**Air Quality, Greenhous Gas Emissions, and Energy**

**Discipline Report**

**TEMPLATE**

April 2020

*Italicized red text with yellow highlight is instructions*

Blue highlighted text is example text, modify to apply to your project.

***WSDOT HQ AQ staff welcomes feedback on this template to incorporate for future versions; please check for the most up to date version at the start of each project. Please contact*** [***Karin.landsberg@wsdot.wa.gov***](mailto:Karin.landsberg@wsdot.wa.gov) ***with questions or feedback.***

April 2020

**Contents**

[1. Summary 1](#_Toc37412103)

[1.1 Purpose of Report 1](#_Toc37412104)

[1.2 Study Approach 1](#_Toc37412105)

[1.3 Existing Conditions Overview 1](#_Toc37412106)

[1.4 Project Effects Overview 2](#_Toc37412107)

[1.5 Measures to Avoid or Minimize Effects 5](#_Toc37412108)

[2. Project Description 6](#_Toc37412109)

[2.1 Background 6](#_Toc37412110)

[2.2 Project Description 6](#_Toc37412111)

[2.3 Project Construction 6](#_Toc37412112)

[3. Study Approach 7](#_Toc37412113)

[3.1 Policies and Regulations 7](#_Toc37412114)

[3.2 Study Area 14](#_Toc37412115)

[3.3 Study Approach 14](#_Toc37412116)

[4. Existing Conditions 15](#_Toc37412117)

[4.1 Criteria Pollutants 15](#_Toc37412118)

[4.2 MSATs 16](#_Toc37412119)

[4.3 Greenhouse Gases 19](#_Toc37412120)

[4.4 Energy Use 20](#_Toc37412121)

[4.5 Efforts to Reduce Energy Use and Greenhouse Gas Emissions 21](#_Toc37412122)

[5. Project Effects 21](#_Toc37412123)

[5.1 Operational Effects 21](#_Toc37412124)

[5.2 Operational Effects 21](#_Toc37412125)

[5.3 Construction Effects 27](#_Toc37412126)

[5.4 Indirect Effects 28](#_Toc37412127)

[6. Measures to Avoid or Minimize Effects 29](#_Toc37412128)

[6.1 Operational Mitigation 29](#_Toc37412129)

[6.2 Construction Mitigation 29](#_Toc37412130)

[7. References 30](#_Toc37412131)

[Appendix A 31](#_Toc37412132)

[Appendix B – Operational MSAT, GHG, and Energy MOVES Modeling 35](#_Toc37412133)

# 

# Summary

*This section provides a brief overview of the report.*

## Purpose of Report

This report identifies potential effects on air quality, energy and greenhouse gas associated with the [name of project].

*Identify the document the analysis supports*. The Project is currently undergoing a National Environmental Policy Act (NEPA) reevaluation to examine the potential project effects from design revisions in the section from Carlisle Avenue south, across the Spokane River, to I-90. The analysis was triggered because the previous transportation conformity determination was over three years old.

## Study Approach

Air quality, energy, and greenhouse gases are regulated by federal, state, and local agencies. The analysis for the [Project Name] follows the current guidelines developed by the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), the [Regional Air Quality Agency], and [MPO].

This study included the following elements:

* Carbon Monoxide (CO) hotspot analysis to demonstrate conformity
* Coarse Particulate Matter (PM10)hotspot analysis to demonstrate conformity
* Mobile Source Air Toxics (MSAT), GHG, and energy operational analyses
* Quantitative GHG and energy construction and operations analysis
* Qualitative criteria pollutant and MSAT construction analysis

## Existing Conditions Overview

Air quality monitors measure pollutant concentrations throughout the country. EPA, state, tribal, and local agencies use that data to ensure that pollutants remain at levels that protect public health and the environment. Nationally, average pollutant concentrations have decreased substantially over the years. Air quality in the [Puget Sound] region has followed similar trends.

The [Spokane] region is currently in attainment of the National Ambient Air Quality Standards (NAAQS) for all criteria pollutants. The region violated [CO and PM10] standards in the past.

***Identify when the area was redesignated attainment****.* [In 2005, the Environmental Protection Agency (EPA) redesignated the area as attaining the standards. Since then, the area has been under maintenance plans for these two pollutants and projects must demonstrate conformity.]

## Project Effects Overview

Transportation projects have environmental effects throughout their lifecycle. This analysis addresses [operational, construction, and maintenance] effects of the [North Spokane Corridor project.]

### Operational Effects

Operational effects are the effects of the vehicles using the facility. Traffic in the project area would be affected by changes in the number of vehicles, the travel speeds, and the levels of congestion experienced on local roadways. Energy consumption, air quality and greenhouse gas emissions can be affected by these changes. ***Identify years analyzed****.* Traffic data and analysis for 2010 is used to represent existing conditions. Project modeling of build and no build conditions was completed for a design year of 2040.

According to EPA, MOVES2014 is a major revision to MOVES2010

***Summarize analysis results***. The NSC project will have no adverse operational air quality, greenhouse gas and energy effects:

* The CO hotspot analysis shows that the project will not cause or contribute to an exceedance of the NAAQS. The project meets all CO conformity requirements.
* The PM10 hotspot analysis shows that the project will not cause or contribute to an exceedance of the NAAQS. The project meets all PM10 conformity requirements.
* The project followed Federal Highway Administration (FHWA) guidance for MSAT analysis. MSATs decrease dramatically between 2010 and 2040 by 89 percent or more, depending on the pollutant, due to improvements in vehicle technology. MSAT emissions from the build alternative are estimated to be about 14-19 percent less than the no build alternative, depending on the pollutant, because of lower vehicle miles traveled (VMT) in the study area with the North Spokane Corridor project and smoother driving conditions with less idling and stop and go conditions.
* Greenhouse gas emissions are similar under the existing conditions and the no build alternative; vehicle efficiency improvements under the 2040 no build alternative are offset by a 55 percent increase in VMT as compared to the existing conditions VMT in the study area. GHG emissions under the 2040 build alternative are about 15 percent less than the 2040 no build and existing alternatives because the 2040 no build alternative has a lower VMT as compared to the no build alternative in the study area and smoother driving conditions with less idling and stop and go conditions with the North Spokane Corridor project.
* Energy use is similar under the existing conditions and the 2040 no build alternative; vehicle efficiency improvements under the 2040 no build alternative are offset a 55 percent increase in VMT as compared to the existing conditions VMT in the study area. Energy use under the 2040 build alternative is about 15 percent less than the 2040 no build and existing alternatives because the 2040 no build alternative has a lower VMT as compared to the no build alternative in the study area and smoother driving conditions with less idling and stop and go conditions with the North Spokane Corridor project.

***Summarize results in a table, example below.***

Exhibit 3 – Daily Operational Emissions and Energy Use

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alternative | VMT (miles) | 1,3-Butadiene (g) | Acetaldehyde (g) | Acrolein (g) | Benzene (g) | Diesel PM (g) | Ethylbenzene (g) | Formaldehyde (g) | Naphthalene (g) | POM (g) | Energy Use (MMBTU) | GHGs (MT) |
| Existing (year) |  |  |  |  |  |  |  |  |  |  |  |  |
| No Build (year) |  |  |  |  |  |  |  |  |  |  |  |  |
| No Build compared to Existing |  |  |  |  |  |  |  |  |  |  |  |  |
| Build (year) |  |  |  |  |  |  |  |  |  |  |  |  |
| Build compared to Existing |  |  |  |  |  |  |  |  |  |  |  |  |
| Build compared to No Build |  |  |  |  |  |  |  |  |  |  |  |  |

### Construction Effects

Construction effects would be temporary, including fugitive dust from excavation and earth moving, and emissions from diesel-fueled construction equipment. WSDOT would implement best management practices (BMPs) to avoid or minimize potential effects on the environment.

Greenhouse gas emissions *[****energy is only addressed in an EIS***] and energy consumed during maintenance and project construction were quantitatively estimated (see Exhibit 4).

Exhibit 4 – Project Construction and Maintenance Energy and GHG Emissions

|  |  |  |
| --- | --- | --- |
| **Component** | **Energy Use (MMBTU)** | **GHGs (MT)** |
| Bridges and Overpasses |  |  |
| Lighting |  |  |
| Pathways |  |  |
| Roadways |  |  |
| Total |  |  |

|  |
| --- |
| **Notes:** MMBTU= one million British Thermal Units, MT= metric tons |

## Measures to Avoid or Minimize Effects

### Operational Measures

*[****modify text to represent findings.]***

The project would not require mitigation measures during operation.

No meaningful impacts on energy use, criteria pollutant, MSAT, or greenhouse gas emissions are predicted during operations, therefore no mitigation measures are proposed for operational conditions.

### Construction Measures

Construction effects would be temporary, including fugitive dust from excavation and earth moving, and emissions from diesel-fueled construction equipment. WSDOT would implement best management practices (BMPs) to avoid or minimize potential effects on the environment.

The project traffic control plan will include detours and strategic construction timing (such as night work) to continue moving traffic through the area and reduce backups and delays to the traveling public to the extent possible. It is standard practice for WSDOT to set up active construction areas, staging areas, and material transfer sites in a way that reduces standing wait times for equipment during construction. WSDOT will also work with its partners to promote ridesharing and other commute trip reduction efforts for employees working on the project.

# Project Description

The purpose of the Project is to improve regional mobility of the transportation system to serve multimodal local and port freight movement and passenger movement. Furthermore, the project is intended to reduce congestion and improve safety on the arterials and intersections in the project area, improve system continuity, and maintain or improve air quality in the corridor. The need for the project is to enhance regional freight mobility, reduce congestion, improve safety, improve system continuity, and maintain or improve air quality.

## Project Description

The Project is within XX County in the cities of XX. The Project will *[****List key project elements****]* build approximately XX miles of a new, 4-lane limited-access facility from X to X. Exhibit XX depicts the Project Vicinity Map.

Exhibit XX – Project Vicinity Map

## Project Construction

Construction of the project elements is expected to occur over a XX year period, beginning XX. Construction effects on air quality, energy and greenhouse gas would occur primarily as a result of emissions from heavy-duty construction equipment (such as bulldozers, backhoes, and cranes), diesel-fueled mobile sources (such as trucks, brooms, and sweepers), diesel- and gasoline-fueled generators, and on- and off-site project-related vehicles (such as service trucks and pickup trucks). Fugitive dust (particulate matter) emissions are associated with demolition, land clearing, ground excavation, grading, cut-and-fill operations, and structure erection.

If construction traffic and lane closures increase congestion and reduce the speed of other vehicles in the area, emissions from traffic would increase temporarily while those vehicles are delayed. These emissions would be temporary, and the effects of these emissions would generally be limited to the immediate area in which the congestion occurs. Some construction stages (particularly those involving paving operations using asphalt) would result in short-term odors, which might be detectable by some people near the site, and they would be diluted as the distance from the site increases.

# Study Approach

The analyses performed for this project fulfill federal, state, and WSDOT requirements and follow standard guidance.

## Policies and Regulations

The National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations require that environmental reviews include an evaluation of the effects of a proposed Project on air quality. In addition, FHWA requires energy use to be considered in EIS documents.

The federal Clean Air Act (CAA) and its amendments, and the Washington State Clean Air Act currently regulate air quality in the state. The U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and Puget Sound Clean Air Agency (PSCAA) enforce regulations developed to protect air quality**. *If located in an area covered by an MPO, such as PSRC, add info…***

EPA delegates authority to manage air quality issues to the states but sets the criteria for National Ambient Air Quality Standards (NAAQS) and conformity requirements. In Washington, Ecology oversees the development of and conformity to the State Implementation Plan, which is the state’s plan for meeting and maintaining NAAQS. [PSCAA] has local authority for setting regulations and permitting of stationary air pollutant sources and construction emissions.

For the analysis of both operational and construction Project effects, WSDOT followed the agency’s Environmental Manual (WSDOT 2019) for air quality and energy for projects undergoing NEPA review. NEPA requires documenting and comparing air quality effects of project alternatives, evaluation of temporary construction emissions (fugitive dust), operational and construction greenhouse gas emissions (GHG), temporary construction emissions (fugitive dust), and energy use, as described in the next sections.

### Criteria Pollutants

Under the CAA, EPA establishes NAAQS for six common pollutants, referred to as criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO2), particulate matter (PM10 and PM2.5), ozone, and sulfur dioxide (SO2) (EPA 2015a and 2015b). Lead and SO2 are not considered in this report because they are not pollutants of concern for transportation projects. Current NAAQS are listed in Exhibit 10.

The NAAQS are separated into two categories: Primary and Secondary standards (40 Code of Federal Regulations [CFR] 50). The Primary standards were created to protect public health; the Secondary pollutant standards were established to protect public welfare and the environment. Ecology and PSCAA have authority to adopt more stringent standards, although many of the state and local standards are equivalent to the federal mandate.

EPA may designate areas not in compliance with the NAAQS as nonattainment areas. An area remains a nonattainment area for that pollutant until monitored concentrations are in compliance with the NAAQS. After the NAAQS are attained and EPA redesigntes an area as attainment, the area must have a plan in place for 20 years to ensure maintenance of the air quality, a maintenance plan. These areas are often referred to as “maintenance areas,” although that is not an official designation. Through a conformity demonstration, federal projects in a nonattainment or maintenance area must demonstrate that they will not cause or contribute to a violation of the NAAQS. EPA sets requirements for how these conformity demonstration analyses are conducted.

***If the project is located in an attainment area that is under a maintenance plan for:*** The study area is located in an area that is currently designated as a maintenance area for CO. In the past, the XXX area violated the PM10 and CO NAAQS. By 2005, the area had improved its air quality and EPA redesignated it as attaining the NAAQS for both pollutants. The area is currently under a maintenance plan for CO and a limited maintenance plan for PM10. A limited maintenance plan is a simpler plan that EPA allows in situations where there is very little chance of the area violating the standard. Both plans expire in 2025, at which time conformity will no longer be required.

***If the project is located in an attainment area that was once maintenance for CO:*** Transportation conformity is no longer required for CO because maintenance requirements for the area expired October 11, 2016 (EPA 2004).

Transportation conformity for CO is demonstrated via a “hotspot” analysis that evaluates the pollutant concentration at intersections, which are the locations most likely to violate the standard. WSDOT uses the WA State Intersection Screening Tool (WASIST) to demonstrate CO conformity. This tool is based on emission factors from MOtor Vehicle Emission Simulator (MOVES2014) and has been approved by EPA for this purpose.

***If the project is in a PM2.5 or PM10 maintenance area, include the following information.***

Only a project determined to be a “project of air quality concern” (POAQC) requires a PM10 hotspot analysis. If a project is determined not to be a POAQC, no hotspot analysis is needed and conformity can be completed qualitatively.

Section 93.123(b)(1) of the conformity rule defines one category of projects that require a PM2.5 or PM10 hot-spot analysis as: ***identify any applicable project types*** “(i) New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles.” The rule leaves it to the local consultation partners to decide what constitutes a significant number or increase of diesel vehicles. For the North Spokane Corridor project, the consultation partners consist of air quality and transportation staff from WSDOT, EPA, FHWA, FTA, Ecology, SRTC, and SRCAA. The partners determined that this project met the criteria to be a POAQC and requires a PM10 hotspot analysis.

WSDOT followed EPA’s PM10 hotspot analysis guidelines[[1]](#footnote-1) for completing this analysis using EPA’s MOVES and AERMOD models.

Exhibit 3‑1. Ambient Air Quality Standards by Government Jurisdiction

| Pollutant | National[[2]](#footnote-2) | | State of Washington[[3]](#footnote-3) | Puget Sound Region |
| --- | --- | --- | --- | --- |
| Primary | Secondary |
| Nitrogen Dioxide (NO2) | | | | |
| 1-Hour (ppm) | 0.10 | NS | 0.10 | 0.10 |
| Annual Average (ppm) | 0.053 | 0.053 | 0.053 | 0.053 |
| Carbon Monoxide (CO) | | | | |
| 1-Hour Average (ppm) | 35.0 | NS | 35.0 | 35.0 |
| 8-Hour Average (ppm) | 9.0 | NS | 9.0 | 9.0 |
| Ozone (O3) | | | | |
| 8-Hour Average (ppm) | 0.070 | 0.070 | 0.070 | 0.075 |
| 1-Hour Average (ppm) | Revoked | Revoked | NS | NS |
| Particulate Matter (PM10) | | | | |
| 24-Hour Average (µg/m3) | 150 | 150 | 150 | 150 |
| Annual Arithmetic Average (µg/m3) | Revoked | Revoked | NS | NS |
| Particulate Matter (PM2.5) | | | | |
| 24-Hour Average (µg/m3) | 35 | 35 | 35 | 35 |
| Annual Arithmetic Average (µg/m3) | 12 | 15 | 12 | 15 |
| µg/m3 = micrograms per cubic meter; ppm = parts per million (by volume); NS = no standard established; TSP = total suspended particulates  National standards other than O3, PM, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The O3 standard is attained when the fourth highest 8‑hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24‑hour standard is attained when the expected number of days per calendar year with a 24‑hour average concentration above 150 µg/m3 is equal to or less than 1. For PM2.5, the 24‑hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard. | | | | |

### NEPA

The National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) require that environmental reviews include an evaluation of the effects of a proposed project on air quality. FHWA provides guidance on addressing air quality in environmental documents through their Air Quality Technical Advisory[[4]](#footnote-4) and their 2016 Updated Interim Guidance on Mobile Source Air Toxics (MSATs) Analysis in NEPA Documents[[5]](#footnote-5). In addition, in an EIS, FHWA requires energy[[6]](#footnote-6) effects to be considered. WSDOT requires greenhouse gas emissions be considered in project documentation and follows the agency Project-Level Greenhouse Gas Evaluations under NEPA and SEPA[[7]](#footnote-7) guidance.

#### Mobile Source Air Toxics (MSAT)

NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals, and that Federal agencies use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment (42 U.S.C. 4332). In addition to evaluating the potential environmental effects, FHWA must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest (23 U.S.C. 109(h)). The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

Consideration of MSAT in NEPA Documents

FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

1. No analysis for projects with no potential for meaningful MSAT effects;
2. Qualitative analysis for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

For projects warranting MSAT analysis, all nine priority MSAT (discussed further in Section 4.2) should be considered.

***Use the text corresponding to the level of MSAT analysis the project requires. Modify as needed to describe the project.***

**Projects with No Meaningful Potential MSAT Effects, or Exempt Projects.**

The types of projects included in this category are:

* Projects qualifying as a categorical exclusion under 23 CFR 771.117;
* Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; and
* Other projects with no meaningful impacts on traffic volumes or vehicle mix.

For projects that are categorically excluded under 23 CFR 771.117, or are exempt from conformity requirements under the Clean Air Act pursuant to 40 CFR 93.126, no analysis or discussion of MSAT is necessary. Documentation sufficient to demonstrate that the project qualifies as a categorical exclusion and/or exempt project will suffice. For other projects with no or negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is recommended. However, the project record should document in the EA or EIS the basis for the determination of no meaningful potential impacts with a brief description of the factors considered. Example language, which must be modified to correspond with local and project-specific circumstances, is provided in [Appendix A](https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/page01.cfm).

**Projects with Low Potential MSAT Effects**

The types of projects included in this category are those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. This category covers a broad range of projects.

We anticipate that most highway projects that need an MSAT assessment will fall into this category. Examples of these types of projects are minor widening projects; new interchanges; replacing a signalized intersection on a surface street; and projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).

For these projects, a qualitative assessment of emissions projections should be conducted. This qualitative assessment should compare, in narrative form, the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic and the associated changes in MSAT for the project alternatives, including no-build, based on VMT, vehicle mix, and speed. It should also discuss national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by EPA. Because the emission effects of these projects typically are low, we expect there would be no appreciable difference in overall MSAT emissions among the various alternatives.

In addition to the qualitative assessment, a NEPA document for this category of projects must include a discussion of information that is incomplete or unavailable for a project specific assessment of MSAT impacts, in compliance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(b)). This discussion should explain how current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts that could result from a transportation project in a way that would be useful to decision-makers. Also in compliance with 40 CFR 150.22(b), this discussion should contain information regarding the health impacts of MSAT. See [Appendix C](https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/page03.cfm).

**Projects with Higher Potential MSAT Effects**

This category includes projects that have the potential for meaningful differences in MSAT emissions among project alternatives. We expect a limited number of projects to meet this two-pronged test. To fall into this category, a project should:

* Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, involving a significant number of diesel vehicles for new projects or accommodating with a significant increase in the number of diesel vehicles for expansion projects; or
* Create new capacity or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the design year;

And also

* Be proposed to be located in proximity to populated areas.[[8]](#footnote-8)

The North Spokane Corridor project falls into the category of projects with higher potential MSATs. FHWA states that projects falling within this category should be more rigorously assessed for impacts. This approach would include a quantitative analysis to forecast local-specific emission trends of the priority MSAT for each alternative, to use as a basis of comparison.

#### Greenhous Gas Emissions

Gases that trap heat in the atmosphere are called greenhouse gases (GHG). Vehicles emit a variety of gases during their operation; some of these are greenhouse gases, and include water vapor; carbon dioxide (CO2); methane (CH4), also known as “marsh gas”; and nitrous oxide (N2O), which is used in dentists’ offices and also referred to as “laughing gas.” Any process that burns fossil fuel releases greenhouse gases into the air. CO2 comprises the bulk of the greenhouse gas emissions from transportation activities.

Greenhouse gases differ in their ability to trap heat. For example, 1 ton of CO2 has a different effect than 1 ton of CH4. To compare emissions of different greenhouse gases, inventory compilers use a weighting factor called “Global Warming Potential” (GWP). To use a GWP, the heat-trapping ability of 1 metric ton (1,000 kilograms) of CO2 is taken as the standard, and emissions are expressed in terms of CO2-equivalent (CO2e). The CO2e for a gas is derived by multiplying the tons of the gas by the associated GWP. The GWP of CO2 is 1. In EPA’s MOVES2014a model [add brief notation for source here, and full citation in the References section.] the GWP of CH4 is 25, whereas the GWP of N2O is 298, using a 100-year basis.

#### Energy Use

***Describe the study area. Geographically and how the links included in the analysis were selected.*** Example text: The topography of the Puget Sound region is characterized by low rolling hills intermingled with a complex maze of interconnected waterways linked to the Pacific Ocean through Puget Sound. The region has a mild climate with cool summers and mild, wet, and cloudy winters. Land uses in the study area are low-density residential with some higher-density residential, commercial, and industrial uses.

## Study Approach

### CO Conformity Analysis

For the CO hotspot analysis, WSDOT used WASIST; see Appendix A for detailed documentation.

### MSAT, GHG, and Energy Operational Analysis

As required by EPA, WSDOT used the EPA Motor Vehicle Emissions Simulator (MOVES 2014b) model, and relevant local inputs for this analysis to calculate daily emissions. WSDOT used an emissions burden analysis to demonstrate the changes in energy consumption and tailpipe emissions for the MSAT, GHG emissions, and energy between year existing conditions and the analysis years year of opening and design year with and without the Project.

MOVES2014b is the latest EPA tool for estimating emissions. The MOVES model was used to calculate daily emissions for the existing conditions, 2015, and No Build Alternative and Build Alternative (with the Project) for the 2025 and 2045 analysis years.

Specific details of the MOVES analysis are provided in Appendix XX. Modeling, input, and output files are provided electronically.

### Criteria Pollutant and MSAT Construction Emissions

Emissions of criteria pollutants and MSATs during construction were evaluated qualitatively. Best management practices (BMPs) to reduce emissions are outlined is Section X to reduce emissions.

### Greenhouse Gas Emissions and Energy Construction Analysis

Following the WSDOT Guidance for Project-Level Greenhouse Gas Evaluations under NEPA and SEPA, WSDOT quantified GHG emissions and energy consumed during construction (WSDOT 2018) using FHWA’s Infrastructure Carbon Estimator (ICE) spreadsheet tool (FHWA 2016b). Construction CO and PM10 emissions are considered qualitatively.

WSDOT uses FHWA’s Infrastructure Carbon Estimator (ICE) spreadsheet tool to calculate GHG emissions from fuel usage, traffic delays, and maintenance emissions resulting from the construction and maintenance of projects. FHWA’s ICE spreadsheet tool uses information on the project (number of lanes, miles of roadway, number of bridge spans, etc.) to estimate emissions from construction equipment, materials, and routine maintenance. The 2020 version of the tool was used. ***Use project relevant sections of ICE.*** The Bridges and Overpasses, Lighting, Roadways, and Pathways sections of the tool were populated with the following project-specific inputs:

Project Features

* Construct 1.7 miles of interstate
* Realign 7 miles of urban minor arterials or collectors
* Construct approximately 40 bridge spans for four lanes of traffic
* Construct 3 miles of new off-street bike and pedestrian paths
* Construct 1 mile of on-street bike lane
* Install approximately 153 light fixtures

The mitigation feature of the tool was not used because specific mitigation measures have not been identified at this time. WSDOT will encourage the contractor to incorporate recycled materials as appropriate and to use newer, more efficient construction equipment.

# Existing Conditions

## Criteria Pollutants

Nationally and locally, average pollutant concentrations have decreased substantially over the years as a result of improved vehicle technology and measures to control road dust. Air quality in the Spokane area has followed similar trends. SRCAA monitors air quality in the Spokane region. CO monitoring ended in Spokane in 2017 because the CO levels have been well below the NAAQS for many years. Fine particulate matter (PM2.5) is measured at several locations while PM10 is measured at one location.Exhibit 13 displays the most recent three years of monitoring data, which show that the air pollutant concentrations for both pollutants remain below the NAAQS. The Spokane region is in attainment of the NAAQS for all criteria pollutants.

Exhibit XX – Ambient Air Quality Monitoring Data.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pollutant** | **Standard** | **2016** | **2017** | **2018** | **NAAQS** |
| CO | 8-hour | 1.2 | –[[9]](#footnote-9) | – | 9 |
| PM10 | Annual Max | 70 µg/m3 | 78 µg/m3 | 77 µg/m3 | 150 µg/m3 |
| PM2.5 | 24-hour  (98th percentile) | 18 µg/m3 | 36.2 µg/m3 | 31 µg/m3 | 35 µg/m3 |
| PM2.5[[10]](#footnote-10) | Annual (average) | 8.0 µg/m3 | 10.9 µg/m3 | 10.3 µg/m3 | 12.0 µg/m3 |
| **Notes:** CO – monitoring has been discontinued in the Spokane area because CO concentrations have been well below the standards for many years. Data is not available for 2017 and 2018. PM10 – values shown are the annual max after days affected by wildfire were removed. PM2.5 (24-hour) – value shown is the 98th percentile for each year. Attainment determinations are made by averaging the 98th percentile for three years. Data is not available to calculate the 3-year average for 2016 and 2017. PM 2.5 annual average is the weighted annual average. | | | | | |

## MSATs

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA’s [Integrated Risk Information System](https://www.epa.gov/iris) (IRIS).[[11]](#footnote-11) In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the [2011 National Air Toxics](https://www.epa.gov/national-air-toxics-assessment) Assessment (NATA).[[12]](#footnote-12) These are 1,3-butadiene,acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

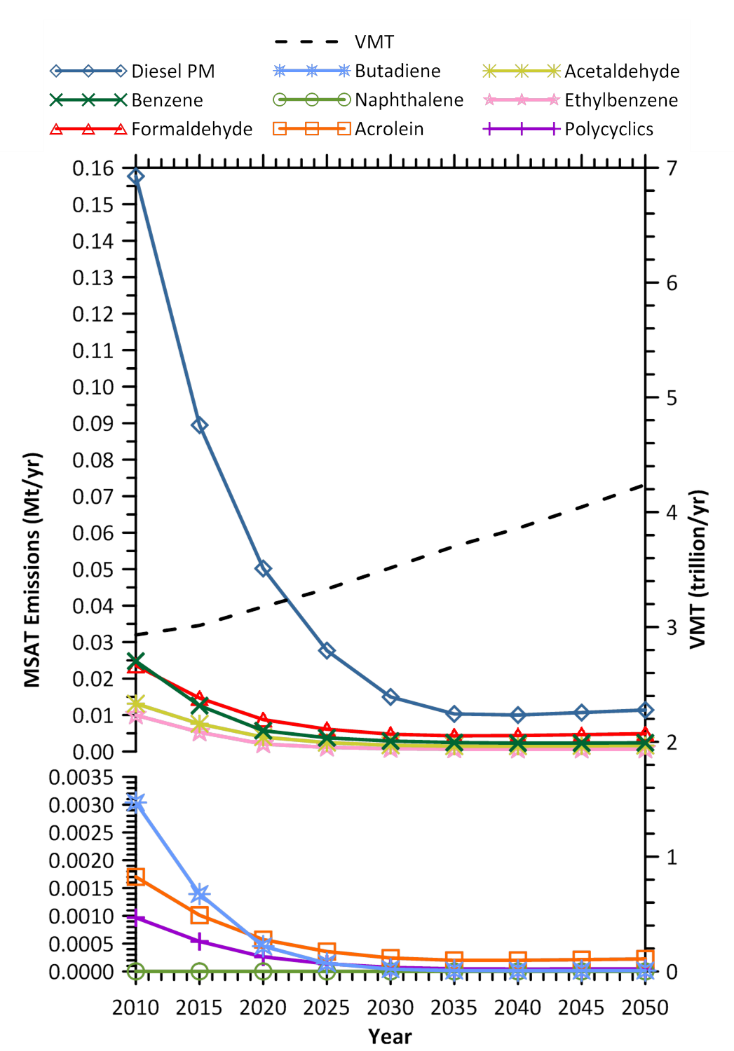
Motor Vehicle Emissions Simulator (MOVES)

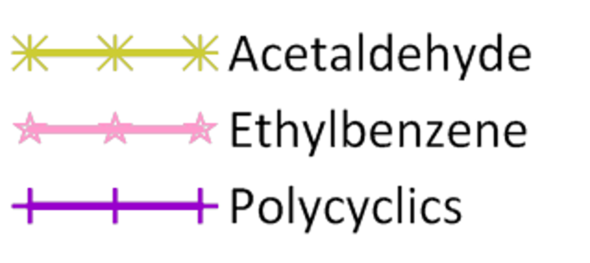
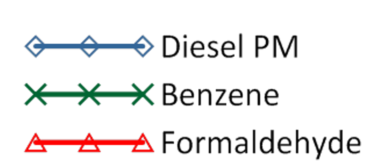
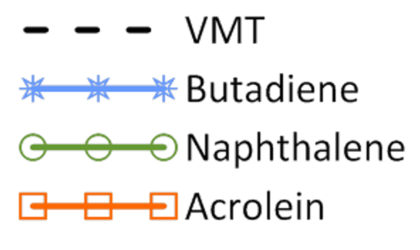
According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and VMT data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 [MOVES2014a Questions and Answers Guide](https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt),[[13]](#footnote-13) EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using EPA’s MOVES2014a model, as shown in Exhibit 15, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period. Trends for specific locations may be different, depending on locally derived information representing VMT, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Diesel particulate matter (DPM) is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

Exhibit 15 – FHWA Projected National MSAT Emission Trends 2010 – 2050, For Vehicles Operating on Roadways Using EPA’s MOVES2014a Model[[14]](#footnote-14)

[](https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/nmsatetrends.cfm)



MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

## Greenhouse Gases

Vehicles emit a variety of gases during their operation; some of these are greenhouse gases (GHGs). The GHGs associated with transportation are carbon dioxide (CO2), methane, and nitrous oxide. Any process that burns fossil fuel releases CO2 into the air. Carbon dioxide makes up the bulk of the emissions from transportation.

Vehicles are a significant source of GHG emissions and contribute to climate change primarily through the burning of gasoline and diesel fuels. National estimates show that the transportation sector (including on-road vehicles, construction activities, airplanes, and boats) accounts for about 29 percent of total domestic CO2 emissions. However, in Washington State, transportation accounts for nearly half of GHG emissions because the state relies heavily on hydropower for electricity generation, unlike other states that rely on fossil fuels such as coal, petroleum, and natural gas to generate electricity. The next largest contributors to total GHG emissions in Washington are fossil fuel combustion in the residential, commercial, and industrial sectors at 27 percent and electricity consumption at 19 percent. Exhibit 16 shows the gross GHG emissions by sector, for Washington State and nationally. ***Check WSDOT’s Guidance for updated graphs. Contact WSDOT HQ AQ specialist for Excel version.***

Exhibit 16 – State and National GHG Emissions by Sector

## Energy Use

Transportation energy is the energy required to move people and goods from place to place. For transportation projects, energy usage is predominantly influenced by the amount of fuel used. Transportation accounts for a major portion of the energy consumed in the United States. As shown in Exhibit 4‑3, transportation was the second largest source of energy consumption in the United States and the largest source of energy consumption in Washington State in 2017.

Transportation energy is generally discussed in terms of operational and construction energy consumption. Operational energy consumption is all energy consumed by vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and the thermal value of the fuel being used. Operational energy consumption also includes the energy required to maintain the transportation facilities. Construction energy consumption involves the non-recoverable, one-time energy expenditure involved in the construction of the physical infrastructure associated with the project.

Fossil fuels (e.g., gasoline, diesel fuel, and jet fuel) are the predominant source of energy for transportation in Washington State.

Exhibit 17 – Washington Energy Consumption by End-Use Sector, 2017[[15]](#footnote-15)

## Efforts to Reduce Energy Use and Greenhouse Gas Emissions

Throughout the agency, WSDOT is working to reduce transportation sector greenhouse gas emissions. Our Active Transportation and Public Transportation Divisions are working to expand alternatives to driving alone and support transit options with lower emissions. Our planners work closely with local and regional planning entities to ensure our plans work with their plans and provide access and mobility options to everyone. Through Innovative Partnerships, we are supporting the expansion of electric vehicle charging infrastructure with grants and coordination. ***Check with WSDOT HQ AQ staff for updated information.***

# Project Effects

Transportation projects have environmental effects throughout their lifecycle. This analysis addresses operational effects, i.e., the effects of the vehicles using the facility, construction effects, and maintenance effects.

## Operational Effects

The NSC project will have no adverse operational air quality effects:

* The CO hotspot analysis shows that the project will not cause or contribute to an exceedance of the NAAQS. The project meets all CO conformity requirements.
* The PM10 hotspot analysis shows that the project will not cause or contribute to an exceedance of the NAAQS. The project meets all PM10 conformity requirements.
* The project followed FHWA guidance for MSAT analysis. MSATs decrease dramatically between 2010 and 2040, by 89 percent or more, depending on pollutant, due to improvements in vehicle technology. MSAT emissions from the build alternative are estimated to be about 14-19 percent less than the no build alternative, depending on the pollutant, because of lower VMT in the study area with the North Spokane Corridor project and smoother driving conditions.
* Greenhouse gas emissions are similar under the existing conditions and the no build alternative; vehicle efficiency improvements under the 2040 no build alternatives are offset by a 55 percent increase in VMT as compared to the existing conditions VMT in the study area. GHG emissions under the 2040 build alternative are about 15 percent less than the 2040 no build and existing alternatives because the 2040 no build alternative has a lower VMT in the study area as compared to the no build alternative and smoother driving conditions with the North Spokane Corridor project.
* Energy use is similar under the existing conditions and the 2040 no build alternative; vehicle efficiency improvements under the 2040 no build alternative are offset a 55 percent increase in VMT as compared to the existing conditions VMT in the study area. Energy use under the 2040 build alternative is about 15 percent less than the 2040 no build and existing alternatives because the 2040 no build alternative has a lower VMT as compared to the no build alternative in the study area and smoother driving conditions with the North Spokane Corridor project.

### Criteria Pollutants & Conformity

A screening level CO analysis was conducted for the project to demonstrate conformity. The analysis screened the 8 intersections that are predicted to have a level of service (LOS) of D or worse under the build alternatives. Intersections were analyzed for existing (2015) and build (2040) conditions to evaluate if the worst case peak hour traffic volumes would exceed the NAAQS. Per standard guidance, receivers were placed 10 feet from each leg of the intersection. The receivers with the highest concentrations at each intersection are presented in Exhibit 18.

Exhibit 18 – Modeled CO Concentrations Compared to NAAQS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intersection** | **Existing (2015) (ppm)** | | | **Build (2040) (ppm)** | | | **NAAQS (ppm)** | |
| **1-hr** | **8-hr** | **1-hr** | | **8-hr** | **1-hr** | | **8-hr** |
| US 2 (S Division St) and E 3rd Ave | 3.8 | 3.6 | 3.3 | | 3.2 | 35 | | 9 |
| SR 290/N Hamilton St and E Trent Ave | 3.9 | 3.6 | 3.3 | | 3.2 | 35 | | 9 |
| S Freya St and E Sprague Ave | 3.9 | 3.6 | 3.2 | | 3.1 | 35 | | 9 |
| S Havana St and E Sprague Ave | 3.7 | 3.5 | 3.3 | | 3.2 | 35 | | 9 |
| S Fancher Rd and E Sprague Ave | 3.6 | 3.4 | 3.2 | | 3.1 | 35 | | 9 |
| N Thierman Rd and E Broadway Ave | 3.4 | 3.3 | 3.2 | | 3.1 | 35 | | 9 |
| I-90 WB Ramps and E Broadway Ave | 3.4 | 3.3 | 3.1 | | 3.1 | 35 | | 9 |
| S Thierman Rd and E Appleway Blvd | 3.8 | 3.6 | 3.4 | | 3.2 | 35 | | 9 |
| **Note:** Displayed concentration for each intersection is the receiver with the highest modeled concentration. See Appendix A for model output files*.* | | | | | | | | |

***Describe changes in traffic and effects on intersection screening results.***

Estimated emissions remain well below the NAAQS.

### Conformity Determination

Because the NSC project lies within CO and PM10 maintenance areas, the project must comply with the project-level conformity criteria of the EPA Conformity Rule and with WAC Chapter 173-420.

The SRTC must include regionally significant projects in their approved Metropolitan Transportation Plan (MTP) and federally approved Transportation Improvement Program (TIP). The regional conformity analysis reviewed by the consultation partners and FHWA documented the conformity determination a letter to SRTC dated December 6, 2019.

As stated in 40 CFR Part 93, the following criteria must be met when determining project conformity. A brief summary of the project’s conformity to the State Implementation Plan (SIP) is discussed with each criterion:

* The conformity determination must be based on the latest planning assumptions (40 CFR Part 93.110).
  + The December 6, 2019 letter from FHWA to SRTC documents that regional consultation partners found that both the Spokane Regional MTP and the TIP are based on the latest planning assumption.
* The conformity determination must be based on the latest emission estimation model available (40 CFR Part 93.111).
  + The December 6, 2019 letter from FHWA to SRTC documents that regional consultation partners found that both the MTP and TIP are based on the latest emissions model.
* The project must come from a conforming transportation plan and program (40 CFR Part 93.114).
  + The project is included in SRTC’s conforming MTP and TIP:
    - MTP: US 395/North Spokane Corridor – Francis Ave to Spokane River, project L
    - MTP: US 395/North Spokane Corridor – Spokane River to I-90, project X
    - TIP: US 395/NSC I-90 to Sprague Ave (pg 93)
    - TIP: US 395/NSC Spokane River to Columbia (pg 95)
    - TIP: US 395/NSC Spokane River Crossing (pg 94)
* There must be a current conforming plan and a current conforming TIP at the time of project approval (40 CFR Part 93.115).
  + The region’s plan and TIP are current and conforming. The SRTC board adopted the current (2020-2023) TIP on October 10, 2019. The current version of the MTP, Horizon 2040, was approved on December 14, 2017 and became the current plan in January 2018.
* The project must not cause or contribute to any new localized CO or violation in CO and PM10 nonattainment or maintenance areas (40 CFR Part 93.116).
  + CO hot-spot analysis using WASIST demonstrates that the project will not cause or contribute to any CO violations.
  + The PM10 hot-spot analysis showed that the background concentration plus the conservative estimate of the project contribution are 130 µg/m3, below the NAAQS of 150 130 µg/m3. The project will not cause or contribute to PM10 violations.
* The FHWA project must comply with control measures in the applicable implementation plan (40CFR Part 93.117).
  + WSDOT complies with PM10 control measures in the Spokane second 10-year LMP for PM10. The plan states that WSDOT has submitted sanding and sweeping plans as required by SRCAA regulation section 6.14.

### MSAT

The MSAT analysis was conducted for existing conditions, the 2040 no build alternative and the 2040 build alternative. . As shown in Exhibit 7, the 2007 EPA rule described above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. Results are shown in Exhibit 20.

***Describe changes in MSAT emissions between alternatives for years analyzed.***

In the MSAT study area, VMT is expected to increase by 55 percent from the existing conditions in 2010 to the no build alternative in 2040 while emissions are predicted decrease by 85 to 99 percent, depending on the pollutant. Compared to the no build alternative, the build alternative is expected to decrease VMT by about 12 percent because vehicles traveling through Spokane will have a more direct route due to the project. Build alternative MSAT emissions are expected to be 14 to 19 percent lower than the no build because of the reduced VMT and smoother driving conditions. Alternative would not result in a significant environmental impact regarding MSAT emissions.

In FHWA’s view (FHWA 2016), information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. More information on Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis is in Appendix E.

Table XX: Regional MSAT Emission Assessment

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alternative | VMT (miles) | 1,3-Butadiene (g) | Acetaldehyde (g) | Acrolein (g) | Benzene (g) | Diesel PM (g) | Ethylbenzene (g) | Formaldehyde (g) | Naphthalene (g) | POM (g) | Energy Use (MMBTU) | GHGs (MT) |
| Existing (2010) |  | 13.03 | 41.41 | 4.38 | 114.32 | 320.27 | 50.38 | 65.54 | 115.92 | 480.21 | 479.8 | 3,679 |
| No Build (2040) |  | 0.03 | 3.42 | 0.45 | 5.36 | 19.61 | 5.75 | 9.78 | 15.54 | 50.46 | 483.1 | 3,696 |
| No Build compared to Existing | 55% | -99% | -92% | -90% | -95% | -94% | -89% | -85% | -87% | -89% | 1% | 0% |
| Build (2040) |  | 0.02 | 2.86 | 0.37 | 4.52 | 16.51 | 4.68 | 8.12 | 12.79 | 43.42 | 411.0 | 3,145 |
| Build compared to Existing | 36% | -99% | -93% | -92% | -96% | -95% | -91% | -88% | -89% | -91% | -14% | -15% |
| Build compared to No Build | -12% | -18% | -16% | -17% | -16% | -16% | -19% | -17% | -18% | -14% | -15% | -15% |

### Greenhouse Gases

The GHG analysis was conducted for existing conditions, the 2040 no build alternative and the 2040 build alternative. Results are shown in Exhibit 20.

***Describe changes in MSAT emissions between alternatives for years analyzed.***

Estimated No Build (20XX) greenhouse gas emissions are predicted to be less than Existing Conditions (20XX), despite an increase in regional vehicle miles traveled (Table X). This decrease in emissions is expected as a series of Federal fuel economy standards are phased in. Modeled Build (20XX) greenhouse gas emissions are predicted to increase by X percent as compared to a No Build scenario (20XX), which is attributed to the X percent increase in VMT; however, the greenhouse gas emissions are less than Existing Conditions. The Build Alternative would not result in a significant environmental impact regarding greenhouse gas emissions.

### Energy Use

***Only include energy in analysis for an EIS***

A quantitative energy analysis was conducted for this project. The results closely follow the GHG emission results (see section above). Energy consumption is similar in the study area under existing conditions and the no build alternative. A 55 percent increase in the 2040 no build alternative VMT as compared to the existing conditions is offset by vehicle efficiency improvements. VMT reductions and smoother driving conditions under the build alternative as compared to the no build alternative lead to about a 14 percent reduction in energy use. See Exhibit 20 for results. The proposed Build Alternative would not result in a significant environmental impact regarding energy consumption.

## Construction Effects

Air quality impacts during construction of the project could occur as a result of energy use and emissions generated from construction equipment, construction activities, and vehicles experiencing congestion because of construction detours or delays. Construction-related effects result primarily from energy use and emissions of heavy-duty construction equipment (e.g., bulldozers, backhoes, and cranes), diesel-fueled mobile sources (e.g., trucks, brooms, and sweepers), diesel- and gasoline-fueled generators, and on‑site and off-site project-related vehicles (e.g., service trucks and pickups).

In addition dust, or fugitive PM, is also of concern. PM10 emissions are associated with land clearing, ground excavation, grading, cut-and-fill operations, and structure erection. These emissions would vary from day to day, depending on the level of activity, specific operations, and weather conditions. Fugitive PM10 emissions from construction activities could be noticeable if uncontrolled. Mud and particulates from trucks could also be of concern if construction trucks are routed through streets near sensitive land uses (e.g., residences, schools, and parks).

Construction traffic and lane closures increase congestion and reduce the speed of other vehicles, which could temporarily increase emissions burdens and energy use. These effects would be temporary, and generally limited to the immediate area in which the congestion occurs.

In addition to potential air quality impacts, some construction work activities (particularly those involving paving operations using asphalt) could result in short-term odors, which could be detectable to some people near the site and would be diluted as distance from the site increases.

### Greenhouse Gases and Energy Use

Project construction and production of materials used in the project will use energy and release GHGs. Likewise, maintenance activities and materials over the life of the project will produce GHG emissions. Estimated emissions and energy use are shown in Exhibit 21.

Exhibit 21 – Project Construction and Maintenance Energy and GHG Emissions

|  |  |  |
| --- | --- | --- |
| **Alternative** | **Energy Use (MMBTU)** | **GHGs (MT)** |
| Bridges and Overpasses | 105,756 | 12,818 |
| Lighting | 4,808 | 158 |
| Pathways | 2,519 | 215 |
| Roadways | 49,205 | 4,836 |
| Total | 162,287 | 18,027 |

## Indirect Effects

The air quality, energy and greenhouse gas analysis for the project is based on forecasted traffic volumes, which includes future population and employment growth. Therefore, the analysis of long-term impacts generally includes the cumulative impacts of air pollutant emissions from all traffic forecasted to operate within the project area and other traffic growth that is expected to occur regionally and locally, with or without the project.

The indirect air quality benefits of the project are that it is expected to help reduce future traffic volumes and levels of congestion within the project area compared to the No Build Alternative, as well as reduce traffic-related energy consumption, air pollutant and greenhouse gas emissions. Adverse indirect air quality, energy and greenhouse gas impacts from the project are unlikely.

# Measures to Avoid or Minimize Effects

## Operational Mitigation

The project would not require mitigation measures during operation.

As detailed above, no meaningful impacts on energy use and criteria pollutant, MSAT and greenhouse gas emissions are predicted, therefore no mitigation measures are proposed for operational conditions.

## Construction Mitigation

The project traffic control plan will include detours and strategic construction timing (such as night work) to continue moving traffic through the area and reduce backups and delays to the traveling public to the extent possible. It is standard practice for WSDOT to set up active construction areas, staging areas, and material transfer sites in a way that reduces standing wait times for equipment during construction. WSDOT will also work with its partners to promote ridesharing and other commute trip reduction efforts for employees working on the project.

Particulate emissions (in the form of fugitive dust during construction activities) are regulated by Ecology and PSCAA. The operator of a source of fugitive dust is required to take reasonable precautions to prevent fugitive dust from becoming airborne and must maintain and operate the source to minimize emissions (AGCW 1997). Construction impacts from the Project’s improvements will be minimized by incorporating mitigation measures per the WSDOT standard specifications into the construction specifications for the project. Specific mitigation measures will include the following, as applicable:

* Spraying exposed soil with water or other dust palliatives
* Covering all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck)
* Removing particulate matter deposited on paved, public roads
* Minimizing delays to traffic during peak travel times
* Placing quarry spall aprons where trucks enter public roads
* Graveling or paving haul roads
* Planting vegetative cover as soon as possible after grading
* Minimizing unnecessary idling of on-site diesel construction equipment
* Locating diesel engines, motors, or equipment as far away as possible from existing residential areas and other sensitive areas
* Minimizing hours of operation near sensitive receptor areas and rerouting the diesel truck traffic away from sensitive receptor areas
* Educating vehicle operators to shut off equipment when not in active use to reduce idling
* Using cleaner fuels as appropriate
* The project traffic control plan will include detours and strategic construction timing (such as night work) to continue moving traffic through the area and reduce backups and delays to the traveling public to the extent possible.
* WSDOT will also work with its partners to promote ridesharing and other commute trip reduction efforts for employees working on the project.

# References

***Include additional references as needed.***

Federal Highway Administration (FHWA). 2016a. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Retrieved on Date, from <https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/>

<https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_preparing_env_documents.aspx#aq>

FHWA. 2016b. Infrastructure Carbon Estimator Tool. Retrieved on date, from https://www.fhwa.dot.gov/environment/sustainability/energy/tools/carbon\_estimator/index.cfm.

U.S. Environmental Protection Agency. 1992. *Guideline for Modeling Carbon Monoxide from Roadway Intersections*. *Report Number EPA-454/R-92-005*. Retrieved on date, from <https://www3.epa.gov/ttn/scram/guidance/guide/coguide.pdf>, November.

EPA. 2004. *Puget Sound Area CO 2nd 10-Year Maintenance Plan Summary*. Retrieved on date, from <http://www.federalregister.com/Browse/Document/usa/na/fr/2004/8/5/04-17782>.

EPA. 2015a. National Ambient Air Quality Standards (NAAQS) Table. Retrieved on date from https://www.epa.gov/criteria-air-pollutants/naaqs-table.

EPA. 2015b. 2015 National Ambient Air Quality Standards for Ozone. Retrieved on date, from https://www.epa.gov/ozone-pollution/2015-national-ambient-air-quality-standards-naaqs-ozone.

EPA. 2018. Washington State Air Quality Monitoring Station Reporting-Outdoor Air Quality Data. Retrieved on date, from https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.

Puget Sound Clean Air Agency (PSCAA). 2018. Regulation 1. Retrieved on date, from <https://www.pscleanair.org/DocumentCenter/View/354/Regulation-I?bidId=>.

State of Washington. 2016. Washington State Ambient Air Quality Standards. Washington Administrative Code (WAC) 173-476. Retrieved on date from <https://apps.leg.wa.gov/wac/default.aspx?cite=173-476-900>.

U.S. Energy Information Administration. 2019. Energy Consumption Data. Retrieved on date, from https://www.eia.gov.

Washington State Department of Ecology (Ecology). 2016. *Report to the Legislature on Washington Greenhouse Gas Emissions Inventory: 2010-2013*. Publication No. 16-02-025.

Washington State Department of Transportation (WSDOT). 1999. *Memorandum of Agreement between WSDOT and Puget Sound Clean Air Agency Regarding Control of Fugitive Dust from Construction Projects*..

WSDOT. 2018. *WSDOT Guidance-Project-Level Greenhouse Gas Evaluations under NEPA and SEPA*. Retrieved on date, from https://www.wsdot.wa.gov/sites/default/files/2019/02/08/ENV-ANE-GHGGuidance.pdf.

WSDOT. 2019. *Environmental Manual*. M 31-11.21. Engineering and Regional Operations, Development Division, Environmental Services Office.

Appendix A – Incomeplete or Unavailable Information

***Make sure current text from FHWA used.***

Council on Environmental Quality (CEQ) Provisions Covering Incomplete or Unavailable Information (40 CFR 1502.22)

Sec. 1502.22 Incomplete or Unavailable Information

* When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
* If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the following information in the EIS:
  + a statement that such information is incomplete or unavailable;
  + a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
  + a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
  + the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.
* The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA’s view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is “a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects” (EPA, <https://www.epa.gov/iris>). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA’s Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, [https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects](https://www.fhwa.dot.gov/exit.cfm?link=https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects)) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, [https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects](https://www.fhwa.dot.gov/exit.cfm?link=https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects)). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, “[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (EPA IRIS database, Diesel Engine Exhaust, Section II.C. <https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal)>.”

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA’s approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (<https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf> ).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

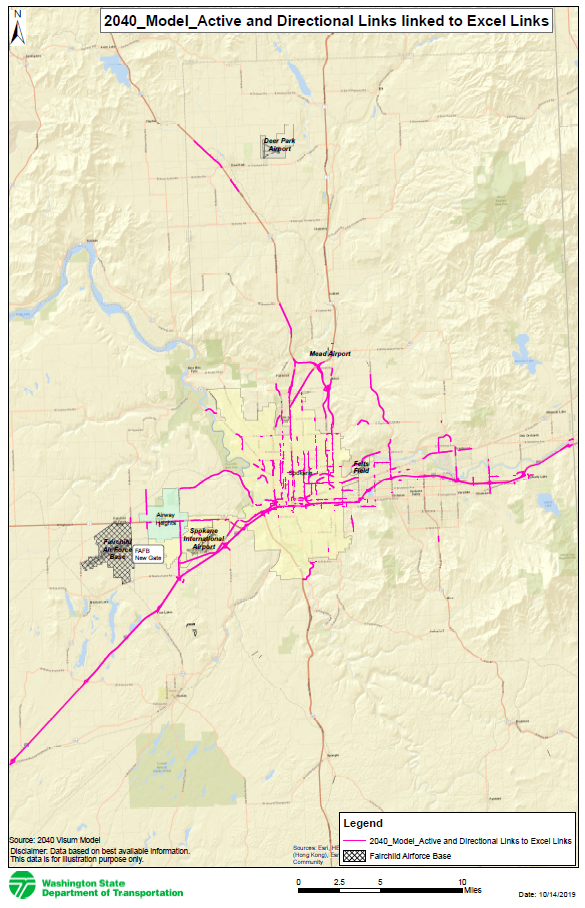
Appendix B – Operational MSAT, GHG, and Energy MOVES Modeling

As required by EPA, the analysis was developed using the EPA MOtor Vehicle Emissions Simulator (MOVES 2014b) model and relevant local inputs for this analysis to calculate daily emissions. Settings used for the MOVES runs are identified in Exhibit XX.

Study Area

Following FHWA guidance, the study area for the MSAT analysis included roadways with a 10 percent or greater change in travel time between the build and no build in the during the AM and PM peak hours. In addition, all links on the NSC and I-90 were included in the study area. The same study area was used for GHG and Energy. Exhibit XX shows the roadways used.

Exhibit XX – Links with Greater than 10 Percent Change in Vehicle Hours Travelled



Data Sources and Information Collected

The WSDOT Eastern Region Planning office provided traffic information from the regional travel model. Data was provided in six time periods: AM and PM peak hours, AM (6-9 am), mid-day (9 am to 3 pm), PM (3-6 pm), and overnight (6 pm to 6 am). Data included link length, average speed, and volume, as well as link identification information.

From this traffic data, three the MOVES input files were generated.

Exhibit XX documents the input files used and the source of each file. The process for generating project specific files is described below.

Exhibit XX – MOVES Inputs

|  |  |
| --- | --- |
| Input File | Data Source |
| Age Distribution | Ecology |
| Average Speed Distribution | Project specific |
| Day VMT | Ecology |
| Fuel (fuel supply, fuel formulation, fuel use fraction) | Default |
| Hour VMT | Ecology |
| I/M | Existing (2010) – Ecology  2040 (Build and No Build) – No I/M program |
| Meteorological Data | Default |
| Month VMT | Ecology |
| Ramp Fraction | Default |
| Road Type Distribution | Project specific |
| Source Type Population | Ecology |
| Source Type VMT | Project specific |

Road Type Distribution

Road type was assigned to all links based on names in traffic file; North Spokane Corridor, I-90, and ramp links were labeled as urban restricted (RoadType 5) and all other links were urban unrestricted (4).

For each period, VMT for each link was calculated by multiplying the link length by the link volume for that period. These VMT values were then summed for the total VMT by road type.

Total VMT by road type was parsed to vehicle type. Project traffic engineers reported truck percentages on arterials as 3 percent and on restricted roads at 10 percent.[[16]](#footnote-16) Source types were assigned to truck or non-truck fractions as follows:

* Non-Truck Fraction: 11, 21, 31, 32, 41, 42, 43
* Truck Fraction: 51, 52, 53, 54, 61, 62

Average Speed Distribution

The total vehicle hours traveled (VHT) was calculated for each link and summed for all links in the time period (AM, mid-day, etc.) Fractions were calculated for each link by period by dividing link VHT by the period’s total VHT. Finally, for each period, the link fractions were summed by speed bin and road type to generate the average speed distribution inputs.

Source Type VMT

As part of the dispersion modeling, FHWA calculated source type fractions. The same fractions were used to parse the total VMT for each road type across the vehicle source types for the MSAT, GHG, and Energy analysis.

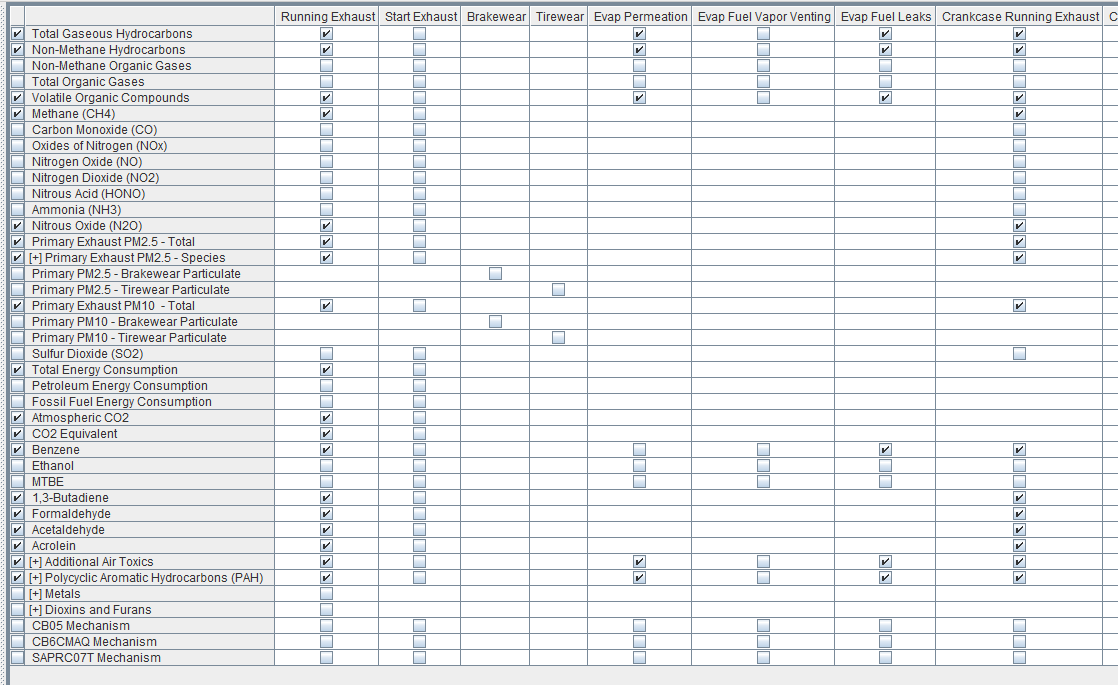
Post-Processing

MOVES outputs were decoded using the built-in decoder script. Emissions were exported with Day ID and Fuel Type ID. Emissions from weekdays and weekends were separately divided by twelve (because the run included all 12 months) and then multiplied by the number of days each day type occurs in the week (weekdays by 5 and weekends by 2). Finally, weekend and weekday quantities were summed and divided by seven to arrive at average daily emissions.

Exhibit XX – MOVES Settings

|  |  |  |
| --- | --- | --- |
| Navigation Panel | Setting | Selections |
| Scale | Model | Onroad |
| Domain/Scale | County |
| Calculation Type | Inventory |
| Time Spans | Time Aggregation Level | Hour |
| Year | 2010 & 2040 |
| Months | All |
| Days | All |
| Hours | All |
| Geographic Bounds | Region | County |
| State | Washington |
| County | Spokane |
| On Road Vehicle Equipment |  | All fuel and vehicle combinations |
| Road Type |  | Urban restricted  Urban unrestricted access |
| Pollutants and Processes | Processes | Running Exhaust, Evaporative Permeation, Evap Fuel Leaks, Crank Case Running Exhaust |
| Pollutants | See appendix X |
| Strategies |  | No selections needed |
| General Output | Mass units | Grams |
| Energy | Joules |
| Distance | Miles |
| Activity | Distance traveled & Population |
| Output Emissions Detail | For all Vehicle/equipment Categories | Fuel Type |
| On and off Road | Road Type & Source Use Type |
| Advanced Performance Measures |  | No selections needed |

Exhibit XX – MOVES Pollutant Selections *Show your pollutant selections*



1. <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NMXM.pdf> [↑](#footnote-ref-1)
2. <https://www.epa.gov/criteria-air-pollutants/naaqs-table> [↑](#footnote-ref-2)
3. WAC 173-476. <https://apps.leg.wa.gov/WAC/default.aspx?cite=173-476> [↑](#footnote-ref-3)
4. FHWA, 1987. [↑](#footnote-ref-4)
5. FHWA , 2016 [↑](#footnote-ref-5)
6. FHWA, 1987. [↑](#footnote-ref-6)
7. WSDOT, Feb, 2018. [↑](#footnote-ref-7)
8. FHWA, 2016. [↑](#footnote-ref-8)
9. As of 2017, CO is no longer monitored in the Spokane area because the region has been substantially below the NAAQS for many years. [↑](#footnote-ref-9)
10. EPA website: <https://www.epa.gov/outdoor-air-quality-data/monitor-values-report> - KL check source. [↑](#footnote-ref-10)
11. <https://www.epa.gov/iris> [↑](#footnote-ref-11)
12. <https://www.epa.gov/national-air-toxics-assessment> [↑](#footnote-ref-12)
13. <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt> [↑](#footnote-ref-13)
14. Source: EPA MOVES2014a model runs conducted by FHWA, September 2016. [↑](#footnote-ref-14)
15. EIA, <https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/rank_use.html&sid=WA> [↑](#footnote-ref-15)
16. Citation needed. KL to find. [↑](#footnote-ref-16)