

3.21 Cumulative Effects

Cumulative effects result from the incremental effect of a proposed action when added to those of other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or nonfederal) or person that undertakes such other actions. Cumulative effects can result from individually minor but collectively substantial actions that take place over a period of time (definition paraphrased from 40 CFR 1508.7).

The cumulative effects timeframes considered in this analysis are as follows:

- “Past” actions vary by component of the environment.
 - Natural environment analysis considers broad changes beginning in the 1800s.
 - Cultural environment analysis begins 15,000 years before present.
 - Built environment analysis starts in the early 1950s, with the construction of I-5.
- “Present” actions are those ongoing in nature, such as maintenance of the existing transportation system.
- “Future” actions are those that will occur between the present (2023) and 2045, the design year of the IBR Program.

This analysis considers past major actions; planned transportation projects; population, employment, and land use forecasts; comprehensive land use plans; and other major public and private projects that are under development or reasonably expected to occur. Because the geographic scale of analysis varies by discipline, the cumulative effects analysis uses the study area identified in each technical report when evaluating cumulative effects on a particular resource.

The information presented in this section is based on the Cumulative Effects Technical Report, which contains greater detail and additional analysis.

3.21.1 Changes or New Information Since 2013

The CRC Final EIS and Record of Decision (ROD) were completed in 2011, with design refinements addressed in subsequent NEPA re-evaluations in 2012 and 2013. Since then, the following changes and new information have affected the analysis of potential cumulative effects:

- Updates to past, present, and reasonably foreseeable future actions, or projects, in the study areas that have affected or could affect environmental and community resources.
- Changes to the design of the CRC project’s LPA to develop a Modified LPA, including design options.
- Changes in the direct and indirect effects on specific resources (as documented in each resource section).

Based on the analysis described in sections of Chapter 3, the effects of the Modified LPA would be similar to the CRC LPA. As such, the Modified LPA would have a similar contribution to effects caused by past, present, and reasonably foreseeable future actions and would have cumulative effects similar to those of the CRC LPA.

3.21.2 Past, Present, and Future Actions

Past Actions

Past transportation projects, urbanization, housing, and other developments have influenced the social, economic, and natural environment reflected in the existing conditions of the region and study area. Past projects were not always planned and implemented with meaningful public input and communication.

Work in Progress - Not for Public Distribution

Interstate Bridge Replacement Program

1 Native Americans have occupied and traveled through the study area for thousands of years. Traces of their
2 past activities are no longer easily identifiable in the study area's current natural and built environment;
3 however, there are numerous cultural resources in the study area associated with these activities. In the
4 1800s, Euro-American settlement began and expanded with the Hudson Bay Company's post in Vancouver,
5 and the Portland and Vancouver area population began to dramatically increase.

6 In the 1890s early urbanization in Portland and Vancouver was greatly influenced by the trolley line system,
7 followed by the introduction of the automobile in the early 1900s. Construction of the Interstate Bridge
8 occurred in two stages: the original bridge was built in 1917, followed in 1958 by construction of a parallel
9 bridge and conversion of the 1917 bridge to northbound traffic only. Other past actions that influenced the
10 built, social, and natural environment in the study area, include the removal of Indigenous peoples to
11 reservations; airplane manufacturing at Pearson Field during World War I and shipyard manufacturing during
12 World War II; urban renewal and large-scale transportation projects such as the construction of I-5; and
13 greater concentration of development in urban centers under growth management policies in Oregon and
14 Washington.

15 Recent projects in or near the study area that give a sense of current development trends include:

16 **Recent Transportation Projects**

- 17 • Port of Vancouver's West Vancouver Freight Access Project (Vancouver, west of I-5).
- 18 • Waterfront Renaissance Trail (Vancouver, east of I-5).
- 19 • Interstate Bridge northbound trunnion replacement (Vancouver/Portland).
- 20 • Interstate Bridge northbound active traffic management (Vancouver).
- 21 • Clark County Public Transit Benefit Area Authority (C-TRAN) bus-on-shoulder service (Vancouver, I-5, and
22 Interstate 205 [I-205]).
- 23 • New metering on southbound I-5 at the 39th Street/SR 500 off-ramp (Vancouver).

24 **Recent Developments**

- 25 • Multifamily residential buildings along N Marine Drive and N Anchor Way (Portland, east of I-5).
- 26 • Vanport wetlands restoration (Portland, west of I-5).
- 27 • Jantzen Beach Center redevelopment (outdoor mall) (Portland, Hayden Island, west of I-5).
- 28 • Floor and Décor (commercial store) (Portland, Hayden Island, east of I-5).
- 29 • Vancouver Waterfront (mixed-use development) (Vancouver, west of I-5).
- 30 • Hurley Building condominiums (Vancouver, west of I-5).
- 31 • New Seasons (grocery store) (Vancouver, west of I-5).
- 32 • West Barracks renovation (commercial properties) (Vancouver, east of I-5).
- 33 • Vancouver Community Library (Vancouver, west of I-5).
- 34 • Aegis/Providence Academy redevelopment (mixed-use development) (Vancouver, west of I-5).
- 35 • Block 10 (mixed-use development) (Vancouver, west of I-5).
- 36 • Office buildings at 210 W 4th Street and 1010 E 6th Street (Vancouver, west of I-5).
- 37 • Vancouver Center Condos (Vancouver, west of I-5).
- 38 • Vancouver Innovation, Technology and Arts Elementary School (Vancouver, east of I-5).

1 Present Actions

2 Present actions were identified as those that are ongoing in nature, such as maintenance of the existing
3 transportation system and ongoing safety improvements.

4 Reasonably Foreseeable Future Actions and Projects

5 For many resources, anticipated changes in conditions over time are linked to future changes in population,
6 employment, traveler behavior, and transportation system performance, and land use patterns. Regional
7 transportation forecast modeling is built upon the best available projections of 2045 population,
8 employment, and land use changes and includes the transportation improvements that are reasonably
9 expected to occur by 2045. Therefore, the analyses based on regional traffic forecast modeling are already
10 cumulative. This includes the analysis of air quality, climate, energy (fuel and greenhouse gas [GHG]
11 emissions), noise and vibration, and transportation.

12 The list of reasonably foreseeable future actions included in the cumulative effects analysis has been
13 organized into three categories:

- 14 1. Future transportation projects.
- 15 2. Other future projects (non-transportation).
- 16 3. Future growth and regional changes identified in adopted state, regional, and local plans.

17 Future Transportation Projects

18 The list of future transportation projects is based on the transportation modeling conducted for the IBR
19 Program, which is detailed in Appendix A of the Transportation Technical Report. The list includes a variety of
20 projects that are assumed to be built and in operation before 2045. Sources for this future transportation
21 project list include the Oregon Metro (Metro) Regional Transportation Plan (RTP) (Metro 2018) (including
22 amendments) and the Southwest Washington Regional Transportation Commission (RTC) RTP (RTC 2019).¹ In
23 addition, based on discussions with partner agencies, ODOT's Regional Mobility Pricing Project (RMPP) in the
24 Portland area and the Main Street Promise project in Vancouver were included in future transportation
25 projects because of their potential to influence changes even though they are not currently included on the
26 financially constrained lists.^{2,3}

27 The list of future transportation projects considered for the No-Build Alternative includes the projects in the
28 two RTPs and the two additional projects noted above, but does not include the improvements proposed
29 under the Modified LPA and assumes that the Interstate Bridge would not be tolled. The Modified LPA
30 assumes the same future transportation projects as the No-Build Alternative, with the addition of the Program
31 components, including additional auxiliary lanes on I-5, light-rail transit extension from Expo Center Station in
32 Portland to Evergreen Boulevard in Vancouver, active transportation improvements, and variable-rate tolling.

33 Other Future Projects

34 Other future projects considered in the cumulative effects analysis were identified based on proximity to the
35 study area. This list of projects, described below, was confirmed with local and regional partner agencies.

¹One transportation project, the Fourth Plain Safety and Mobility project, is not listed on the financially constrained list in the RTC's regional transportation plan (RTP) but was incorporated into the modeling at the request of partner agencies.

²Federal regulations require that and RTP be financially constrained. Total transportation expenditure levels identified within the RTP must not exceed the total revenue level reasonably expected to be available for the Metro region over the life of the plan; this includes existing revenues and new revenues that may be reasonably anticipated.

³An amendment to Metro's RTP is under consideration that would include the RMPP on the financially constrained list.

- 1 • **Vancouver Waterfront.** This ongoing project is a large-scale mixed-use development led by a public/
2 private collaborative partnership between the City of Vancouver and private development interests. A
3 master plan was approved for the 20-block, 32-acre site, which included new office and residential space,
4 in addition to a public park and multiuse trail. While the improvements are largely complete, private
5 properties at the waterfront continue to be developed. Temporary traffic impacts may occur during
6 project construction, but these should conclude before the IBR Program begins construction.
- 7 • **Terminal 1.** The Port of Vancouver USA is developing a 10-acre property known as Terminal 1, which is
8 located between the Vancouver Waterfront (described above) and the existing Interstate Bridge. Terminal
9 1 would be a mixed-use development with a hotel, office and retail space, outdoor gathering areas, and a
10 public marketplace. Terminal 1 would also complete a missing segment of the Vancouver Waterfront
11 Renaissance Trail, connecting the existing trail at the Vancouver Waterfront to the existing Columbia River
12 Renaissance Trail east of Terminal 1.
- 13 • **Renaissance Boardwalk.** The Renaissance Boardwalk project is a public-private partnership between
14 Kirkland Development and the City of Vancouver to develop a 2.3-acre plot of land directly to the east of
15 the Interstate Bridge. The development plans include two new buildings and underground parking, with
16 230 apartments and retail space for 30 tenants. A public walkway along the water's edge would be
17 included in the development and would connect to existing trails.
- 18 • **Waterfront Gateway.** This project, run by the Vancouver City Center Redevelopment Authority, would
19 redevelop a 6.4-acre site in downtown Vancouver near City Hall. The City Center Redevelopment Authority
20 has selected a development team to move forward with efforts to turn the site into a mixed-use
21 destination space that includes office, retail, and residential uses.
- 22 • **Portland Metro Levee System Project (Levee Ready Columbia).** The U.S. Army Corps of Engineers
23 (USACE), in partnership with the Multnomah County Drainage District, is planning improvements to the
24 existing levee along the south side of the harbor (Levee Ready Columbia n.d.). In 2021, the USACE released
25 a final feasibility report and environmental assessment that identified a recommended plan to fix the
26 levee system.
- 27 • **Restoration and Habitat Projects.** There are several planned restoration projects within the study area,
28 and along habitat corridors or waterways that pass through the study area. Within the study area,
29 restoration activities are planned along Burnt Bridge Creek in Vancouver and the Columbia Slough in
30 Portland (Ecology n.d.; Lee and Stamberger 2018). These projects are led by various agencies and
31 organizations, including the Cities of Vancouver and Portland and the Columbia Slough Watershed
32 Council.
- 33 • **Portland Expo Center.** Metro owns the Portland Expo Center, which is a 53-acre employment and
34 exhibition site located west of I-5. Following a development opportunity study, Metro recommended
35 redevelopment of the Expo Center into a sports and cultural complex. While a general future use has been
36 recommended, project details are still to be determined and therefore the potential effects (and
37 contribution to cumulative effects) cannot be described at this time without speculation. The IBR Program
38 will continue to coordinate with Metro as the Expo Center project progresses, and the project will be
39 included in future analysis (i.e., the Final SEIS) if sufficient details become available.

Future Growth and Regional Changes Identified in Adopted State, Regional, and Local Plans

40 Adopted state, regional, and local plans include visions of growth or change in the region over the next 20
41 years. These visions are reflected in this analysis, as the plans' assumptions regarding growth were inputs into
42 the regional modeling conducted for air quality (including GHG emissions), energy, noise and vibration, and
43 transportation. Details on how projected changes in population, land use, employment, and other factors are
44 reflected in the regional modeling are provided in Appendix A of the Transportation Technical Report.
45

3.21.3 Cumulative Effects

Please see the resource technical reports for additional information on anticipated Program effects on a particular resource (e.g., air quality, wetlands).

Transportation

Past and present actions affecting transportation in the study area (and region) include population growth and accompanying development, which subsequently led to an increase in single-occupancy and freight vehicles on roads, and the expansion of public transit and active transportation networks. Past transportation improvements in the area include expansion and increase in service of Tri-County Metropolitan Transportation District of Oregon's (TriMet) bus and light-rail system (including the extension of light-rail to the Expo Center), as well as C-TRAN's bus service (including the introduction of bus rapid transit).

No-Build Alternative

Under the No-Build Alternative, congestion would continue to increase and the active transportation and transit improvements proposed under the Modified LPA would not be constructed. Congestion at the bridge would continue to be caused by overall high traffic volumes, the structure's limited capacity, limited sight distance, substandard shoulders, short merge and diverge locations north and south of the bridge, high-volume on- and off-ramp flows north of the river, and high truck volumes.

Future growth and development would continue to increase the number of vehicles and expansion of the transit and active transportation systems. Planned transportation projects in the study area include the Bridgeton Trail along the shoreline of North Portland Harbor in Portland and a public walkway along Vancouver's shoreline as part of the Renaissance Boardwalk development. The introduction of congestion pricing under the RMPP would likely contribute to the beneficial cumulative effects of several future projects that would reduce congestion and increase the use of public transit and active transportation.

Modified LPA

The Modified LPA would reduce freight and vehicle congestion, improve safety, and extend the connectivity of and improve the reliability of active transportation and transit networks. Forecasted increases in congestion and vehicle collisions would be partially offset by transportation improvements included in the Modified LPA as well as other improvements in the region. The key drivers of transportation demand—population growth and accompanying development patterns—will continue to affect the mobility of all transportation modes in the study area and region. When combined with past, present, and foreseeable future actions, the Modified LPA would have a beneficial cumulative effect on transportation.

Aviation and Navigation

Two airports are located near the study area: Pearson Field and Portland International Airport (PDX). Both airports were in operation prior to construction of I-5 in the early 1950s (though improvements at both airports have occurred since then), and the airports and the existing Interstate Bridge pre-date federal aviation regulations. Past actions affecting aviation in the study area include development that penetrates the airspace of aircraft landing or departing at Pearson Field. The towers of the existing Interstate Bridge and several buildings in downtown Vancouver currently penetrate the Pearson Field Part 77 airspace. There are no known planned projects in the area that would contribute to cumulative effects on airspace.

Past actions affecting river navigation include authorization and construction of the Columbia River federal navigation channel, construction of upstream dams and navigation locks, construction of the existing Interstate Bridge and North Portland Harbor bridge, and other bridges constructed upriver and downriver of the study area, such as the BNSF Railway Bridge. The federal navigation channel at and upstream of the

1 Interstate Bridge was established as a deep-draft (27 feet) channel to accommodate ocean-going ships
2 upstream to The Dalles. This shipping traffic never materialized, and the USACE currently maintains the
3 channel to a depth of 17 feet, reflecting current river traffic. There are no known planned navigation projects
4 in the area that could contribute to cumulative effects on navigation. Furthermore, few properties exist within
5 this reach of the river (BNSF Railway Bridge in Vancouver to Celilo Falls BNSF bridge) that have current
6 commercial/industrial facilities using waterborne shipping or the potential for future such facilities. The
7 primary factors affecting commercial/industrial development along the Columbia River are political and
8 geographic constraints, including the Columbia River Gorge National Scenic Area, transportation routes
9 paralleling the river, steep topography, and existing recreational and open space uses. Industrial uses
10 generating marine vessel traffic are typically located within industrial parks in urban areas. If the USACE were
11 to deepen the channel from Vancouver to The Dalles to 27 feet as authorized, it would allow deeper draft
12 vessels to traverse the study area, which would contribute to a change in navigation.

13 **No-Build Alternative**

14 The No-Build Alternative would not alter existing aviation conditions. The towers of the Interstate Bridge
15 would continue to penetrate into the Pearson Field Part 77 airspace, which requires special departure
16 procedures to help aircraft avoid the towers. The Interstate Bridge creates no intrusion or hazard for aircraft
17 navigation at PDX.

18 Columbia River navigation conditions would not be changed by the No-Build Alternative; navigation would
19 continue to be affected by the existing piers and bridge lift restrictions. Under the No-Build Alternative, the
20 primary navigation channel under the Interstate Bridge would remain in its current position, which lines up
21 with the opening in the BNSF Railway Bridge. The alternate channels under the Interstate Bridge are located
22 toward the center and south bank of the river, thus requiring vessels to make an S-curve maneuver between
23 the Interstate Bridge and the BNSF Railway Bridge opening. Without seismic upgrades to the Interstate
24 Bridge, a major earthquake could collapse or seriously damage one or both bridges, temporarily restricting or
25 preventing navigation.

26 **Modified LPA**

27 The Modified LPA would have no effect on aviation at PDX. The Modified LPA with a fixed-span bridge
28 configuration (single-level or double-deck) would have some benefits for operations at Pearson Field by
29 removing the lift towers that were introduced when the existing Interstate Bridge was constructed. No
30 identified future actions would contribute to cumulative effects at Pearson Field. The City of Vancouver and
31 the Federal Aviation Administration would review any future actions that could affect operations to ensure
32 compliance with their regulations.

33 Under the Modified LPA (including all bridge configurations), the safety and security of river navigation—of
34 both the main channel of the Columbia River and North Portland Harbor—would be improved by elimination
35 of the “S” curve maneuver required to align with the BNSF Railway Bridge opening, a reduction in the number
36 of piers, and improved seismic resiliency. There would be some differences in impacts to navigation from a
37 fixed-span bridge (either double-deck or single-level configuration) compared to a single-level movable-span
38 configuration. The movable-span configuration would provide a vertical navigation clearance of at least 178
39 feet (in the open position) per the U.S. Coast Guard’s Preliminary Navigation Clearance Determination. The
40 two fixed-span options would be at a somewhat higher elevation that would eliminate river traffic delays
41 associated with bridge lifts, whereas the movable span would continue to require lifts for some vessels.

42 When combined with past, present, and foreseeable future actions, the Modified LPA would make a minor
43 beneficial contribution to cumulative effects on aviation, and both minor adverse and beneficial contributions
44 to cumulative effects on aviation on navigation.

1 **Acquisitions**

2 The original construction of I-5 during the late 1950s and early 1960s required substantial property
3 acquisitions and displacements in the study area. According to historic aerial photos, the floating home
4 moorages were developed following the original construction of I-5, and therefore no floating homes were
5 displaced by I-5. Most of the area (approximately 84%) that would be directly affected by the Modified LPA is
6 already public right of way from previous transportation projects or other infrastructure projects.

7 **No-Build Alternative**

8 Under the No-Build Alternative, no Program-related acquisitions would occur.

9 **Modified LPA**

10 In Oregon, most of the acquisitions and displacements resulting from the Modified LPA would be commercial
11 properties and floating homes on Hayden Island. State and federal regulations make it difficult to permit new
12 moorage space, which reduces opportunities for relocating displaced floating homes. No known future
13 projects would require displacements on the Hayden Island floating home community.

14 In Washington, most acquisitions and displacements would be commercial properties and multifamily
15 dwellings in downtown Vancouver. Some single-family residences would be acquired and displaced along I
16 Street in Vancouver's Shumway neighborhood. The ages of these properties vary; those developed before I-5
17 may have been affected by construction, while those developed afterwards likely were not. The Modified LPA
18 would displace up to 10 businesses in downtown Vancouver. No specific future projects have been identified
19 that would result in the future displacement of existing residential or commercial properties or the relocation
20 of businesses in downtown Vancouver. However, based on recent and proposed developments in Vancouver,
21 additional businesses may be displaced due to infill development (see the Land Use Technical Report for
22 additional details).

23 The acquisition of property for the Modified LPA would be substantially smaller than the acquisitions
24 associated with the original construction of I-5 in the corridor but would make a cumulative contribution to
25 the conversion of residential and commercial land to transportation use. When combined with past, present,
26 and foreseeable future actions, the Modified LPA would make a minor contribution to cumulative effects on
27 property acquisitions.

28 **Land Use and Economic Activity**

29 **Land Use**

30 Past development in the Portland-Vancouver region transformed land use over time from wilderness to
31 urban. Since the 1950s, actions affecting land use have included the construction of I-5 and other
32 transportation projects, increased urbanization, and new growth-management regulations.

33 Land use on Hayden Island has changed from recreational to residential and commercial development,
34 including the Jantzen Beach Center (a regional large-format retail shopping center) and surrounding retailers.
35 Residential uses in the area include manufactured homes and floating homes associated with small marinas,
36 as well as other low- to medium-density developments. The City of Portland's 2009 planning for Hayden
37 Island calls for redevelopment of the commercial core from the current large-scale retail land use pattern to a
38 more urban form with more mixed uses, pedestrian-scale design, and transit orientation. The plan identifies a
39 replacement bridge over the Columbia River and the addition of high-capacity transit, both of which the IBR
40 Program would provide, as important elements of future development on the island. None of the identified
41 future projects would contribute to the cumulative effects of the Program on Hayden Island.

1 Vancouver’s downtown has changed greatly over the past decade, broadening from mainly professional
2 offices to tourism and recreation, retail shopping, meeting and convention activities, housing, and
3 entertainment. Revitalization of the retail core and central waterfront has included new office, mixed-use, and
4 residential development including projects such as the Vancouver Waterfront. New and growing land uses
5 include eateries, bars/taverns, a new playhouse, and personal services. Future projects that continue these
6 development trends include Terminal 1, Renaissance Boardwalk, Waterfront Gateway Project, and Hyatt
7 Place.

8 *No-Build Alternative*

9 The No-Build Alternative would not address current deficiencies in the Interstate Bridge structure, design, or
10 capacity. Existing land uses that rely on I-5 to travel within the region would remain vulnerable to high levels
11 of congestion, unsafe conditions, and potential earthquake-induced failure. There would also be no high-
12 capacity transit service to connect the regional centers of downtown Vancouver and downtown Portland,
13 which would be inconsistent with the stated policies and goals of applicable regional transportation plans. In
14 addition, the No-Build Alternative would not meet certain goals in the Hayden Island Neighborhood Plan,
15 such as providing light-rail transit service or connectivity within the neighborhood and to the rest of the
16 transportation network.

17 The No-Build Alternative would result in traffic congestion that would impair freight movement and reduce
18 the region’s productivity. This could indirectly impede the effective implementation of land use plans and
19 hinder goals for economic development. A loss in the growth of local jobs could have impacts such as
20 decreased property values, increased commercial vacancies, and reduced demand for downtown
21 revitalization.

22 *Modified LPA*

23 The Modified LPA is consistent with and would support land use policies, transportation system plans, and
24 development trends in Oregon and Washington, which encourage investment in urban infrastructure,
25 multimodal transportation, freight mobility, economic development, and compact urban development. It
26 would also support subsequent development that is more urban in nature and focused near light-rail
27 facilities. The Modified LPA would continue the trend of roadway development, and the more recent trend of
28 transit development, and would balance that development with the improvement of transit, bicycle, and
29 pedestrian infrastructure. In total, the Modified LPA would convert approximately 39 acres of land to
30 transportation use, including areas for associated stormwater facilities and landscaping (see Section 3.3,
31 Acquisitions). The extension of light-rail transit and the development of parking structures and other
32 transportation infrastructure are consistent with and supportive of the goals and policies of adopted climate
33 and transportation plans (see Sections 3.19, Climate and 3.1, Transportation).

34 The Community Connector at Evergreen Boulevard in downtown Vancouver would address existing gaps in
35 connectivity between residential and commercial land uses created by the past construction and presence of
36 I-5. Combined with past, present, and foreseeable future actions, the Modified LPA would have a slightly
37 positive cumulative effect on land uses in the area.

38 *Economic Activity*

39 I-5 runs continuously from Mexico, through the United States, and into Canada and is used for freight,
40 business, and personal travel. In the Portland-Vancouver region I-5 is the central component of the
41 transportation infrastructure. Freight needs are a major driver for future improvements along the I-5 corridor.

42 The Ports of Portland and Vancouver are critical to the region’s economic growth and prosperity. The total
43 annual tonnage moving through the two ports is expected to double from approximately 300 million tons in
44 2007 to almost 600 million tons in 2040 (Cambridge Systematics 2015). Both ports connect to the surface

1 transportation network within the study area to move products to, from, and within the region. To remain
2 competitive with other West Coast ports, efficient and cost-effective multimodal transportation systems must
3 be available. Increases in regional traffic congestion could severely hinder the ports' ability to move goods
4 and impact their competitiveness.

5 The RMPP would implement congestion pricing on I-5 from the Columbia River to Wilsonville (excluding tolls
6 at the Interstate Bridge). Both the Metro RTP and the RTC RTP include capacity and safety projects west of I-5
7 that are designed to improve safety and traffic flow for commercial trucks traveling between I-5 and industrial
8 areas to the west.

9 *No-Build Alternative*

10 Under the No-Build Alternative, no businesses in Oregon or Washington would be displaced by right of way
11 acquisition, and there would be no resulting decrease in property or sales tax revenues or jobs. However,
12 increasing congestion on I-5 could result in significant economic effects, as planned economic development
13 may occur more slowly with business owners reluctant to locate in an area with poor access and mobility for
14 employees and customers. Freight reliability would decrease as congestion continues to spread throughout
15 the day. Customers could elect to shop in areas with better access and mobility.

16 *Modified LPA*

17 The Modified LPA's highway, transit, and active transportation components would move people and
18 commerce more effectively and efficiently through the I-5 corridor. The Modified LPA, along with other
19 projects aimed at reducing congestion and enhancing freight mobility, would support an improvement in
20 economic activity. Congestion relief in the study area would benefit freight traffic generated by Swan Island,
21 the Rivergate area, the Port of Portland, and the Port of Vancouver. Incremental benefits would include
22 decreased travel times, increased mobility, and increased reliability for freight vehicles. In combination with
23 past, present, and foreseeable future actions, the Modified LPA would have a beneficial cumulative effect on
24 economics.

25 **Neighborhoods and Equity**

26 Past projects adversely affected neighborhoods in the I-5 corridor, while more recent transportation projects
27 have generally provided net benefits through improved access, pedestrian-oriented development, mitigation,
28 and other amenities. Past highway development had significant effects on neighborhoods and communities
29 along the I-5 corridor, including equity priority communities.⁴ The development of I-5 required the acquisition
30 of right of way, and the relocation of many businesses and homes and contributed to a loss of community
31 cohesion. Local planning efforts serve to strategically place and design current and future transportation to
32 maximize benefits and minimize negative impacts.

33 Several foreseeable projects are anticipated to improve connectivity in neighborhoods in the study area. In
34 Vancouver, the Main Street Promise project will improve safety and connectivity in downtown Vancouver
35 through improvements to vehicle and active transportation infrastructure.

⁴ The IBR Program has made a commitment to the community to place equity at the center of the Program, beyond legal and statutory requirements. A foundational component of this commitment was the formation of an Equity Advisory Group, which developed a Program-specific definition of equity and identified "equity priority communities" as those who experience and/or have experienced discrimination and exclusion based on identity or status. The communities include Black, Indigenous, and People of Color (BIPOC); people with disabilities; communities with limited English proficiency; persons with lower incomes; houseless individuals and families; immigrants and refugees; young people; and older adults.

1 **No-Build Alternative**

2 The No-Build Alternative would not displace residences or businesses and would not directly change
3 community cohesion. Neighborhoods in the study area would continue to develop according to local and
4 regional plans, though their development might not be fully consistent with goals that assume improved
5 mobility in the I-5 corridor and expanded transit access. Neighborhoods and equity priority communities
6 would experience increased traffic congestion, decreased safety, and no benefits from increased mobility and
7 accessibility from construction highway improvements, light-rail, and active transportation facilities.

8 **Modified LPA**

9 The Modified LPA is not anticipated to adversely affect community cohesion in most neighborhoods, except
10 for Hayden Island. Benefits from the Modified LPA to equity priority communities include increased access to
11 high-capacity transit, increased availability of active transportation, and highway and driving travel time
12 reductions. Burdens to equity priority communities include potential displacement of encampments of
13 houseless populations, residential displacements, and the additional transportation cost from tolling.

14 The Modified LPA would construct the proposed Bridgeton Trail and complete a missing link in the Marine
15 Drive Trail, improving connectivity for neighborhoods along the waterfront in Portland. These trails would
16 contribute and connect to bicycle and pedestrian facilities provided by the Modified LPA within the Marine
17 Drive interchange area.

18 The Modified LPA is expected to continue the positive trend in the corridor of improving neighborhood access
19 and mobility. The provision of a light-rail station, the connection of N Tomahawk Island Drive under I-5, and
20 the improved access and capacity of the Hayden Island interchange may contribute to the viability and
21 success of redevelopment plans for the island (see Section 3.4, Land Use and Economic Activity). However, the
22 Modified LPA would displace sufficient commercial and residential activities to constitute an adverse impact.
23 Reducing impacts to Hayden Island neighborhoods would require successfully relocating displaced floating
24 home residents and neighborhood-serving businesses.

25 One major difference between the Modified LPA and past actions is that past actions were not always planned
26 and implemented with meaningful input from and communication with the public. Involving communities
27 and understanding impacts is an essential part of the IBR Program. When combined with past, present, and
28 foreseeable future actions, the Modified LPA would have a slightly positive cumulative effect on
29 neighborhoods.

30 **Public Services and Utilities**

31 Past population growth has incrementally increased demand on public services and utilities. Effects from
32 most of the future projects would include changes to traffic patterns and increased demand on public services
33 and utilities. Adopted land use plans and projected population growth are expected to create an increased
34 demand for public services and utilities. However, since those increases are planned, it is reasonable to
35 assume that the public service sector and utility providers would have adequate time to plan and adjust for
36 future conditions.

37 **No-Build Alternative**

38 The No-Build Alternative would not change existing utility connections and would, therefore, not have a
39 cumulative effect on utilities. While the No-Build Alternative would not change the types of public services
40 provided, increased congestion could slow response times for emergency vehicles, and ongoing bridge lifts
41 would continue to disrupt traffic and cause potential delays for emergency vehicles, which would have an
42 adverse effect on public services.

1 **Modified LPA**

2 The Modified LPA would enhance transit service, provide safety improvements, and improve emergency
3 response times to serve the planned growth. The direct physical impacts to public services from the Modified
4 LPA would be minor. The IBR Program would work with affected communities to ensure that Program-related
5 changes do not impair existing overall levels of service for public services. When considered in combination
6 with past, present, and foreseeable future actions, the Modified LPA would have a beneficial cumulative effect
7 on public services and little to no cumulative effect on utilities.

8 **Parks and Recreation**

9 Park and trail development efforts in the region have been ongoing and will continue consistent with current
10 plans and programs. Planned expansions of park and recreation facilities include park and trail development
11 at the North Portland Harbor waterfront, Hayden Island, the Vancouver waterfront, Terminal 1, the Vancouver
12 National Historic Reserve, and Kiggins Bowl. None of the identified reasonably foreseeable future projects are
13 anticipated to reduce the number or size of park or recreation facilities in the study area.

14 **No-Build Alternative**

15 The No-Build Alternative would not require the conversion of parks and recreation resources to
16 transportation use. Access to parks and recreation resources would remain as is, with limited public transit
17 service and active transportation facilities.

18 **Modified LPA**

19 The Modified LPA would improve access to regional recreational resources, including the Portland Expo
20 Center, Portland International Raceway, East Delta Park, and Vancouver National Historic Reserve.
21 Additionally, the Modified LPA would result in improved pedestrian and bicycle access in the area.

22 The Modified LPA would require the acquisition of approximately 1.3 acres of parkland for a transportation
23 use. Permanent acquisitions would be required from East Delta Park, Fort Vancouver National Historic Site,
24 Old Apple Tree Park, Marshall Community Center and Park, and Kiggins Bowl. Some acquisitions would affect
25 lands protected by Section 4(f) of the U.S. Department of Transportation Act and/or Section 6(f) of the Land
26 and Water Conservation Fund Act (see Chapter 5 for the draft Section 4[f] evaluation and the Parks and
27 Recreation Technical Report for details on Section 6[f] properties). These acquisitions would be used to
28 improve connections across the active transportation network in the study area.

29 Effects on parks resulting from the Modified LPA, considered in context of the past and planned projects
30 (including park expansions), would be relatively minor. The Modified LPA would improve access to the
31 Vancouver waterfront and connect parks on the east side and the west side of the Columbia River bridges. The
32 Modified LPA would contribute to beneficial cumulative effects on parks and recreation.

33 **Cultural Resources**

34 **Archaeological Sites**

35 While there is archaeological evidence that Native Americans inhabited the Pacific Northwest more than
36 10,000 years ago, the archaeological record for Native American land use in the lower Columbia River begins
37 around 3,500 years ago. The Native American groups inhabiting the cultural resource area of potential effects
38 (APE)⁵ were part of an extensive network of villages, trade, and harvesting, fishing, and resource sites. Villages

⁵ The APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause alteration in the character or use of historic properties, if any such properties exist.” (936 CFR 800.16(d)) APE is analogous to “study area,” which is the term commonly used for other resources.

1 consisted of multifamily houses and other structures such as fish-drying sheds or scaffolds, sweat and
2 menstrual lodges, and temporary dwelling houses. Starting in the late 18th century, maritime expeditions by
3 Europeans and European Americans began to interact with Native Americans along the Oregon coast and the
4 mouth of the Columbia River. European American settlement along the Columbia River's southern bank
5 remained sparse in the mid-1800s and the area remained sparsely developed throughout the 19th century.
6 More extensive development began in the 20th century, including rapid development associated with World
7 War II and construction of I-5 in the 1950s.

8 Past construction activities have involved earthmoving on a massive scale, which impacted the presence and
9 preservation of archaeological sites in the APE. Many archaeological sites have been lost or altered by
10 construction projects, though some have been preserved underground and, recently, some have been
11 recovered, studied, and archived. Additional studies are in progress to verify known archaeological resource
12 presence and dimensions, and to identify unrecorded terrestrial and marine archaeological sites. Further
13 studies will be performed through phased identification as allowed under Section 106 of the National Historic
14 Preservation Act (36 CFR 800.4 (b)(2)) and would be stipulated in the Section 106 Programmatic Agreement
15 (PA). While none of the identified future actions are known to affect a documented archaeological site, it is
16 likely that future actions in the APE could encounter additional sites, which may be preserved, recovered,
17 disturbed, or destroyed. Current local, state, and federal cultural resources laws and regulations that protect
18 archaeological sites reduce the likelihood of destruction.

19 *No-Build Alternative*

20 The No-Build Alternative would not affect archaeological sites in the APE and would therefore not contribute
21 to a cumulative effect.

22 *Modified LPA*

23 Construction-related physical ground disturbance is anticipated to be the primary source of potential
24 permanent and temporary direct effects on archaeological sites. Based on the anticipated nature and extent
25 of ground disturbance associated with the Modified LPA, it is anticipated that construction would damage or
26 destroy portions of 13 archaeological sites located within the Modified LPA's limits of disturbance within the
27 APE. Potential effects on archaeological sites would be essentially the same across all design options.

28 The ground disturbance associated with the Modified LPA would contribute to cumulative effects on
29 archaeological sites in an area previously subject to earthmoving at a large scale.

30 FHWA and FTA, in coordination with WSDOT and ODOT, and in consultation with the Washington State
31 Department of Archaeology and Historic Preservation, the Oregon State Historic Preservation Office,
32 consulting tribes, and other consulting parties, have chosen to complete the Section 106 process and resolve
33 adverse effects on historic properties through the development of a PA, pursuant to 36 CFR 800.14(b). A Draft
34 PA, with redactions for sensitive information as deemed appropriate by FHWA and FTA in consultation with
35 consulting parties and tribes, will be made available to the public prior to publication of the Final SEIS. The
36 Final PA will be executed prior to the issuance of the ROD and will be included as an appendix to the ROD.

37 *Historic Built Environment*

38 There is a wide variety of historic built environment resources in the APE in Oregon and Washington, reflective
39 of the area's historic development. The land now known as Vancouver became an important post in the
40 Hudson's Bay Company's inland trade routes, succeeded thereafter by a U.S. military installation, and was the
41 center of life and commerce in the region. The region became an important area for trading in the 18th and
42 19th centuries, with ample resources provided by the rivers and adjacent valleys. Further growth and
43 development in the region in the 20th century was driven by the introduction of wartime industries, such as
44 the Kaiser shipyards, and the completion of major infrastructure projects, including railroad bridges and the

1 Interstate Bridge. The 1917 Interstate Bridge span is listed on the National Register of Historic Places in both
2 Oregon and Washington, and the 1958 span has been determined eligible.

3 Past activities of settlement and development have dramatically affected the preservation of historic built
4 environment resources in the APE. Many resources were demolished or their historic contexts largely altered.
5 The original construction of I-5 divided Vancouver's downtown from the Vancouver National Historic Reserve
6 and separated the major commercial and civic center from the historic resources and context of the fort and
7 barracks. Recent development, including the Vancouver Community Library and the Aegis/Providence
8 Academy redevelopment, have affected the historic built environment. While none of the identified
9 foreseeable future actions are anticipated to demolish a known historic resource, ongoing development in the
10 area may demolish additional historic resources or preserve or restore others.

11 *No-Build Alternative*

12 The No-Build Alternative would retain the existing infrastructure, including the existing historic Interstate
13 Bridge, which would continue to operate. There would be no direct impacts on the character-defining
14 features or integrity of the historic built environment properties and, therefore, no contribution to cumulative
15 effects.

16 *Modified LPA*

17 The Modified LPA is being designed to avoid direct effects on historic built environment resources and
18 minimize impacts that cannot be avoided. However, activities proposed for the Modified LPA would result in
19 adverse effects, as defined under 36 CFR 800.5, to 13 historic built environment properties, including
20 demolition of the northbound and southbound Interstate Bridge. The Modified LPA's incremental impact to
21 the loss of the area's historic fabric is relatively small compared to the combined effects of past projects and
22 developments. When combined with past, present, and foreseeable future actions, the Modified LPA would
23 contribute to adverse cumulative effects on the historic built environment.

24 **Visual Quality**

25 Visual quality impacts occur when the visual character of a place changes (for example, from an agricultural
26 landscape to a residential development) as perceived by viewers. In the Portland and Vancouver areas, visual
27 character has steadily evolved from a primarily natural environment to rural and agriculture, and then to
28 suburban and urban. The I-5 corridor has steadily grown in development intensity and in use as a major
29 transportation route. Future development projects would continue the study area's visual transformation.

30 *No-Build Alternative*

31 While the existing bridges, ramps, interchanges, roadways, and other structures will remain in place, it is
32 important to recognize that the visual environment should not be perceived as static or unchanging. Ongoing
33 and upcoming developments within the Area of Visual Effect (AVE) will continue to impact the existing visual
34 landscape. Furthermore, opting for the No-Build Alternative would lead to heightened traffic congestion
35 within the AVE, potentially diminishing the overall cohesiveness of the project environment. However, it is
36 worth noting that the No-Build Alternative would not significantly influence visual quality and would not
37 contribute to cumulative adverse effects on the visual landscape.

38 *Modified LPA*

39 The primary elements of the Modified LPA that affect visual character and quality are new highway bridges
40 across North Portland Harbor and the Columbia River; revised I-5 interchanges; and light-rail transit
41 guideway, stations, and park-and-ride facilities. The visual quality of the entire length of the corridor and all
42 landscape units would be affected.

1 In general, the visual impacts of the Modified LPA are expected to range from neutral to beneficial for most
2 viewers in the Columbia Slough, Columbia River, Vancouver Downtown, Burnt Bridge Creek, and Ruby
3 Junction landscape units. However, the higher Columbia River Bridge decks and the more visually complex SR
4 14 interchange represent a departure in scale from the existing structures. These new elements are likely to be
5 notably more visible to adjacent recreational viewers in the Greater Central Park landscape unit. As a result,
6 visual impacts are expected to be adverse for these sensitive viewers. All of the identified future projects
7 would alter the existing visual character in the study area to some degree; however, all projects would be
8 required to be consistent with existing zoning and design standards, which would help minimize adverse
9 visual effects and maintain visual consistency with existing development. When combined with past, present,
10 and foreseeable future actions, the Modified LPA would have both minor beneficial and adverse cumulative
11 effects on visual quality.

12 **Air Quality**

13 Past and present actions affecting air quality in the study area and region include programs and regulations to
14 control air pollutant emissions. Starting in the early 1970s, regulatory controls on air pollutant emissions have
15 substantially reduced vehicle emissions. The implementation of current regulations will continue to reduce
16 pollutant emissions from mobile sources and other sources into the future and, along with vehicle
17 electrification, are expected to yield additional vehicle emission reductions over the next 25 to 30 years (DEQ
18 2021; FHWA 2016).

19 The air quality analysis is based on projected land use and employment information, expected overall growth
20 in the region and the study area, and the effect of the transportation projects identified as reasonably
21 foreseeable future actions. Non-transportation projects may increase emissions, such as general commercial
22 and residential development in the area, may increase air pollutant emissions. Tolling under the RMPP may
23 reduce overall emissions through a mode shift away from single-occupancy vehicles to carpooling, public
24 transit, and active transportation, as well as a reduction in emissions associated with congestion.

25 **No-Build Alternative and Modified LPA**

26 Under both the No-Build Alternative and the Modified LPA, air pollutant emissions are expected to be
27 substantially lower in the future than under existing conditions for most mobile source air toxins and criteria
28 pollutants. For all pollutants analyzed, future 2045 emissions are projected to be lower than existing
29 conditions under both the Modified LPA and No-Build Alternative.

30 The Modified LPA would further reduce pollutant emissions compared to the No-Build Alternative. Reductions
31 in vehicle miles traveled (VMT) and improved traffic flow would result in lower emissions of mobile source air
32 toxins and criteria pollutants in the region, with decreases ranging from 1% to 16%, varying by pollutant. The
33 Modified LPA may also contribute to beneficial cumulative effects through the expansion of public transit and
34 active transportation networks or other projects, resulting in changes to emissions and beneficial effects on
35 air quality. However, on some roadway links traffic volumes would increase with the Modified LPA which
36 could increase localized air pollutant concentrations.

37 Regional improvements, such as increased transit capacity, extension of active transportation networks, and
38 implementation of tolling under the RMPP, would further reduce additional future emissions and have a
39 positive effect on air quality. Based on the emissions analysis, the cumulative effects of the No-Build
40 Alternative and the Modified LPA, when combined with foreseeable future actions, would be improved air
41 quality.

42 **Noise and Vibration**

43 The noise analysis in Section 3.11 incorporates regional growth and foreseeable transportation projects;
44 therefore, the modeling reflects cumulative effects on noise and vibration in the study area.

1 Noise in the study area is typical of urban noise sources and noise levels. Sources include traffic on I-5, SR 14,
2 SR 500, Martin Luther King Jr. Boulevard, N Marine Drive, and various arterials and other roadways. Air traffic
3 associated with PDX and Pearson Field is also a substantial source of noise that has increased over time.
4 Marine vessels on the river, trains on two rail lines, industrial uses, and the Portland International Raceway
5 further add to the cumulative noise environment. Many residences and other uses in the study area, including
6 those adjacent to I-5 and the proposed light-rail transit guideway, have experienced increasing noise levels
7 over time, resulting from steady growth in vehicle traffic, air traffic, and other urban noise sources.

8 If the land use plans for the City of Vancouver and Hayden Island are realized, then residential and commercial
9 construction activities could be a substantial, intermittent source of noise over the next two decades.
10 Highway noise would also be expected to increase over time as population and employment growth lead to
11 increased single-occupancy and freight vehicle trips.

12 ***No-Build Alternative***

13 Under the No-Build Alternative, these receivers are expected to experience increased noise levels in the future
14 as population, employment, highway traffic, air traffic, and freight rail traffic continue to grow. Similarly, noise
15 and vibration effects from the light-rail corridor will continue to increase as rail volumes increase.

16 ***Modified LPA***

17 Design features and mitigation measures proposed for the Modified LPA, such as noise walls, would reduce
18 traffic noise levels from I-5, as a result of the Modified LPA. Mitigation measures would be developed in
19 accordance with FHWA's highway noise mitigation regulations and FTA's transit noise and vibration impact
20 assessment manual. When combined with past, present, and foreseeable future actions, the Modified LPA
21 would contribute to increasing cumulative effects on noise and vibration levels.

22 **Energy**

23 Regional energy demand and use in the study area have grown as a result of general development patterns,
24 including suburban residential growth, increases in the VMT of single-occupancy vehicles, and increase in
25 renewables used. However, the expansion of C-TRAN's bus service in Vancouver (including the introduction of
26 bus rapid transit and electric express buses) and improvements in TriMet's bus and light-rail system (including
27 the extension of light-rail to the Expo Center and the use of wind-generated electricity for the Metropolitan
28 Area Express [MAX]), have likely reduced energy demand and use due to the use of alternative energy sources
29 and a mode shift from personal vehicles to public transit.

30 The future demand for energy will depend on trends in population, economic activity, energy prices, and
31 adoption and implementation of technology. The U.S. Energy Information Administration projects that energy
32 consumption in the transportation sector will remain lower than 2019 levels through 2050 due to
33 improvements in fuel economy. As a result, energy consumption by light-duty and heavy-duty vehicles is
34 projected to remain lower than 2019 levels through 2045.

35 ***No-Build Alternative and Modified LPA***

36 The energy analysis in Section 3.12 incorporates projected increases in traffic, regional growth, and
37 foreseeable future transportation projects. The analysis showed that under both the No-Build Alternative and
38 the Modified LPA, energy consumption and GHG emissions in 2045 are expected to be substantially lower than
39 existing values for the region, which is consistent with national trends. Although the annual VMT in the study
40 area would increase, GHG emissions would decrease substantially compared to baseline conditions (2015)
41 due to the implementation of fuel and engine efficiency regulations. On a regional basis, future emissions
42 would be similar under the No-Build Alternative and Modified LPA.

1 Operation of the Modified LPA would lower the transportation demand for petroleum relative to the No-Build
2 Alternative because of the mode shift to public transportation and active transportation options. Daily
3 regional VMT would decrease by approximately 0.16% and total regional transportation energy consumption
4 would decrease by approximately 0.28% in 2045 under the Modified LPA compared to the No-Build
5 Alternative. When combined with past, present, and foreseeable future actions, the Modified LPA would have
6 a negligible cumulative effect on energy.

7 **Electric and Magnetic Fields**

8 The existing electromagnetic field (EMF) environment in the study area varies depending on location, as EMF
9 levels are site- and time-specific. The main transportation sources of EMF are the traction power system and
10 traction power substations associated with TriMet's MAX light-rail transit system.

11 **No-Build Alternative**

12 The No-Build Alternative would not change the existing light-rail transit system and would not have a
13 cumulative effect on EMF levels.

14 **Modified LPA**

15 The extension of the light-rail line under the Modified LPA would result in the generation of additional EMF
16 within the study area. EMF levels from Portland's light-rail system are well below the International
17 Commission on Non-Ionizing Radiation Protection and American Conference of Governmental Industrial
18 Hygienists exposure standards. There is no evidence to indicate that light-rail-generated EMF would change
19 the human health risk associated with cumulative EMF exposure. Therefore, as with the existing light-rail
20 system, the Modified LPA would not have adverse effects associated with EMF emissions. Combined with past,
21 present, and foreseeable future actions, the Modified LPA would have a negligible cumulative effect on EMF
22 exposure.

23 **Water Quality and Hydrology**

24 Historic land use changes and increasing urbanization have decreased the number of natural areas and
25 natural flow regimes in the study area. Flood-control measures have been implemented that affect the entire
26 lower Columbia River area. Levees and river embankments were constructed in the early 1900s on both sides
27 of the river, which isolated most of the floodplain from all but the highest flows.

28 The enactment of environmental laws beginning in the 1960s (such as the Clean Water Act), combined with
29 decreases in upstream heavy industrial activities, has reduced contamination sources and improved water
30 quality in study area water bodies, although the water quality in many of these water bodies remains
31 substantially impaired. There are approximately 180 acres of existing contributing impervious area (CIA) in the
32 study area, over 80% of which (approximately 150 acres) is untreated.

33 Anticipated projects that would improve water quality in the study area include restoration activities along
34 Burnt Bridge Creek in Vancouver and the Columbia Slough in Portland (Ecology 2021; Lee and Stamberger
35 2018). For Burnt Bridge Creek, the Washington State Department of Ecology recommends sampling and
36 monitoring of water quality, implementing best management practices for stormwater management in the
37 watershed, completing watershed evaluations, conducting windshield surveys and desktop analysis,
38 achieving system potential riparian vegetation of 85% tree canopy, and completing additional studies to
39 identify priority areas for streamflow restoration activities. Future projects from the Columbia Slough
40 Watershed Council may also include slough cleanup and stormwater management projects such as the
41 Expand for a Bigger Great Slough Clean Up program, Portland Water Bureau's Main Pump Station riparian
42 restoration, and a volunteer trash monitoring program.

1 **No-Build Alternative**

2 The No-Build Alternative would continue to degrade water quality through stormwater runoff from roadways,
3 as most of the existing impervious roadway surfaces within the study area are, and would remain, untreated.

4 **Modified LPA**

5 The Modified LPA would result in an increase in impervious surfaces within the study area, which could result
6 in increased stormwater runoff rates and volumes. Under the Modified LPA, CIA would increase to
7 approximately 200 acres; however, all of this CIA would be treated, and the area of untreated CIA would be
8 reduced by 150 acres. However, the Modified LPA includes stormwater treatment facilities on new and
9 resurfaced existing roadways, including the new Columbia River bridges, which would remove pollutants from
10 stormwater runoff and improve water quality in the Columbia Slough, Columbia River, North Portland Harbor,
11 Burnt Bridge Creek, and Fairview Creek.

12 Preliminary hydraulic calculations show that the Modified LPA would not result in floodplain impacts.
13 Modeling studies conducted for permit applications would identify additional commitments needed to meet
14 floodplain requirements.

15 With new stormwater treatment and infiltration, the Modified LPA would improve surface water quality,
16 increase groundwater recharge, and help restore natural flow regimes, thus reducing the impacts associated
17 with past actions. When combined with past, present, and foreseeable future actions, the Modified LPA would
18 have a positive cumulative effect on water quality and hydrology.

19 **Wetlands and Jurisdictional Waters**

20 Urbanization and land use changes have reduced the acreage of wetlands in the study area since the 1800s
21 (Morlan et al. 2010). Between the 1780s and 1980s, Oregon and Washington lost an estimated 38% and 31% of
22 their wetlands, respectively (Dahl 1990). In the 1970s through the 1990s, stricter federal and state protections
23 led to a reduction in annual wetland loss in the Willamette Valley, but they did not stop the loss of wetlands
24 (Morlan et al. 2010).

25 Since 1958 (the base year of I-5 construction), improvements have occurred to some wetlands near the
26 southern portion of the study area. The Port of Portland completed a wetland restoration project at the 90-
27 acre Vanport wetlands parcel, located immediately west of the existing highway and light-rail line. Other
28 historic wetlands east of the highway, in the Delta Park area and on Hayden Island, have undergone increased
29 development, draining, or filling since 1964. Identified future actions in the study area contributing to
30 cumulative effects on wetlands and waters include:

- 31 • Planned restoration activities near the Columbia Slough and the Smith and Bybee Wetlands Natural Area.
- 32 • The Levee Ready Columbia project is estimated to result in the loss of approximately 0.5 acres of wetlands
33 that would be mitigated through compensatory mitigation (e.g., the purchase of credits from a wetland
34 mitigation bank) (USACE and CCDD 2021).
- 35 • Future dredging projects, such as the potential deepening of the navigation channel by the USACE, that
36 would disturb sediment in the Columbia River waterway.

37 **No-Build Alternative**

38 The No-Build Alternative would not result in further filling of wetlands or the fill or reduction of wetland
39 buffers within the study area. Untreated stormwater within the study area would continue to be discharged
40 into wetlands and jurisdictional waters.

1 **Modified LPA**

2 The Modified LPA would require the fill of relatively small area of wetlands and wetland buffers
3 (approximately 0.6 acres and 7.4 acres, respectively), which could have an indirect effect on the wetland
4 functions. In addition, the Modified LPA would increase the impervious surface area in the vicinity of wetlands
5 and decrease the distance between wetlands and roadway traffic, which could increase stormwater flow and
6 pollutants. However, the Modified LPA would also provide stormwater facilities that would treat stormwater
7 runoff for both new and existing impervious surfaces created by the original construction of I-5, which would
8 improve water quality flowing into wetlands.

9 Mitigation for wetland fill is regulated by federal, state, and local jurisdictions and would typically require
10 purchasing credits from an agency-approved mitigation site or completing on-site or off-site mitigation to
11 compensate for functions lost or degraded by those impacts. Fill of the Vanport wetland would require
12 increased mitigation ratios because it is an existing wetland mitigation site. Unavoidable wetland and
13 waterway impacts would be offset through one or more compensatory mitigation projects, which are
14 currently being developed in coordination with federal, state, and local regulatory agencies, tribes, and
15 community members. With mitigation, it is anticipated that the Modified LPA would result in a net beneficial
16 effect on quality and ecological function of wetlands and waters.

17 In the context of widespread urban development in the study area, the potential impacts to wetlands buffers
18 resulting from the Modified LPA are minor. Mitigation of wetland fill would replace or improve the functions to
19 the extent possible, and is anticipated to help mitigate past actions. When combined with past, present, and
20 foreseeable future actions, the Modified LPA would have both adverse and beneficial cumulative effects on
21 wetlands.

22 **Ecosystems**

23 Native Americans lived in the study area for more than 10,000 years before the arrival of Euro-American
24 settlers. Since the Euro-American settlement in the mid-1800s, human population growth and land
25 development have gradually displaced and reduced the quality and quantity of wildlife habitat. Historically,
26 many activities, including deforestation, urbanization, dams for hydroelectricity, irrigation and flood control,
27 hatchery operations, and overfishing have contributed to the loss of habitat and reduction in fish and wildlife
28 species. Compared to their historic conditions natural habitats in the area are generally small and
29 fragmented. The areas remaining provide habitat for a variety of plants, terrestrial wildlife, birds, and fish,
30 including common species and species with special regulatory status. These past actions have made
31 significant changes to the region's ecosystems.

32 General growth and development in the region will continue to affect species and habitats in the study area.
33 Current and future projects, such as Levee Ready Columbia, Port of Vancouver Terminal 1, dredging, and
34 maintenance of existing waterfront structures could include construction activities that would affect aquatic
35 or terrestrial species and their habitats. Increases in impervious surface area could increase the quantity of
36 stormwater runoff, affecting aquatic habitat function. Of the identified future actions, only the Levee Ready
37 Columbia project is identified as increasing impervious surfaces (by less than 1 acre); the remaining projects
38 (including the Renaissance Boardwalk) are located on areas that currently consist primarily of impervious
39 surfaces.

40 Projects involving these types of activities are subject to federal, state, and/or local permits that require a
41 mitigation sequencing process consisting of avoidance, minimization, and mitigation to achieve no net loss of
42 function. Future projects would be required to provide stormwater quality treatment consistent with
43 applicable stormwater regulations to reduce the risk of potential effects on water quality. Because
44 requirements typically include treatment for existing untreated impervious surfaces, future projects may lead
45 to a net beneficial effect on water quality. Future projects constructed over time would also be legally

1 required to avoid, minimize, and mitigate impacts to fish and wildlife to achieve no net loss in habitat
2 function. Planned restoration in the study area includes projects along Burnt Bridge Creek in Vancouver and
3 the Columbia River Slough in Portland (Ecology 2021; Lee and Stamberger 2018).

4 **No-Build Alternative**

5 The No-Build Alternative would not change the existing ecosystem conditions unless a catastrophic seismic
6 event were to occur, causing the existing bridge structures to collapse. The No-Build would continue to
7 contribute to an adverse cumulative effect on ecosystem resources from untreated stormwater runoff from I-5
8 and disturbance of wildlife during intermittent bridge and highway maintenance activities.

9 **Modified LPA**

10 Construction of the Modified LPA would result in temporary impacts (e.g., increased noise, turbidity,
11 overwater shading) to sensitive aquatic and terrestrial species and their habitats, including species of
12 significance to consulting tribes. The Modified LPA would result in both permanent and short-term
13 disturbance to sensitive terrestrial habitats, including riparian buffers, trees, wetlands, and wetland buffers.

14 Long-term effects on aquatic ecosystem resources would include displacement of benthic habitat from the
15 bridge piers and new overwater shading. However, the Modified LPA would include a small net restoration of
16 benthic habitat due to the removal of the existing Interstate Bridge piers. The Modified LPA would create new
17 impervious surfaces, which would generate stormwater but would also provide water quality treatment for
18 new and existing impervious surfaces created by the original construction of I-5 that did not include
19 stormwater treatment. The Modified LPA would reduce pollutants (including dissolved copper) associated
20 with highway runoff, improving aquatic habitat. Impacts to fish and wildlife species would be avoided,
21 minimized, and offset through mitigation sequencing to the extent practicable, as required by compliance
22 with federal, state, and local regulatory requirements. These conservation and mitigation measures would
23 result in no net loss of habitat function. A compensatory mitigation approach is currently in development with
24 federal, state, and local regulatory agencies; tribes; and community members.

25 Mitigation measures under the Modified LPA would reduce harmful effects and even improve parts of the local
26 ecosystem relative to existing conditions. The Modified LPA would have a net beneficial effect on aquatic
27 species and habitat, considering the small net improvement in benthic habitat as well as a reduction in
28 pollutants entering the Columbia River and North Portland Harbor. While the Modified LPA's impacts to
29 ecosystem resources would be mitigated, historic development and expected growth throughout the region
30 are likely to continue to impact ecosystems. When combined with past, present, and foreseeable future
31 actions, the Modified LPA would contribute to both beneficial and adverse cumulative effects on ecosystem
32 resources.

33 **Geology and Groundwater**

34 Past activities in the study area include settlement and development of the region, filling of lowland areas,
35 grading of slopes, and construction in earthquake-prone areas. The study area consists of soils with high
36 relative earthquake hazard rating that are susceptible to severe ground shaking and liquefaction during a
37 major seismic event. The steep slopes and soils susceptible to erosion in the Burnt Bridge Creek area have
38 been disturbed in the past from the construction of I-5 and SR 500. Current infrastructure, including roads,
39 bridges, and buildings, was constructed under seismic codes applicable at the time of construction. The
40 existing bridges and other I-5 structures, such as overpasses and retaining walls, were built before design
41 standards addressed the impacts associated with subduction zone earthquakes, including severe
42 liquefaction.

43 Past actions such as the Vanport Flood and the siting of the Hayden Island Landfill resulted in contamination
44 of groundwater through the spillage or leakage of gasoline and other petroleum products stored at

1 commercial sites or industrial facilities. Contaminants from historical commercial and industrial activities in
2 both Vancouver and Portland have diminished groundwater quality. Future actions, such as the Waterfront
3 Gateway and the Renaissance Boardwalk, may include development and regrading that could lead to soil
4 erosion, even with erosion control best practices in place. These actions may also continue to sustain existing
5 impacts to degradation of the groundwater quality from stormwater runoff in the study area.

6 ***No-Build Alternative***

7 The No-Build Alternative would not include the construction of new Columbia River bridges and other
8 structures built to current seismic safety standards. Therefore, the No-Build Alternative would leave I-5
9 vulnerable to earthquakes and other geologic hazards that would have an adverse cumulative effect. In
10 addition, the No-Build Alternative would continue to leave stormwater runoff untreated that could have an
11 adverse cumulative effect on groundwater.

12 ***Modified LPA***

13 The Modified LPA would construct new Columbia River bridges and other I-5 structures to current, seismic
14 design standards that would substantially improve the region's seismic resiliency to withstand a major
15 seismic event. The Modified LPA would expose approximately 415 acres of near-surface soils to potential
16 erosion from excavation, fill, clearing, and grading during construction.

17 The Modified LPA would have beneficial effects on groundwater quality, including for the Troutdale Sole
18 Source Aquifer, through stormwater facilities that would manage stormwater volume and flow rates and treat
19 stormwater runoff to reduce pollutants. The Modified LPA could also improve groundwater quality by
20 remediating some existing contamination. When combined with past, present, and foreseeable future actions,
21 the Modified LPA would have a beneficial cumulative effect on geology and groundwater.

22 ***Hazardous Materials***

23 Past actions in the study area, including spills and releases of hazardous materials from commercial and
24 industrial land uses, have caused soil and groundwater contamination and pose a risk to human health. There
25 are 579 sites that could contain hazardous materials within the study area, and the Ruby Junction
26 Maintenance Facility is a small-quantity generator for hazardous wastes, including solvents, batteries, and
27 paints. High-priority hazardous materials sites include the U.S. Army Vancouver Barracks, Hayden Island
28 landfill, and Jantzen Beach car wash, among others. Many of these contaminated areas have been
29 documented, and in some cases cleanup actions have been initiated or completed. There may also be
30 unknown contamination caused by past land uses and actions in the study area that poses additional risks.

31 Development in the study area may involve the management of legacy sites, which are hazardous materials
32 sites where the owner is or should be undertaking long-term cleanup actions. Sites for which the responsible
33 party has not yet complied may require additional investigation and cleanup. These sites may also be
34 considered "orphan" sites, which are being managed by regulatory agencies. Future development in the study
35 area could add exposure risks but also provide cleanup and remediation benefits. The discovery of new legacy
36 sites would be the responsibility of the property owners, who would need to comply with all applicable
37 federal, state, and local requirements for managing and mitigating contamination. In addition, population
38 and employment growth could cause increased traffic that may result in slightly more incidents of hazardous
39 material spills.

40 ***No-Build Alternative***

41 Under the No-Build Alternative, there would be no acquisitions or displacements, no potential for property
42 acquisition liability, and no cleanup of previously contaminated locations. The No-Build Alternative would not
43 have a cumulative effect related to hazardous materials.

Modified LPA

Construction activities for the Modified LPA would involve cleanup of contamination associated with past releases of hazardous materials, which would reduce the risk of future contamination and risks to human health. Construction of the Modified LPA, or other future construction actions, creates a potential for the release of hazardous substances or petroleum products into the environment from the improper transfer of fuel or spills from construction equipment. Other pollutants, such as paints, acids for cleaning masonry, solvents, raw concrete, paving, striping products, and concrete-curing compounds, are often present at construction sites and may enter the environment if not managed correctly.

The Modified LPA would improve safety and operations on I-5, which could reduce hazardous material spills as a result of highway crashes. In combination with past, present, and foreseeable future actions, the Modified LPA would have a beneficial cumulative effect on the environment and human health through the reduction and clean up of hazardous materials.

Climate

Substantially rising GHG concentrations from human activities have been a primary driver of global warming. Both the Washington State Department of Ecology and the Oregon Global Warming Commission publish reports every two years measuring their states' GHG emissions and progress toward state and federal goals to reduce these emissions. Transportation (including highway, rail, and air transport) is the greatest contributor to GHG emissions in Oregon and Washington. Multiple federal, state, regional, and local regulations and policies have been enacted to guide the development and evaluation of transportation projects and local communities' management of GHG emissions.

Future actions related to the policies and plans of state, regional, and local jurisdictions have the potential to influence the decrease in GHG emissions in the transportation and land use sectors. Policies that directly regulate the emissions of vehicles, such as a clean fuels standard, have the greatest potential to reduce GHG emissions. Additional ancillary benefits may also come from transitions to renewable energy sources in the energy sector. Compared to existing conditions, GHG emissions associated with the transportation sector are expected to decline in future years due to improvements in vehicle fuel technologies and the transition away from using gasoline and diesel fuels to power vehicles. As more of the vehicle fleet is composed of electric cars, the decarbonization of the electric grid in Washington and Oregon will further decrease GHG emissions associated with vehicle travel.

Because the effects of regional growth and reasonably foreseeable future actions are incorporated into the transportation modeling the results of the GHG emissions modeling reflect cumulative effects on annual GHG emissions in the study area.

No-Build Alternative

Although VMT would increase in the study area by 2045 under the No-Build Alternative, GHG emissions are expected to decline substantially over this period due to the implementation of fuel and engine regulations. However, the No-Build Alternative would not contribute to a cumulative reduction in GHG emissions.

Modified LPA

The Modified LPA would result in fewer GHG emissions than the No-Build Alternative because of a mode shift to public transit and active transportation as well as decreases in VMT, congestion, and vehicle idling. GHG emissions from construction activities would be mitigated and reduced by following current standard specifications and regulatory guidance from ODOT and WSDOT to conserve the use of construction materials and fuels and implementing best management practices.

1 The Modified LPA includes features that would improve local and regional resiliency to the anticipated effects
2 of climate change. These features would help to avoid fragmentation and degradation of floodplain hydrology
3 by sensitively locating new and modified transportation and utility project components; maximizing
4 management of stormwater by restoring existing unused impervious paved areas to natural, permeable, and
5 vegetated conditions during the design phase; and ensuring that the bridge design would accommodate
6 potential climate-change-induced effects, such as larger water volumes from winter storms and more
7 frequent snow and ice storms. The Modified LPA, when combined with other past, present, and foreseeable
8 future actions, would have an incremental beneficial contribution to cumulative climate effects through a
9 reduction in GHG emissions and improvements in the climate resiliency of the corridor and region.

10 **Environmental Justice**

11 The original construction of I-5 and I-205 through Portland had significant effects on the populations in and
12 adjacent to the highway's path, including environmental justice (EJ) populations.⁶ ODOT cleared entire blocks
13 for development of the roadway, dividing neighborhoods, displacing residences, and affecting businesses in
14 the historic center of Portland's Black community. The construction of I-5 through Vancouver changed the city
15 by closing 5th Street (the route heading east) and encouraging development of housing to the north of
16 downtown. Fewer displacements occurred in Vancouver than Portland because the area was less densely
17 developed than Portland at that time.

18 One socioeconomic impact attributed to the cumulative effect of population growth and development is an
19 increase in the cost of living. Between 2000 and 2021, median gross rent increased 52% in Portland, 48% in
20 Multnomah County, 40% in Vancouver, and 41% in Clark County (adjusted for inflation) (U.S. Census Bureau
21 2000, 2021). In the same period, median household income increased by only 15% in Portland and 11% in
22 Multnomah County, while median household income decreased by 4% in Vancouver and 7% in Clark County
23 (U.S. Census Bureau 2021). As the cost of living increases, low-income households often move farther from
24 jobs and services to find affordable housing. This can result in longer commute times and higher
25 transportation costs for low-income households.

26 Future transportation actions would follow federal and state guidelines, such as the Uniform Relocation Act,
27 to provide replacement housing and relocation benefit packages. Other currently planned transportation
28 projects, such as the RMPP and the I-205 tolling program, may implement low-income or equitable tolling
29 policies to subsidize or offset the economic burden of tolling on low-income and minority populations. The
30 Oregon Toll Program is investigating a low-income program that would address the cumulative effects of
31 tolling and congestion pricing projects on low-income drivers.

32 **No-Build Alternative**

33 The No-Build Alternative would not change the existing conditions that affect EJ populations. It would not
34 acquire or displace residences or businesses or provide an extension of light-rail, improvements to active
35 transportation facilities, and improved bus service in the corridor. Therefore, the No-Build Alternative would
36 not contribute to beneficial or adverse cumulative effects on EJ populations.

37 **Modified LPA**

38 The Modified LPA would have both beneficial and adverse effects on EJ populations. Some populations,
39 including minority and low-income individuals, would be adversely affected by displacement of businesses
40 and residents and by noise and traffic during construction. However, in general, the Modified LPA would likely
41 improve conditions (such as air pollution, poor access, and poor transit service) for populations and

⁶ Environmental justice populations include low-income and minority groups.

1 neighborhoods that have historically been adversely affected by other past actions. See Section 3.20,
2 Environmental Justice, for additional details on direct and indirect impacts to EJ populations.

3 For low-income populations, among which BIPOC communities are overrepresented, the impacts of tolling
4 and congestion pricing associated with the Modified LPA, such as the share of total household income spent
5 on transportation costs, may be disproportionate. The IBR Program is coordinating with the Oregon Toll
6 Program to address these impacts.

7 EJ populations would benefit from the Modified LPA through the construction of light-rail transit; increased
8 transit frequencies; improved travel times on I-5; significantly improved bicycle and pedestrian facilities; and
9 safer vehicle, bicycle, and pedestrian travel. The construction of light-rail transit would provide a lower cost
10 option than single-occupancy vehicles, which would be subject to tolls and future congestion pricing under
11 the RMPP. Combined with past, present, and foreseeable future actions, the Modified LPA would have both
12 beneficial and adverse cumulative effects on EJ populations.

13 3.21.4 Temporary Construction Effects

14 Construction of the Modified LPA would likely overlap with the construction of many of the projects listed in
15 Section 3.21.2 (above), the Transportation Technical Report, and future private development. Cumulative
16 impacts during construction may result when simultaneous or sequential construction projects have an
17 additive effect on the temporary effects of constructing the Modified LPA. For example, bridge construction
18 activity would need to be coordinated with other in-water work that could occur simultaneously.
19 Simultaneous or sequential construction projects can increase congestion, create more employment
20 opportunities, impact community and natural resources, and require additional public and private spending.

21 Other projects would have their own traffic control plans, but some may influence the travel routes of
22 commuters and freight and could place more traffic in the study area. Likewise, some projects are on planned
23 haul routes and could influence the delivery of supplies and materials to the job sites for the Modified LPA. As
24 more detailed plans are developed, traffic control plans would need to be coordinated with these projects
25 and their timelines. Temporary cumulative effects on the community may result from local traffic congestion
26 and rerouting, as well as noise and air quality impacts, if construction under the Modified LPA overlaps with
27 the construction of other projects in the area.

28 Construction of the Modified LPA could also result in increased employment and spending in the study area
29 during construction. The extent of these effects depends on the funding sources and the makeup of work
30 crews used during construction. This could affect the ability of other projects to obtain skilled workers.

31 Construction of the Modified LPA is likely to affect marine commerce, including disruptions and delays for
32 vessels during the in-water work (projected to be periodic over four years), which may overlap with other in-
33 water work associated with other projects. The temporary effects from the Modified LPA, in combination with
34 other planned projects, would cause delays and disruptions to local residents and businesses. Mitigation
35 plans, including coordinated traffic control plans and business assistance, would reduce the negative
36 consequences of construction, while the employment demands would result in positive economic outcomes
37 for the region.

38 Most construction-related natural environment impacts would be localized in extent and magnitude such that
39 cumulative effects from other projects would be minimal. Other projects in the area, such as Levee Ready
40 Columbia and Renaissance Boardwalk, could directly impact the same waters or wetlands or regulated
41 habitats that the Modified LPA would affect. Cumulative effects related to construction activities (such as
42 underwater noise from pile driving conducted for other projects) would only occur if such activities were
43 being conducted simultaneously and in close proximity to construction being conducted for the Modified LPA.
44 No projects are currently identified that would require substantial in-water construction activity in the
45 immediate vicinity of the construction for the Modified LPA; however, it is possible that such a project could

1 be proposed. Any such project would require federal approvals for work within the river and would therefore
2 undergo Section 7 Endangered Species Act consultation.

3 To minimize temporary cumulative effects, ODOT and other agencies should coordinate construction
4 schedules to minimize overlapping impacts. These impacts would involve general construction procedures
5 such as detours, lane closures, entering/exiting of construction vehicles and equipment, travel delays, noise,
6 etc. For these reasons, it is unlikely that a project conducted concurrently with IBR Program-related
7 construction would result in adverse cumulative construction effects.

8 3.21.5 Irreversible and Irrecoverable Commitments of Resources

9 NEPA regulations from the Council on Environmental Quality require the environmental analysis to identify
10 "...any irreversible and irretrievable commitments of resources that would be involved in the proposed action
11 should it be implemented" (CFR 1502.16). Council on Environmental Quality guidelines describe primary
12 irreversible and irretrievable resource commitments as uses of nonrenewable resources throughout a project
13 that may be irreversible if removal of the resources occurs and cannot be replaced within a reasonable
14 timeframe (for example, extinction of a threatened or endangered species) or if obstruction of the use of
15 resources occurs after construction. Implementing the Modified LPA would involve committing natural,
16 physical, human, and fiscal resources.

17 The proposed improvements would involve a long-term conversion of land to provide right of way for the
18 Modified LPA. Although these transportation facilities could revert to urban land and open space, that is
19 unlikely and would require resources to make happen. Fossil fuels used to power construction, operate
20 vehicles, and manufacture materials are the major nonrenewable resources that would be consumed by
21 construction of the Modified LPA and the resulting daily vehicle operations.

22 Considerable amounts of labor and material, including cement, aggregate, asphalt, sand, fill materials, lime,
23 and steel, would be used for construction. Equipment emissions from on-site fuels are an additional
24 contributor to the carbon footprint of construction. The Program will investigate and consider construction
25 materials, equipment, and practices to reduce embedded carbon in construction (e.g., the carbon emitted
26 during the production, transport, and installation of the materials required for construction), maximize
27 recycling, and reduce GHG emissions from construction. For demolition of the existing infrastructure, reuse
28 options are relatively limited, but many materials can be recycled. As construction packages and plans are
29 developed, construction bid document specifications or performance requirements could include measures
30 such as maximizing the inclusion of recycled material to reduce new material production and inclusion by
31 recycling existing concrete and asphalt pavements to be used as aggregate base, subbase, backfill materials,
32 etc. The use of these construction materials would not have an adverse impact upon continued availability of
33 these resources. Construction would also require a substantial one-time expenditure of both state and federal
34 funds that may not be retrievable. Retrievability is possible if the improved transportation facilities spur
35 economic growth and toll revenues are bonded to provide capital funding for bridge construction.