

The Regional Transportation Plan — 2018

Appendix D

Regional Air Quality Conformity Analysis



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APPENDIX D: Regional Air Quality Conformity Analysis

INTRODUCTION

This paper documents the positive air quality findings of the Regional Transportation Plan (RTP) for conformity with the State Implementation Plan for Air Quality (SIP). Required under the federal Clean Air Act, a SIP provides a blueprint of how current and former nonattainment areas will meet and maintain the National Ambient Air Quality Standards (NAAQS). Positive findings of conformity are required by the federal Clean Air Act, the Fixing America's Surface Transportation (FAST) Act and the Washington State Clean Air Act. A positive conformity finding will allow the region to proceed with implementation of transportation projects in a timely manner.

As demonstrated in the sections below, PSRC has determined the RTP conforms to the Washington State Implementation Plan as required by the federal Clean Air Act and the state Clean Air Act. This includes an emission analysis demonstrating that on-road transportation emissions are expected to be below the motor vehicle emissions budgets specified in the State Implementation Plan (SIP).

Transportation conformity is a mechanism for ensuring that transportation activities -- plans, programs and projects -- are reviewed and evaluated for their impacts on air quality prior to funding or approval. The intent of transportation conformity is to ensure that new projects, programs and plans do not impede an area from meeting and maintaining air quality standards. Specifically, regional transportation plans, improvement programs and projects may not cause or contribute to new violations, exacerbate existing violations, or interfere with the timely attainment of air quality standards or the required interim emissions reductions towards attainment. Meeting conformity requirements takes the collective participation of all jurisdictions and agencies that implement transportation projects and programs within the central Puget Sound region.

AIR QUALITY STATUS

Air quality conformity must be addressed for areas designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for specific pollutants. This section outlines the status of the Puget Sound region for each of the six criteria air pollutants and the respective obligations related to transportation conformity.

The federal Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: particulate matter (fine particulates, PM_{2.5}, and coarse particulates, PM₁₀), ground-level ozone, carbon monoxide (CO), sulfur oxides, nitrogen oxides (NO_x), and lead. Areas of the country where there have been exceedances of the NAAQS may be designated by the U.S. Environmental Protection Agency (EPA) as "nonattainment" for a particular pollutant. The Clean Air Act requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan to attain the standards for each area designated nonattainment for any pollutant. These plans, known as State Implementation Plans or SIPs, are developed by state and local air quality management agencies and submitted to EPA for approval. A nonattainment area that has demonstrated pollutant concentration levels below the NAAQS may be redesignated to attainment. These

areas are subject to an EPA-approved maintenance plan that is included as part of the SIP, and are commonly referred to as maintenance areas.

Within the Puget Sound region, there is currently a PM_{2.5} maintenance area and three PM₁₀ maintenance areas. The region is in attainment of all other criteria pollutants. Figure 1 on the next page shows the location of the current, and former, nonattainment and maintenance area boundaries. More information on these areas is provided below.

In 2008, a portion of Pierce County was designated as nonattainment for PM_{2.5}. This area is located in the Wapato Hills-Puyallup River Valley area near Tacoma. Effective March 12, 2015, the region was redesignated by the EPA as attainment with an approved maintenance plan for PM_{2.5}. PM_{2.5} nonattainment and maintenance areas must consider sources of indirect PM_{2.5} emissions because they can result in formation of PM_{2.5} emissions. NO_x is considered a PM_{2.5} precursor; therefore, NO_x emissions are addressed as part of the PM_{2.5} conformity demonstration. Other pollutants can be considered PM_{2.5} precursors but were not identified in the SIP as having a significant contribution to PM_{2.5} emissions within the maintenance area.

In 1987, the industrial areas of the Seattle Duwamish River, Kent Valley and Tacoma Tidelands were classified as nonattainment areas for PM₁₀. The three PM₁₀ areas were redesignated as attainment with an approved maintenance plan effective May 14, 2001, after years of meeting the NAAQS. In December 2013, EPA proposed the approval of a limited maintenance plan for the three PM₁₀ areas. A limited maintenance plan is used to meet Clean Air Act requirements for formerly designated nonattainment areas with little risk of violating the PM₁₀ NAAQS again. All three areas currently have monitored PM₁₀ levels that are roughly one-third of the PM₁₀ NAAQS, with steady declines in emission levels since the areas were first designated in 1987. EPA approved the limited maintenance plan for conformity purposes on May 30, 2014, resulting in a regional emissions analysis no longer being required to demonstrate conformity for the three PM₁₀ areas.¹ EPA released the final approval of the limited maintenance plan on August 20, 2014.

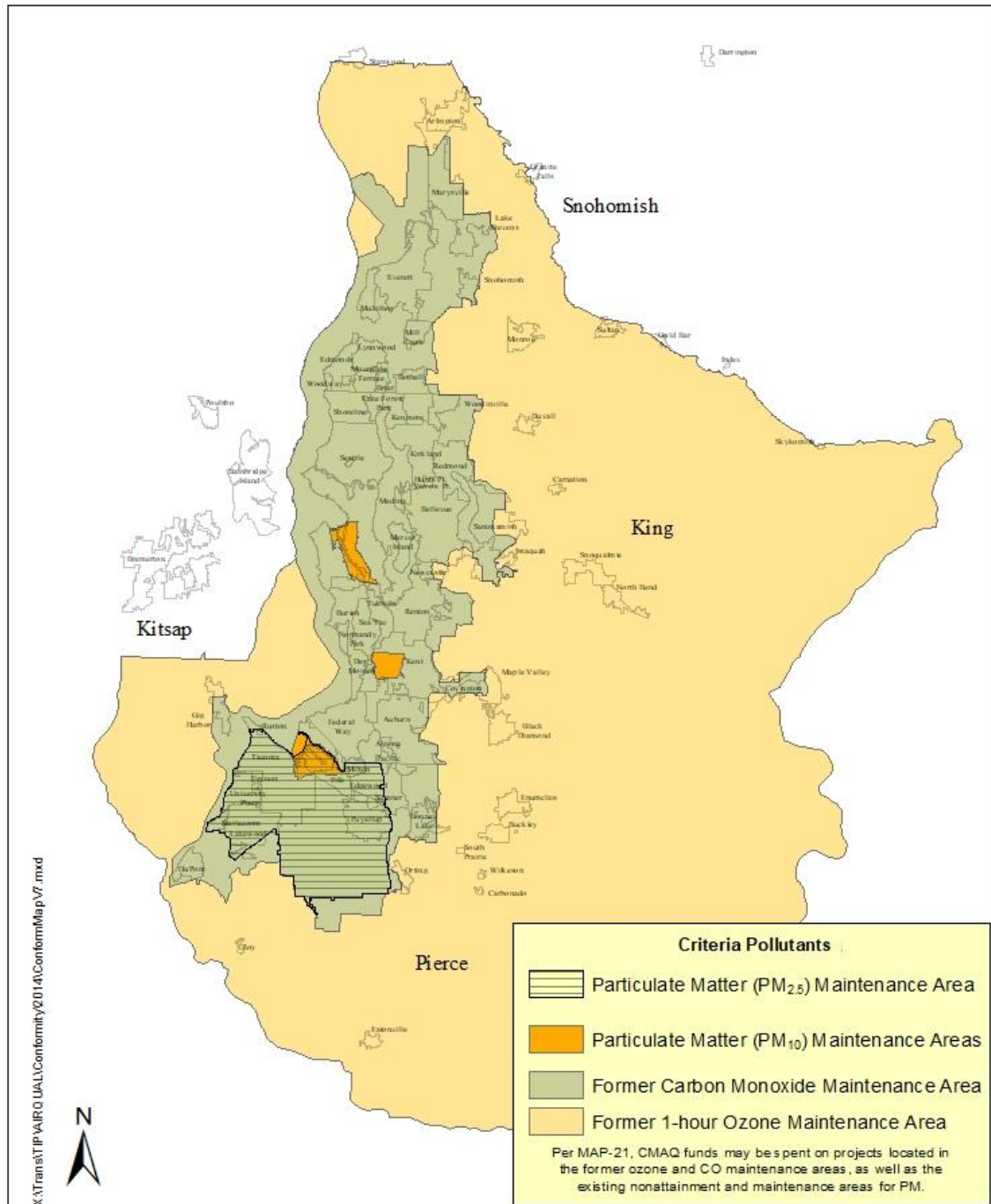
In 1978, the central Puget Sound region was classified as a nonattainment area by EPA for carbon monoxide (CO). In 1996, having met the federal standards for several years, the region was redesignated by the EPA as attainment with an approved maintenance plan for CO. On October 11, 2016, the area reached the end of the 20-year maintenance period for CO; transportation conformity is no longer required for CO in the region as of this date.

The region was previously a maintenance area for the original 1-hour ground-level ozone standard; a newer standard based on an 8-hour average concentration replaced the 1-hour standard as of June 15, 2005. The 1-hour standard was revoked, and conformity no longer applies. The region is currently designated as Unclassifiable/Attainment for the 8-hour ground-level ozone standard. The former ozone maintenance area is included on the map in Figure 1 because the area is still eligible for funds from the Congestion Mitigation Air Quality (CMAQ) Program.

¹ Additional requirements still apply under a Limited Maintenance Plan, including consultation, the implementation of any outstanding TCMs, and project level analyses.

Figure 1

**Current Central Puget Sound Region
Designated Maintenance and Nonattainment Areas
November 2017**



CONFORMITY ANALYSIS REQUIREMENTS

Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a SIP. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS.

Section 93.109 of the federal conformity rule identifies the applicable criteria and procedures for determining conformity of transportation plans, programs and projects, which are further detailed in sections 110-119. The sections applicable to plans are summarized below.

- Section 93.110: The conformity determination must be based on the latest planning assumptions.²*
- Section 93.111: The conformity determination must be based on the latest emissions estimation model available.*
- Section 93.112: The MPO must make the conformity determination according to consultation procedures identified in the conformity rule.*
- Section 93.113: Plans and TIPs must provide for the timely implementation of transportation control measures (TCMs) from the applicable SIP.*
- Section 93.118: Regional emissions must be less than or equal to the motor vehicle emissions budgets established in the applicable SIP or submitted SIP revision.*

Latest Planning Assumptions

The federal conformity rule includes procedures for estimating regional emissions for transportation conformity analyses (§93.122). The process for estimating regional emissions for conformity analyses involves the integration of PSRC's land use and travel demand modeling with EPA's emissions factor model. The land use and travel demand modeling must be based on the latest planning assumptions. The following sections describe the technical analysis used for the RTP conformity analysis.

Land Use Modeling

PSRC used an application of the UrbanSim land use model system to develop a land use allocation product called Land Use Vision (LUV). LUV projects growth in the PSRC region through 2040 and was developed through the following process. First, the PSRC Regional Macroeconomic Forecast supplies regional totals for population, households, and jobs. Second, the Macroeconomic Forecast is apportioned to annual jurisdictional control totals using numeric policy guidance from the Vision 2040 Regional Growth Strategy and adopted local growth targets. Third, the control totals are used in UrbanSim to allocate projected growth on developable land at the parcel level. Fourth, the model results are shared with and vetted by

² This requirement is further clarified in the joint FHWA/EPA Memorandum, "Guidance for the Use of Latest Planning Assumptions in Conformity Determinations," dated December 2008.

local planners, and post-modeling adjustments are made to better reflect adopted local policy. Lastly, the LUV dataset is converted into the applicable formats for use as input in the regional activity-based travel demand model.

The technical and policy assumptions underlying the LUV dataset were established to ensure federal air quality conformity analysis requirements regarding use of “latest available planning assumptions” were met. The key assumptions are as follows:

- The LUV dataset is consistent with the region’s most current long-range regional forecast of households, population and employment from the 2015 Regional Macroeconomic Forecast
- The LUV dataset reflects the regional long-range strategic growth assumptions as detailed by VISION 2040 Regional Growth Strategy
- The LUV dataset is reflective of locally adopted growth targets and comprehensive plans developed to begin implementing the VISION 2040 Regional Growth Strategy

Travel Demand Modeling

PSRC has developed a customized set of computer programs and mathematical procedures to simulate current and future travel patterns and conditions within the four counties (King, Kitsap, Pierce, and Snohomish) of the central Puget Sound region. These programs and procedures are collectively referred to as the “regional travel demand forecasting model” or simply as the “travel model.” The travel model produces detailed spatial and network data that are used to analyze how the region’s transportation infrastructure and environment are likely to be impacted by future population growth and development. The travel model provides the analytical foundation from which PSRC develops many of its plans including the Regional Transportation Plan.

Model/Tool

A new travel demand model called SoundCast produced model results for the plan. SoundCast is an activity-based model, where the previous model was trip-based. Activity-based travel models represent people’s need to travel to conduct daily activities, as compared to the previous model which aggregately represented trips between zones. As an activity-based model, SoundCast allows for greater temporal and spatial resolution to better evaluate alternative transportation policies. The performance outcomes shown throughout the plan rely on the fine-grained results from SoundCast. To learn more, visit: <https://www.psrc.org/activity-based-travel-model-soundcast>.

Land use and population allocations (representing demand conditions) along with transportation projects, policies, and network attributes (representing supply conditions) represent the key input assumptions for any travel demand analysis framework. For the travel demand analysis used to support the plan, the previously mentioned land use dataset, allocated throughout the region across 3,700 transportation analysis zones, comprises the key land use assumptions, while the set of transportation projects and policies enumerated within the plan form the basis for the key transportation network assumptions. Additional information on PSRC’s travel demand modeling procedures is available through PSRC’s web site (www.psrc.org) or by calling the Information Center ((206) 464-7532).

The conformity analysis must include modeling of all regionally significant projects. As defined by the conformity rule, a regionally significant project is:

"a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel."

The conformity analysis includes all modelable projects and programs contained in the plan. Projects are coded into PSRC's travel demand model networks for their respective years of implementation. The travel demand model analyses performed for the RTP include 2014, 2025, and 2040.

Latest Emissions Model

The conformity analysis for the RTP was performed using the latest version of EPA's Motor Vehicle Emission Simulator (MOVES2014a). Emissions were calculated for PM_{2.5} and NO_x. The emissions for each of the analyses were generated by output from PSRC's travel demand model and MOVES2014a. Emission estimates for PM_{2.5} and NO_x were created using model settings consistent with the procedures used by Ecology to develop the motor vehicle emissions budgets provided in conjunction with the PM_{2.5} Maintenance Plan and Redesignation Request. All model options and assumptions were coordinated with PSRC's air quality partner agencies.

MOVES inputs include the most current vehicle registrations, vehicle inspection and maintenance (I/M) settings, fuel supply data, and local meteorology at the county level. Ecology provided county-specific input files that were used in the most recent statewide emissions inventory. These files were used to create input files for future analysis years, assuming the fleet mix and age distribution remains constant. MOVES utilizes a database-centered design that does not create an input file that could be provided as part of this documentation, however Attachment A contains more details about MOVES methodology and assumptions.

INTERAGENCY CONSULTATION AND PUBLIC INVOLVEMENT

Federal Clean Air Act regulations, as identified in the federal conformity rule (40 CFR Part 93), and the state Clean Air Act regulations defined in the state conformity rule (WAC 173-420-070), require formal consultation procedures for conducting conformity analyses. The consultation procedures for the conformity analysis of the RTP are consistent with PSRC's Public Participation Plan, which is in compliance with the federal Statewide and Metropolitan Planning regulations (23 CFR Part 450) as well as the above conformity regulations. The Public Participation Plan may be obtained by contacting PSRC's Information Center ((206) 464-7532), or through PSRC's web site (www.psrc.org).

A major task identified under the consultation procedures requirements is the review of key assumptions for conducting the conformity analysis. PSRC held a scoping meeting with the region's air quality consultation partners to present the methodology and procedures for the conformity analysis conducted for the RTP in November 2017. These partner agencies include the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Environmental Protection Agency (EPA), the Washington State Departments of Transportation

(WSDOT) and Ecology, and the Puget Sound Clean Air Agency (PSCAA). This scoping meeting met the formal consultation requirements of the federal and state Clean Air Acts.

In addition to interagency consultation, opportunity for public comment is also provided. The RTP is being released for a formal public comment period between December 14 and January 29, 2017, including this air quality conformity documentation. In addition, opportunity for public comment is provided at the beginning of each PSRC Board meeting. The adoption of the plan and the approval of the conformity determination are expected to occur at PSRC's May 2018 General Assembly meeting, preceded by Transportation Policy and Executive Board recommendations in April 2018. Additional information on public involvement throughout the preparation of the plan is included in Appendix C of the plan document.

STATUS OF TRANSPORTATION CONTROL MEASURES

According to the federal conformity rule, transportation plans must provide for the timely implementation of Transportation Control Measures (TCMs) from an applicable maintenance plan (§93.113). TCMs are projects, programs or actions that will aid in the elimination or reduction of the severity or number of violations of the NAAQS, and help expeditiously attain and maintain those standards. TCMs can be strategies to increase the efficiency of existing transportation facilities, reduce travel demand, or lower the amount of emissions in vehicles leading to measurable vehicle emissions reductions. Expected emissions reductions, or credits, from these TCMs are included in maintenance plan inventories and attainment/maintenance demonstrations.

There are no control measures in the PM₁₀ or PM_{2.5} maintenance plans relating to on-road mobile sources.

MOTOR VEHICLE EMISSIONS BUDGET

The conformity analysis must show that the total regional emissions produced by projects in the plan, plus activity on the existing travel network, do not exceed the motor vehicle emissions budget identified in the maintenance plan for each respective criteria pollutant. The emissions budget is a ceiling of total emissions that cannot be exceeded. Emissions are calculated on an individual link basis, based on the vehicle miles traveled (VMT) and speed of each link. This calculation is performed separately for every hour of the day between 5am and 10pm, and for one overnight time period between 10pm and 5am. Emissions are calculated for both intrazonal and interzonal trips. The calculated emissions of individual links are then summed for each of the time periods, which in turn are summed for the total daily emissions in each maintenance area.

Table 1 identifies the motor vehicle emissions budget for the required criteria pollutants and presents the analysis results. The emissions from the projects and programs in the plan for each of the analysis years are below the established daily motor vehicle emissions budgets for PM_{2.5} and NO_x.

Table 1 – PM_{2.5} and NO_x Emissions Analysis Results (lbs./day)

Year	PM _{2.5}	NO _x
2017 Motor Vehicle Emissions Budget*	1,888	41,790
2017	1,295	34,843
2020	1,046	27,249
2026 Motor Vehicle Emissions Budget**	1,321	22,880
2026	618	14,019
2030	567	11,722
2040	438	5,981

* estimated emissions for years 2017 through 2025 must be less than the 2017 MVEB

** estimated emissions for years 2026 and beyond must be less than the 2026 MVEB

Emissions of PM_{2.5} and NO_x were calculated for 2014, 2025, and 2040, corresponding to the available travel modeling analysis years. The emissions for 2017, 2020, 2026, and 2030 were therefore interpolated, per consultation with PSRC's air quality partner agencies and consistent with Section 93.118(d)(2) of the federal conformity rule. Pursuant to Section 93.118(b) of the federal conformity rule, analyses were conducted for each year for which a motor vehicle emissions budget has been established, the horizon year of the plan, and intermediary years such that the analyses are no more than 10 years apart. Under consultation with PSRC's air quality partner agencies and consistent with standard practices (Section 93.118(b)(2)(ii) of the federal conformity rule), these budgets were carried forward in this analysis as the budgets for 2020, 2030 and 2040, which is the horizon year of the plan.

Fiscal Constraint

The Regional Transportation Plan includes a financial strategy for all of the combined investments through the year 2040, including capacity projects, preservation, maintenance and operations, per 23 CFR 450.324(g)(11). The plan document describes this financial strategy in greater detail, and Appendix P provides additional information and background.

CONCLUSIONS

This analysis provides sufficient basis for PSRC to determine that the Regional Transportation Plan conforms to the Washington State Implementation Plan as required by the federal Clean Air Act and the state Clean Air Act.

ATTACHMENT A: EMISSIONS METHODOLOGY

As part of the regional conformity analysis, on-road mobile emissions of PM_{2.5} and NO_x were estimated for required years within the designated maintenance area. The PM_{2.5} and NO_x conformity analyses are consistent with the methodology Ecology used to develop the PM_{2.5} and NO_x motor vehicle emissions budgets (MVEB). The budget calculation method developed by Ecology was designed to be as simple as possible, yet without sacrificing the accuracy of the emissions estimates. The basic calculation equation is shown below, followed by a more detailed description of the method and data sources. These examples are from the 2011 Clean Data Determination. Actual emissions analyses were performed using updated data years.

Basic Calculation

$$E = (M \times F_{gmi}) + (V \times F_{gpveh})$$

where E = emissions in g

M = VMT

V = vehicle population

F_{gmi} = emission factor in g/mi

F_{gpveh} = emission factor in g/vehicle

Vehicle Miles Traveled

As part of the plan update, average daily weekday VMT for the Puget Sound region for the years 2014, 2025 and 2040 was modeled. The travel demand model VMT is estimated for individual roadway links for every hour of the day between 5am and 10pm, and for one overnight time period between 10pm and 5am.

Data for each link and time period includes:

- Length
- Facility type
- Functional class (for most links)
- County
- NAA flag (Yes/No flag for in the nonattainment or maintenance area)
- Congested speed
- VMT

The VMT link data was combined with the MOVES emission factors. First, each link was assigned to its closest MOVES speed bin and classified as to its MOVES road type: Rural Restricted, Rural Unrestricted, Urban Restricted, or Urban Unrestricted. For PM_{2.5} and NO_x calculations, the NAA link VMT data was summed by time period, MOVES speed bin and MOVES road type to estimate emissions for an average winter day.

Vehicle Population

Washington State Department of Licensing, Federal Transit Administration, and Washington State Office of the Superintendent of Public Instruction vehicle registration data was used to calculate the vehicle population in each county. The ratio of county VMT to nonattainment or maintenance area VMT was used to allocate the vehicle population to the appropriate area. 2025 and 2040 vehicle populations were estimated for each county using a combination of

vehicle trips and households. The future vehicle population was then allocated to the nonattainment or maintenance area using the VMT ratio as described above.

Emission Factors

Ecology provided a series of MOVES input files that were used to create the 2011 statewide PM_{2.5} emissions inventory. A set of files was created for each county and represented the current vehicle registration data, fuel supply data, and I/M programs specific to each county. These files were used to create MOVES input files for 2014, 2025, and 2040, assuming that the vehicle mix and age distributions remain constant in the future.

The PM_{2.5} and NO_x budgets were developed with MOVES using a meteorological input file that represented the temperature profile for peak PM_{2.5} conditions. MOVES was run with this same meteorological file for this conformity analysis. EPA's MOVES model was used to generate PM_{2.5} and NO_x emission factors in grams/mile and grams/vehicle. The grams/mile factors were output by hour, road type, and speed bin. The grams/vehicle factors were output by hour.

The emission factors were prepared for combination with the VMT and vehicle population data. The grams/mile factors were averaged over each of the time periods resulting in one factor per road type, time period, and speed bin. The grams/vehicle factors were summed over each hour of the day resulting in one factor per day.