.52*
Northampton	Running Exhaust	0.16	1.86
	Start Exhaust	0.18	0.26
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.09	0.00
	Evap Fuel Vapor Venting	0.29	0.00
	Evap Fuel Leaks	0.67	0.00
	Crankcase Running Exhaust	0.01	0.02
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.02
	Auxiliary Power Exhaust	0.00	0.00
	Subtotal	*1.41*	*2.17*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**3.15**	**5.68**
	(Kg/Day)	**2,856**	**5,154**

Lehigh Valley Ozone Daily Emission Summary

2045 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Summer Daily VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lehigh	Off-Network	N/A	N/A	0.8	0.57
	Rural Restricted	1,232,645	42.6	0.0	0.25
	Rural UnRestricted	2,039,248	28.2	0.1	0.43
	Urban Restricted	4,508,123	32.2	0.2	1.00
	Urban UnRestricted	5,917,987	21.3	0.3	1.38
	Subtotal	*13,698,003*		*1.49*	*3.63*
Northampton	Off-Network	N/A	N/A	0.8	0.45
	Rural Restricted	0	N/A	0.0	0.00
	Rural UnRestricted	1,816,957	38.3	0.1	0.30
	Urban Restricted	3,951,012	40.2	0.1	0.70
	Urban UnRestricted	3,768,053	24.2	0.2	0.76
	Subtotal	*9,536,022*		*1.19*	*2.21*
Off-Model Project Emission Benefits				0.00	-0.01
Region Total		**23,234,025**		**2.68**	**5.84**
			(Kg/Day)	**2,429**	**5,294**

Lehigh Valley Ozone Daily Emission Summary
2045 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Summer Daily VMT	Emissions (Tons/Day)	
			VOC	NOx
Lehigh	Motorcycle	81,112	0.2	0.05
	Passenger Car	6,912,384	0.5	0.09
	Passenger Truck	4,423,156	0.5	0.18
	Light Commercial Truck	1,124,021	0.1	0.06
	Intercity Bus	2,092	0.0	0.01
	Transit Bus	23,204	0.0	0.07
	School Bus	10,434	0.0	0.02
	Refuse Truck	6,618	0.0	0.02
	Single Unit Short-haul Truck	319,165	0.0	0.40
	Single Unit Long-haul Truck	45,069	0.0	0.05
	Motor Home	46,465	0.0	0.06
	Combination Short-haul Truck	298,090	0.0	1.10
	Combination Long-haul Truck	406,193	0.0	1.53
	Subtotal	*13,698,003*	*1.49*	*3.63*
Northampton	Motorcycle	56,676	0.1	0.04
	Passenger Car	4,834,096	0.4	0.08
	Passenger Truck	3,093,302	0.4	0.14
	Light Commercial Truck	786,093	0.1	0.05
	Intercity Bus	863	0.0	0.00
	Transit Bus	9,541	0.0	0.03
	School Bus	6,553	0.0	0.01
	Refuse Truck	4,436	0.0	0.01
	Single Unit Short-haul Truck	213,100	0.0	0.24
	Single Unit Long-haul Truck	30,086	0.0	0.03
	Motor Home	31,022	0.0	0.03
	Combination Short-haul Truck	199,064	0.0	0.65
	Combination Long-haul Truck	271,188	0.0	0.90
	Subtotal	*9,536,022*	*1.19*	*2.21*
Off-Model Project Emission Benefits			0.00	-0.01
Region Total		**23,234,025 (Kg/Day)**	**2.68 2,429**	**5.84 5,294**

Lehigh Valley Ozone Daily Emission Summary
2045 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lehigh	Running Exhaust	0.23	3.26
	Start Exhaust	0.16	0.28
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.07	0.00
	Evap Fuel Vapor Venting	0.24	0.00
	Evap Fuel Leaks	0.76	0.00
	Crankcase Running Exhaust	0.02	0.05
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.03
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.49*	*3.63*
Northampton	Running Exhaust	0.15	1.92
	Start Exhaust	0.14	0.24
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.06	0.00
	Evap Fuel Vapor Venting	0.21	0.00
	Evap Fuel Leaks	0.61	0.00
	Crankcase Running Exhaust	0.01	0.03
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.02
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.19*	*2.21*
Off-Model Project Emission Benefits		0.00	-0.01
Region Total	**(Kg/Day)**	**2.68 2,429**	**5.84 5,294**

Lehigh Valley Ozone Daily Emission Summary

2050 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Summer Daily VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lehigh	Off-Network	N/A	N/A	0.8	0.58
	Rural Restricted	1,290,922	41.1	0.0	0.27
	Rural UnRestricted	1,952,031	27.1	0.1	0.43
	Urban Restricted	4,639,542	31.7	0.2	1.06
	Urban UnRestricted	6,270,001	21.2	0.3	1.49
	Subtotal	*14,152,496*		*1.38*	*3.83*
Northampton	Off-Network	N/A	N/A	0.7	0.46
	Rural Restricted	0	N/A	0.0	0.00
	Rural UnRestricted	1,888,105	38.0	0.1	0.32
	Urban Restricted	4,064,357	39.9	0.1	0.74
	Urban UnRestricted	3,904,275	23.5	0.2	0.82
	Subtotal	*9,856,737*		*1.10*	*2.33*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**24,009,233**		**2.48**	**6.16**
			(Kg/Day)	**2,252**	**5,593**

Lehigh Valley Ozone Daily Emission Summary

2050 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lehigh	Running Exhaust	0.24	3.45
	Start Exhaust	0.16	0.29
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.07	0.00
	Evap Fuel Vapor Venting	0.24	0.00
	Evap Fuel Leaks	0.65	0.00
	Crankcase Running Exhaust	0.02	0.05
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.03
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.38*	*3.83*
Northampton	Running Exhaust	0.15	2.03
	Start Exhaust	0.14	0.25
	Brakewear	0.00	0.00
	Tirewear	0.00	0.00
	Evap Permeation	0.06	0.00
	Evap Fuel Vapor Venting	0.20	0.00
	Evap Fuel Leaks	0.53	0.00
	Crankcase Running Exhaust	0.01	0.03
	Crankcase Start Exhaust	0.00	0.00
	Crankcase Extended Idle Exhaust	0.00	0.00
	Extended Idle Exhaust	0.00	0.02
	Auxiliary Power Exhaust	0.00	0.01
	Subtotal	*1.10*	*2.33*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**2.48**	**6.16**
	(Kg/Day)	**2,252**	**5,593**

Lehigh Valley Ozone Daily Emission Summary
2050 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Summer Daily VMT	Emissions (Tons/Day)	
			VOC	NOx
Lehigh	Motorcycle	83,744	0.2	0.05
	Passenger Car	6,746,160	0.5	0.09
	Passenger Truck	4,896,560	0.4	0.17
	Light Commercial Truck	1,222,351	0.1	0.06
	Intercity Bus	2,210	0.0	0.01
	Transit Bus	24,072	0.0	0.08
	School Bus	10,832	0.0	0.02
	Refuse Truck	7,022	0.0	0.02
	Single Unit Short-haul Truck	322,262	0.0	0.42
	Single Unit Long-haul Truck	45,164	0.0	0.05
	Motor Home	59,599	0.0	0.07
	Combination Short-haul Truck	299,042	0.0	1.13
	Combination Long-haul Truck	433,477	0.0	1.67
	Subtotal	*14,152,496*	*1.38*	*3.83*
Northampton	Motorcycle	58,545	0.2	0.04
	Passenger Car	4,719,981	0.4	0.08
	Passenger Truck	3,425,906	0.3	0.14
	Light Commercial Truck	855,248	0.1	0.04
	Intercity Bus	923	0.0	0.00
	Transit Bus	9,903	0.0	0.03
	School Bus	6,816	0.0	0.01
	Refuse Truck	4,653	0.0	0.01
	Single Unit Short-haul Truck	215,361	0.0	0.25
	Single Unit Long-haul Truck	30,165	0.0	0.03
	Motor Home	39,821	0.0	0.04
	Combination Short-haul Truck	199,849	0.0	0.67
	Combination Long-haul Truck	289,567	0.0	0.99
	Subtotal	*9,856,737*	*1.10*	*2.33*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**24,009,233 (Kg/Day)**	**2.48 2,252**	**6.16 5,593**

Annual $PM_{2.5}$ Analysis

Lehigh Valley PM2.5 Annual Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lehigh	Off-Network	N/A	N/A	276.98	10.77
	Rural Restricted	274,239,980	54.5	115.96	3.21
	Rural UnRestricted	538,089,238	35.2	197.66	8.36
	Urban Restricted	1,048,951,044	46.9	407.32	12.66
	Urban UnRestricted	1,512,066,003	27.5	567.93	27.37
	Subtotal	*3,373,346,266*		*1,565.85*	*62.37*
Northampton	Off-Network	N/A	N/A	234.52	9.55
	Rural Restricted	0	N/A	0.00	0.00
	Rural UnRestricted	502,786,968	40.3	169.67	7.08
	Urban Restricted	1,064,539,409	51.1	383.29	11.91
	Urban UnRestricted	997,698,452	27.3	367.92	17.82
	Subtotal	*2,565,024,829*		*1,155.40*	*46.36*
Off-Model Project Emission Benefits				-0.21	-0.01
Region Total		**5,938,371,095**	**(Kg/Year)**	**2,721.04** **2,468,488**	**108.72** **98,630**

Lehigh Valley PM2.5 Annual Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lehigh	Motorcycle	20,050,841	15.41	0.49
	Passenger Car	1,708,371,020	114.04	14.67
	Passenger Truck	1,093,167,410	295.38	16.41
	Light Commercial Truck	277,800,380	126.63	5.80
	Intercity Bus	376,490	1.85	0.05
	Transit Bus	5,473,996	25.81	0.48
	School Bus	2,456,340	8.05	0.30
	Refuse Truck	1,579,683	6.04	0.12
	Single Unit Short-haul Truck	75,534,536	111.66	2.84
	Single Unit Long-haul Truck	10,705,580	13.81	0.36
	Motor Home	11,021,136	30.52	1.13
	Combination Short-haul Truck	71,050,922	308.42	6.51
	Combination Long-haul Truck	95,757,933	508.22	13.22
	Subtotal	*3,373,346,266*	*1,565.85*	*62.37*
Northampton	Motorcycle	15,279,459	11.92	0.37
	Passenger Car	1,302,735,500	94.05	11.23
	Passenger Truck	833,608,900	234.93	12.64
	Light Commercial Truck	211,840,210	99.80	4.43
	Intercity Bus	198,882	0.96	0.02
	Transit Bus	2,507,331	11.50	0.21
	School Bus	1,723,670	5.59	0.20
	Refuse Truck	1,169,642	4.27	0.08
	Single Unit Short-haul Truck	56,053,587	79.63	2.02
	Single Unit Long-haul Truck	7,942,197	9.80	0.26
	Motor Home	8,181,699	21.97	0.81
	Combination Short-haul Truck	52,713,729	218.72	4.63
	Combination Long-haul Truck	71,070,024	362.27	9.46
	Subtotal	*2,565,024,829*	*1,155.40*	*46.36*
Off-Model Project Emission Benefits			-0.21	-0.01
Region Total		**5,938,371,095** **(Kg/Year)**	**2,721.04** **2,468,488**	**108.72** **98,630**

Lehigh Valley PM2.5 Annual Emission Summary

2025 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lehigh	Running Exhaust	1,364.96	28.84
	Start Exhaust	172.50	8.49
	Brakewear	0.00	15.19
	Tirewear	0.00	5.86
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	10.62	3.60
	Crankcase Start Exhaust	0.01	0.07
	Crankcase Extended Idle Exhaust	0.13	0.10
	Extended Idle Exhaust	16.52	0.20
	Auxiliary Power Exhaust	1.11	0.02
	Subtotal	*1,565.85*	*62.37*
Northampton	Running Exhaust	978.60	20.97
	Start Exhaust	156.04	7.79
	Brakewear	0.00	10.34
	Tirewear	0.00	4.37
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	7.43	2.58
	Crankcase Start Exhaust	0.01	0.07
	Crankcase Extended Idle Exhaust	0.10	0.07
	Extended Idle Exhaust	12.38	0.15
	Auxiliary Power Exhaust	0.83	0.01
	Subtotal	*1,155.40*	*46.36*
Off-Model Project Emission Benefits		-0.21	-0.01
Region Total		**2,721.04**	**108.72**
	(Kg/Year)	**2,468,488**	**98,630**

Lehigh Valley PM2.5 Annual Emission Summary

2030 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lehigh	Off-Network	N/A	N/A	226.08	10.31
	Rural Restricted	288,770,294	54.4	77.01	2.20
	Rural UnRestricted	551,099,676	34.5	139.10	6.46
	Urban Restricted	1,088,797,798	46.0	273.43	9.09
	Urban UnRestricted	1,573,056,355	27.3	415.96	22.18
	Subtotal	*3,501,724,123*		*1,131.57*	*50.24*
Northampton	Off-Network	N/A	N/A	189.86	9.34
	Rural Restricted	0	N/A	0.00	0.00
	Rural UnRestricted	516,117,854	40.1	116.02	5.37
	Urban Restricted	1,101,277,318	50.7	249.75	8.46
	Urban UnRestricted	1,021,091,248	26.8	264.90	14.33
	Subtotal	*2,638,486,419*		*820.53*	*37.50*
Off-Model Project Emission Benefits				-0.57	-0.02
Region Total		**6,140,210,543**		**1,951.53**	**87.71**
			(Kg/Year)	**1,770,399**	**79,570**

Lehigh Valley PM2.5 Annual Emission Summary
2030 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lehigh	Motorcycle	20,804,126	15.84	0.51
	Passenger Car	1,772,668,280	71.22	15.09
	Passenger Truck	1,134,311,760	135.03	14.04
	Light Commercial Truck	288,250,020	58.79	4.32
	Intercity Bus	383,755	1.43	0.03
	Transit Bus	5,712,353	18.17	0.26
	School Bus	2,563,457	5.79	0.15
	Refuse Truck	1,632,694	5.15	0.06
	Single Unit Short-haul Truck	78,815,111	95.33	1.89
	Single Unit Long-haul Truck	11,140,310	11.82	0.25
	Motor Home	11,487,202	22.34	0.77
	Combination Short-haul Truck	73,695,346	274.25	4.72
	Combination Long-haul Truck	100,259,709	416.41	8.15
	Subtotal	*3,501,724,123*	*1,131.57*	*50.24*
Northampton	Motorcycle	15,712,077	12.13	0.38
	Passenger Car	1,339,643,200	60.93	11.56
	Passenger Truck	857,223,800	110.39	10.91
	Light Commercial Truck	217,849,700	47.13	3.33
	Intercity Bus	200,856	0.73	0.01
	Transit Bus	2,591,177	8.04	0.11
	School Bus	1,779,496	4.06	0.10
	Refuse Truck	1,199,159	3.59	0.04
	Single Unit Short-haul Truck	57,887,342	66.94	1.31
	Single Unit Long-haul Truck	8,189,172	8.26	0.18
	Motor Home	8,436,049	15.77	0.54
	Combination Short-haul Truck	54,114,975	191.33	3.30
	Combination Long-haul Truck	73,659,418	291.23	5.73
	Subtotal	*2,638,486,419*	*820.53*	*37.50*
Off-Model Project Emission Benefits			-0.57	-0.02
Region Total		**6,140,210,543 (Kg/Year)**	**1,951.53 1,770,399**	**87.71 79,570**

Lehigh Valley PM2.5 Annual Emission Summary
2030 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lehigh	Running Exhaust	971.75	16.89
	Start Exhaust	134.95	9.11
	Brakewear	0.00	16.10
	Tirewear	0.00	6.09
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	11.06	1.81
	Crankcase Start Exhaust	0.00	0.07
	Crankcase Extended Idle Exhaust	0.11	0.06
	Extended Idle Exhaust	11.90	0.09
	Auxiliary Power Exhaust	1.79	0.01
	Subtotal	*1,131.57*	*50.24*
Northampton	Running Exhaust	680.67	12.21
	Start Exhaust	121.93	8.42
	Brakewear	0.00	10.89
	Tirewear	0.00	4.51
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	7.63	1.28
	Crankcase Start Exhaust	0.00	0.07
	Crankcase Extended Idle Exhaust	0.08	0.05
	Extended Idle Exhaust	8.87	0.07
	Auxiliary Power Exhaust	1.34	0.01
	Subtotal	*820.53*	*37.50*
Off-Model Project Emission Benefits		-0.57	-0.02
Region Total	**(Kg/Year)**	**1,951.53 1,770,399**	**87.71 79,570**

Lehigh Valley PM2.5 Annual Emission Summary

2035 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lehigh	Off-Network	N/A	N/A	207.10	9.74
	Rural Restricted	301,941,302	54.3	63.59	1.76
	Rural UnRestricted	579,553,827	33.6	125.85	5.87
	Urban Restricted	1,125,875,488	44.9	230.55	7.64
	Urban UnRestricted	1,633,990,336	27.0	373.86	20.26
	Subtotal	*3,641,360,953*		*1,000.96*	*45.27*
Northampton	Off-Network	N/A	N/A	173.42	8.93
	Rural Restricted	0	N/A	0.00	0.00
	Rural UnRestricted	538,166,239	39.7	101.44	4.76
	Urban Restricted	1,133,535,643	50.5	203.50	6.94
	Urban UnRestricted	1,059,536,726	26.8	234.70	12.98
	Subtotal	*2,731,238,609*		*713.06*	*33.62*
Off-Model Project Emission Benefits				-1.03	-0.03
Region Total		**6,372,599,563**		**1,712.99**	**78.85**
			(Kg/Year)	**1,553,999**	**71,536**

Lehigh Valley PM2.5 Annual Emission Summary

2035 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lehigh	Motorcycle	21,619,351	16.29	0.53
	Passenger Car	1,842,276,692	54.99	14.82
	Passenger Truck	1,178,853,590	84.18	13.01
	Light Commercial Truck	299,568,410	28.66	3.54
	Intercity Bus	404,263	1.29	0.02
	Transit Bus	5,976,466	16.24	0.17
	School Bus	2,685,455	5.08	0.09
	Refuse Truck	1,718,545	5.19	0.05
	Single Unit Short-haul Truck	82,520,165	95.42	1.75
	Single Unit Long-haul Truck	11,633,486	11.72	0.23
	Motor Home	12,020,111	18.74	0.69
	Combination Short-haul Truck	76,948,147	273.78	4.26
	Combination Long-haul Truck	105,136,273	389.38	6.11
	Subtotal	*3,641,360,953*	*1,000.96*	*45.27*
Northampton	Motorcycle	16,253,889	12.41	0.39
	Passenger Car	1,385,990,700	48.33	11.21
	Passenger Truck	886,891,000	70.85	10.13
	Light Commercial Truck	225,382,350	23.82	2.75
	Intercity Bus	206,746	0.64	0.01
	Transit Bus	2,698,236	7.11	0.07
	School Bus	1,858,323	3.58	0.06
	Refuse Truck	1,249,548	3.55	0.03
	Single Unit Short-haul Truck	60,315,682	66.07	1.20
	Single Unit Long-haul Truck	8,512,742	8.06	0.15
	Motor Home	8,785,676	12.96	0.48
	Combination Short-haul Truck	56,241,633	188.19	2.93
	Combination Long-haul Truck	76,852,085	267.49	4.21
	Subtotal	*2,731,238,609*	*713.06*	*33.62*
Off-Model Project Emission Benefits			-1.03	-0.03
Region Total		**6,372,599,563**	**1,712.99**	**78.85**
		(Kg/Year)	**1,553,999**	**71,536**

Lehigh Valley PM2.5 Annual Emission Summary
2035 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lehigh	Running Exhaust	858.73	11.30
	Start Exhaust	118.87	9.05
	Brakewear	0.00	17.18
	Tirewear	0.00	6.36
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	11.65	1.22
	Crankcase Start Exhaust	0.00	0.07
	Crankcase Extended Idle Exhaust	0.10	0.04
	Extended Idle Exhaust	9.38	0.04
	Auxiliary Power Exhaust	2.22	0.01
	Subtotal	*1,000.96*	*45.27*
Northampton	Running Exhaust	589.30	8.12
	Start Exhaust	107.17	8.39
	Brakewear	0.00	11.44
	Tirewear	0.00	4.68
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	7.92	0.86
	Crankcase Start Exhaust	0.00	0.07
	Crankcase Extended Idle Exhaust	0.07	0.03
	Extended Idle Exhaust	6.96	0.03
	Auxiliary Power Exhaust	1.64	0.01
	Subtotal	*713.06*	*33.62*
Off-Model Project Emission Benefits		-1.03	-0.03
Region Total		**1,712.99**	**78.85**
	(Kg/Year)	**1,553,999**	**71,536**

Lehigh Valley PM2.5 Annual Emission Summary
2045 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lehigh	Off-Network	N/A	N/A	206.19	7.26
	Rural Restricted	329,454,362	53.3	61.67	1.64
	Rural UnRestricted	617,722,478	31.9	130.33	5.90
	Urban Restricted	1,204,909,342	43.8	222.87	7.23
	Urban UnRestricted	1,775,396,224	25.7	398.17	21.13
	Subtotal	*3,927,482,406*		*1,019.23*	*43.17*
Northampton	Off-Network	N/A	N/A	172.94	6.69
	Rural Restricted	0	N/A	0.00	0.00
	Rural UnRestricted	561,648,270	39.1	100.26	4.57
	Urban Restricted	1,205,743,606	49.0	196.84	6.61
	Urban UnRestricted	1,164,729,865	25.8	248.75	13.60
	Subtotal	*2,932,121,741*		*718.79*	*31.48*
Off-Model Project Emission Benefits				-1.28	-0.04
Region Total		**6,859,604,147**		**1,736.74**	**74.60**
			(Kg/Year)	**1,575,545**	**67,678**

Lehigh Valley PM2.5 Annual Emission Summary
2045 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lehigh	Motorcycle	23,288,525	17.47	0.58
	Passenger Car	1,984,823,596	45.13	14.35
	Passenger Truck	1,270,065,630	62.17	11.68
	Light Commercial Truck	322,751,770	19.35	3.18
	Intercity Bus	458,131	1.38	0.02
	Transit Bus	6,518,399	17.41	0.16
	School Bus	2,930,932	5.30	0.08
	Refuse Truck	1,883,456	5.75	0.05
	Single Unit Short-haul Truck	90,090,545	105.92	1.95
	Single Unit Long-haul Truck	12,725,702	13.05	0.25
	Motor Home	13,115,304	14.80	0.42
	Combination Short-haul Truck	84,159,316	298.19	4.40
	Combination Long-haul Truck	114,671,100	413.30	6.05
	Subtotal	*3,927,482,406*	*1,019.23*	*43.17*
Northampton	Motorcycle	17,429,382	13.18	0.42
	Passenger Car	1,486,506,900	41.14	10.62
	Passenger Truck	951,204,400	54.05	8.91
	Light Commercial Truck	241,727,220	16.74	2.42
	Intercity Bus	231,144	0.68	0.01
	Transit Bus	2,930,684	7.62	0.07
	School Bus	2,012,935	3.74	0.05
	Refuse Truck	1,359,046	3.92	0.04
	Single Unit Short-haul Truck	65,476,446	72.96	1.33
	Single Unit Long-haul Truck	9,237,360	8.92	0.17
	Motor Home	9,533,426	10.04	0.28
	Combination Short-haul Truck	61,135,819	203.68	3.01
	Combination Long-haul Truck	83,336,980	282.12	4.14
	Subtotal	*2,932,121,741*	*718.79*	*31.48*
Off-Model Project Emission Benefits			-1.28	-0.04
Region Total		**6,859,604,147 (Kg/Year)**	**1,736.74 1,575,545**	**74.60 67,678**

Lehigh Valley PM2.5 Annual Emission Summary
2045 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lehigh	Running Exhaust	880.66	8.66
	Start Exhaust	114.45	6.76
	Brakewear	0.00	19.65
	Tirewear	0.00	6.92
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	12.83	1.05
	Crankcase Start Exhaust	0.00	0.05
	Crankcase Extended Idle Exhaust	0.10	0.04
	Extended Idle Exhaust	8.59	0.03
	Auxiliary Power Exhaust	2.59	0.00
	Subtotal	*1,019.23*	*43.17*
Northampton	Running Exhaust	598.47	6.18
	Start Exhaust	103.35	6.29
	Brakewear	0.00	13.08
	Tirewear	0.00	5.09
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	8.68	0.74
	Crankcase Start Exhaust	0.00	0.05
	Crankcase Extended Idle Exhaust	0.07	0.03
	Extended Idle Exhaust	6.32	0.02
	Auxiliary Power Exhaust	1.91	0.00
	Subtotal	*718.79*	*31.48*
Off-Model Project Emission Benefits		-1.28	-0.04
Region Total	**(Kg/Year)**	**1,736.74 1,575,545**	**74.60 67,678**

Lehigh Valley PM2.5 Annual Emission Summary

2050 FFY25 TIP and 2050 LRTP Conformity (By Road Type)

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lehigh	Off-Network	N/A	N/A	213.30	6.31
	Rural Restricted	344,977,872	53.3	64.37	1.68
	Rural UnRestricted	590,949,193	31.2	128.95	5.67
	Urban Restricted	1,240,011,172	43.5	233.11	7.38
	Urban UnRestricted	1,882,295,218	25.8	427.87	22.26
	Subtotal	*4,058,233,454*		*1,067.59*	*43.29*
Northampton	Off-Network	N/A	N/A	179.10	5.83
	Rural Restricted	0	N/A	0.00	0.00
	Rural UnRestricted	583,707,582	38.7	106.32	4.74
	Urban Restricted	1,240,313,135	49.1	204.30	6.70
	Urban UnRestricted	1,206,854,578	25.2	265.16	14.21
	Subtotal	*3,030,875,295*		*754.88*	*31.49*
Off-Model Project Emission Benefits				-0.35	-0.01
Region Total		**7,089,108,749 (Kg/Year)**		**1,822.12** **1,653,004**	**74.77** **67,828**

Lehigh Valley PM2.5 Annual Emission Summary

2050 FFY25 TIP and 2050 LRTP Conformity (By Source Type)

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lehigh	Motorcycle	24,046,909	17.99	0.60
	Passenger Car	1,937,272,688	46.55	14.10
	Passenger Truck	1,406,127,720	59.59	11.48
	Light Commercial Truck	351,018,460	18.85	3.13
	Intercity Bus	488,843	1.49	0.02
	Transit Bus	6,766,111	18.84	0.18
	School Bus	3,044,673	5.66	0.08
	Refuse Truck	1,983,479	6.22	0.06
	Single Unit Short-haul Truck	91,015,113	109.95	2.03
	Single Unit Long-haul Truck	12,753,730	13.41	0.26
	Motor Home	16,833,617	18.57	0.52
	Combination Short-haul Truck	84,479,102	303.19	4.40
	Combination Long-haul Truck	122,403,010	447.29	6.44
	Subtotal	*4,058,233,454*	*1,067.59*	*43.29*
Northampton	Motorcycle	18,004,506	13.58	0.44
	Passenger Car	1,451,474,800	42.87	10.53
	Passenger Truck	1,053,524,500	52.51	8.62
	Light Commercial Truck	263,003,320	16.49	2.36
	Intercity Bus	242,334	0.72	0.01
	Transit Bus	3,045,750	8.29	0.08
	School Bus	2,096,327	4.02	0.05
	Refuse Truck	1,433,040	4.25	0.04
	Single Unit Short-haul Truck	66,158,479	76.02	1.39
	Single Unit Long-haul Truck	9,277,143	9.22	0.17
	Motor Home	12,236,848	12.63	0.35
	Combination Short-haul Truck	61,390,018	207.87	3.02
	Combination Long-haul Truck	88,988,230	306.42	4.42
	Subtotal	*3,030,875,295*	*754.88*	*31.49*
Off-Model Project Emission Benefits			-0.35	-0.01
Region Total		**7,089,108,749 (Kg/Year)**	**1,822.12** **1,653,004**	**74.77** **67,828**

Lehigh Valley PM2.5 Annual Emission Summary
2050 FFY25 TIP and 2050 LRTP Conformity (By Emission Process)

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lehigh	Running Exhaust	924.24	8.42
	Start Exhaust	117.82	5.83
	Brakewear	0.00	20.67
	Tirewear	0.00	7.19
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	13.57	1.07
	Crankcase Start Exhaust	0.00	0.05
	Crankcase Extended Idle Exhaust	0.10	0.04
	Extended Idle Exhaust	9.06	0.03
	Auxiliary Power Exhaust	2.79	0.00
	Subtotal	*1,067.59*	*43.29*
Northampton	Running Exhaust	629.93	6.00
	Start Exhaust	106.97	5.45
	Brakewear	0.00	13.89
	Tirewear	0.00	5.29
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	9.21	0.76
	Crankcase Start Exhaust	0.00	0.04
	Crankcase Extended Idle Exhaust	0.07	0.03
	Extended Idle Exhaust	6.65	0.02
	Auxiliary Power Exhaust	2.05	0.00
	Subtotal	*754.88*	*31.49*
Off-Model Project Emission Benefits		-0.35	-0.01
Region Total		**1,822.12**	**74.77**
	(Kg/Year)	**1,653,004**	**67,828**

ATTACHMENT C

Sample MOVES Data Importer (XML) Input Files and Run Specification (MRS) Input Files

(Sample for 2025 July Weekday and Annual Runs)

MOVES County Data Manager Importer File – July Weekday Run (MOVESIMPORTER.XML)

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MOVES Run Specification File – July Weekday Run (MOVESRUN.MRS)

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Scenario: OZO Lehigh 2025 Jul WkDay

2025 Build, Inv, Ozone

Emission Inventory with Local data]]></description>
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<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="91" processname="Auxiliary Power Exhaust"/>
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<fuelsubtype selected="false"/>
<emissionprocess selected="true"/>
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    <outputstarts value="true"/>
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MOVES County Data Manager Importer File – Annual Run (MOVESIMPORTER.XML)

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         <onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
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Unit Long-haul Truck"/>
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Truck"/>
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MOVES Run Specification File – Annual Run (MOVESRUN.MRS)

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Scenario: P25 Lehigh 2025 Year WkEnd_WkDay

2025 Build Inv PM 2.5 NOx and VOC

Emission Inventory with Local data]]></description>
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<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
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<onroadvehicleselection fueltypeid="5" fueltypedesc="Ethanol (E-85)" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
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