3.10 Air Quality

Many natural and human activities generate air pollutants that can affect human and environmental health. Air quality is closely tied to transportation (including motor vehicles, trucks, and buses), which is a major contributor of air pollutants in the Portland-Vancouver area. This section evaluates the long-term and temporary effects of the No-Build Alternative and the network improvements of the Modified LPA for two types of air pollutants:

- Mobile source air toxics (MSAT). The Clean Air Act identifies 188 air toxics, of which MSAT are a subset of nine pollutants emitted by vehicles. These nine pollutants are also included in the Oregon Department of Environmental Quality's (DEQ) Toxic Air Contaminant Priority List.
- Criteria pollutants. These pollutants have federally established limits based on human health and environmental criteria.

Information presented in this section is based on the Air Quality Technical Report, including details of the emissions analyses for MSAT and criteria pollutants. Greenhouse gas emissions are discussed in Section 3.12, Energy, and Section 3.19, Climate Change.

3.10.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CPA LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with air quality has been updated in this Draft SEIS to include:

- Updated analysis to address National Ambient Air Quality Standards (NAAQS) and other recent federal guidance, such as FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA 2023a) and FHWA's Frequently Asked Questions for Conducting Quantitative MSAT Analysis for FHWA NEPA Documents (FHWA 2023b).
- Revised methodology based on the updated ODOT Air Quality Manual and WSDOT Guidance on Addressing Air Quality, Greenhouse Gas Emissions, and Energy for WSDOT projects.
- Removed an assessment for localized carbon monoxide at congested intersections, as the region's 20-year carbon monoxide maintenance period ended in 2017. Therefore, transportation projects in the region are no longer required to demonstrate conformity.
- Updated the analysis based on updated transportation modeling data.
- Calculated criteria pollutants using the U.S. Environmental Protection Agency's (EPA's) Motor Vehicle Emissions Simulator Model (MOVES) (version 3.1.0)[1], which is the version used in current regional modeling analyses in Oregon and Washington. CRC emissions estimates were developed using EPA's MOBILE6.2 model, which MOVES replaced.
- Deleted reference to the Portland Air Toxics Solution study, as it only projected emissions to 2017.
- Added a summary of Oregon State Toxic Air Contaminant Program, which was most recently amended in November 2021.

[1] As of August 2023, MOVES 4 is now the EPA's regulatory emissions modeling system. The EPA has provided a two-year grace period, meaning that MOVES 3 is still an acceptable and appropriate model for regional emissions analyses.

- Changes to the project footprint, as necessitated by changed conditions, and changes in existing land uses resulting in changes to proximity to sensitive receptors.

Table 3.10-1 compares the impacts and benefits of the CRC LPA to those of the Modified LPA as a result of the changes listed above, which include many updates in the analysis methodology and traffic modeling data. Based on the analysis described in this section, the effects of the Modified LPA would be similar to those of the CRC LPA. Overall, the Modified LPA would reduce the emissions of air quality pollutants compared to existing conditions.

Table 3.10-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in this Section	Explanation of Differences
Change in VMT used to calculate air pollutant emissions – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA).	• 40% (2030)	• 62% (2045)	• Variations in methodology such as the base year of analysis and MSAT study area.
MSAT Emissions (2030 in CRC LPA and 2045 in Modified LPA) – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA). [a]	• 1,3-Butadiene: -53% • Acetaldehyde: N/A • Acrolein: -52% • Benzene: -57% • Diesel Particulate Matter: -93% • Ethylbenzene: N/A • Formaldehyde: -48% • Naphthalene: -37% • Polycyclic Organic Matter: N/A	• 1,3-Butadiene: -100% • Acetaldehyde: -85% • Acrolein: -90% • Benzene: -70% • Diesel Particulate Matter: -88% • Ethylbenzene: -29% • Formaldehyde: -88% • Naphthalene: -94% • Polycyclic Organic Matter: -96%	• CRC LPA MSAT emissions are in units of pounds per summer day and Modified LPA MSAT emissions are in tons per year. • Additional differences include analysis years, updates to future volume projections, updates to federal air emissions standards, and updates to EPA's emission factor model.
Regional Criteria Pollutant Emissions (2030 in CRC LPA and 2045 in Modified LPA) – Difference from Existing (2005 in CRC LPA and 2015 in Modified LPA). [b]	• Carbon Monoxide (winter): -26% • Nitrogen Dioxide: -74% • Sulfur Dioxide: N/A • Volatile Organic Compounds: -56% • Total PM_{10}: -92% • Total $PM_{2.5}$: -91%	• Carbon Monoxide: -63% • Nitrogen Dioxide: -79% • Sulfur Dioxide: 9% • Volatile Organic Compounds: 25% • Total PM_{10}: 21% • Total $PM_{2.5}$: -48%	• CRC LPA Regional Criteria Pollutant Emissions are in tons per day and Modified LPA Regional Criteria Pollutant Emissions are in tons per year.

Source: CRC 2011

Note: 2019 is the baseline year for most existing conditions data. The exception is for outputs that rely on the Metro/RTC regional travel demand model, which has not yet updated its base year model from 2015. As a result, all Metro/RTC regional travel demand model outputs summarize 2015 data based on 2015 land use, population, and employment data.

a MSAT Emissions for CRC are in pounds per day and for Modified LPA are in tons per year.

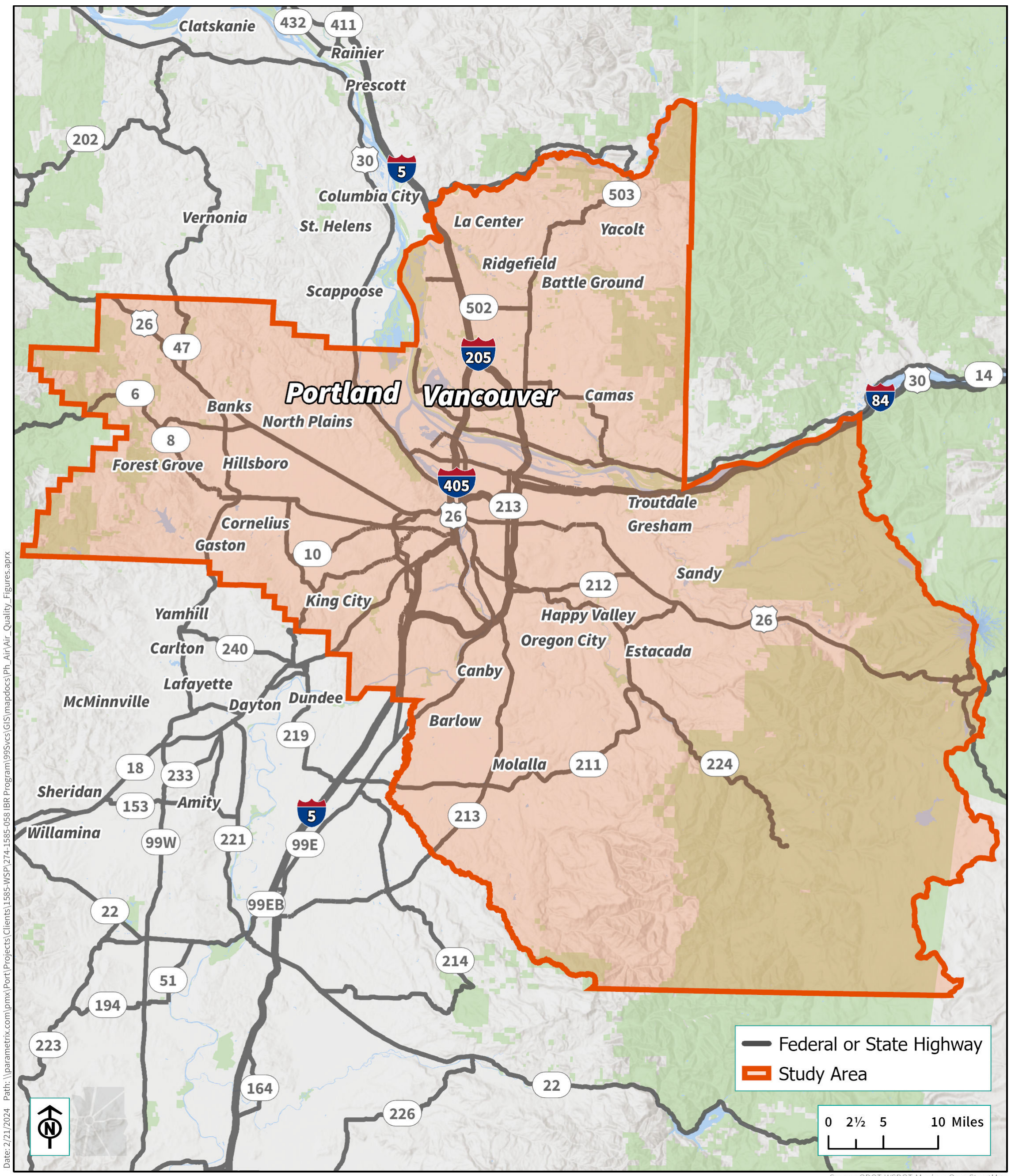
b Regional Criteria Pollutant Emissions for CRC are in tons per day and for Modified LPA are in tons per year.

CRC = Columbia River Crossing; EIS = Environmental Impact Statement; EPA = Environmental Protection Agency; LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; N/A = not applicable; VMT = vehicle miles traveled

3.10.2 Existing Conditions

The study area is shown in Figure 3.10-1. The Oregon DEQ measures air pollutant levels with a network of air monitoring and sampling equipment at more than 40 sites throughout the state, including the study area. The Washington State Department of Ecology (Ecology) does not operate many monitors in the Vancouver area because the monitors operated by DEQ fulfill the federal monitoring requirements for the metropolitan area. Over the last 10 years, pollutant concentrations have been trending mostly downward for most locations, with most exceptions corresponding to wildfire smoke events. DEQ implements several programs that regulate emissions of air toxics and monitors ambient levels present at various locations across Oregon. DEQ uses this concentration data to develop strategies to reduce ambient levels of air toxics in the state. The Air Quality Technical Report includes tables of recent monitoring data for criteria pollutants and air toxics.

Figure 3.10-1. Air Quality Study Area



Air Quality Pollutants and Standards

Mobile Source Air Toxics

MSAT emissions are the subset of air toxics emitted by mobile sources. The priority MSAT pollutants include benzene, 1,3-butadiene, naphthalene, polycyclic organic matter, formaldehyde, acrolein, ethylbenzene, acetaldehyde, and diesel particulates. Exposure to these pollutants over time can affect human health. Unlike criteria pollutants, MSAT pollutants do not have regulatory standards.

The EPA's MOVES 3.1.0 model was used to estimate the MSAT emissions (in tons per year) for existing conditions, the No-Build Alternative and the Modified LPA. The analysis was performed according to FHWA guidance that recommends estimating emissions for roadway segments that are expected to have a change in volume of more than 5% compared to the No-Build Alternative. The roadway network used for the emissions analysis is shown by the roadway segments highlighted in Figure 3.10-2.

The MOVES model estimates emissions from this MSAT network based on details from regional travel demand modeling (traffic volumes, speeds, and vehicle mix) and region-specific MOVES inputs that describe the climate, fuel supply, and vehicle registration. DEQ and Ecology provided data files to run two MOVES models to determine the emissions on Oregon and Washington roadway segments, using regional conditions for each state. The Air Quality Technical Report presents details of the travel demand modeling assumptions, including the consideration of potential trip diversion.

Criteria Pollutants

The EPA has developed NAAQS for six major air pollutants. Areas previously designated nonattainment areas that are now in compliance with air quality standards are classified as "attainment" areas or "maintenance areas." A table of the current NAAQS is found in the Air Quality Technical Report.

The study area spans four counties in the Portland and Vancouver metropolitan areas; the EPA has designated both metropolitan areas as in attainment for all criteria pollutants. The area was previously designated as nonattainment for carbon monoxide and 1-hour ozone. As of October 2, 2017, the 20-year transportation conformity planning period associated with the Carbon Monoxide Maintenance Plan was completed. All measures and requirements contained in the Carbon Monoxide Maintenance Plan must be complied with until the EPA approves a revision to the state plan; however, transportation projects are no longer required to demonstrate NAAQS compliance with the transportation conformity requirements of 40 Code of Federal Regulations Part 93 subpart A.

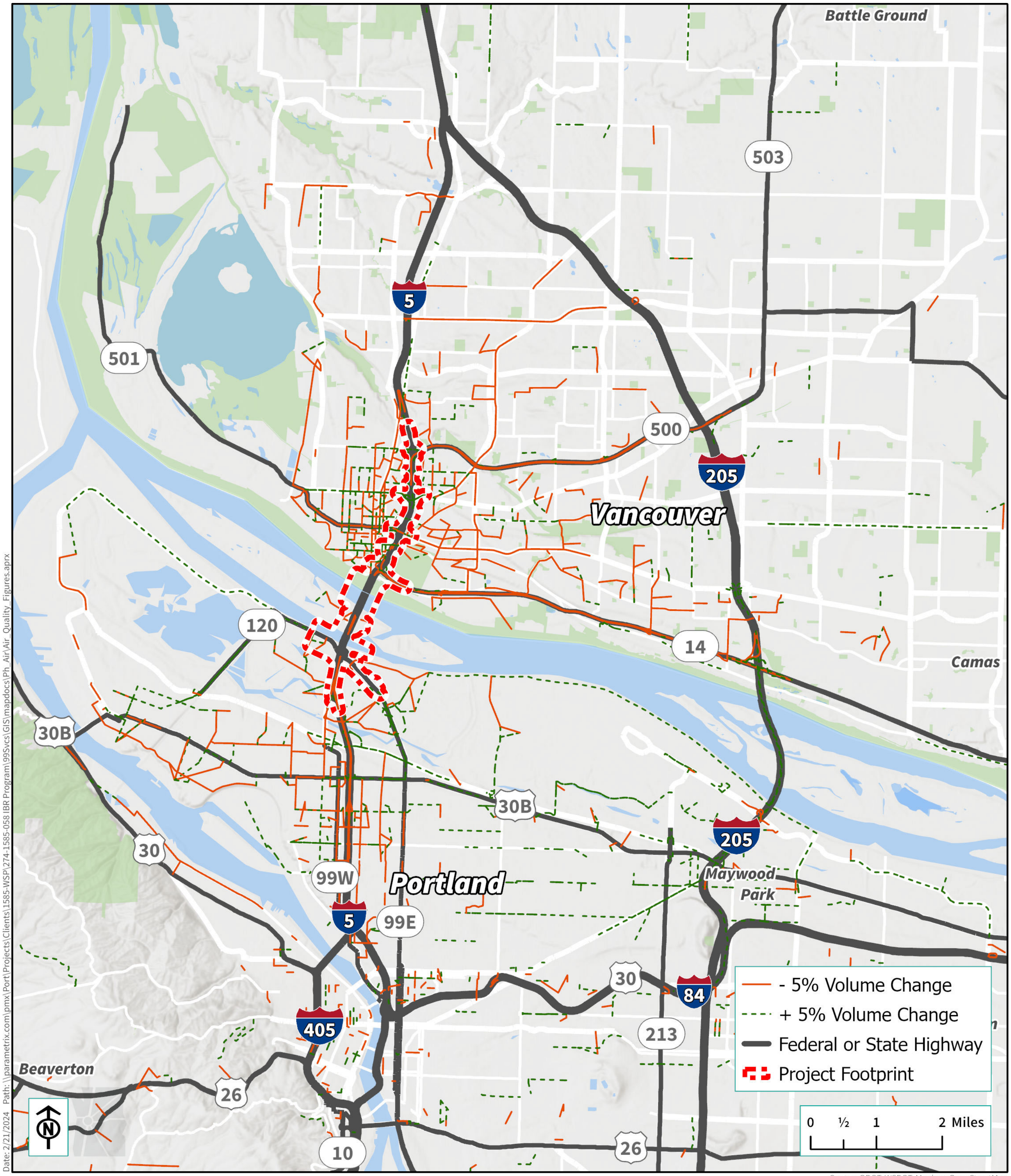
In 2005, EPA revoked the 1-hour ozone standard. At the time, the Portland-Vancouver region was subject to an ozone maintenance plan. The maintenance plan, including regional commitments for transportation strategies to address ozone, is still in effect.

The criteria pollutant emissions analysis followed the same methodology described for the MSAT analysis to provide a comparison of emissions between existing and future conditions.

As part of Oregon's State Implementation Plan for carbon monoxide, Transportation Control Measures (TCMs) were identified to reduce emissions by reducing vehicle use (DEQ 2004). Although transportation conformity is no longer required after the 20-year maintenance period, the following TCMs were applicable between the years of 2006 and 2017 and are examples of strategies that have been used to reduce emissions:

- Transit Service Increase: Regional transit service revenue hours (weighted by capacity) are increased 1% per year. The increase is assessed on the basis of a five-year rolling average of actual hours for assessments conducted between 2006 and 2017.

Figure 3.10-2. Roadway Emissions Analysis Network



- Bicycle Paths : Jurisdictions and government agencies must program a minimum total of 28 miles of bicycle paths or trails within the Portland metropolitan area between the years 2006 and 2017. Bicycle paths must be consistent with state and regional bikeway standards. A cumulative average of 5 miles of bikeways or trails per biennium must be funded from all sources in each Metropolitan Transportation Improvement Program. Facilities subject to this TCM must be in addition to those required for expansion or reconstruction projects under Oregon Revised Statutes 366.514.
- Pedestrian Paths : Jurisdictions and government agencies must program at least 9 miles of pedestrian paths in mixed-use centers between the years 2006 and 2017, including the funding of a cumulative average of 1.5 miles in each biennium from all sources in each Metropolitan Transportation Improvement Program. Facilities subject to this TCM must be in addition to those required for expansion or reconstruction projects under Oregon Revised Statutes 366.514, except where such expansion or reconstruction is located within a mixed-use center.

Sensitive Receptors

While air quality effects on all members of the population are evaluated, potential effects on sensitive receptors are of particular concern. Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, and assisted living facilities are examples of sensitive receptors. Table 3.10-2 lists the hospitals, schools, and assisted living facilities located near the Program footprint. Many of these facilities are located in downtown Vancouver, west of the Program footprint.

Table 3.10-2. Sensitive Receptors Near the Program Footprint

Facility	Address
Hospitals and other Healthcare Facilities	
Portland VA Health Care System- Vancouver	1601 E 4th Plain Blvd, Vancouver, WA 98661
Providence Esther Short - Vancouver	700 Washington St Suite 105, Vancouver, WA 98660
ZoomCare	781 W Columbia Way, Vancouver, WA 98660
Sea Mar Community Health Center- CSNW Rose Village	2502 E 4th Plain Blvd, Vancouver, WA 98661
Schools	
Discovery Middle School	800 E 40th St, Vancouver, WA 98663
Vancouver School of Arts and Academics	3101 Main St, Vancouver, WA 98663
Washington State School for the Blind	2214 E 13th St, Vancouver, WA 98661
Hudson's Bay High School	3528, 1601 E McLoughlin Blvd, Vancouver, WA 98663
VITA Elementary School	1111 Fort Vancouver Way, Vancouver, WA 98663
Clark College	1933 Fort Vancouver Way, Vancouver, WA 98663

Facility	Address
Assisted Living	
Rose Village Adult Care Home	3810 S St, Vancouver, WA 98663
Knights of Pythias Retirement Center	3409 Main St, Vancouver, WA 98663
The Oaks at Timberline	400 E 33rd St, Vancouver, WA 98663
The Evergreen Inn	500 Main St, Vancouver, WA 98660
The Springs at The Waterfront	655 W Columbia Way Suite 602, Vancouver, WA 98660
Van Vista	410 W 13th St, Vancouver, WA 98660

3.10.3 Long-Term Effects

Table 3.10-3 summarizes the effects on air quality of the No-Build Alternative and the Modified LPA with the double-deck fixed-span, single-level fixed-span, and single-level movable-span configurations. Detailed analysis of the effects is provided in the following sections.

No-Build Alternative

Air pollutant emissions from the regional transportation system would continue, including from idling vehicles during bridge openings under the No-Build Alternative (Table 3.10-4 and Table 3.10-5). Although vehicle miles traveled (VMT) would increase substantially between now and 2045, emissions of most MSAT and criteria pollutants would go down because of more stringent regulation of fuels and emissions.

Modified LPA

The Modified LPA would not cause long-term adverse air quality impacts. Emissions reductions vary by pollutant. Decreases range from 29% to 100%, with minor differences between the Modified LPA and the No-Build Alternative (Table 3.10-4 and Table 3.10-5). Changes in criteria pollutant emissions compared to existing conditions range from reductions of up to 79% to increases of up to 25%, depending on the pollutant.

Air pollutant emissions are expected to be substantially lower in the future than under existing conditions for all pollutants evaluated, except SO_2, VOC, and total PM_{10}. The predicted emissions reduction would be almost entirely due to EPA regulations, fuel and engine standard improvements. Emissions reduction associated SO_2, VOC, and total PM_{10} would not outpace emissions increases caused by VMT growth.

Future 2045 emissions for the Modified LPA are less than 2045 No-Build Alternative for all pollutants. The emissions shown for the roadway segments are meant to present the difference between the No-Build Alternative and the Modified LPA—the MOVES model results do not represent the total emissions for the entire regional study area.

Compared to the No-Build Alternative, travel demand modeling that includes projected transit ridership and potential trip diversion to avoid tolls, showed the Modified LPA would lower emissions of MSAT and criteria pollutants by improving traffic flow and reducing VMT within the study area. Compared to the Modified LPA with the double-deck fixed-span configuration, the Modified LPA with the single-level fixed-span (any bridge type option) or the single-level movable-span configuration may slightly reduce operational vehicle emissions because of the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.

Table 3.10-3. Summary of Air Quality Effects of the No-Build Alternative and the Modified LPA as Compared to Existing Conditions

1	2	3	4	5
Effect	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Fixed-Span Configuration, a One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options	Modified LPA with Single-Level Movable-Span Configuration, One or Two Auxiliary Lanes, with or without C Street Ramps, Centered I-5 or I-5 Westward Shift, all Park-and-Ride Site Options
VMT in MSAT study area	• 3,537,900 VMT in 2045 (66% increase compared to existing conditions).	• 3,455,400 VMT in 2045 (62% increase compared to existing conditions).	• Same as effects listed in Column 3.	• Same as effects listed in Column 3.
Changes in air pollutant emissions	• Future regional emissions would be substantially lower than existing emissions for all MSAT, CO, NO_X, and $PM_{2.5}$. Future regional emissions of SO_2, VOC would be up to 25% higher than existing conditions due to increased VMT.	• Similar to No-Build Alternative (slightly lower emissions than No-Build Alternative due to reduced VMT).	• Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.
Changes in MSATs emissions (2045)	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 82% reduction • Acrolein: 89% reduction • Benzene: 69% reduction • Diesel Particulate Matter: 86% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 86% reduction • Naphthalene: 93% reduction • Polycyclic Organic Matter: 93% reduction	• 1,3-Butadiene: 100% reduction • Acetaldehyde: 85% reduction • Acrolein: 90% reduction • Benzene: 70% reduction • Diesel Particulate Matter: 88% reduction • Ethylbenzene: 29% reduction • Formaldehyde: 88% reduction • Naphthalene: 94% reduction • Polycyclic Organic Matter: 96% reduction	• Similar to effects listed in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.

1	2	3	4	5
Changes in regional criteria pollutant emissions	• Carbon Monoxide: 61% reduction • Nitrogen Dioxide: 75% reduction • Sulfur Dioxide: 16% increase • Volatile Organic Compounds: 26% increase • Total PM_{10}[a]: 46% increase • Total $PM_{2.5}$[b]: 39% reduction	• Carbon Monoxide: 63% reduction • Nitrogen Dioxide: 79% reduction • Sulfur Dioxide: 9% increase • Volatile Organic Compounds: 25% increase • Total PM_{10}[a]: 21% increase • Total $PM_{2.5}$[b]: 48% reduction	• Similar to effects in Column 3, but may slightly reduce operational emissions due to the lower profile grade, which would reduce acceleration and braking of vehicles crossing the bridges.	• Similar to effects in Column 4, except for a minor increase in air quality pollutants due to vehicles idling during bridge openings. There would be fewer bridge openings than with the No-Build Alternative.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.

LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; VMT = vehicle miles traveled

Table 3.10-4. Mobile Source Air Toxics Emissions (Tons per Year)

Pollutant	Existing (2015)	No-Build Alternative (2045)	Modified LPA (2045)[a]	Modified LPA Difference from Existing	Modified LPA Difference from No-Build Alternative
MSAT Study Area Daily VMT	2,128,200	3,537,900	3,455,400	62%	-2%
1,3-Butadiene	0.7	0.0	0.0	-100%	0%
Acetaldehyde	2.4	0.4	0.4	-85%	-14%
Acrolein	0.23	0.03	0.02	-90%	-12%
Benzene	14.2	4.3	4.3	-70%	-1%
Diesel Particulate Matter	10.8	1.6	1.3	-88%	-14%
Ethylbenzene	19.0	13.5	13.4	-29%	-1%
Formaldehyde	3.61	0.51	0.45	-88%	-12%
Naphthalene	0.47	0.03	0.03	-94%	-7%
Polycyclic Organic Matter	0.19	0.01	0.01	-96%	-42%

Note: Percentage differences calculated prior to rounding.
a The data for the Modified LPA applies to all design options except the two auxiliary lane option.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; VMT = vehicle miles traveled

Table 3.10-5. Criteria Pollutant Emissions (Tons per Year)

Pollutant	Existing (2015)	No-Build Alternative (2045)	Modified LPA (2045)[a]	Modified LPA Difference from Existing	Modified LPA Difference from No-Build Alternative
MSAT Study Area Daily VMT	2,128,200	3,537,900	3,455,400	62%	-2.3%
Carbon Monoxide	4,355	1,687	1,597	-63%	-5.3%
Nitrogen Dioxide	897	226	184	-79%	-18.5%
Sulfur Dioxide	2.4	2.8	2.6	9%	-5.7%
Volatile Organic Compounds	662	830	826	25%	-0.6%
Total PM_{10}[b]	46.0	67.1	55.9	21%	-16.6%
Total $PM_{2.5}$[c]	18.5	11.3	9.6	-48%	-14.5%

Note: Percentage differences calculated prior to rounding.
a The data for the Modified LPA applies to all design options except the two auxiliary lane option.
b Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brake wear, and PM_{10} tire wear.
c Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brake wear, and $PM_{2.5}$ tire wear.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; VMT = vehicle miles traveled

The Modified LPA with the double-deck fixed-span configuration and the single-level fixed-span configuration (any bridge type option) would eliminate emissions from idling during a bridge opening. The Modified LPA with the single-level movable-span configuration would still result in idling and emissions due to bridge openings; however, because it would have a higher vertical navigation clearance than the existing bridge, it could result in fewer bridge openings and reduced idling compared to the No-Build Alternative. Because the different bridge configurations would not result in meaningfully different regional VMT and speed, there was no change to the regional travel demand model output, and no additional air quality modeling was warranted. The emissions are considered to be the same as discussed above for the Modified LPA.

As discussed in the Navigation Technical Report, the configuration ultimately selected would affect navigation patterns. However, emissions from marine vessels were not evaluated because it is anticipated there would be no change in vessel idling emissions. Currently, bridge openings are scheduled as needed so vessels can pass with limited need for idling. The Modified LPA incorporating any of the configuration or bridge type options would result in either the same or less emissions from idling vessels. It is possible that marine traffic could increase if the need for bridge openings is eliminated; while the potential increase in marine traffic is beyond the scope of this project to predict it would be anticipated that the increased marine traffic would not require a bridge opening and therefore not result in marine idling.

Compared to the Modified LPA with one auxiliary lane, the analysis of the long-term effects of the Modified LPA with two auxiliary lanes using the regional travel demand model shows no statistical difference in pollutant emissions (Table 3.10-6 and Table 3.10-7); pollutant emissions are within a 1.5% difference.

As in the case of the configuration and bridge type options described above, the long-term effect on air quality of the Modified LPA would be the same for any of the design options except the two auxiliary lane options (i.e., with or without the I-5 C Street ramps at the SR 14 interchange, with the centered I-5 mainline or the westward shift, and with each of the park-and-ride site options). Because design options other than the two auxiliary lane option would not result in meaningfully different regional VMT and speed, no additional air quality modeling was conducted.

Table 3.10-6. Mobile Source Air Toxics Emissions for the Modified LPA with One or Two Auxiliary Lanes (Tons per Year)[a]

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
MSAT Study Area Daily VMT	3,455,400	3,462,400	0.2%
1,3-Butadiene	0.00	0.00	0.0%
Acetaldehyde	0.4	0.4	-0.9%
Acrolein	0.02	0.02	-0.6%
Benzene	4.3	4.3	0.0%
Diesel Particulate Matter	1.3	1.3	-0.9%
Ethylbenzene	13.4	13.4	0.0%
Formaldehyde	0.45	0.45	-0.7%
Naphthalene	0.03	0.03	-0.2%

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
Polycyclic Organic Matter	0.01	0.01	0.0%

a Data in this table apply to all design options, unless otherwise indicated.
LPA = Locally Preferred Alternative; MSAT = Mobile Source Air Toxics; VMT = vehicle miles traveled

Table 3.10-7. Criteria Pollutant Emissions for the Modified LPA with One or Two Auxiliary Lanes (Tons per Year)[a]

Pollutant	Modified LPA with One Auxiliary Lane (2045)	Modified LPA with Two Auxiliary Lanes (2045)	Difference Between Modified LPA with One and Two Auxiliary Lanes
MSAT Study Area Daily VMT	3,455,400	3,462,400	0.2%
Carbon Monoxide	1,597	1,596.1	0.0%
Nitrogen Dioxide	184	181.6	-1.4%
Sulfur Dioxide	2.6	2.6	0.0%
Volatile Organic Compounds	826	825.5	0.0%
Total PM_{10}[b]	55.9	55.3	-1.2%
Total $PM_{2.5}$[c]	9.6	9.5	-1.0%

a Data in this table apply to all design options, unless otherwise indicated.
b Total PM_{10} emissions are the sum of PM_{10} exhaust, PM_{10} brake wear, and PM_{10} tire wear.
c Total $PM_{2.5}$ emissions are the sum of $PM_{2.5}$ exhaust, $PM_{2.5}$ brake wear, and $PM_{2.5}$ tire wear.

MSAT Health Effects

Within the study area, there may be localized areas where ambient concentrations of MSAT with the Modified LPA could be different from the No-Build Alternative. The magnitude and duration of potential localized concentration increases cannot be reliably quantified because of uncertainty in future emissions, weather patterns, exposure pathways, and causation of effects.

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

Sensitive Receptors

Some occupants of hospitals, schools, assisted living facilities and other sensitive receptors are more susceptible to the adverse effects of air pollutants than the general public. All of the design options would have the same air quality effect on sensitive receptors in the area (as listed in Table 3.10-2), except the Modified LPA with I-5 mainline westward shift would shift traffic closer to the sensitive receptors, which are located west of the Program footprint and could change localized pollutant emissions. Because the Portland

and Vancouver metropolitan areas are in attainment for NAAQS, no further analysis is necessary to confirm that the Modified LPA would not result in pollutant concentrations in excess of the NAAQS.

3.10.4 Temporary Effects

No-Build Alternative

The No-Build Alternative would not involve construction and therefore would not result in construction-related air quality effects.

Modified LPA

Construction of the Modified LPA under any of the design options includes construction of the new bridges and removal of the existing Interstate Bridge. Construction-related activities would result in temporary air emissions, which could include increases in particulate matter in the form of fugitive dust (from demolition, ground clearing and preparation, grading, stockpiling of materials, on-site movement of equipment, and transportation of construction materials) and exhaust emissions from material delivery trucks, construction equipment, and workers' private vehicles. Dust emissions increase during dry weather, construction activities, or high wind conditions. Temporary impacts to air quality from construction activities would occur during the 9- to 15-year Program-wide construction period, which is expected to last from 2 to 10 years in specific locations. Although this construction duration is longer than the 5 years usually considered as temporary under transportation conformity rules (40 CFR 93.123), these rules do not apply to areas like Portland, which are in attainment for all NAAQS. Locations of elevated emissions would likely occur directly next to the construction activities, staging areas, and material hauling routes. All design options of the Modified LPA are expected to have similar temporary construction effects.

At this design stage, the Program has not developed detailed construction sequencing plans, which depend on funding, permitting, and other future considerations. Once these plans are developed, some areas located near concentrations of construction activity may be exposed to elevated levels of emissions. To better understand the potential for increased air emissions near construction sites, particularly for construction activities near sensitive receptors, the IBR Program team reviewed the example of the Dan Ryan Expressway, which had similar scope to the IBR Program. During construction of the Dan Ryan Expressway, air monitoring was conducted at 27 sites—at schools, parks, public housing, and public facilities—where the population was expected to be more sensitive to air contaminants. The monitored pollutants included total dust, respirable silica, lead, asbestos, polycyclic aromatic hydrocarbons (as diesel components), PM_{10}, and $PM_{2.5}$. Air monitoring was conducted during the construction period (from January 2005 until October 2007) and federal air quality standards were not exceeded. The results from the Dan Ryan Expressway project indicate that the construction activities for the Modified LPA should not result in violations of air quality standards and should not pose an undue health risk to the neighboring communities, including sensitive populations. More information on the Dan Ryan Expressway project can be found in the Air Quality Technical Report.

3.10.5 Indirect Effects

Indirect effects are those caused at a later time or farther away, but that are still reasonably foreseeable. The Modified LPA, under any of the design options, may indirectly encourage development, particularly in light-rail station areas, due to improved bicycle, pedestrian, highway, and transit access in Portland and Vancouver. Such development could generate additional traffic, which would increase air emissions; however, because the Modified LPA would provide additional transportation options such as transit and nonmotorized facilities, any increase in emissions is expected to be minor. As described Section 3.4, Land Use and Economic Activity, the magnitude and location of development facilitated by the Modified LPA would be consistent with all local and regional land use plans, and the IBR Program is not expected to result in urban sprawl, which tends to increase air emissions. No additional indirect effects would occur under the Modified LPA. All design options of the Modified LPA are expected to have similar indirect effects.

3.10.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

The requirements of the Oregon and Washington State Implementation Plans would continue to be implemented by the states; there are no regulatory requirements that would be directly implemented by the IBR Program.

Program-Specific Mitigation

Long-term air quality impacts are not expected to occur because of the Modified LPA, and Program-specific mitigation for long-term impacts is not proposed.

Temporary Effects

There are no thresholds associated with the temporary effects to air quality. Although there is no mitigation required to meet applicable emissions thresholds, measures would be required to protect and minimize temporary effects on air quality during construction. ODOT, WSDOT, and all project contractors would comply with standard and regulatory mitigation measures. As construction phasing plans and mitigation measures are further developed, potential air quality impacts to sensitive receptors will be considered, particularly those due to prolonged construction emissions and/or simultaneous or sequential construction activities. Best management practices, including strategies to reduce fugitive dust and reduce vehicle idling, would be implemented to reduce and mitigate air quality emissions during construction.

Regulatory Requirements

To protect and minimize temporary effects on air quality during construction, standard and regulatory mitigation measures such as best management practices would be implemented.

Construction contractors would be required to comply with the following standard and regulatory air quality measures in Oregon:

- Division 208 of OAR 340.
- ODOT Standard Specifications Section 290.
- The Clean Diesel Construction Standard (OAR-731-005-0800).
- Oregon House Bill 2007, known as the “Clean Diesel Bill.”
- The City of Portland Clean Air Construction Program to reduce diesel emissions by implementing a standard set of idle reduction and diesel equipment requirements on job sites.

Standard and regulatory mitigation measures for air quality in Washington include:

- WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, Section 1.07.5(4).
- Fugitive dust control best management practices set forth in the Associated General Contractors of Washington Education Foundation and Fugitive Dust Task Force pamphlet, “Guide to Handling Fugitive Dust From Construction Projects.”

Program-Specific Mitigation

- Through contract specifications, encourage all contractors to minimize impacts to surrounding communities such as using newer low-emitting construction equipment and electric equipment, and avoiding haul routes through residential areas.