



## Chapter 7: Cumulative Effects

*This chapter describes cumulative effects expected to be associated with the proposed SR 520, I-5 to Medina: Bridge Replacement and HOV Project. The Final Indirect and Cumulative Effects Discipline Report (included in Attachment 7) details analytical methods and other past, present, and reasonably foreseeable future actions that could add to or interact with the direct and indirect effects of the project (discussed in Chapters 5 and 6) to produce cumulative effects. WSDOT does not mitigate cumulative effects because it does not have jurisdiction over the many non-WSDOT projects that contribute to them (WSDOT et al. 2008). However, WSDOT is required to disclose cumulative effects and to suggest practical mitigation options that could be taken by the responsible parties. Consequently, this chapter suggests ways that public agencies and private developers beyond WSDOT's jurisdictional responsibilities could mitigate cumulative effects. For more information, see the Final Indirect and Cumulative Effects Discipline Report.*

### 7.1 What are cumulative effects?

Cumulative effects (also called cumulative impacts) are defined as follows:

... the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 Code of Federal Regulations [CFR] 1508.7)

A cumulative effect is the project's direct and indirect effects on a particular resource combined with the past, present, and future effects of other human activities on that same resource. The result is the expected future condition of the resource when all of the external factors known or likely to affect it are taken into account.

## 7.2 Why are cumulative effects considered in an EIS?

Federal regulations (40 CFR 1502.16, 1508.7, 1508.8) require that cumulative effects be considered in an EIS because they inform the public and decision-makers about possible unintended consequences of a project that are not always revealed by examining direct effects alone. This information places the proposed action in context with other development and transportation improvement projects planned throughout a region, and provides a brief assessment of each resource's present condition and how it is likely to change in the future as a result of the cumulative effect.

## 7.3 How did WSDOT assess cumulative effects?

To identify and evaluate likely cumulative effects and the extent to which the project would contribute to them, WSDOT first reviewed the general guidance in Section 412 of the *Environmental Procedures Manual* (WSDOT 2009j) and in FHWA Technical Advisory T 6640.8A (FHWA 1987). Next, it followed the eight-step procedure set forth in *Guidance on Preparing Cumulative Impact Analyses* (WSDOT et al. 2008), shown in Table 7-1.

Table 7-1. WSDOT's Approach for Assessing Cumulative Effects

Step	Approach
1	Identify resources to consider
2	Define the study area for each resource
3	Describe current status/viability and historical context for each resource
4	Identify direct and indirect project effects that might contribute to a cumulative effect
5	Identify other current and reasonable foreseeable actions
6	Identify and assess cumulative effects
7	Document the results
8	Assess the need for mitigation

Source: WSDOT et al. 2008.

WSDOT conducted cumulative effects assessments for the same resources for which direct and indirect effects assessments were conducted (discussed in Chapters 5 and 6). WSDOT made two general assumptions in following the guidance: first, in most cases it considered construction-related effects to be short-term, with the effect ending at the same time as the construction activity causing it. Secondly, operational effects of the project were considered to be long-term and permanent through the project design year, 2030.

In addition to examining the operational effects, WSDOT examined the potential long-term effects that project construction could have on the resources in the study area. WSDOT carefully considered the potential for short-term construction effects to contribute to adverse cumulative effects, especially on resources that are already under stress from the effects of other past, present, and reasonably foreseeable future actions. WSDOT's assessment considered the project's measures to reduce and avoid construction related effects. In two cases, aquatic resources and greenhouse gas (GHG) emissions, WSDOT found that construction effects would persist over the long term and make minor contributions to cumulative effects.

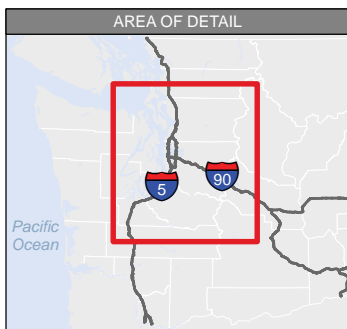
The Final Indirect and Cumulative Effects Discipline Report provides information on the methods used to conduct the cumulative effects assessments on individual resources. These methods focused on long-term trends in the status or condition of each resource, and emphasized impact pathways and mechanisms through which the expected direct and indirect effects of the proposed action could accelerate, slow, or offset those trends.



## 7.4 How did WSDOT determine the study areas and time frames for the cumulative effects assessments?

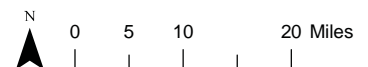
WSDOT determined the cumulative effects study area for each resource by 1) the distribution of the resource itself and 2) the area within that distribution where the resource could be affected by the project in combination with other past, present, and reasonably foreseeable actions. For most resources, the cumulative effects study area is the central Puget Sound region as defined by the Puget Sound Regional Council in its planning document *Vision 2040* (PSRC 2008). Exhibit 7-1 shows the central Puget Sound region, which includes King, Kitsap, Pierce, and Snohomish counties. Some resources required cumulative effects study areas that were larger or smaller than the central Puget Sound region (Exhibits 7-2 and 7-3).

The period for the cumulative effects assessment for each resource starts at a representative year or decade when past actions began to change the status of the resource from its original condition, setting a long-term trend still evident in the present and likely to continue into the reasonably foreseeable future. For most resources, the cumulative effects period starts in the mid-19th century, when the central Puget Sound region began to be altered by non-indigenous settlers. The period for all resources ends in 2030, the project design year.

Exhibit 7-1. Cumulative Effects Study Area



-  Study Area: air quality, cultural resources, economic, geology and soils, greenhouse gas consumption and emissions, land use, and social elements
-  County Boundary



## 7.5 How did WSDOT determine the baseline condition of each resource?

WSDOT characterized the baseline (present) condition of each resource by describing its current status within the cumulative effects study area and by providing historical context for understanding how the resource got to its current state (WSDOT et al. 2008; see Table 7-1, Step 3). WSDOT used information from field surveys, interviews, and literature searches to assess the current condition of the resource, relying especially on baseline information presented in PSRC’s *Transportation 2040: Toward a Sustainable Transportation System* (PSRC 2010a).

Past actions affecting the resource were reviewed to “tell the story of the resource” and to identify persistent trends in the changing condition of the resources over time. WSDOT did not address the past in detail, but prepared a brief summary to place the resource in its historical context and provide a comparative basis for the cumulative effects assessment.

Chapter 4 of this Final EIS presents information on the baseline condition of each resource addressed in the cumulative effects assessments. The transportation section in Chapter 5 of this Final EIS describes how traffic would grow in the region and on SR 520, I-90, SR 522, and other major roads with and without the project. Using a travel demand model, traffic volumes were predicted for the year 2030 with and without the project.

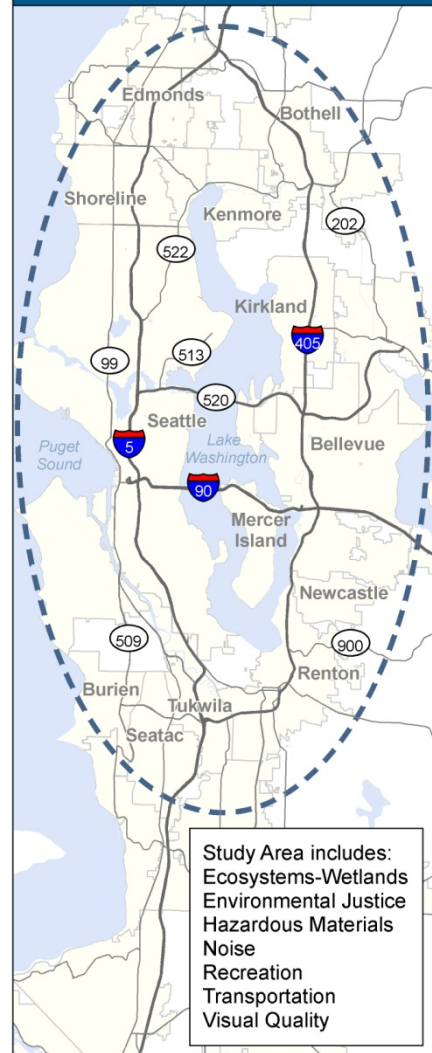
Future traffic was forecasted for morning and evening commutes (peak-hour travel), which enabled an assessment of how travel times would be affected and where congestion would occur. This section also examined how the project would affect transit facilities and service, non-motorized facilities, and parking.

## 7.6 How did WSDOT identify other present and reasonably foreseeable actions?

CEQ and WSDOT guidance does not provide explicit requirements for how to identify other present and reasonably foreseeable actions. Rather, it allows agencies to determine the level of analysis appropriate for their projects (AASHTO 2011; WSDOT, FHWA, and EPA 2008). The CEQ guidance does not require an inclusive list of projects, but instead suggests evaluating both *individual* actions, when they are reasonably well known, and *groups* of actions, which are typically included in documents such as transportation plans and master plans.

To identify *individual* present and reasonably foreseeable actions, WSDOT reviewed comprehensive land use planning documents, long-range transportation plans, projections presented in the *Transportation 2040 Final EIS* (PSRC 2010c), and agency web sites to obtain publicly available information. WSDOT also obtained information from agency officials.

Exhibit 7-2. Cumulative Effects Study Area – Travelshed




### DEFINITION

#### Reasonably Foreseeable Actions

Reasonably foreseeable actions were defined as actions or projects with a reasonable expectation of actually happening, as opposed to potential developments expected only based on speculation.

Exhibit 7-3. Cumulative Effects Study Area - Water Resources and Ecosystems

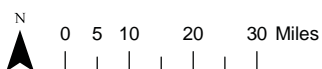


 Water Resource Inventory Area (WRIA) Boundary

Study Area for Water Resources is WRIA 8.

Study Area for Ecosystems – Wildlife includes WRIA 8, Puget Sound, Georgia Strait, and Strait of Juan de Fuca.

Study Area for Ecosystems – Aquatic Resources includes north Pacific Ocean, northwest Washington coast, Strait of Juan de Fuca, Georgia Strait, Puget Sound, WRIA 8, and WRIA 22.



Reasonably foreseeable actions (shown in Table 7-2) were defined as actions or projects with a reasonable expectation of being implemented, based on the following criteria (WSDOT 2008):

- Is the proposed project included within a financially constrained plan (e.g., a capital improvement program)?
- Is it permitted or in the permit process?
- How reasonable is it to assume that the proposed project will be constructed?
- Is the action identified as high priority?

**Table 7-2. Current and Reasonably Foreseeable Actions**

	<b>Project</b>	<b>Planning Document or Agency</b>
Transportation	I-405 Southbound Braided Ramps	I-405 Master Plan, Transportation 2040; estimated completion by 2030
	SR 520 – 124th Avenue Interchange	I-405 Master Plan, Transportation 2040; unfunded (possible funding by City of Bellevue)
	I-405 at North 8th Street high-occupancy vehicle ([HOV] Interchange)	Transportation 2040
	I-405 at I-90 (HOV/High-Occupancy Toll [HOT])	Transportation 2040, estimated completion by 2030
	I-405 at NE 6th Street Extension (HOV/HOT)	Transportation 2040
	I-405 at SR 520 (HOV)	Transportation 2040
	I-405 at SR 522 Interchange	Transportation 2040
	I-405: SR 169 to NE 6th Street Express Toll Lanes (ETLs)	I-405 Master Plan, Transportation 2040
	I-405: I-5 to SR 167 ETLs	I-405 Master Plan, Transportation 2040
	I-405: SR 167 to SR 169 ETLs	I-405 Master Plan, Transportation 2040
	I-5 at Airport/Industrial Way (HOV)	Transportation 2040, estimated completion by 2025
	I-5: Olive–SR 520 (transit)	Transportation 2040, estimated completion by 2025
	Mercer Corridor Improvements: Phase II	City of Seattle
	NE 132nd Street Road Improvements (116th to NE 118th Street)	City of Kirkland
	124th Avenue NE Road Improvements (NE 85th Street to NE 116th Street)	City of Kirkland
	132nd Ave NE Road Improvements (NE 85th Street to Slater Ave. NE)	City of Kirkland
	120th Avenue NE Corridor Widening (NE 4th Street – NE 12th Street)	City of Bellevue
	Bellevue Way HOV Lanes and Transit	City of Bellevue, Transportation 2040

Table 7-2. Current and Reasonably Foreseeable Actions

Project	Planning Document or Agency
Bel-Red Regional Connectivity – Extend NE 16th Street and Widen 13th Place NE (124th Avenue to 132nd Avenue)	City of Bellevue, Transportation 2040
Bel-Red Regional Connectivity – Downtown/Overlake and Bel-Red Transit-oriented Development (TOD) Node	City of Bellevue, Transportation 2040
Coal Creek Parkway Widening at I-405	City of Bellevue, Transportation 2040
Coal Creek Parkway (HOV and Transit)	WSDOT, Transportation 2040
SR 520, Medina to SR 202 Eastside Transit and HOV Project	WSDOT
SR 520 Pontoon Construction Project	WSDOT
I-90 Two-Way Transit and HOV Operation Project	WSDOT, Sound Transit
Alaskan Way Viaduct Replacement Project	FHWA, WSDOT
Sound Transit's East Link	Sound Transit
Sound Transit's North Link	Sound Transit
Sound Transit's University Link	Sound Transit
Sound Transit 2 Program	Sound Transit
Transit Now Program	King County

To identify *groups* of reasonably foreseeable actions, WSDOT relied on adopted regional and local land use and transportation plans, consistent with CEQ guidance. These plans provide information on the intended development of jurisdictions and transportation networks over a long planning horizon, encompassing multiple future projects that collectively have the potential to influence resource trends. In addition, these plans provide information about non-governmental and non-transportation-related development. The planning documents WSDOT used for this analysis are shown in the sidebar at right.

The list of projects shown in Table 7-2 is different from the list of projects in the SDEIS. For the SDEIS, WSDOT identified a large number of individual transportation and development projects in local and regional land use, transportation, and master plans. In the Final EIS, WSDOT determined that, consistent with the CEQ and WSDOT guidance, most of these projects would be more appropriately evaluated within groups of

#### Planning Documents

The planning documents that WSDOT used to identify groups of reasonably foreseeable actions are:

- Vision 2040
- City of Seattle Comprehensive Plan
- City of Medina Comprehensive Plan
- City of Bellevue Comprehensive Plan
- University of Washington Campus Master Plan
- Seattle Children's Hospital Major Institution Master Plan
- Washington Park Arboretum Master Plan and Final EIS
- King County Road Services Capital Improvement Program



reasonably foreseeable actions. The projects considered individually in the Final EIS (shown in Table 7-2) are transportation projects with particular proximity or relevance to the SR 520, I-5 to Medina project and were identified through the transportation modeling effort. The other projects that were identified individually in the SDEIS are still included in the analysis of trends as components of their respective planning documents.

## 7.7 What cumulative effects on the natural environment did WSDOT identify?

The following section discusses the cumulative effects on the natural environment for the Preferred Alternative and SDEIS options. The options considered in the 2010 SDEIS and the Preferred Alternative are similar and, for purposes of this analysis, nearly indistinguishable. Therefore, all the build alternatives are discussed together except where a separate discussion is warranted. Refer to the Final Indirect and Cumulative Effects Discipline Report for additional information.

### Water Resources

#### What is the historical trend for water resources?

Over the last several decades, urban development and the discharge of untreated stormwater have reduced water quality in the study area. Lake Washington received increasing amounts of secondary treated sewage between 1941 and 1963, causing over-enrichment of the water with nutrients and decreasing the water quality of the lake. The present water quality is largely the consequence of removing secondary treated sewage from Lake Washington. Additionally, stormwater regulations since the 1990s have been aimed at treating and reducing pollutants in runoff before discharge to streams and lakes. While Lake Washington currently has some of the best water quality for a large lake entirely within a major metropolitan area, the lake is still impaired with bacterial contamination.

#### What are the cumulative effects of current and reasonably foreseeable actions without the project?

The likely future condition of the surface water bodies of the study area will be gradual and steady improvement in quality. This is due to requirements for improved stormwater management and treatment of new development projects and the improvement in stormwater treatment technologies. However, these improvements only occur for new developments and redevelopments. Therefore, under the No Build Alternative, much of SR 520 would not have stormwater treatment and would provide a negative contribution to water quality effects in Lake Washington.

## What would the project's additional contribution to cumulative effects on water resources likely be?

The proposed project would add to the positive trend of improved surface water quality in Water Resource Inventory Area (WRIA) 8 but would not affect the rest of the cumulative effect study area. While the Preferred Alternative and SDEIS options would increase the pollutant-generating impervious surface (PGIS) area, the project includes stormwater treatment. The stormwater discharges under the Preferred Alternative and SDEIS options would meet water quality criteria according to the *Highway Runoff Manual's* (HRM) evaluation methods (WSDOT 2008a). Stormwater discharges to Lake Union, Portage Bay, and Union Bay would receive enhanced treatment that would exceed the minimum level of treatment required by the HRM.

The Preferred Alternative and SDEIS options would construct a stormwater treatment system that would reduce pollutant loading to surface waters in the project area. For the Lake Washington area, the Preferred Alternative and SDEIS options show a predicted net reduction for all five stormwater pollutants—total suspended solids (TSS), total zinc, dissolved zinc, total copper, and dissolved copper—compared with the No Build Alternative.

Stormwater runoff during construction of the Preferred Alternative and SDEIS options would be mitigated to minimize the entry of waterborne contaminants into surface waters, and the project's improved stormwater treatment facilities would reduce pollutant runoff from SR 520 paved surfaces relative to present conditions. For these reasons, WSDOT concluded that the proposed project would slightly offset historical negative actions, and slightly add to the gradual improvement of water quality expected in the study area between now and 2030.

## How could cumulative effects on water resources be mitigated?

Under the Preferred Alternative and SDEIS options, the project would not contribute to a negative cumulative effect; therefore, per WSDOT guidance, mitigation is not proposed.

## Ecosystems

Ecosystems can be divided into three components: wetlands, fish and aquatic habitat, and wildlife. The project would directly affect wetlands, streams, and wildlife habitat, but these effects would be mitigated as part of the project. Mitigation details are presented in the Ecosystems section of Chapter 5 and the Ecosystems Discipline Report Addendum and Errata (Attachment 7).

## Wetlands

### What is the historical trend for wetlands?

Wetlands in the study area have been substantially affected by past and present actions including alteration of ecosystem processes; loss of forests and riparian habitat; loss of wetlands and habitat fragmentation; introduction of invasive species; agriculture; and increases in impervious surface area and water pollution associated with urban environments. Taken together, these effects have resulted in significant wetland loss in the study area. Transportation systems, which are a component of the overall urban development pattern within the central Puget Sound region, have historically played a key part in these ecosystem changes. In the project area, one of the most significant past projects to affect wetlands was construction of the Ship Canal and Ballard Locks, which lowered Lake Washington by about 9 feet in 1916 and the subsequent roadway and land development that occurred.

Local, state, and federal protections for wetlands have been in place for only about two decades. While this has slowed the loss of wetlands and wetland functions, the rules and regulations differ by jurisdiction and are not always sufficient to protect the long-term sustainability of the area wetlands and their functions. Mitigation has often been used for projects that affect wetlands. Mitigation has been partially successful and is improving with more guidance and regulatory oversight. The use of alternative mitigation options, such as mitigation banks and fee-in-lieu, are currently in use.

### What are the cumulative effects of current and reasonably foreseeable actions without the project?

Under the No Build Alternative, wetland functions in the study area would continue to be adversely affected by the road corridor, mostly due to inadequate water quality treatment. Stormwater treatment would not be added to the existing roadway, so the discharge of untreated stormwater would continue into the future.

A number of shoreline and wetland enhancement projects will occur in the project area, whether the project is constructed or not. These projects will contribute, incrementally along with other small roadway and land development projects with improved stormwater management and treatment, to improved water quality in the study area. Water quality in wetlands receiving treated stormwater from the SR 520, Medina to SR 202 project would improve over time after construction. In addition, restoration efforts identified in the Washington Park Arboretum Proposed Master Plan and for the northern shorelines of Union Bay as described in the Union Bay Natural Area Management Plan would improve wetland habitats near the project relative to existing conditions (Arboretum and Botanical Garden Committee 2000). The *University of Washington Master Plan – Seattle Campus*

has a number of improvements planned for the stadium and other areas on the campus (University of Washington 2003).

What would the project's additional contribution to cumulative effects on wetlands likely be?

WSDOT has worked to avoid and minimize impacts to ecosystems during the scoping and design of this project. WSDOT avoided many impacts to wetlands through careful identification of sensitive areas early in the design process.

Where avoidance was not possible, effects were minimized by raising bridge heights, treating stormwater, and improving water quality functions of aquatic wetlands. The project would make a beneficial contribution to wetlands resources in the Lake Washington area near the SR 520 corridor through improved stormwater management and treatment, reducing the cumulative effect of development on wetlands habitat. Through best management practices (BMPs), conservation measures, and the application of specific construction sequencing and timing (such as minimizing in-water work), WSDOT would ensure that short-term construction effects on wetlands would be minimized to prevent to the extent possible any effects that could lead to any decreased wetland function.

When effects cannot be avoided or minimized, WSDOT has identified mitigation to reduce the cumulative effect of the project on wetlands. The proposed compensatory mitigation will be developed in coordination with regulatory agencies, resource agencies, and the Muckleshoot Indian Tribe. As a result, the project's contribution to cumulative effects of wetlands within WRIA 8 is anticipated to be minor to negligible.

How could cumulative effects on wetlands be mitigated?

The federal wetland regulatory goal of No Net Loss and recently updated state and local regulations for protecting and managing critical areas under the Growth Management Act are intended to slow the cumulative decline of wetlands. Beyond these measures, the cumulative effect of wetland conversion and loss could be mitigated by more stringent regulations, greater regulatory consistency and coordination among jurisdictions, improved planning at both regional and local levels, and increased participation of non-governmental organizations and other stakeholders in restoration efforts. Long-term programs such as watershed-based mitigation and mitigation banking also aid in the protection of the resource. For example, Ecology has prepared two guidance documents to facilitate more effective compensatory wetland mitigation. These are *Wetland Mitigation in Washington State, Part 1: Agency Policies and Guidance* (Ecology et al. 2006a), and *Wetland Mitigation in Washington State, Part 2: Developing Mitigation Plans* (Ecology et al. 2006b), both prepared as part of a collaborative effort among Ecology, the USACE, and the EPA. The City of Seattle has comprehensive plans and critical areas ordinances that guide

future community development so that adverse cumulative effects on wetlands can be alleviated.

## Aquatic Resources

### What is the historical trend for aquatic resources?

The existing conditions of Lake Washington are the result of a series of major physical and limnological changes within the study area resulting from human occupation and use of the watershed since the mid-1800s. These changes began with changing the outlet of Lake Washington from the Black River to the newly constructed Montlake Cut, Ship Canal, and Ballard Locks in 1916. The result was as follows:

- A regulated lake with water level fluctuations limited to about 2 feet instead of historical 6.5 feet;
- The lake level was lowered by about 9 feet, which exposed about 1,300 acres of previously shallow water habitat, reduced the lake's surface area by 7.0 percent, decreased the shoreline length by about 12.8 percent, and eliminated much of the lake's shoreline wetlands (Chrzastowski 1983);
- Increased inflow when the Cedar River was redirected from the Black River into Lake Washington; and
- Required salmonids to use a different migratory route and rearing corridor in Lake Washington.

Shoreline alterations since 1916 include:

- Construction of the I-90 and Evergreen Point bridges, which also affected shoreline habitat;
- Human-made bulkheads over about 80 percent of the salmonid migratory route in Lake Washington (Toft et al. 2003, Weitkamp et al. 2000);
- About 400 residential docks that extend offshore 30 to 100 feet to cover an estimated 4 percent of the lake surface area within 100 feet of the shoreline (Toft et al. 2003, Weitkamp et al. 2000);
- Natural riparian vegetation has been removed from nearly 90 percent of the shoreline between the Cedar River and Union Bay; and
- Non-native aquatic vegetation populates substantial portions of the shallow water habitat along the migration route, becoming sufficiently dense in late spring and summer to block access to this generally preferred habitat of migrating/rearing juvenile salmonid species (Celedonia et al. 2008). This vegetation also provides habitat for predator fish species and reduces the water quality conditions for salmonids and other aquatic species (Frodge et al. 1995).

More recently, the Lake Washington watershed has experienced the following changes, most of which are likely attributable to human development, together with climate change:

- Increasing long-term trend in seasonal and annual average water temperatures, with a 1.5 degree Fahrenheit rise in the upper approximately 30 feet of the lake between 1964 and 1998 (Arhonditsis et al. 2004).
- Introduction of sockeye salmon into the Cedar River with a recently introduced hatchery program to enhance the run.
- Hatchery-reared Chinook salmon resulting in about 2 million juveniles released each year and returns of approximately 10,000 or more adults annually (Washington State Department of Fish and Wildlife [WDFW] 2010c). [is this the 2010 ref?]
- Introduction of at least 23 non-native predator and competitor fish species into the lake, thereby substantially altering the lake's biological community, as well as its habitat (Weitkamp et al. 2000). Some of these non-native species now form major populations in the lake and potentially compete with or prey on juvenile anadromous fish. Known substantial predators of young salmon include smallmouth and largemouth bass (Fayram 1996, Tabor et al. 2004).
- Planting of hatchery-reared rainbow trout in Lake Washington for a number of years. The larger individuals preyed on juvenile salmonids (Beauchamp 1987).
- Artificial rearing and release of Coho salmon in the Lake Washington watershed since at least 1950 (Donaldson and Allen 1958). Juvenile Coho salmon are released in the Lake Washington watershed in large numbers. In other areas, the young Coho have been shown to be substantial predators of smaller juvenile salmonids (Pearsons and Fritts 1999).

What is the cumulative effect of current and reasonably foreseeable actions without the project?

Some WRIA 8 salmonid stocks have appeared to stabilize because of improved management and recovery efforts. However, continued recent and present trends and stressors (such as continued regional population growth and global climate change) indicate that, under the No Build Alternative, the condition of fish and aquatic habitat would most likely continue along a level or downward trend into the reasonably foreseeable future. These factors are directly influenced by ocean temperatures and circulation patterns, which are influenced by climate processes, and might be negatively affected by global climate change associated with GHG emissions.

Large-scale restoration plans and activities are being implemented in the study area and throughout the Puget Sound area. These activities might

slow, or even halt, the existing downward trends in fish populations. For example, Shared Strategy for Puget Sound is a collaborative initiative to restore and protect salmon runs across Puget Sound. Shared Strategy for Puget Sound coordinates with existing recovery efforts and works with federal, tribal, state, and local governments, businesses, and conservation groups. Fifteen watersheds, including Lake Washington, are participating in the shared strategy process to identify actions to recover salmon and obtain the commitments needed to achieve the actions. Goals for Lake Washington include improvements to fish access and passage, riparian restoration projects, improvements in water quantity and quality, and protection and preservation of existing high-quality habitat. The Chehalis Basin Partnership, which includes WRIA 22 and Grays Harbor, is another example of watershed planning and restoration occurring in the study area.

Improvements to water quality are expected to continue for Lake Washington and Puget Sound through improvements to stormwater management and treatment, as roads are upgraded and new development/redevelopment occurs with stricter water quality and runoff regulations. Such improvements would occur from the SR 520, Medina to SR 202 project. The new project would collect and treat stormwater from new and replaced road surfaces, thereby improving water quality in nearby streams that drain to Lake Washington. In addition, several stream crossings under SR 520 between Medina and I-405 would be upgraded to improve fish passage. Portions of Yarrow Creek would be reconfigured and large woody debris would be installed to improve fish habitat and use.

In addition, the added protection provided to species listed as threatened or endangered under the federal Endangered Species Act (ESA), as well as their designated critical habitat, would improve conditions for other species occurring in the area. This is particularly true for other salmonid species, which occupy similar habitats as the three salmonids species currently protected by the ESA.

Survival of salmonids within the north Pacific Ocean portion of their migration route is a major factor in assessing the cumulative effects of a project on aquatic resources. Ocean conditions such as the Pacific Decadal Oscillation, El Niño, sea surface temperature anomalies, coastal upwelling influence the growth and survival of all northwest Pacific salmon stocks (Peterson et al. 2010). These conditions will continue to change and be a major factor in the survival of anadromous salmon produced in the Lake Washington and Grays Harbor watersheds.

**What would the project's additional contribution to cumulative effects on fish and aquatic resources likely be?**

The fact that Pacific salmon stocks inhabiting Lake Washington and its tributaries are classified as Endangered under the ESA indicates that their populations are at a tipping point where long-term trends in their condition

could be adversely altered by short-term construction effects. In particular, impact pile-driving and the presence of construction work bridges could impede salmon migration, and the overhead structures provided by work bridges could increase salmon mortality by providing habitat for predators. These short-term construction effects could thus contribute to the cumulative effect on salmonids.

Over the long term, the SR 520, I-5 to Medina project would have a minor beneficial, although likely not measurable, contribution to the cumulative effect on aquatic resources. The condition of habitat and expected restoration plans for salmonid recovery as described in the Ecosystems Discipline Report Addendum and Errata (Attachment 7) would not change because of the SR 520, I-5 to Medina project. This project is expected to provide a slight beneficial contribution to the cumulative effect on water quality in Lake Washington, although it would have no effect throughout the rest of the study area. Recent juvenile salmon studies indicate that the new bridge would have an effect similar to or less than the existing Evergreen Point Bridge on smolt migration, and that the new transition spans, specifically the west transition span, would have less intense direct effects on smolt migration as they are higher and farther offshore, thus reducing shading effects on behavior. Data for adult spawner returns also support the conclusion that the project would not have a measurable effect on aquatic resources. The condition of the ocean is a major factor in survival of anadromous salmon, although the incremental loss of freshwater habitat cannot be discounted or ignored. However, this cumulative loss, part of a greater trend, would not receive a contribution from the direct or indirect effects of the SR 520, I-5 to Medina project.

As more fully discussed in the Final Indirect and Cumulative Effects Discipline Report (Attachment 7), WSDOT did not find evidence that construction of a wider Evergreen Point Bridge would affect salmon populations in the lake. Using the Cedar River Chinook, various Coho, and sockeye salmon returns available and the reconstruction of the I-90 Bridge in 1993, WSDOT did not find a correlation between salmon population counts and bridge reconstruction. However, as is well-documented, salmon return numbers have declined since the late 1980s.

#### How could cumulative effects on fish and aquatic resources be mitigated?

A variety of measures could mitigate the cumulative effects on fish and aquatic resources, such as the following:

- A region-wide cooperative interagency approach or public-private partnerships, with a focus on improving fish habitat conditions and water quality within WRIs 8 and 22 and Puget Sound, would aid in the recovery of fish stocks. This is underway with watershed planning, which specifically addresses water quality and habitat, as well as ESA



recovery plans addressing listed species but also possibly improving habitat and other life-cycle issues for other non-listed species.

- More stringent land use regulations could reduce future negative effects on fish associated with stormwater runoff and human development.
- Habitat restoration at the south end of Lake Washington is potentially available at the Cedar River Delta and the adjacent Department of Natural Resources site east of the delta. These potential projects offer the opportunity to produce new high-quality shoreline habitat at locations where it would be most valuable to salmonid fry emigrating from the Cedar River.

## Wildlife and Wildlife Habitat

### What is the historical trend for wildlife and wildlife habitat?

Past development actions, such as road construction and housing, have adversely affected wildlife habitat within the study area. Recent past and present trends in habitat quality and quantity are expected to continue in response to present actions and reasonably foreseeable actions. These actions include alteration of ecosystem processes; loss, alteration, and fragmentation of suitable habitat; introduction of invasive species; overharvesting; increases in impervious surface area and water pollution; and changes in natural flow regimes. Taken together, these effects have resulted in significant loss of wildlife habitat in central Puget Sound region. Transportation systems, which are a component of the overall urban development pattern within the central Puget Sound region, have historically played a key part in these ecosystem changes (PSRC 2010a).

The coastal route for shipping the pontoons contains suitable habitat or occurrences of six ESA-listed species (leatherback sea turtle, southern resident killer whale, humpback whale, Steller sea lion, brown pelican, and marbled murrelet), as well as designated critical habitat for the southern resident killer whale population. No species listed under the ESA occur along the SR 520 corridor, although the bald eagle receives protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The trends for effects on wildlife and wildlife habitat are likely to continue, though state and federal regulations and international treaties that may be implemented within the project timeframe would slow or mitigate those losses.

### What is the cumulative effect of current and reasonably foreseeable actions without the project?

In the reasonably foreseeable future without the project, wildlife and wildlife habitat, with the exception of urban-adapted wildlife, is likely to continue to decline as the factors affecting wildlife mentioned above continue. However, the ESA and other federal, state, and local regulations are designed to protect wildlife and the ecosystems on which they depend. Regulatory and voluntary efforts to improve habitat are expected to

continue with or without the project. Water quality in Lake Washington is likely to continue to improve as land development and roadway projects in the study area are constructed, and the management and treatment of stormwater improves.

Land development and roadway projects may either benefit or adversely affect wildlife and wildlife habitat. In the project area there are no large tracks of undeveloped land; even parks are highly managed though may be more compatible with wildlife. The Washington Park Arboretum and other restoration programs discussed in the wetlands section would likely benefit wildlife as well.

#### What would the project's additional contribution to cumulative effects on wildlife and wildlife habitat likely be?

In general, wildlife in the study area has been substantially affected and would continue to be affected by past actions, present actions, and reasonably foreseeable actions. The availability of suitable habitat for many species of wildlife would likely continue to decline. In contrast, wildlife adapted to urban conditions (such as crows, sparrows, and raccoons) would likely continue to flourish.

The existing SR 520 roadway creates a barrier not only to people but also to wildlife. Many of the features of the proposed project to increase connectivity for people, such as trail improvements, may also help wildlife. WSDOT has made efforts to avoid and minimize negative effects on wildlife. However, the project would result in permanent loss of 8.1 acres of wildlife habitat and shading of 6.5 acres of vegetation. Adverse effects associated with habitat loss may be offset to some degree by long-term improvements in stormwater quality, decreased noise disturbance, and reduced barriers to animal movement. Urban habitats in the SR 520 corridor are not likely to provide key habitat for the maintenance of wildlife populations that are threatened by range-wide habitat degradation and loss. Considered with the effects of past, present, and reasonably foreseeable actions, the direct effects of the project operation would be expected to have a negligible contribution to cumulative effects on wildlife in the study area.

#### How could cumulative effects on wildlife and wildlife habitat be mitigated?

A number of initiatives are underway that would improve wildlife habitat. These include improving park areas and creating corridors for people that also function as wildlife corridors. The City of Seattle has a number of regulations that limit vegetation removal, which could be strengthened or expanded to further promote wildlife habitat. The following are other potential measures:

- More stringent regulations through land use planning and growth management

- Improved planning on a larger scale to include wildlife corridors
- Better coordination among agencies to voluntarily implement planting and corridor strategies
- National or global agreements limiting the emission of GHGs that could help slow or stop the manifestations of global climate change
- Voluntary efforts by individual developers that can often be implemented at relatively small additional cost; these efforts could create small but, with time, cumulatively substantial new habitat areas to slow and offset cumulative habitat loss from past development, such as the following:
  - Using native plants in landscaping
  - Designing curved or irregular rather than straight boundaries between vegetated and nonvegetated areas
  - Leaving islands of native vegetation connected by vegetated corridors
  - Providing vegetated buffers along streams

## Air Quality

### What is the historical trend for air quality?

According to PSRC's *Transportation 2040*, "regional air pollution trends have generally followed national patterns over the last 20 years, with the level of criteria air pollutants decreasing over the last decade to levels below the federal standards" (PSRC 2010a). In the same document, PSRC points out that carbon monoxide (CO) levels have decreased substantially in the region, in large part because of federal emission standards for new vehicles and the gradual replacement of older, more polluting vehicles. Additionally, improvements in fuels, inspection programs, and traffic control measures have also helped to decrease CO emissions.

The central Puget Sound region has designated maintenance areas for CO and particulate matter. The region is in attainment for all other criteria pollutants. In general, the air quality in the central Puget Sound region has either maintained or seen improvements over the last 5 years. Cleaner cars, industries, and consumer products have contributed to cleaner air throughout much of the United States, including in the central Puget Sound region, and this trend is likely to continue.

### What is the cumulative effect of current and reasonably foreseeable actions without the project?

Without the project, regional air quality is still likely to improve between the present and 2030 because of trends towards cleaner vehicles and industries. A number of transportation infrastructure projects are planned for the reasonably foreseeable future, including the provision of HOV lanes from

Medina to SR 202 (Eastside Transit and HOV Project) and Sound Transit's North Link and East Link light rail projects. These projects would increase transit and multiple-occupancy vehicle use on the SR 520 corridor beyond present levels, increase the overall efficiency of the transportation system, and help to reduce the overall number of vehicle miles traveled (VMT).

What would the project's additional contribution to cumulative effects on air quality likely be?

Because the Preferred Alternative and SDEIS options would be a major transportation project located in a maintenance area for CO, it would be subject to transportation conformity requirements. The intent of transportation conformity is to ensure that new projects, programs, and plans do not impede an area from meeting and maintaining air quality standards. Conformity with the State Implementation Plan (SIP) means that transportation activities will not produce new air quality violations, worsen existing violations, or delay timely attainment of the National Ambient Air Quality Standards (NAAQS).

The project is not expected to create any new violations, nor increase the frequency of an existing violation of the CO standard; it would conform with the purpose of the current SIP and the requirements of the federal Clean Air Act and the Washington Clean Air Act. As a "regionally significant" project, the proposed project is included in the current regional transportation plan (RTP), *Destination 2030* (PSRC 2007), and in the Puget Sound Regional 2010-2013 Transportation Improvement Program (TIP), which lists all current transportation projects (PSRC 2010b). The RTP and the TIP meet the conformity requirements identified by federal and state regulations for CO. The proposed project is also included in all of the action alternatives in *Transportation 2040* (PSRC 2010a).

How could the cumulative effect on air quality be mitigated?

No cumulative effects were identified; therefore, per WSDOT guidance, mitigation is not provided.

## Geology and Soils

What is the historical trend for geology and soils?

The Puget Sound has undergone multiple glaciations that have deposited a variety of soil types (PSRC 2010a). Supplies of aggregate, including sand and gravel, are in the many millions of tons, with gravel mines located throughout the Puget Sound region.

Human activities since the late 19th century have substantially changed the topography near the corridor. These activities include lowering of Lake Washington; construction of the Montlake Cut; and substantial terrain alterations to build the I-5 and SR 520 roadways, the University of

Washington campus, and other buildings and structures along the SR 520 corridor.

Past construction practices were less effective than today's standards in anticipating geologic and seismic hazards, gravel depletion, and soil erosion. Cumulative development in the region results in top soil loss and erosions and as the infrastructure has aged, a greater percentage of constructed projects have not meet evolving seismic design standards. As these trends became evident, roadway and bridge design codes were updated and development occurring on unstable soils and slopes requires specific site preparation measures be applied to reduce hazards associated with unstable soils and slopes and to provide better protection for the public, resulting in facilities that are more capable of resisting seismic events without damage. BMPs are standard practice in protecting against soil erosion and landslide potential. Construction debris can now be recycled into usable building materials.

What is the cumulative effect of current and reasonably foreseeable actions without the project?

Proposed projects would continue to result in minor changes to topography through excavation and filling. Near the project, for example, the SR 520, Medina to SR 202: Transit and HOV project, the East Link light rail project, the North Link Light Rail Station at Husky Stadium project, and the University of Washington Master Plan would all contribute to changes in the adjacent topography. However, these and other transportation and development projects would be constructed to ever-evolving design and seismic safety standards. No negative effects on geologic and soil conditions would be likely.

Planned construction projects would likely require sand, gravel, and other mineral materials extracted from borrow sites. Over the long-term, this could result in development of new borrow sites or expansion of existing sites to maintain adequate supplies for construction.

What would the project's additional contribution to cumulative effects on geology and soils likely be?

The SR 520, I-5 to Medina project would be constructed to current seismic standards and decrease the risks associated with a seismic event along a major transportation corridor used by thousands of people every day. Construction of the project would contribute toward depleting regional sources of aggregate in conjunction with other past, present, and reasonable and foreseeable projects in the central Puget Sound region. However, given the large supply of aggregate across the region, no adverse cumulative effect is expected.

## How could cumulative effects on geology and soils be mitigated?

No cumulative effects were identified; therefore, per WSDOT guidance, mitigation is not provided.

## Hazardous Materials

Hazardous materials are not themselves a resource that would be evaluated for cumulative effects. Hazardous materials can, however, enter the air and water and eventually affect human health and ecosystems. Hazardous materials can be associated with contaminated soils and groundwater, building materials encountered through demolition, accidental spills at construction sites, and leaking underground storage tanks. Depending on the type of contamination, there can be risks to worker safety and public health as well as environmental damage.

The risk of encountering hazardous materials during the construction of this project is low, however, and safeguards would be in place to minimize temporary impacts, including the WSDOT Spill Prevention Control and Countermeasures Plan for construction projects. The Preferred Alternative and SDEIS options would further contribute to the gradual reduction in existing ground and water contamination by removing hazardous materials that might be encountered during construction. See the Hazardous Materials section (5.13) in Chapter 5 and the Hazardous Materials Discipline Report Addendum and Errata (Attachment 7) for additional information on hazardous materials effects that could be associated with the project and how WSDOT would mitigate them.

Transportation improvement projects improve hazardous material conditions because contaminated soil or water encountered during construction must be removed and disposed of, leaving the site cleaner than it was before. The Transportation 2040 Final EIS (PSRC 2010c) concludes that future projects will continue a positive, declining trend in the total amount of hazardous materials present in the central Puget Sound region.

## 7.8 What cumulative effects on the built environment did WSDOT identify?

The rest of this chapter briefly discusses cumulative effects that could be associated with the Preferred Alternative and SDEIS options. The Final Indirect and Cumulative Effects Discipline Report provides additional information.

## Recreation

### What is the historical trend for recreation?

Seattle's park and recreation resources are interspersed across Seattle and are a key element in defining the development pattern of residential, business, civic, and recreational land uses across the city. The vision and guiding principles for the City of Seattle park system date back to 1903 when the City hired the Olmsted Brothers to prepare a comprehensive plan. The Washington Park Arboretum, as well as numerous playgrounds and playfields, are elements of the original park system.

Park and recreation resources are highly valued by Seattle residents and visitors. As such, they are rarely lost to development projects and when lands are converted to non-recreational purposes, replacement parkland mitigation is required. In 2008, voters approved a \$146 million Parks and Green Spaces Levy for the acquisition, improvement, and maintenance of open spaces and recreational lands and facilities in neighborhoods across Seattle.

### What is the cumulative effect of current and reasonably foreseeable actions without the project?

Without the project, the City of Seattle would continue to manage and acquire parklands per current development plans and using funds from the Parks and Green Spaces Levy described above.

### What would the project's additional contribution to cumulative effects on recreation in the SR 520 corridor likely be?

The direct effect of converting 3.94 acres of parkland adjacent to the SR 520 corridor to transportation right-of-way—considered in the context of other past, present, and reasonably foreseeable actions—would contribute a small physical change to the long-term cumulative effect of development on Seattle's recreational lands. However, unlike the experience of past years, today's transportation improvement projects include mitigation in the form of replacement parkland. No permanent loss in total park area would result from the proposed project in combination with the SR 520, Medina to SR 202 project, Sound Transit's North Link and East Link light rail projects, and other planned transportation improvement and land development or redevelopment projects. In all cases, adverse effects on recreational lands would be mitigated as consistent with applicable requirements.

The conversion of parks to other uses is rare, and when conversion is necessary, there is typically a replacement of the land and function. Consequently, state and local jurisdictions are actively increasing the amount of parks and open space within the central Puget Sound

region. There are new parks identified in neighborhood plans, new parks identified in the Seattle's Parks and Recreation 2006 Development Plan, boulevards, and other properties purchased by the City for open-space and recreational purposes. Cumulatively, there is likely to be a net gain over time in the total area of parkland in the study area.

### How could cumulative effects on recreation be mitigated?

Past effects on recreational and parkland resources due to transportation projects were often significant. However, since the 1960s a number of federal regulations have been put in place to limit the effect of transportation projects on these resources, including Section 6(f) and Section 4(f). Additionally, most cities and counties include protections for existing recreational resources and provisions to add to recreational opportunities. The City of Seattle has several ordinances and planning programs to do just this. Continued implementation of existing regulations and ordinances, which require avoidance and minimization measures before considering mitigation, will slow and possibly reverse the loss of recreational resources. The inclusion of new parklands and other recreational resources, including preservation of views and access to water, is another measure to mitigate loss of recreational opportunities and resources. For Seattle, that includes providing new opportunities for access to fresh and marine water.

WSDOT's mitigation requirements include replacement parkland, which would result in a net gain of parkland within the city. Under Section 6(f), WSDOT identified a 3.9-acre replacement park site along Portage Bay on property owned by the University of Washington (see Chapter 10). There is also a suite of mitigation measures to address Section 4(f) impacts including:

- Selected measures contained in the Arboretum Mitigation Plan developed by the Engrossed Substitute Senate Bill (ESSB) 6392 workgroup for effects on parkland in the Washington Arboretum Park;
- Those developed to address the use of park and recreation properties under Section 4(f) (see Chapter 9); and
- Those included in the community construction management plan, developed in coordination with the Section 106 consulting parties and other affected parties in the community.

### Environmental Justice

A number of different populations are considered in the Environmental Justice section. These include low-income, minority, and Native American populations. Additionally, this Final EIS evaluates limited-English proficient (LEP) populations. The direct and indirect effects from this project are described in the previous sections. To summarize, the project would not have a disproportionately high and adverse effect on low-income, minority, and LEP populations living near the project and would



not contribute to a cumulative effect. The direct and indirect effects from tolling have been updated in context of the project, as well as current and future actions; the regional investments are described below as cumulative effects.

Following the issuance of the SDEIS, WSDOT examined the regional efforts to improve mobility of low-income residents. As noted earlier, the project would have direct effects on the usual and accustomed fishing areas of the federally recognized Muckleshoot Indian Tribe and the Foster Island traditional cultural property (TCP). Therefore, the potential cumulative effects related to Native Americans are considered for cumulative effects.

What is the historical trend for environmental justice populations?

#### Native American Populations

Native Americans inhabited the project area long before the first European explorers sailed into the Puget Sound. They lived throughout the region and hunted and fished to provide food for themselves. Since the mid-19th century, indigenous people have yielded much of the land and water where they lived, hunted, and fished. Development activities have altered fish and aquatic habitats, which in part have led to a decline in the quantity of fish resources and affected usual and accustomed tribal fishing. The Ecosystems section provides more detailed analysis of the declines in fisheries resources.

#### Low-Income Populations

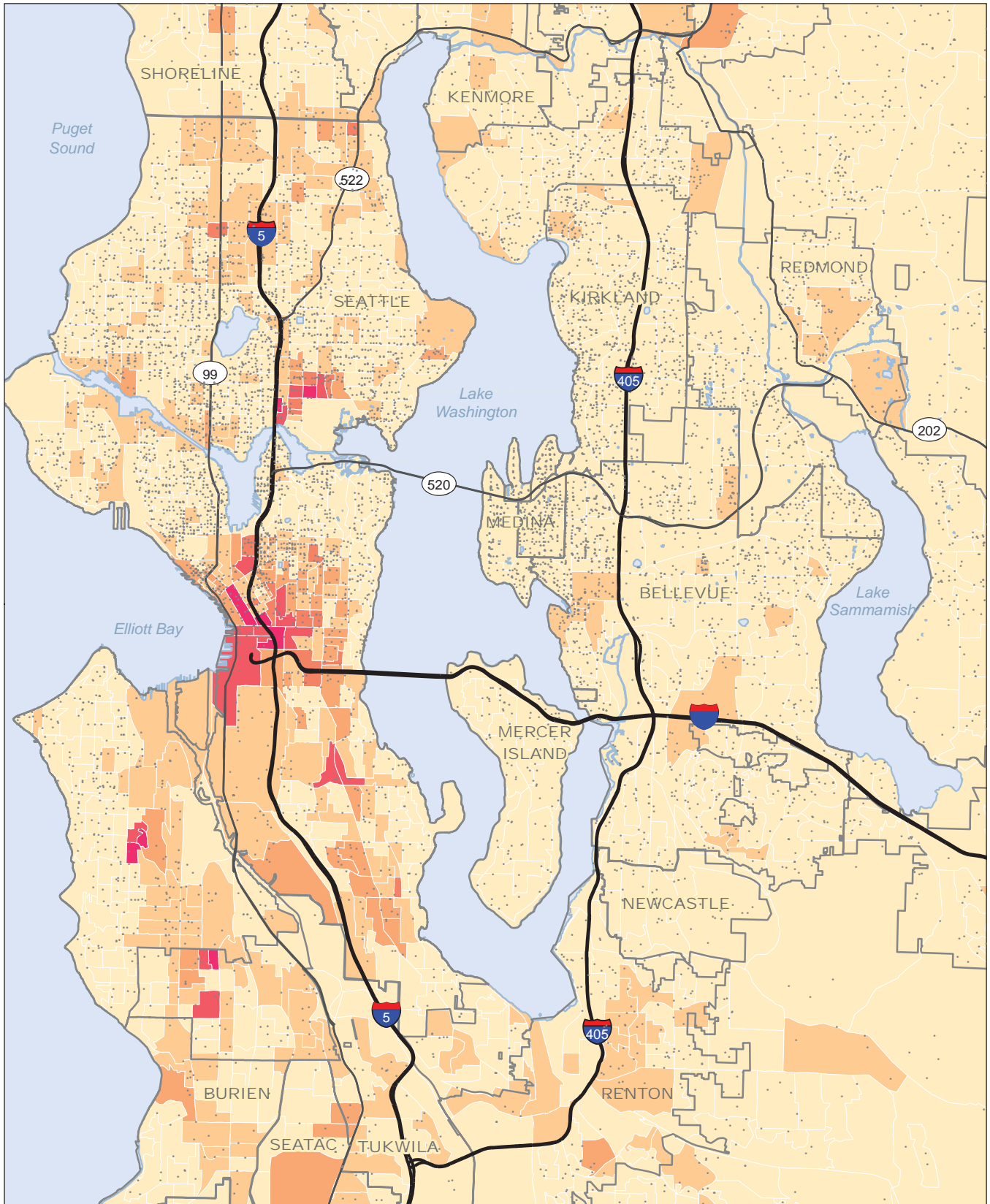
The cost of housing is the key factor in trends that influence where low-income people live within the project area. Decades of census data show various trends. The 2000 census shows pockets of low-income residents in the city limits (Exhibit 7-4). According to outreach conducted for *Transportation 2040*, low-income populations tend to live outside urban areas due to the scarcity of affordable housing, where there is limited or no access to transit (PSRC 2010a).

What is the cumulative effect of current and reasonably foreseeable actions without the project?

#### Native American Populations

Historical and present trends and stressors indicate that the condition of fish and aquatic habitat would most likely continue to degrade into the reasonably foreseeable future. Compensatory mitigation, regulatory, and voluntary efforts to improve habitat will continue with or without the project. Goals for recovery and restoration efforts for fishery populations associated with Lake Washington include improvements to fish access/passage; stream restoration projects; improvements in water quantity and quality; and protection/preservation of existing high-quality habitat.

Exhibit 7-4. Percent Below Poverty Level in the Evergreen Point Bridge Travelshed Area



**Percent at or below Poverty Level by 2000 Census Block Group**

- Less than 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- Greater than 50%

Registered address of vehicle videotaped at Evergreen Point Bridge on- and off-ramps



## Low-Income Populations

The region is looking closely at ways to improve mobility for all its residents. Transportation partners are planning actions to address the challenges that low-income populations face.

Some of the efforts include improving transit, paratransit, and public/private incentives targeting affordable housing with a transportation connection.

Light rail projects such as North Link and East Link, and transit projects including *Transit Now* and Sound Transit 2 Program, would provide more affordable and convenient transportation alternatives for all residents in the region, including low-income and minority populations. The SR 520 Variable Tolling Project (described in Chapter 1) is part of the Lake Washington Congestion Management Program, funded by the U.S. Department of Transportation. In spring 2011, WSDOT will begin automated electronic tolling on SR 520 to relieve existing congestion. The amount of the toll will vary based on time of day and will be designed to maintain travel time, speed, and reliability while generating revenue to fund improvements in the SR 520 corridor.

The legislation authorizing the Variable Tolling Project defined its toll as a “preconstruction toll.” This means that, if the SR 520, I-5 to Medina project moves forward, tolls under the Variable Tolling Project would be discontinued when construction begins and replaced with a new toll to provide funding for SR 520 corridor projects, in accordance with the financing plan. (The new toll would need to be passed by the legislature.) If the No Build Alternative were selected for the SR 520, I 5 to Medina project, the tolls would be discontinued when the bonds for the SR 520, Medina to SR 202 project and the SR 520 Pontoon Construction Project had been paid. The allocation of toll revenues to fund these projects was authorized by the legislature in Engrossed Substitute House Bill (ESHB) 2211 and ESSB 6392 (see Section 1.10 for more information).

The Transportation Commission, along with WSDOT and other regional partners, may implement tolling on other regional highways. Media campaigns and outreach to service providers will help communicate transportation options and measures to gain access to transponders.

What would the cumulative effects on environmental justice populations likely be?

## Native American Populations

The cumulative effects of the project when considered with other reasonably foreseeable actions on environmental justice populations would be similar to future conditions without the project. The cumulative effects on fish and aquatic habitat would be similar to the future trends without the project, with the exception of a slight benefit to water quality and fish

habitat; however, the effects on long-term fisheries trends or stressors would not be measurable. As demonstrated in Section 5.11, the presence of the SR 520 and I-90 bridges is not a limiting factor for salmon production. As such, the Preferred Alternative and SDEIS options would not have a cumulative effect on fish production and the associated effect on Native Americans.

The Preferred Alternative and SDEIS options would have a larger footprint than the existing bridge. This increase is minor compared to the size of Lake Washington. However, the larger footprint does have effects to existing usual and accustomed tribal treaty fishing areas. In addition, the bridge would be in essentially the same location.

WSDOT, in consultation with interested and affected tribes, determined that there would be an adverse effect on historic properties, including Foster Island, which has been determined eligible for the National Register of Historic Places (NRHP) as a TCP. The qualities that contribute to the significance of Foster Island would be diminished from impacts associated with construction and operation of the project. These impacts to Foster Island, as a culturally important site, would contribute to the cumulative effects on Native American populations.

### Low-Income Populations

In the SDEIS, WSDOT disclosed its initial analysis (completed in 2008) of the effect of tolling on the low income, car-dependent users of the bridge. Since publication of the SDEIS, WSDOT and King County Metro Transit have taken meaningful steps to provide affordable alternatives to paying the toll. The SR 520, I-5 to Medina project, in conjunction with planned transit and light rail projects and the SR 520 Variable Tolling Project (described in Chapter 1), would help promote affordable mobility for low-income populations by increasing the efficiency of the transportation system and providing HOV lanes along the corridor to accommodate improvements in transit services. These are more fully discussed in the Environmental Justice Discipline Report Addendum and Errata (Attachment 7). The Final EIS concludes that there is not a high and disproportionate adverse effect on low-income populations due to tolling. After careful consideration of the project benefits, other current and future projects, and the regional dialogue on mobility, WSDOT found that the project would not contribute to an adverse cumulative effect on low-income populations.

### How could cumulative effects on low-income and minority populations be mitigated?

Since the 1960s, federal and state regulations have been enacted to minimize impacts on TCPs and usual and accustomed fishing areas. Potential mitigation for these resources is further discussed in Sections 5.6 and 6.6.

Cumulative effects on low-income populations are being reduced by implementation of several programs including improving transit frequency and increasing the number of routes, implementation of the SR 520 Variable Tolling Project that includes provisions for low-income populations and encourages carpooling/vanpooling, and construction of light rail projects. The reduced congestion and increased predictability and travel time savings offset negative financial impacts on low-income populations (see the Environmental Justice Discipline Report Addendum and Errata [Attachment 7]).

Many federal, state, regional, and local efforts seek to address the transportation needs of low-income populations. For example, low-income people and LEP are considered in PSRC's Coordinated Transit-Human Services Transportation Plan. The 2011-2014 Coordinated Transit Human Services Plan, adopted by PSRC's General Assembly on May 20, 2010 (PSRC 2010d), outlines how transit agencies, social service agencies, school districts, and other transportation providers can most efficiently and effectively work together to improve regional mobility for individuals with special transportation needs throughout King, Kitsap, Pierce, and Snohomish counties.

## Cultural Resources

Cultural resources include “historic properties” such as historic districts, sites, buildings, structures, or objects included in, or eligible for listing in the NRHP. The term also includes significant archaeological sites and TCPs, also discussed in the Environmental Justice section.

### What is the historical trend for cultural resources?

Past and present development has removed or altered the character of many cultural resources in the central Puget Sound region during the last 150 years. The development and subsequent loss of character or integrity of historic properties follows a national trend, which led to the passage of federal and state regulations to protect these resources. In 1966, Congress passed the National Historic Preservation Act to slow the trend of loss. Washington State, King County, and the City of Seattle also have regulations to protect cultural resources and to consider effects on properties eligible for listing in the Washington Historic Register or designation as a King County for Seattle landmark. Although many resources have already been lost, the rate of attrition is slowing because of federal, state, and local protections and an increasing public interest in preserving the nation's cultural heritage for future generations.

### What is the cumulative effect of current and reasonably foreseeable actions without the project?

Development and redevelopment of historic sites could be beneficial or detrimental to cultural resources. The increased interest in preservation

means that many structures that would have been demolished in the past are now rehabilitated. However, the setting of these resources may be compromised by other developments. *Transportation 2040* concludes that without oversight and protection, high-density redevelopment in the region could perpetuate the continuing loss of cultural properties and artifacts (PSRC 2010a). It also notes, however, that development and growth can provide opportunities for the appropriate redevelopment and reuse of historic or culturally significant structures (PSRC 2010a).

What would the project's additional contribution to cumulative effects on cultural resources likely be?

In the project area, residential neighborhoods established in the late 19th and early 20th centuries now include houses and other structures eligible for inclusion in the NRHP as well as Historic Districts, as explained in the Cultural Resources section of Chapter 5. Although the project would not affect any known archaeological sites, it would remove some aboveground historic properties and affect one TCP.

Two properties that could be removed by the project are contributing elements to the Montlake Historic District. Others are individually eligible bridge structures. It is not expected that there would be sufficient loss of property from this or other reasonably foreseeable future projects to reduce the significance of any historic district enough to affect its status for NRHP eligibility. The project is not likely to add to the cumulative effect on built environment properties or archaeological resources. The project would make a minor contribution to the cumulative effect on traditional cultural properties.

How could cumulative effects on cultural resources be mitigated?

The primary federal law regulating effects on cultural resources is Section 106 of the National Historic Preservation Act. Section 106 protects resources that are listed in, or eligible for listing in, the NRHP. Under Section 106, federally sponsored or funded projects are required to avoid, minimize, or mitigate adverse effects if project activities would directly or indirectly cause harmful effects on recognized historic properties or sites.

In Washington, the Department of Archaeology and Historic Preservation, King County, and the City of Seattle also require consideration of effects on properties that have local or statewide significance, are listed or eligible for listing in the Washington Heritage Register, or are designated as a King County or Seattle landmark. These agencies work together to guide and coordinate the administration of historic preservation laws and regulations in order to protect cultural resources.

The legislation and ordinances described above have slowed the pace of loss of cultural resources. However, not all projects are required to comply

with all the regulations, so the increased interest by the public in the preservation and restoration of cultural resources is a key factor when legislation and ordinances do not apply.

WSDOT developed a Programmatic Agreement that addresses mitigation requirements for historic and cultural resources. This agreement, including the mitigation measures, is an attachment to the Final Cultural Resources Assessment and Discipline Report (Attachment 7).

## Transportation

What is the historical trend for transportation?

Growth and development in Seattle and the Puget Sound region have resulted in increased traffic volumes and congestion for many decades. SR 520 is a significant east-west route between Seattle and the Eastside. Traffic currently exceeds capacity at certain times of the day and the existing configuration adds to the congestion.

What is the cumulative effect of current and reasonably foreseeable actions without the project?

Traffic modeling for the SR 520, I-5 to Medina project (described in Section 5.1 of this Final EIS) assumed that the transportation projects shown in Table 7-2 would be in operation by the design year of 2030, since under the definition of “reasonably foreseeable” these projects are expected to be funded and built. In this sense, the transportation analysis is inherently an evaluation of cumulative effects. However, to account for potential changes in future conditions, WSDOT also performed an analysis of transportation projects that are planned for completion by 2030, but had *not* been programmed or funded at the time this Final EIS was prepared. Assumptions for this transportation cumulative effects analysis are provided in Chapter 11 of the Transportation Discipline Report in Attachment 7. They include implementation of the full I-405 Master Plan, a number of unfunded projects identified in *Transportation 2040*, and a potential future regional tolling scenario (recommended in *Transportation 2040*, but not yet planned or programmed). This section summarizes the findings of that evaluation.

The regional population is expected to continue to grow into the future. Without the project, SR 520 would be operated in the year 2030 without tolls and the daily traffic demand would increase by 11 percent from today’s levels due to growth in population and employment. Travel times in the west-bound general-purpose lanes would increase by up to 20 minutes and east-bound travel times would increase by 8 minutes. In addition, congestion at intersections near SR 520 would increase and the level of service at some of these intersections would decrease to failing (see Chapter 2 of the Final Transportation Discipline Report [Attachment 7]).

While the No Build Alternative assumes no tolling on SR 520 in the year 2030, the Lake Washington Congestion Management Project, in conjunction with Transportation Commission, could elect to implement a tolling program on SR 520 and other major roadways to manage congestion by reducing the number of general-purpose vehicle trips and increasing HOV trips on SR 520. Drivers may also elect to avoid SR 520 if tolls were implemented and choose an alternate route, such as I-90 or SR 522, for cross-lake travel.

### What would the project's additional contribution to cumulative effects on transportation likely be?

The SR 520, I-5 to Medina project, regardless of the build alternative identified, would not affect regional growth but would have an impact on regional traffic conditions, including how people move east and west between Seattle and the Eastside, as well as levels of congestion along local roads such as Lake Washington Boulevard and Montlake Boulevard. In the year 2030, total traffic crossing the SR 520 corridor is forecasted to be 5 percent less for the Preferred Alternative and SDEIS options compared to the No Build Alternative, mostly due to the No Build Alternative not being tolled into 2030.

WSDOT expects HOV demand to increase substantially on SR 520 with the Preferred Alternative and SDEIS options compared to the No Build Alternative because the SR 520 program completes the HOV lane system between Redmond and Seattle, and carpools and transit would not be required to pay a toll. The combination of reduced travel time and cost avoidance is a powerful incentive for carpool and transit use. An additional, but smaller, increase in carpool demand is also projected within the region if a toll is also added to the I-90 Lake Washington crossing.

The PSRC modeling indicates that the total net peak and daily cross-lake vehicle travel would decrease compared to the No Build Alternative. This overall decrease would occur because increases in the number of peak and daily cross-lake trips by HOV vehicle trips would be more than offset by the decrease in cross-lake general-purpose trips. In essence, there would be fewer vehicles moving more people across Lake Washington compared to the No Build Alternative. The increase in HOV travel would result from the implementation of tolls on both SR 520 and I-90.

### How could cumulative effects on transportation be mitigated?

Generally, transportation improvements provide a beneficial effect by increasing and/or effectively managing roadway capacity and the efficiency of intersection operations, reducing congestion, enhancing safety, and improving access. The SR 520, I-5 to Medina project would provide these



benefits, as well as improving transit and non-motorized facilities and reducing transit travel times.

There are a number of planned or reasonably foreseeable transportation that would provide improvements to accommodate potential increases in traffic on SR 522 and I-90, resulting from the proposed tolling of SR 520. For I-90, these include the Sound Transit East Link light rail project, the WSDOT/Sound Transit I-90 Two-Way Transit and HOV Operations project, and potential future implementation of a toll on the I-90 bridge midspan. The WSDOT I-5 to I-405 Multi-modal project is planned for SR 522. In addition, Sound Transit 2 and the *Transit Now* programs will continue to expand and increase the regional express and local bus service. As more fully discussed in Chapter 2, the SR 520 corridor can accommodate light rail, although the design for this has not been initiated.

## Navigation

### What is the historical trend for navigation?

There have been significant changes to navigation between Lake Washington and the Puget Sound, starting with the construction of the Lake Washington Ship Canal in 1916. Channel width and depth as well as bridges limit navigation. Construction of the I-90 and Evergreen Point bridges across Lake Washington in the 1950s and 1960s established a set of horizontal and vertical clearances for vessels traveling to the south end of the lake. The Evergreen Point Bridge was constructed with a drawbridge so that when opened there is not a vertical restriction, although the recent history of openings indicates there is little need for the drawbridge.

### What is the cumulative effect of current and reasonably foreseeable actions without the project?

Existing conditions would be expected to continue into the future without the project. There were no projects identified that would be expected to change vertical or horizontal restrictions for vessel movement throughout the project area. This includes Sound Transit's East Link on I-90 and North Link across the Montlake Cut.

### What would the project's additional contribution to cumulative effects on navigation likely be?

The future navigation conditions would be similar to the without project conditions with the exception of the closure of the mid-span drawbridge, which would impose a vertical height limitation on vessel traffic moving south of the floating portion of the Evergreen Point Bridge and would impose an additional clearance limit on Lake Washington overall. Because the clearance limit would essentially match that of the I-90 lake crossing, and because there would be minimal effects on vessels that use the lake, only incidental adverse cumulative effects on navigation were identified. In

addition, the SR 520, I-5 to Medina project would result in incidental adverse permanent effects on navigation. The project is not expected to have any effects on Puget Sound or Pacific Ocean navigation.

How could cumulative effects on navigation be mitigated?

No cumulative effects were identified; therefore, per WSDOT guidance, mitigation is not provided.

## Land Use

What is the historical trend for land use?

Land use trends were established within a short period after the Puget Sound region was settled by non-indigenous people in the mid-19th century. While development began on the Eastside around the same time, it accelerated in the 1970s when Bellevue and Redmond became urban centers.

What is the cumulative effect of current and reasonably foreseeable actions without the project?

The PSRC predicts that by 2040 there will be an additional 1.5 million people, an additional 1.2 million jobs, and approximately 800,000 additional housing units in the central Puget Sound region regardless of any of the transportation projects identified in the regional planning documents.

*Transportation 2040* predicts that much of the forecasted growth will occur as infill development within urbanized centers, as required under the Growth Management Act (PSRC 2010a). Without the project, land use is not expected to significantly change from current uses and is expected to be consistent with *Vision 2040*, land use regulations, and the Growth Management Act.

What would the project's additional contribution to cumulative effects on land use likely be?

The SR 520 project would not contribute to a cumulative effect on land use in combination with other past, present, and reasonably foreseeable actions. This finding was supported by the land use analysis in *Transportation 2040*, which incorporated reasonably foreseeable changes in central Puget Sound's future land use, population, employment, and travel patterns, including the SR 520 project.

The SR 520 project, in conjunction with other reasonably foreseeable actions, would convert existing land uses to transportation right-of-way. Although these conversions would reduce the area of land available to a small extent, they would cumulatively convert only a small portion of the total land in the central Puget Sound region over the next 30 years. As discussed in the Final Indirect and Cumulative Effects Discipline Report and PSRC's *Transportation 2040*, regional growth is expected to occur within

designated urban growth centers consistent with regional growth strategies. The SR 520 project's contribution of 10.1 converted acres would be negligible in a regional context.

How could cumulative effects on land use be mitigated?

No cumulative effects were identified; therefore, per WSDOT guidance, mitigation is not provided.

## Visual Quality and Aesthetics

What is the historical trend for visual quality and aesthetics?

The transformation of the visual landscape began with the arrival of non-indigenous settlers in the mid-19th century. Over a century and a half, they harvested the forest and built transportation routes to reach undeveloped resources, steadily developing the central Puget Sound region. Urban centers including Seattle and eastside communities like Bellevue were built and connected through roadways. The cities and roadways, including bridges across Lake Washington, became significant features of the visual landscape.

What is the cumulative effect of current and reasonably foreseeable actions without the project?

Without the project, the visual character of the central Puget Sound region would be a complex mixture of forested and open-water areas with urban and suburban centers, much like today. Urbanization and development are expected to continue as demonstrated by the planned roadway, non-roadway, and land development projects listed in Table 7-2 and through development plans such as *Vision 2040*.

What would the project's additional contribution to cumulative effects on visual quality and aesthetics likely be?

The long-term presence of the proposed new Evergreen Point Bridge would not make a difference to the cumulative effect of past, present, and reasonably foreseeable actions on visual quality and aesthetics, because it would replace a similar bridge that exists in approximately the same location today. Although the exact view may be altered from the existing view, the setting of the roadway within the urban center and across Lake Washington would not be altered to any significant degree. Therefore, the project would not have cumulative effect on visual quality and aesthetics in the study area.

How could cumulative effects on visual quality and aesthetics be mitigated?

No cumulative effects were identified; therefore, per WSDOT guidance, mitigation is not provided.

## Noise

What is the historical trend for noise?

The Roanoke Park, Montlake, and other neighborhoods west of Lake Washington near SR 520 were settled and developed before construction of major roadways and highways such as SR 520 and I-5. After World War II, population growth in the central Puget Sound region accelerated, leading to increased commercial development and roadway traffic.

In the 1960s, I-5 and SR 520 were built, and traffic noise from these major highways and from arterial roads such as East Roanoke Street, 10th Avenue East, Lake Washington Boulevard, and Montlake Boulevard NE had substantially increased ambient noise levels in comparison to prewar years. The number of residences negatively affected by road noise has increased as traffic levels have increased and infilling closer to the roadway occurred in the established neighborhoods.

What is the cumulative effect of current and reasonably foreseeable actions without the project?

Without the project, six of the ten roadway segments would have an increased number of residences negatively affected by anticipated traffic noise in 2030. This is because there would be increased traffic, but no noise reduction strategies implemented.

What would the project's additional contribution to cumulative effects on noise likely be?

The Preferred Alternative and SDEIS options would have noise contributions equal to or slightly less than current levels and projected future levels without the project. No reasonably foreseeable project has been identified that would be built close enough to SR 520 to contribute to a cumulative noise effect. However, the project would contribute to the noise effects of the other previously built transportation projects as these projects continue to operate in the reasonably foreseeable future. The Preferred Alternative, compared with the 2030 No Build Alternative, would substantially decrease the number of nearby residences exceeding the noise abatement criteria noise levels.

How could cumulative effects on noise be mitigated?

The cumulative effect of transportation-related noise is gradually being mitigated as many new transportation improvement projects incorporate

modern noise reduction strategies, such as lids and noise walls, which were not present in the facility being replaced. As motor vehicles become more efficient and incorporate new ways to generate power, such as electric or hydrogen propulsion, the proportion of quieter vehicles will increase over time. In addition, the *Transportation 2040 Final Environmental Impact Statement* (PSRC 2010c) notes that policies encouraging vehicle trip reductions through transit improvements, HOV lanes, and non-motorized modes of travel where practicable would further reduce the cumulative noise effect. More broadly, *Vision 2040* (PSRC 2008) includes many policies that emphasize concentrating growth in urban centers within the central Puget Sound region and connecting those centers with an efficient, transit-oriented, multimodal transportation system.

## Energy Consumption and Greenhouse Gas Emissions

What is the historical trend for energy consumption and greenhouse gas emissions?

Consistent with the national trend, transportation is a major consumer of energy in Washington State. This trend started locally in the 1920s when the Eastside was connected to the Seattle area by ferries and roadways. Growth in the region accelerated after completion of the interstate highway system and the I-90 and Evergreen Point bridges across Lake Washington in the 1950s and 1960s. Growth continues as interconnectivity of roadways increase.

Total demand for all energy sources in Washington State has grown steadily since the early 1970s. Even though Washington is the leading hydroelectric producer in the nation, energy derived from petroleum products outpaced hydroelectric in 2004.

While the transportation sector is the largest producer of GHG emissions, per capita use of gasoline is about the same and diesel use is slightly lower than the national average. Hydroelectric power, which does not contribute to GHG emissions, accounts for Washington State's higher than average GHG emissions level for transportation compared to the national average. Transportation is projected to be the largest contributor to future emissions growth from 2005 to 2020. Transportation growth could add just over 12 million metric tonnes of carbon dioxide equivalent to Washington's emissions by 2020 (Ecology 2007).

What is the cumulative effect of current and reasonably foreseeable actions without the project?

The Puget Sound region experienced accelerating population growth and industrial, commercial, and residential development, particularly during the second half of the 20th century. Population growth and economic development is projected to continue (PSRC 2010a). Similarly, traffic volumes have increased with population, leading to increased automotive

emissions; this trend is likely to continue in the reasonably foreseeable future.

Policies at the federal, state, and local levels support energy conservation and are intended to reduce energy use, including petroleum, as well as GHG levels over the long-term. As described above, fuel efficiency is largely regulated through requirements on vehicle manufacturers. The trend toward more fuel-efficient vehicles is expected to continue. At the same time, investment in transit and transit service are helping to reduce emissions (PSRC 2010a).

In 2007, Governor Gregoire and the legislature set the following GHG reduction goals for Washington State:

- 1990 GHG levels by 2020
- 20 percent reduction below 1990 levels by 2035
- 50 percent reduction below 1990 levels by 2050

The Washington legislature passed House Bill (HB) 2815 in spring 2008. This bill includes, among other elements, statewide per capita VMT reduction goals as part of the state's GHG emission reduction strategy. Also in 2007, the Climate Advisory Team was formed by the Governor's Executive Order 07-02 to find ways to reduce GHG emissions. The final report included 13 broad recommendations, many of which are now being implemented.

In March 2008, the Governor signed Washington's Climate Change Framework/Green-Collar Jobs Act (HB 2815), which was developed with the help of a broad coalition of business, environment, education, labor, and energy leaders. This law includes, among other elements, statewide per capita VMT reduction goals as part of the state's GHG emission reduction strategy. The final report and other information on the process are available at [www.ecy.wa.gov/climatechange/2008CAT\\_overview.htm](http://www.ecy.wa.gov/climatechange/2008CAT_overview.htm).

In 2009, the Governor issued Executive Order 09-05. Under the order, WSDOT is leading an effort to evaluate the changes needed in transportation, including reductions in VMT, to meet the state's GHG reduction goals. The agency is collaborating with businesses, environmental groups, transportation advocates, and local and regional jurisdictions to complete this work. In addition, WSDOT is among the six agencies leading the development of the initial climate change response strategy, due December 2011.

What would the project's additional contribution to cumulative effects on energy consumption and greenhouse gas emissions likely be?

Construction and operation of the proposed project, along with the other present and reasonably foreseeable future transportation improvement

projects (see the Final Indirect and Cumulative Effects Discipline Report included in Attachment 7) would make a small contribution to statewide GHG emissions. At the same time, the project's long-term operation would reduce VMT below present conditions and below future conditions projected for the No Build Alternative.

Operation of the SR 520, I-5 to Medina project in conjunction with the SR 520, Medina to SR 202: Eastside Transit and HOV Project, the East Link and North Link light rail projects, and other reasonably foreseeable transportation improvement projects would consume energy and emit GHGs over the long term. However, these projects would together generate a smaller contribution to the cumulative effect on energy consumption and GHG emissions than their No Build Alternatives because the projects would improve regional transportation efficiency and increase HOV and transit ridership.

HOV lanes would encourage people to carpool, vanpool, or take transit, assisting in reducing GHG emissions. Tolling of the corridor is also anticipated to encourage transit use and reduce VMT on the corridor. Over the long-term, improvements proposed for the SR 520 corridor in conjunction with Sound Transit's light rail projects would contribute to meeting GHG reduction goals outlined by the legislature and the Governor.

How could cumulative effects on energy consumption and greenhouse gas emissions be mitigated?

Many forms of energy consumption, including burning petroleum-based fuels, produces GHG emissions, which are known to contribute to global climate change. Global climate change is being addressed at local, regional, national, and international levels.

State and federal policies are being developed to reduce GHG levels substantially between now and 2050. WSDOT is supporting GHG reductions through existing and new strategies, such as the following:

- Providing alternatives to driving alone (such as carpooling, vanpooling, and transit);
- Developing transportation facilities that encourage transit, HOV, bike, and pedestrian modes;
- Supporting land use planning and development that encourage such travel modes (such as concentrating growth within urban growth areas); and
- Optimizing system efficiency through variable speeds and tolling.

The cumulative effect on GHG emissions would be further reduced by continuing advancements in automobile technology, fuel content regulations, and the increased availability of lower-carbon fuels. Furthermore, the region's dedication to providing alternative transportation

options, such as public transit and bicycle trail networks, could help reduce the number of single-occupancy vehicles on the roads (PSRC 2010c).

### Economic Activity

What would the project's additional contribution to cumulative effects on economic activity likely be?

WSDOT concluded that long-term operation of the proposed project would not affect the economy directly or indirectly. Therefore, the proposed project would not contribute to lasting trends from other past, present, or reasonably foreseeable actions that would have a cumulative effect on economic activity.

### Social Elements

What would the project's additional contribution to cumulative effects on social elements likely be?

The proposed project would benefit community cohesion and would not result in any long-term adverse effect on public service providers. Any negative effects would be temporary and involve the typical disruptions experienced during roadway construction activities. Therefore, the project would not contribute to a cumulative effect on social elements.