

8.12 Air Quality

8.12.1 Key Findings

Potential air quality effects resulting from the project alternatives are based on a complex set of factors. This analysis considers the available data to provide a simplified or “broad brush” evaluation of the proposed alternatives and to provide a generalized indication of potential air quality trade-offs under the various alternatives. The screening level alternatives analysis does not include detailed air quality modeling.

During this phase of work, a limited number of intersections were included in the traffic engineering study. In addition, because the analyzed intersections were examined individually for the alternatives analysis and not as part of a system, the level of service and delay do not accurately reflect the influence of system-wide congestion on operations. Therefore, those measures are not available to support the air quality evaluation presented in this section.

It should be noted, however, that violations of the carbon monoxide (CO) National Ambient Air Quality Standards (NAAQS) in the Portland area have not been a concern for more than ten years, largely due to the State Implementation Plan (SIP) measures used to ensure Portland’s continued compliance with the CO NAAQS. Although there are differences in the number of congested intersections between the different project alternatives, it is unlikely that exceedance of the CO NAAQS would occur as a result of the project.

When considering the relative potential for differences in air pollutant emissions based on the screening levels analysis of Average Annual Daily Traffic (AADT), VMT, and concerns regarding Mobil Source Air Toxics (MSATs), the results of the analysis show that Alternatives 2 and 3 tend to show less potential for air quality impacts, and less change when compared to the No Build (Alternative 1). In contrast, VMT and AADT is predicted to increase to a greater degree, compared to the No Build Alternative, under Alternatives 4, 5, and 6, thus creating a greater potential for air quality impacts under these alternatives.

8.12.2 Methodology

Geographic areas in which concentrations of a pollutant exceed the NAAQS are classified as “nonattainment areas.” Federal regulations require states to prepare statewide air quality planning documents called State Implementation Plans that establish methods to bring air quality in nonattainment areas into compliance with the NAAQS and to maintain compliance. Nonattainment areas that return to compliance are called “maintenance areas.”

The Portland metropolitan region has not exceeded the standards for five of the NAAQS air pollutants – lead, nitrogen dioxide, PM10, PM2.5, and sulfur dioxide. In the past, the region has exceeded carbon monoxide and ozone standards. The current status, as determined by the U.S. EPA as of April 9, 2007, is that the Portland metropolitan area, including the I-5 to 99W Connector project area, is a maintenance area for carbon monoxide and is in attainment for the 8-hour ozone standard.

The analysis does not include detailed air quality modeling. Instead, it uses the following available data to provide a generalized indication of potential air quality trade-offs under the

various alternatives to aid decision-makers in selecting an alternative to advance through to the EIS phase of the project (Phase 2).

- ◆ Estimated 2030 daily peak PM (two-hour) period emissions of volatile organic compounds (VOCs), CO, and oxides of nitrogen (NOx) for project area roadways
- ◆ 2030 AADT volumes and VMT for project area roadways
- ◆ 2030 PM peak hour v/c for selected project-affected signalized intersections within the project area

Annual Average Daily Traffic Volumes and Vehicle Miles Traveled

Traffic volumes and vehicle miles traveled are considered in this analysis as a proxy for regional emissions of pollutants. 2030 Build and No Build AADT for roadways in the project area are presented in Chapter 7. AADT is presented for informational purposes and to help identify future analysis requirements in later phases of the project, particularly with regard to MSATs. MSATs are discussed in more detail below.

In order to allow a general relative comparison of alternatives and a ranking based on potential changes in air quality, the traffic model was run to obtain 2030 project area VMT in 5 mph speed classes. These data were used to compare alternative-specific VMTs at different average speeds with 2030 vehicle pollutant emission factors for VOCs, CO, and NOx that were obtained from Metro. Vehicle speed can have a significant influence on vehicle pollutant emission rates. The analysis used 2030 wintertime emission factors for DEQ-inspected vehicles in the Portland area to estimate average daily PM peak (two-hour) period emissions of VOCs, CO, and NOx within the project area. This simplified pollutant emission analysis does not allow accurate annual emissions under each alternative to be calculated, but does give enough information to compare the potential for area-wide emissions on an alternative-by-alternative basis. It also shows the percentage difference in emissions under each alternative when compared to the No Build Alternative.

Mobile Source Air Toxics (MSAT)

MSATs are compounds emitted from highway vehicles and nonroad equipment that are known or suspected to cause cancer or other serious health and environmental effects. They include benzene, a known human carcinogen that is present in gasoline, and diesel particulate matter, a probable human carcinogen.

Given the emerging state of the science and of project-level analysis techniques, there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context. No MSAT analysis is included in this phase of the project; however, an MSAT analysis will be performed in support of the Draft EIS in Phase 2 of the project.

Intersection Volume-to-Capacity Ratio

Congested intersections are being considered in this analysis because they are an indicator of localized air quality problems. When many vehicles are stopped and idling in the same vicinity, tailpipe emissions concentrate and can cause localized air quality problems (e.g., CO build up).

The 2030 PM peak hour v/c ratios for the project-affected signalized intersections are discussed qualitatively in this alternatives analysis. As described in Chapter 7, v/c ratios measure congestion. When the v/c ratio is below 1.0, traffic volumes are less than the roadway capacity. As the v/c ratio approaches 1.0, traffic becomes more congested and unstable, with longer delays. If the v/c ratio is more than 1.0, the traffic volume demand is greater than the roadway capacity, almost all vehicles would have to wait through multiple signal cycles to get through the intersection, and congestion conditions would affect operations in subsequent hours.

Only signalized intersections are included in this analysis, because intersections that do not warrant traffic signals generally do not have high enough traffic volumes to result in local CO impacts. In addition, well-performing intersections with low levels of congestion generally do not cause CO impacts. The identified intersections are listed in Table 8.12-3, 2030 Volume-to-Capacity Ratios at Selected Intersections, below.

During this phase of work, a limited number of intersections were included in the traffic engineering study. In addition, because the analyzed intersections were examined individually for the alternatives analysis and not as part of a system, the level of service and delay do not accurately reflect the influence of system-wide congestion on operations. Therefore, those measures are not available to support the air quality evaluation presented in this section.

During Phase 2 of the project, a full traffic engineering study will be performed, resulting in more extensive and refined traffic and intersection operation data. The limited v/c ratio information presented here is used to rank alternatives for their potential to affect localized air quality in the project area. Reduced congestion will generally result in better localized air quality in the vicinity of busy intersections. It should be noted, however, that violations of the CO NAAQS in the Portland area have not been a concern for more than ten years, largely due to the SIP measures used to ensure Portland's continued compliance with the CO NAAQS. Although there are differences in the number of congested intersections between the different project alternatives, it is unlikely that exceedance of the CO NAAQS would occur as a result of the project.

Nonroadway Components of the Build Alternatives

Some alternatives include rail components. No detailed rail air quality analyses are included under this analysis. The No Build Alternative includes the Washington County Wilsonville-to-Beaverton commuter rail line. A final Environmental Assessment (EA) for this project was published in 2001 (USDOT, 2001). The final EA for this project concludes that there would be no localized or regional air quality impacts resulting from commuter train operation and that no mitigation measures would be required. Further, the analysis concludes that criteria pollutant emissions (pollutants for which there is a NAAQS) in the region are expected to decrease as a result of the commuter rail project.

No rail air quality analysis was conducted for the commuter rail extension that is part of the EESA because operational data sufficient to produce a meaningful analysis are not available at this stage of development. However, commuter rail projects are intended to provide faster and more efficient modes of transportation between large urban/employment centers and should lead to a reduction of emissions as a result of reduced automobile use. Therefore, commuter rail would be expected to result in a net reduction of emissions. An air quality impact study would be required during the planning and design phases of such a project to quantify potential air quality impacts and mitigation measures, if required, to address potential impacts.

8.12.3 Affected Environment

The Portland metropolitan area has periods of air stagnation. These tend to occur during winter months when cold air becomes trapped near the valley floor with slightly warmer air above, creating temperature inversion conditions. The combination of cold, stagnant air and restricted ventilation traps air pollutants near the ground. Wintertime temperature inversions contribute to higher particulate and CO levels, while summertime inversions contribute to increases in ozone levels.

Before May 27, 2008 (when the federal ozone standard changed to 0.075 parts per million (ppm)), to be in compliance with the 8-hour ozone standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations could not exceed 0.085 ppm. The data from the Canby monitoring station for 1997 through 2006 show that the 0.085 ppm standard was not exceeded during this period.

The highest CO concentrations for the DEQ monitoring station in downtown Portland ranged between 4.5 and 14.4 ppm in a one-hour period and between 2.7 and 7.3 ppm in an eight-hour period between 1997 and 2006. Thus, no exceedances to the federal criteria have been recorded in Portland between 1997 and 2006.

8.12.4 General Description of Impacts

Impacts are presented using three separate measures: estimated PM peak emissions, AADT on a segment of I-5, and congested intersections. Each measure is presented below.

Estimated daily (wintertime) 2030 project area-wide PM peak (two-hour) period vehicle emissions for the No Build Alternative are shown in Table 8.12-1.

Table 8.12-1 Estimated Daily (Wintertime) 2030 Project Area PM Peak (2 Hour) Period Vehicle Emissions for VOCs, CO, and NOx

Alternative	Existing (2005)	Alternative 1 (No Build)	Alternative 2 (TDM/TSM)	Alternative 3 (EESA)	Alternative 4 (Corridor 4D)	Alternative 5 (Corridor 4E)	Alternative 6 (Corridor 5B)
VOC Emissions (lbs) Change from No Build	647 (-)	335 (-)	333 (-0.6%)	355 (6%)	364 (9%)	366 (9%)	370 (10%)
CO Emissions (lbs) Change from No Build	10,933 (-)	8,349 (-)	8,313 (-0.4%)	9,043 (8%)	9,897 (19%)	9,952 (19%)	10,083 (21%)
NOx Emissions (lbs) Change from No Build	1,335 (-)	348 (-)	347 (-0.3%)	377 (8%)	410 (18%)	412 (18%)	418 (20%)

The alternatives with higher percentage differences compared to the No Build Alternative have higher potential for air quality impacts; Table 8.12-1 shows that Alternative 2 is likely to result in the lowest overall air pollutant emissions in the project area, and that the potential for increases in emissions in the project area under Alternatives 4, 5, and 6 is noticeably higher than under Alternatives 1, 2, and 3.

For the purpose of comparison, the same estimate was made for the existing (2005) year. 2005 PM peak (two-hour) period vehicle emissions for VOC were estimated at 647 pounds; CO emissions were estimated at 10,933 pounds; and NOx emissions were estimated at 1,335 pounds. Even though AADT and VMT increases over time and average speed decreases, the emissions estimates for 2030 are notably less than the existing condition. This is largely due to emission factor model assumptions about improvements in vehicle emissions technology and cleaner fuels in the future.

Table 8.12-2 presents a summary of the range of AADT on the busiest roadway (I-5) in the project area under each alternative. High AADT on I-5 is a concern for MSAT emissions in the project area and is likely to affect the level of analysis required to address them in the EIS phase of the project. The maximum range of AADT is presented here because MSATs have become an increasingly high profile issue with the EPA, FHWA, ODOT, and the public in recent years. As a result, differences in AADT that could effect MSAT emissions are a useful tool in helping to rank the project alternatives in terms of overall potential to cause air quality impacts.

Based on the maximum projected I-5 AADT, Table 8.12-2 shows that Alternatives 1, 2, and 3 are likely to result in lower overall potential MSAT emissions in the project area, while Alternatives 4, 5, and 6 are likely to result in higher overall potential MSAT emissions in the project area because of higher predicted AADT.

Table 8.12-2 Range of 2030 AADT on Sections of I-5 Within the Project Area for Each Alternative

Alternative	Minimum Projected I-5 AADT (Vehicles Per Day)	Maximum Projected I-5 AADT (Vehicles Per Day)
1 - No Build	153,000	156,000
2 - TDM/TSM	153,000	156,000
3 - EESA	157,000	157,000
4 - Corridor 4D	172,000	191,000
5 - Corridor 4E	173,000	196,000
6 - Corridor 5B	166,000	202,000

Intersection v/c ratios provide another method of comparing alternatives based on the estimated level of congestion at the busiest intersections affected by the project alternatives. Table 8.12-3 presents 2030 v/c ratio data developed during the traffic engineering analysis for this project. Intersections with a v/c in excess of 1.0 are shown in shaded cells.

Based on the analysis of congested intersections, Alternatives 1 and 2 have the greatest overall potential to impact localized air quality in the project area because they have the highest number of severely congested intersections, and thus the greatest potential to generate air quality hot spots (e.g., CO). Alternatives 3 through 6 have less potential to impact localized air quality in the project area because they have fewer severely congested intersections.

Table 8.12-3 2030 Volume-to-Capacity Ratios at Selected Intersections - Weekday PM Peak Hour

Intersection	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	No Build	TDM/TSM	EESA	Corridor 4D	Corridor 4E	Corridor 5B
OR 99W at Durham Road	1.17	1.20	1.14	1.25	1.21	1.19
OR 99W at 124 Avenue	0.91	0.92	0.80	0.81	0.86	0.85
OR 99W at Tualatin-Sherwood Road ⁽¹⁾	1.26	1.25	1.09	0.98	-	1.24
OR 99W at Edy Road/Sherwood Boulevard ⁽¹⁾	1.08	1.08	0.99	0.98	-	0.90
OR 99W at Sunset Boulevard	1.22	1.22	1.42	0.87	0.90	1.08
Tualatin-Sherwood Road at Oregon Street	1.23	1.20	0.92	1.01	0.89	0.86
Tualatin-Sherwood Road at Boones Ferry Road ⁽²⁾	1.00	0.98	-	0.86	0.86	0.84
65 th Avenue at Elligsen Road ⁽³⁾	>2.0	>2.0	0.93	0.89	0.88	0.99
65 th Avenue at Stafford Road ⁽³⁾	>2.0	>2.0	-	-	-	-
I-5 Northbound Ramps at Carmen Drive	1.09	1.09	1.15	1.08	1.08	1.11
I-5 Northbound Ramps at Nyberg Road	0.85	0.85	0.83	0.85	0.81	0.82
I-5 Northbound Ramps at Elligsen Road	0.80	0.80	0.81	0.90	0.91	0.90

Intersection	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
I-5 Northbound Ramps at Wilsonville Road ⁽⁴⁾	1.55	1.54	1.56	1.64	1.61	1.57
I-5 Southbound Ramps at Carmen Drive	0.92	0.92	0.95	0.92	0.94	0.93
I-5 Southbound Ramps at Nyberg Road	0.74	0.72	0.73	0.80	0.76	0.72
I-5 Southbound Ramps at Elligsen Road	0.92	0.92	0.93	0.95	0.95	0.95
I-5 Southbound Ramps at Wilsonville Road ⁽⁴⁾	1.48	1.48	1.35	1.60	1.56	1.43
Number of Intersections with v/c > 1.0	11	10	6	5	4	6

Notes:

- ¹ Alternative 5 (Connector 4E) would have no Tualatin-Sherwood Road/OR 99W intersection.
- ² Alternative 3 (EESA) would replace the at-grade intersection with an interchange.
- ³ A traffic signal was assumed to be installed at a combined Elligsen Road/Stafford Road intersection with 65th Avenue.
- ⁴ Although there is a project in the STIP that includes improvements at this interchange, specific details were not available at the time of this analysis; therefore, the evaluation reflects current lane configurations.

Source: 2030 Travel Demand Forecasting Model

Relative Performance

The difference in the relative performance of the project alternatives when considering the PM peak period emission estimates (based on VMT), AADT, and v/c ratio screening level analysis highlights the complex area and local nature of transportation emissions and air quality.

Changes in AADT and VMT could result in greater criteria pollutant (i.e., pollutants for which there are NAAQS) and MSAT emissions in the project area; however, increased efficiency and lower v/c at busy intersections will result in less congestion and fewer localized areas where pollutants can build up to higher concentrations.

As discussed earlier, violations of the CO NAAQS at busy intersections in the Portland area have not been a concern for more than ten years, largely due to the measures used to ensure Portland's continued compliance with the CO NAAQS. Although there are differences in the number of congested intersections between the different project alternatives, it is unlikely that exceedances of the CO NAAQS would occur as a result of the project under any of the alternatives considered in this alternatives analysis.

When considering the relative potential for differences in air pollutant emissions based on the screening levels analysis of AADT, VMT, and concerns regarding MSATs, the results of the analysis show that overall the alternatives fall into two broad groups. Alternatives 1, 2, and 3 tend to show less potential for air quality impacts, and less change when compared to the No Build condition (Alternative 1). In contrast, VMT and AADT is predicted to increase to a greater degree, compared to the No Build condition, under Alternatives 4, 5, and 6, thus creating a greater potential for air quality impacts under these alternatives, as shown in Tables 8.12-1 and 8.12-2.

Construction Emissions

Construction emissions would vary by alternative, but would generally result from the generation of dust from site clearing, excavation and grading, direct emissions from construction vehicles, and impacts to traffic flow in the project area. Traffic congestion increases idling times and reduces travel speeds, resulting in increased vehicle emission levels. Construction of concrete structures may have associated dust-emitting sources, such as concrete mixing operations.

Indirect Effects

The traffic data used by the project traffic engineers in the air quality screening analysis were based on Metro's land use-based regional travel demand model. These data include assumptions about levels of future development in the region; thus, they account for indirect or secondary effects.

Cumulative Effects

Cumulative effects would vary between project alternatives based on the level of traffic volume changes. Changes in the distribution of traffic volumes as a result of the project would increase future pollutant emissions levels in some areas and decrease pollutant emissions in others.

Changes in pollutant emissions as a result of the project will occur in the context of the broader airshed and would be cumulative relative to other changes that may occur. The general air quality environment includes emissions from the interstate and local roadways in the area, rail lines, industrial and commercial activities, as well as the residential development that has occurred in both the local and wider Portland metropolitan areas.

The cumulative effects of the project combined with past, present, and other future development in the area between now and the project design year will be addressed as part of a more detailed air quality analysis in support of the draft EIS during Phase 2 of the project.

8.12.5 Summary of Potential Permits Required

An Indirect Source Construction Permit (ISCP) is required for any indirect source within the Portland CO maintenance area that adds 1,000 parking spaces. If there are elements of the proposed alternatives (such as park and ride facilities) that include the construction of 1,000 or more vehicle parking spaces, an ISCP may be required. The ISCP application is normally submitted approximately six months prior to bid let and is based on the final project design.

8.12.6 Potential Mitigation Measures

The air quality screening analysis presented here is not detailed enough to identify specific air quality impacts that might result from the project. The following mitigation measures are recommended to minimize construction-related air quality impacts.

- ◆ Construction contractors must comply with OAR 340-208-0210, requiring that reasonable precautions be taken to avoid dust emissions. These regulations require the use of dust suppression measures, such as applying water or suppressants during dry weather, and truck and equipment washing to prevent inadvertently transporting dirt and dust from the construction areas onto nearby roads.

- ◆ In addition, contractors are required to comply with ODOT standard specifications. Section 290 of the specifications has requirements for environmental protection, which include air pollution control measures.
- ◆ To reduce the effect of construction delays on traffic flow and resultant emissions, when possible, road or lane closures should be restricted to nonpeak traffic periods.
- ◆ Stationary sources such as concrete mix plants are generally required to obtain air permits from DEQ and to comply with dust control regulations and other pollutant emissions.

More detailed air quality analysis will be conducted in support of the draft EIS during Phase 2 of the project. Mitigation measures, if required, will be discussed in the draft EIS.