ENVIRONMENTAL ASSESSMENT
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

DECEMBER 2009

SR 520, Medina to SR 202: Eastside Transit and HOV Project

Appendix U

Indirect and Cumulative Effects Technical Memorandum

Washington State Department of Transportation

U.S. Department of Transportation Federal Highway Administration

SR 520, Medina to SR 202: Eastside Transit and HOV Project Environmental Assessment

Indirect and Cumulative Effects

Technical Memorandum

Prepared for

Washington State Department of Transportation
Federal Highway Administration

Lead Author

CH2M HILL

Consultant Team

HDR Engineering, Inc.
Parametrix, Inc.
CH2M HILL
Parsons Brinckerhoff
Michael Minor and Associates
Pacific Rim Resources

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Exhibits

Acronyms and Abbreviations

Acronym	Meaning
AASHTO	American Association of State Highway and Transportation Officials
CFR	Code of Federal Regulations
CO	carbon monoxide
dBA	A-weighted decibels
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
GHG	greenhouse gas
HOV	High Occupancy Vehicle
LEP	Limited-English Proficiency
L_{eq}	Equivalent sound pressure level
LOS	level of service
mg/L	milligrams per liter
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
PSRC	Puget Sound Regional Council
RTP	Regional Transportation Plan
SEPA	State Environmental Policy Act
SIP	State Implementation Plan
SPCC	Spill Prevention Control and Countermeasures Plan
SR	State Route

TIP	Transportation Improvement Program
VMT	vehicle miles traveled
WSDOT	Washington State Department of Transportation

1. Introduction

This technical memorandum describes indirect and cumulative effects expected to be associated with the proposed SR 520, Medina to SR 202: Eastside Transit and HOV Project. WSDOT is required to disclose cumulative effects and to suggest practical mitigation options that could be taken by the responsible parties (WSDOT, FHWA, and EPA 2008). Therefore, this technical memorandum suggests ways in which cumulative effects could be minimized by public agencies and private developers beyond WSDOT's jurisdictional responsibilities.

What are indirect and cumulative effects?

The discipline reports and technical memoranda (Appendix D and Appendices F through S) supporting the *Medina to SR 202: Eastside Transit and HOV Project Environmental Assessment* (EA) (WSDOT 2009a) explain how project construction and operation could directly affect people and the environment. This technical memorandum describes two other kinds of environmental effects: indirect effects and cumulative effects. *Indirect effects* (sometimes called secondary impacts or effects) are defined as effects that:

> ... are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 Code of Federal Regulations [CFR] 1508.8).

Indirect effects result from one project but, unlike direct effects, typically involve a chain of cause-and-effect relationships that can take time to develop and can occur at a distance from the project site.

Cumulative effects (sometimes called cumulative impacts) are defined as:

> ... 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 non-federal) 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 CFR 1508.7).

A cumulative effect is the project's direct and indirect effects on a particular environmental 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.

Why are indirect and cumulative effects considered in an EA?

Federal regulations (40 CFR 1502.16, 1508.7, 1508.8) implementing the National Environmental Policy Act (NEPA) require that indirect and cumulative effects be considered in NEPA documents because they inform the public and decision-makers about possible unintended consequences of a project that are not always revealed by examining only the direct effects of the individual project under review. This information helps project planners, designers, and builders to mitigate direct effects under their control in ways that can make adverse indirect and cumulative effects less likely and less severe.

What is the project?

The Washington State Department of Transportation (WSDOT) is proposing to construct the SR 520, Medina to SR 202: Eastside Transit and HOV Project to reduce transit and high-occupancy vehicle (HOV) travel times and to enhance travel time reliability, mobility, access, and safety for transit and HOVs in rapidly growing areas along the State Route (SR) 520 corridor east of Lake Washington. Exhibit 1 shows the project vicinity. Some of the improvements included in this project were originally part of the SR 520 Bridge and HOV project. On June 18, 2008, the Federal Highway Administration (FHWA) authorized WSDOT to develop the Medina to SR 202 project as an independent project. The project includes building a complete HOV system between Lake Washington and 108th Avenue NE and restriping the existing HOV lanes from the outside lanes to the inside lanes between the 108th Avenue NE interchange and SR 202 in Redmond.

The SR 520, Medina to SR 202: Eastside Transit and HOV Project addresses needs specific to the portion of SR 520 east of Lake Washington. The project limits extend approximately 8.8 miles along SR 520 from the east shore of Lake Washington (vicinity of Evergreen Point Road) to the interchange with SR 202 in Redmond.

WSDOT is considering two alternatives for the project: the Build Alternative and the No Build Alternative.

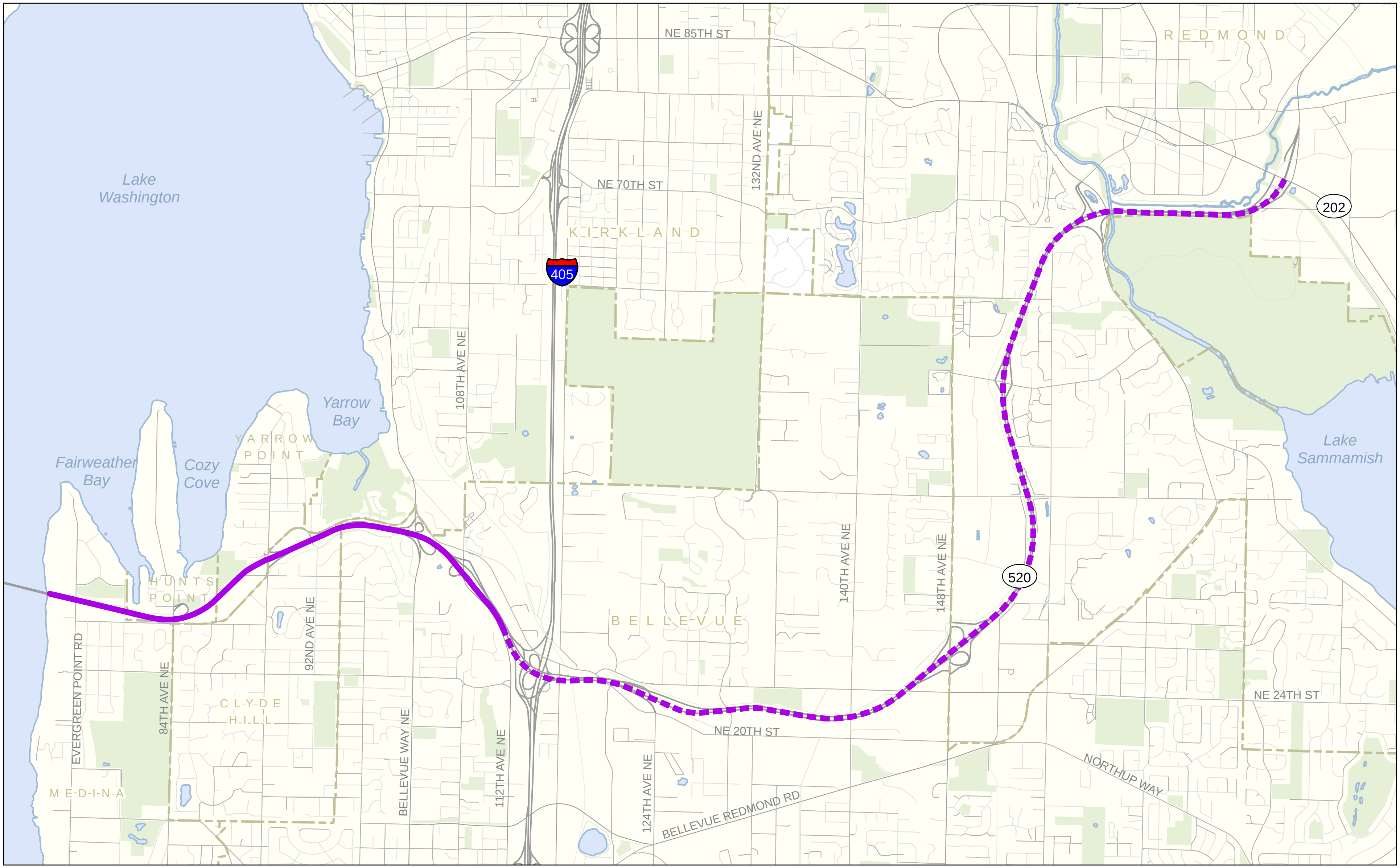
Build Alternative

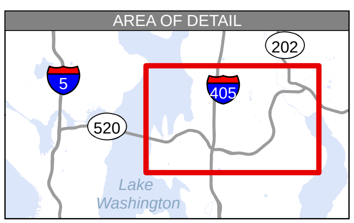
Under the Build Alternative, the proposed project would include the improvements described below.

SR 520 Improvements from Lake Washington to I-405

This proposed project will reconstruct SR 520 from just west of Evergreen Point Road to just east of 108th Avenue NE. Elements constructed as part of this section include the following:

- Construct a new eastbound HOV lane from Lake Washington to the existing eastbound HOV lane west of the I-405 interchange. This improvement would complete the currently discontinuous HOV network on the Eastside and improve travel time reliability for buses and carpools.
- Relocate the existing westbound HOV lane from the outside lane to the inside lane from Lake Washington to I-405. This change would enhance safety by eliminating the need for merging vehicles to weave across the faster-moving HOV lanes to reach the general-purpose lanes.
- Construct a lid with inside transit stop over SR 520 at Evergreen Point Road.





Construction Extent

Restriping Extent

Park

City Limits

N

0 0.5 1 Miles

Source: King County (2005) GIS Data (Streets), King County (2007) GIS Data (Waterbody) and CH2M HILL (2008) GIS Data (Parks and Streams). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 1. **Project Vicinity**

Medina to SR 202: Eastside Transit and HOV Project

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- Construct a new lid and modify the existing half-diamond interchange at 84th Avenue NE.
- Construct a new lid with inside transit stop over SR 520 at 92nd Avenue NE and modify the existing interchange.
- Reconfigure the existing interchange at Bellevue Way NE.
- Construct new HOV direct access ramps at 108th Avenue NE. This improvement would create a more efficient connection for transit and HOV from SR 520 to the South Kirkland Park-and-Ride via local streets.

What is a lid?

The term "lid" is short for "lidded highway". Lids are long bridges that cover a length of highway. Lid surface areas can carry paths and trails to connect communities across the highway, landscaping to create open space and places for passive recreation, and items such as pergolas, seating, and transit waiting areas.

- Add a bike/pedestrian path from Lake Washington to approximately 108th Avenue NE. This improvement would facilitate nonmotorized use of SR 520, provide transit connections for bikes and pedestrians, and complement the existing nonmotorized transportation network on the Eastside.

SR 520 Improvements from I-405 to SR 202

- Restripe existing eastbound and westbound HOV lanes from the outside to the inside lane. This change would enhance safety by eliminating the need for merging vehicles to weave across the faster-moving HOV lanes to reach the general-purpose lanes.

Other Improvements

- Provide noise walls between Evergreen Point Road and Bellevue Way.
- Provide retaining walls and stormwater detention and treatment facilities.
- Improve stream habitat by realigning portions of the Yarrow Creek channel and shortening some culverts.
- Improve fish passage culvert crossings to restore fish passage and open up habitat that was previously inaccessible to salmon and other fish species.
- Mitigate the project’s effects on wetlands and streams at a site or sites as determined through future negotiations with permitting agencies.

No Build Alternative

Under the No Build Alternative, the project would not be built. Only routine maintenance, repair, and minor safety improvements would take place on SR 520 in the study area over the next 20 years. The No Build Alternative would not improve transit reliability and transit and HOV travel times on SR 520. Also included in the No Build for traffic modeling purposes is the assumption that the SR 520 Bridge and HOV would not be built until after this project is complete.

WSDOT is evaluating the No Build Alternative to provide a reference point for comparing the effects, both positive and negative, associated with the proposed project.

What are the key points of this technical memorandum?

This technical memorandum identifies ways in which the project would produce indirect effects on environmental resources and how it would contribute, along with past, present, and reasonably foreseeable future actions, to cumulative effects on those same resources. Temporary effects (e.g., construction impacts) are not considered to be cumulative effects unless they are likely to be measurable into the future. The key points of this technical memorandum are:

- Cumulative effects analyses were conducted on air quality, ecosystems, economics, land use, noise, transportation, visual quality, and water resources because of direct effects identified in the EA. The direct effects associated with these resources did not measurably contribute to a cumulative effect.
- Cumulative effects analysis was conducted on geology and soils because of direct and indirect effects, including topographic changes (direct) and depletion of aggregate or granular soil (indirect) suitable for construction. Topographic changes will be mitigated through careful design and consideration of views and setting, and through use of retaining walls to minimize slope cuts. Depletion of aggregate and granular soil would be partially mitigated through re-use of existing demolition debris and excavated soils.
- Cumulative effects were identified for energy due to the consumption of fuel required to construct the project; this would also contribute to additional greenhouse gas emissions. Energy consumption would result in a small incremental contribution to cumulative greenhouse gas emissions in combination with other past and reasonably foreseeable future projects.
- The Build Alternative would have a negligible contribution to the cumulative effects of past, present and future actions.

2. Approach

How did the analysts identify and evaluate indirect effects?

The analysts followed WSDOT and FHWA guidance to conduct the indirect effects assessments reported in this technical memorandum. Potential indirect effects were characterized where feasible by probable location and extent, magnitude and duration, whether beneficial or adverse (potentially harmful), and, if adverse, how WSDOT could avoid or minimize the effect. Section 412 of the WSDOT *Environmental Procedures Manual* (WSDOT 2009b) and FHWA Technical Advisory T 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA 1987) provide general guidance for identifying, evaluating, and documenting indirect effects of transportation projects. More specifically, WSDOT (2009b) and the FHWA's *Indirect Effects Analysis Checklist* (FHWA 2009) recommend the 8-step approach presented in National Cooperative Highway Research Program (NCHRP) Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (Louis Berger Group, Inc. 2002). The 8-step approach, shown in Exhibit 2, guided the indirect effects analyses presented in this technical memorandum.

Exhibit 2. 8-Step Approach for Indirect Effects Assessment

1. **Scoping** – Determine study approach, level of effort required, and location and extent of study area.

2. **Identify Study Area Directions and Goals** – Assemble information on trends and goals within study area.

3. **Inventory Notable Features** – Identify specific environmental issues within indirect effects study area.

4. **Identify Impact-Causing Activities of Proposed Action and Alternatives** – Break down activities into individual, impact-causing components for analysis.

5. **Identify Potentially Significant Indirect Effects for Analysis** – Catalog indirect effects by component activities; identify cause-effect linkages and interconnections that can delay and/or disperse effects; flag potentially significant indirect effects meriting further analysis.

6. **Analyze Indirect Effects** – Use quantitative and qualitative tools to determine magnitude, probability of occurrence, timing and duration, and degree to which the effect can be controlled or mitigated.

7. **Evaluate Analysis Results** – Evaluate assumptions and uncertainty associated with results and implications for indirect and cumulative effects assessments.

8. **Assess Consequences and Develop Appropriate Mitigation and Enhancement Strategies** – Assess consequences of indirect effects and develop strategies to address unacceptable outcomes.

Source: Louis Berger Group, Inc. 2002; FHWA 2009.

The analysts completed Steps 1 through 4 before and during the direct effects analyses, which are documented in the resource-specific discipline reports and technical memoranda supporting the *Medina to SR 202: Eastside Transit and HOV Project Environmental Assessment* (EA) (WSDOT 2009a; see Appendix D and Appendices F through S). In Steps 5 through 8, the analysts went beyond the direct effects assessments and focused on the intermediate cause-and effect relationships and interconnections among resources that can lead to indirect effects. Section 4 of this technical memorandum, Potential Indirect and Cumulative Effects, describes the indirect effects assessments that the team conducted on the same resources examined with regard to direct effects.

How did the analysts identify and evaluate cumulative effects?

A cumulative effects analysis was conducted when direct and/or indirect adverse effects were identified. To identify and evaluate likely cumulative effects and the extent to which the project would contribute to those effects through its expected direct and indirect effects, the analysts reviewed the general guidance in Section 412 of the WSDOT *Environmental* Procedures *Manual* (WSDOT 2009b) and in FHWA Technical Advisory T 6640.8A (FHWA 1987). More specifically, they followed the 8-step procedure set forth in *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008) shown in Exhibit 3. Similarly to the analysis of indirect effects described above, Steps 1 through 4 were performed before and during the direct effects analyses; in Steps 5 through 8, the analysts went beyond the direct effects assessments and focused on potential cumulative effects. Section 4 of this technical memorandum describes the cumulative effects assessments that the team conducted on the same resources examined with regard to direct effects.

Exhibit 3. 8-Step Approach For Cumulative Effects Assessment

1. **Identify the resources to consider in the analysis** – List each resource for which the project could cause direct or indirect effects. If the project will not cause a direct or indirect effect on a resource, it cannot contribute to a cumulative effect on that resource. Make a statement to that effect, and stop.

2. **Define the study area for each resource** – Define the Geographic Resource Study Area and the Temporal Resource Study Area for each resource.

3. **Describe the current status/viability and historical context for each resource** – Characterize the current condition of the resource and trends affecting it, and briefly summarize the historical context and past actions that have had a lasting effect on the resource.

4. **Identify direct and indirect impacts of the project that might contribute to a cumulative impact** – Summarize the direct and indirect impacts already identified. The project's contribution to a cumulative effect would be the residual direct or indirect effect(s) remaining after mitigation.

5. **Identify other current and reasonably foreseeable actions** – Ask what other present and reasonably foreseeable actions (development projects) are affecting your resource today or could affect it in the future. A reasonably foreseeable action is a private or public project already funded, permitted or under regulatory review, or included in an approved final planning document.

6. **Identify and assess cumulative impacts** – Review the information gathered, describe the cumulative impact(s), and draw conclusions that put into perspective the extent to which the project will add to, interact with, or reduce the cumulative impact.

7. **Document the Results** – Describe the analyses, methods, or processes used; explain the assumptions; and summarize the results of each analysis, all the steps in adequate detail to disclose its strengths and weaknesses, your conclusions, and how and why you reached those conclusions.

8. **Assess the need for mitigation** – WSDOT does not mitigate cumulative effects, because many entities contribute to them in ways that are beyond WSDOT's jurisdiction. But WSDOT does disclose the project's likely contribution to each identified cumulative effect and suggest practicable ways by which the cumulative effect could be mitigated.

Source: WSDOT, FHWA, and EPA (2008).

How was the scope of the study defined?

Resources

The resources and disciplines selected for indirect and cumulative effects assessments were the same as those for which direct effects of the project were evaluated. The analyst responsible for each resource or discipline conducted assessments in the following order: direct, indirect, and cumulative effects. The assessments identified and compared expected effects of the Build Alternative and the No Build Alternative on each resource or discipline.

Study Areas and Time Frames

For the indirect and cumulative effects assessments, the geographic study areas and time frames for the analyses depended on the specific discipline or resource and the nature of the effect being evaluated, as explained in the following discussions.

Study Area

The study areas used in this indirect and cumulative effects analysis are presented in Exhibit 4. The cumulative effects study area for a specific resource or discipline is the total area of the resource or discipline that could be influenced by the direct or indirect effects of the project in combination with the effects of other past, current, and reasonably foreseeable actions. The study area used to assess potential indirect effects on each resource or discipline was the same used for the cumulative effects assessment. Because the cumulative effects study area typically extends well beyond the direct effects study area and is defined in terms specifically relevant to each resource, it typically satisfies criteria applicable to indirect effects as well (Louis Berger Group, Inc. 2002).

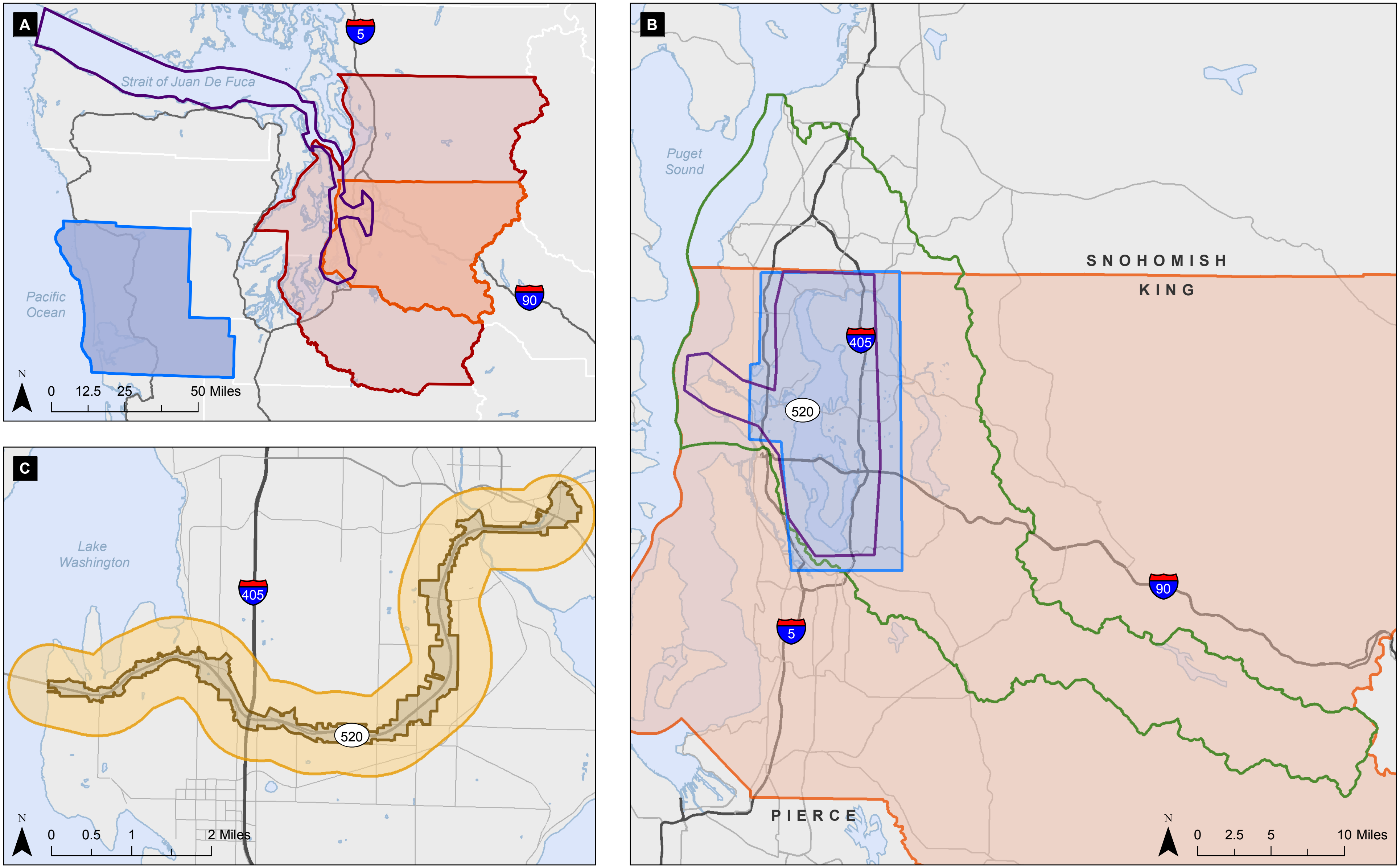
To define each resource-specific study area, the analysts started with the direct effects study area for the resource and expanded that area to include the larger region within which the resource could be influenced by indirect effects of the project and by the effects of other past, present, and reasonably foreseeable actions (WSDOT, FHWA, and EPA 2008). In this way, the study area for each resource was determined first by the distribution of the resource itself, and second by the area within that distribution where the resource could be affected by the project in combination with other actions.

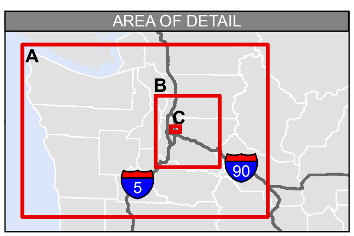
Time Frame

Cumulative effects assessment focuses on the future; the assessment begins at the same baseline applied to direct and indirect effects—the start of the proposed action. However, because the cumulative effect on the resource also includes persisting influences from past actions, the analyst must take the past into account when characterizing the baseline condition. Therefore, the time frame for cumulative effects assessment starts at a representative year or decade when a past human action or actions began to change the health or status of the resource from its pre-development condition, setting a trend that is still evident in the present and likely to continue into the reasonably foreseeable future. For most disciplines and resources, the year 1850 was appropriate for the baseline, pre-development condition. Deviations from this time frame are noted in the discussion of individual resources in Chapter 4.

The timeframe for cumulative effects assessment must continue far enough into the future to account for the potential direct and indirect effects of the project along with other reasonably foreseeable actions, discussed later in this section. The time frame must extend far enough to include the construction periods and at least portions of the operational periods of the proposed action and relevant reasonably foreseeable actions. The time frame can stop at the project design year (2030 for this project) or at a future year determined by the characteristics of the particular discipline or resource under study. For example, the end point could be based on a characteristic response time of a plant or wildlife species to environmental stressors or, for land use or transportation, the planning horizon in a comprehensive plan or long-range transportation plan (WSDOT, FHWA, and EPA 2008). For most disciplines and resources, the project design year, 2030, was considered to be an appropriate end point for the time frame; in some cases, the year 2040 was considered appropriate based on the relevance of the Puget Sound Regional Council's (PSRC's) *Transportation 2040 Draft Environmental Impact Statement* (DEIS) (PSRC 2009a).

The time frames used to assess indirect effects were the same as those used for the cumulative effects assessment. Because indirect effects must be reasonably foreseeable, the time frame for their analysis is typically captured within the time frame for cumulative effects assessment (Louis Berger Group, Inc. 2002).





Cultural Resources

Energy

Ecosystems

Water Resources

Environmental Justice, Hazardous Materials, Land Use, and Visual Quality

Navigable Waterway

Air Quality, Economics, Geology, Soils and Transportation

Source: WSDOT (1995) GIS Data (Counties), WSDOT (2001) GIS Data (County and State Route) and King County (2007) GIS Data (Water Bodies), WDOE (2001) GIS Data (Water Bodies). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 4. **Indirect and Cumulative Effects Study Areas**

Medina to SR 202: Eastside Transit and HOV Project

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How was the baseline condition of each resource determined?

The analyst for each resource characterized the baseline (current) condition of the resource by describing its current health, condition, or status within the study area and by providing historical context for understanding how the resource got to its current state (WSDOT, FHWA, and EPA 2008; see Exhibit 3, Step 3). The analyst used information from field surveys, interviews, and literature searches to assess the current condition of the resource. In particular, the analysts relied on baseline information presented in the PSRC's *Transportation 2040 DEIS* (PSRC 2009a). Past actions and trends affecting the resource were reviewed to "tell the story of the resource" (WSDOT, FHWA, and EPA 2008). The analysts gathered information about past projects from a variety of historical resources that have influenced development of communities in the project vicinity (Rochester 1998; Stein 1998a, 1998b, 1998c; City of Bellevue 2006; City of Medina 2008; City of Clyde Hill 2009; GRCC 2009). The analyst did not describe the past in detail but prepared a brief summary to place the resource in its historical context and to provide a comparative basis for the cumulative effects assessment.

How were other current and reasonably foreseeable actions identified?

To identify other current and reasonably foreseeable future actions (see Exhibit 3, Step 5), the analysts reviewed relevant comprehensive land use planning documents, long-range transportation plans, projections presented in the *Transportation 2040 DEIS* (PSRC 2009a) and agency web sites to obtain publicly available information. They also interviewed agency and tribal officials, representatives of private companies and organizations, and members of the public during the scoping process conducted for the *SR 520 Bridge Replacement Project and HOV Project DEIS* (WSDOT 2006). The *SR 520, Medina to SR 202: Eastside Transit and HOV Project Agency Coordination and Public Involvement Discipline Report* (WSDOT 2009c) provides information about the scoping process, interviews, and meetings.

For present and reasonably foreseeable future actions, the analysts contacted local jurisdictions (Bellevue, Clyde Hill, Hunts Point, Kirkland, Medina, Redmond, and Yarrow Point) to find out about pending permits or reasonably foreseeable plans for street improvements, development, or redevelopment within approximately 1/4 mile of the proposed project. The analysts reviewed transportation and capital improvement plans. WSDOT provided information on planned transportation improvement projects involving state highways and the Interstate Highway System.

Reasonably foreseeable future actions were defined as actions or projects with a reasonable expectation of actually happening, as opposed to potential developments expected only on the basis of speculation. Accordingly, the analysts applied the following criteria (WSDOT, FHWA, and EPA 2008):

- Is the proposed project included in a financially constrained plan?
- 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?

Using these criteria, the analysts compiled lists of present and reasonably foreseeable future actions to support the discipline-specific cumulative effects assessments conducted for those areas. Maps of identified present and reasonably foreseeable future actions are presented in Section 3. Attachments 1 and 2 tabulate and summarize these projects using the same identification numbers shown on the maps.

3. Affected Environment

This chapter provides a summary of the human and natural history of the Eastside project area, including historical context, present condition, and current and reasonably foreseeable development projects. Detailed historical descriptions, from which much of the following information is excerpted and summarized, can be found in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Cultural Resources Technical Memorandum* (WSDOT 2009d).

When the first Euro-American settlers arrived at Seattle in 1851, the Puget Sound region was thickly forested. As these people continued to arrive and development of the area continued and intensified, trees were cut and landforms were altered. Since that time, development in the study area has been shaped in large part by the geography of Lake Washington, the development of transportation routes to and across the lake, and the ways in which those routes have changed over time.

The early economy of the Puget Sound region was based on logging and coal mining. In 1867, coal was discovered in the Coal Creek area on the east side of Lake Washington, and settlers began to arrive as extensive mining began at the Newcastle Coal Mine. William Meydenbauer and Aaron Mercer staked large claims on the east side of Lake Washington in 1869, becoming among the first non-Native settlers there. German-born Meydenbauer, who owned a prosperous bakery in Seattle, settled next to what is now Meydenbauer Bay. Mercer owned the land around what is now known as the Mercer Slough (Rochester 1998). In 1871, Warren Wentworth Perrigo and Captain Luke McRedmond staked the first land claims on Lake Sammamish in present day Redmond (GRCC 2009).

During the 1870s, Seattle businesspeople and real estate investors began to buy property on what came to be known as the Eastside. Marshall Blinn purchased the land on what would become Hunt's Point, and Jacob Furth, a banker, and Bailey Gatzert, mayor of Seattle, also purchased property there. Once land speculators and other settlers came to the Eastside, making the land more profitable, Meydenbauer and Mercer both sold their claims and moved on (Rochester 1998).

Logging, almost by necessity, became a primary occupation on the Eastside, as the settlers who came to pursue agriculture needed to clear land for their farms. The timber industry arrived in earnest when logger Albert King and his brothers homesteaded nearby Groat Point and Eastland in 1875 (Rochester 1998). In 1882, Isaac Bechtel, Sr. bought land near current downtown Bellevue and began a logging operation. The first sawmill on the Eastside was started by John Peterson near Pine Lake in 1890 (GRCC 2009). In 1891, Mr. T. L. Dabney, considered Medina's first permanent resident, built the first landing in Medina on what later became known as Dabney Point. The landing was directly across from the Leschi Park landing and it became the main crossing point for settlers and visitors to enter “the Points Country” (City of Medina 2008).

In 1888, Leigh S. J. Hunt, owner of the Seattle Post-Intelligencer, built a large estate that he named “Yarrow” on the northern shoreline of a Lake Washington peninsula, branding the peninsula as Yarrow Point from then on. He also purchased much of the land on Hunt’s Point, which he named for himself and held until the financial Panic of 1893 (Knauss 2003). Also in 1888, Hunt partnered with Englishman Peter Kirk and purchased thousands of acres of land to found a new town that they called Kirkland, which they planned as a steel mill community (Stein 1998a). Throughout the late nineteenth century, settlers came to the Eastside, including Civil War veterans awarded homesteads for their service (City of Bellevue 2006). Much of the Points area was settled by Irish and Scottish immigrants.

The Seattle Lake Shore and Eastern Railroad reached Redmond in 1889, ensuring the economic success of the Eastside timber industry (Stein 1998b). That same year, Washington achieved statehood and by 1890, about 20 families had settled in the Points area of the Eastside from Medina to Kirkland. In June 1900, the Federal Census of the Bellevue Precinct in King County, encompassing about the same area, counted 254 people (City of Clyde Hill 2009). Much of the Eastside area had become a haven for berry growing and fruit orchards. Bellevue’s first permanent school was built in 1892, and the town of Bellevue was platted in 1904. By then Bellevue was already the center for berry growing in King County, supported by a thriving Japanese-American community (Stein 1998c). Kirkland incorporated in 1905, and although it never succeeded as the steel mill town Mr. Kirk had envisioned, it prospered through ship building and wool milling (Stein 1998a). The City of Redmond incorporated in 1912 and began to transition from a lumber economy to an agricultural one (Stein 1998b).

While most other communities in the Points area were developing on the basis of agriculture, coal, timber, hopes of a steel mill, and other commercial ventures, Medina, promoted by William C. Calvert, developed as a wealthy residential enclave, an idyllic retreat from urban Seattle. The area became known as the “Gold Coast” because of the many wealthy citizens who built large homes along the shoreline. Medina Heights (now Medina) was officially named and platted in 1914 (Rochester 1998).

Before 1900, people crossed Lake Washington by canoe or private boats. A public ferry service was started in 1900, supplementing the private boats carrying travelers across the lake. Until 1912, the Cedar River flowed into the Black River, which flowed into the Duwamish River and out into Puget Sound. After serious flooding in Renton in 1911, the Cedar River was diverted away from the Black River and into Lake Washington. The Cedar River now comprises more than half of the inflow to the lake.

In 1916, the Montlake Cut was completed to provide a western outlet and a direct passage from Lake Washington to Puget Sound. When the water level dropped, water from Lake Washington ceased to feed the Black River, causing the lake’s natural outlet to Puget Sound to dry up. This event caused massive fish mortality and destruction of fish habitat and migration corridors; the river dried up quickly, stranding the fish and leaving them to die in the remaining pools of water. Other habitat characteristics also changed: much of the shallow shoreline waters of Lake Washington were lost and seasonal flooding stopped; the buffer and shade provided by shoreline trees and vegetation and the complexity of the habitat were modified or diminished, including the loss of approximately 1,300 acres of shoreline wetlands; and water quality, species diversity, and natural production decreased. These changes caused a loss of fish spawning, foraging, and rearing habitats, removed vegetative cover that had protected juvenile fish from predators, and altered fish migratory corridors.

At the same time, the Montlake Cut created additional lakeside acreage and rich agricultural land, leading to further development on Lake Washington. By the 1920s, a road system connected the Eastside communities, and ferries linked them to Seattle, but the east side of Lake Washington remained relatively isolated from the west side. This separation ended with the opening of the Lake Washington Pontoon Bridge in 1940 just south of Bellevue, along the route of today's I-90 bridges (the Homer M. Hadley and Lacey V. Murrow floating bridges), ushering in a new era of regional travel and bringing rapid growth and increased property values to the Eastside communities. With the time required to cross the lake cut dramatically, the communities on the Eastside became attractive residential choices for people working in downtown Seattle. Another event during this period led to further change: after the United States entered World War II, Americans of Japanese descent had their properties confiscated and were sent to internment camps. These two factors—the bridge and the internment—signaled the end of the agricultural era of the Eastside and the beginning of its suburban development (City of Bellevue 2006).

Fueled by the postwar economic boom, Seattle followed the trend of cities nationwide, with an increasing number of families moving into the automobile-oriented suburbs. Medina, Hunts Point, Clyde Hill, Yarrow Point, and Bellevue each incorporated in the 1950s in response to growing development pressures and the desire to control and shape that development. From 1950 to 1960, the Eastside population (Medina, Hunts Point, Clyde Hill, Yarrow Point, Bellevue, and Kirkland) more than doubled in size, increasing from 11,373 to 24,184 (WSDOT 2009d).

Urbanization has diminished the quality and amount of fisheries and wildlife habitat associated with Lake Washington. As Seattle and Eastside development accelerated after World War II, the number of manmade structures such as bulkheads, bridge supports, and piers in the lake proliferated. King County implemented policies to reduce pollution, establishing an extensive sewage treatment system that substantially improved the water quality of Lake Washington (WSDOT 2009d).

From 1970 to 2000, population and employment growth on the Eastside outstripped Seattle's, increasing the number of vehicles crossing the Evergreen Point Bridge and changing travel patterns. During the same time period, the number of Eastside jobs grew 626 percent, compared with 73 percent in Seattle. With employment growth on the Eastside exceeding growth in Seattle, traffic across Lake Washington is now heavy in both directions throughout the day. On SR 520, traffic volumes have been virtually equal in both directions since the late 1980s, and since 1993, peak afternoon traffic volumes have been slightly higher westbound than eastbound (WSDOT 2009d).

How is the region expected to change by 2040?

The PSRC's *Vision 2040* (PSRC 2008) provides comprehensive planning guidelines for the region (Snohomish, King, Pierce, and Kitsap counties) over the next 40 years. As documented in *Vision 2040*, population in the region is expected to increase from approximately 3.6 million in 2007 to nearly 5 million in 2040. Employment will increase from about 2 million jobs in 2007 to more than 3 million in 2040.

> Growth Centers are...
>
> VISION 2040 calls for the creation of central places with a mix of uses and activities.
>
> These centers are locations of more compact, pedestrian-oriented development with a mix of residences, jobs, retail, and entertainment. They are identified to receive a greater portion of the region's population and employment growth.
>
> Centers are designed as places for improved accessibility and mobility — especially for walking, biking, and transit. As a result they also play a key transportation role.
>
> Source: Vision 2040 (PSRC 2008)

Regional transportation planning by PSRC has been based on *Vision 2040's* allocation of population and employment volumes and densities around Puget Sound. The PSRC's *Transportation 2040 DEIS* provides an analysis of transportation alternatives, after which the *Transportation 2040 Plan* itself will be developed. The DEIS notes that population and employment growth is anticipated to be concentrated within 27 regional growth centers within *Vision 2040*'s designated metropolitan and core cities. Smaller-scale centers in smaller jurisdictions will also play an important and increased role over time as places that accommodate growth (PSRC 2009a).

Vision 2040 and the *Transportation 2040 DEIS* predict regional growth and the percentage of population and employment growth that the different types of planning areas are expected to experience. Exhibit 5 shows where future population and employment are expected to occur with larger metropolitan areas absorbing the most growth.

Exhibit 5. 2040 Population and Employment Forecasts

Type of Area	Population Increase	Employment Increase
Metropolitan Cities (Bellevue, Bremerton, Everett, Seattle, Tacoma)	540,000 – 32%	511,000 – 42%
Core Cities & Silverdale (Auburn, Bothell, Burien, Federal Way, Kent, Kirkland, Lakewood, Lynnwood, Puyallup, Redmond, Renton, SeaTac, Silverdale (unincorporated), Tukwila)	363,000 – 21%	352,000 – 29%
Large Cities (Arlington, Bainbridge Island, Des Moines, Edmonds, Fife, Issaquah, Kenmore, Maple Valley, Marysville, Mercer Island, Mill Creek, Monroe, Mountlake Terrace, Mukilteo, Sammamish, Shoreline, University Place, Woodinville)	181,000 – 11%	111,000 – 9%
Small Cities and Small Residential Towns (Algona, Black Diamond, Bonney Lake, Brier, Covington, Du Pont, Edgewood, Fircrest, Gig Harbor, Lake Forest Park, Lake Stevens, Medina, Milton, Newcastle, Normandy Park, Orting, Pacific, Port Orchard, Poulsbo, Ruston, Steilacoom, Sumner, Beaux Arts, Clyde Hill, Hunts Point, Woodway, Yarrow Point, Buckley, Carbonado, Carnation, Darrington, Duvall, Eatonville, Enumclaw, Gold Bar, Granite Falls, Index, North Bend, Roy, Skykomish, Snohomish, Snoqualmie, South Prairie, Stanwood, Sultan, Wilkeson)	148,000 – 9%	100,000 – 8%
Unincorporated Area	362,000 – 21%	113,000 – 9%
Rural Area	118,000 – 7%	31,000 – 3%

Source: PSRC 2009a

Continued growth in the region is seen as an opportunity to restore watersheds, develop environmentally sensitive approaches to stormwater treatment, enhance habitat, and pioneer new technologies and industries that benefit both the environment and the regional economy (PSRC 2008). The expectation of the *Vision 2040* planning effort is that future land use and transportation development will occur in a sustainable manner, accommodating the expected economic growth and increased population without resulting in deterioration of the environment. *Transportation 2040*'s approach is intended to be consistent with that of *Vision 2040*.

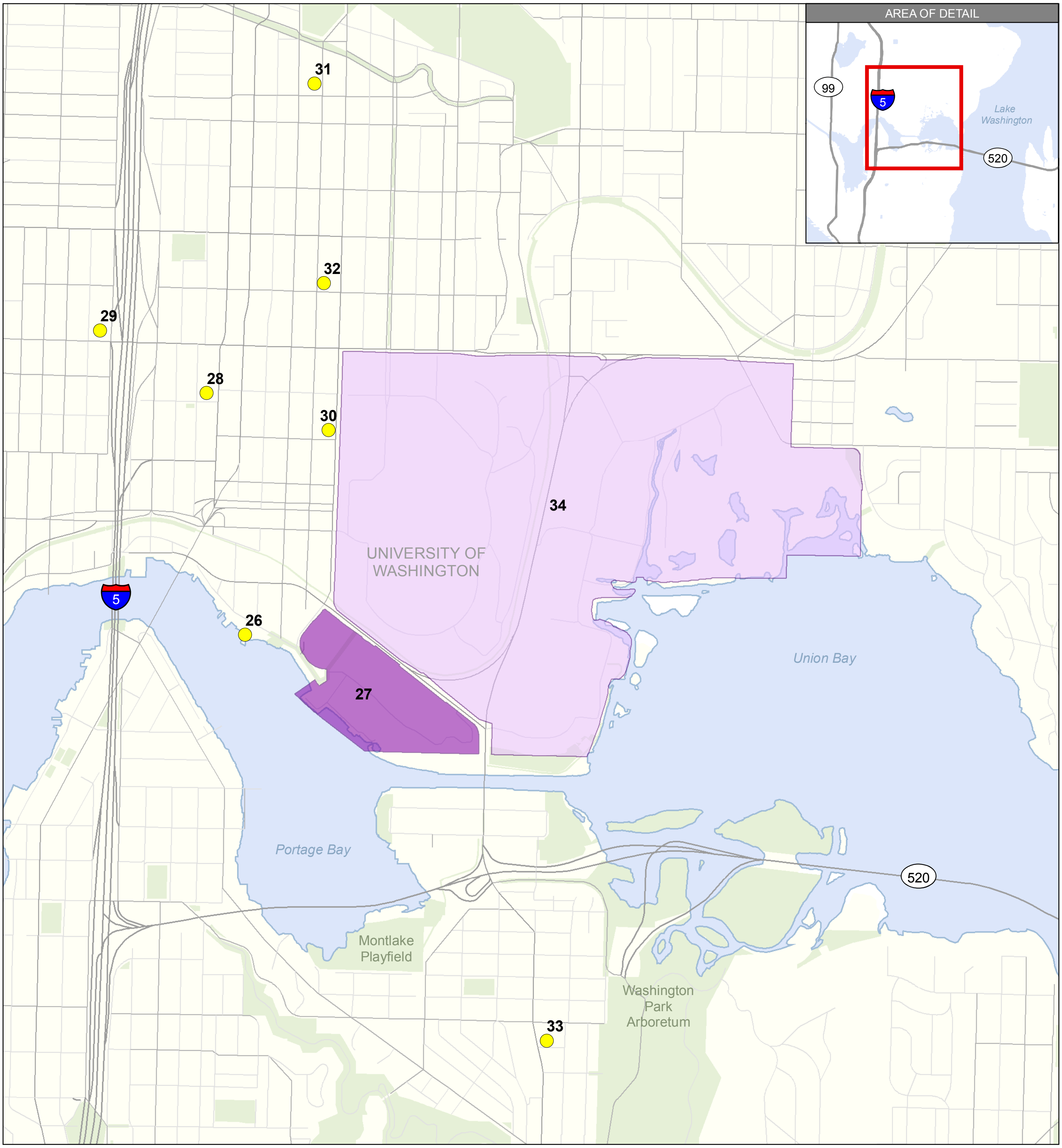
What other projects exist or are proposed in the project area?

Within the *Transportation 2040 DEIS*, assumptions were made about the specific development and transportation projects that would occur between now and 2040. NEPA requires an analysis that accounts for the incremental effect of a proposed project when added to other past, present, and reasonably foreseeable future actions. The analysts conducting cumulative and indirect effect analyses for this project used the regional transportation planning process and associated assumptions about development as a baseline, then developed an updated list of development and transportation actions and projects –the present and reasonably foreseeable future actions discussed in Chapter 2. This process is consistent with the coordination of planning actions envisioned by the *Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users* (SAFETEA-LU), which encourages community planning in advance of the NEPA process.

The identified actions include projects by local governments in the project area, as well as private developments. Exhibit 6, plates a through f, show the general locations of the projects, and Chapter 4 discusses specific interactions with the listed projects where applicable.

Attachment 1 lists and describes the development-related reasonably foreseeable future actions. The term "development" refers to the construction of new residential, commercial, industrial, and civic projects and does not refer to new transportation projects, which are discussed in the next section. Private mixed use developments near the west side of the project area and one boat launch on Portage Bay were evaluated. Analysts considered the University of Washington's master plans being implemented for redevelopment of the campus and the medical center. East of the floating bridge, public and private developments (including recreational facilities) were considered in Bellevue, Redmond, and Mercer Island.

Attachment 2 lists and describes all of the transportation-related reasonably foreseeable future actions that analysts considered for this cumulative effects analysis. The projects include roadway and transit projects in the region by Sound Transit, Cities of Seattle, Redmond, Clyde Hill, Bellevue, Kirkland, and Medina and WSDOT.



ID	Project
26	Car Top Boat Launch and Portage Bay Vista
27	University of Washington Medical Center Master Plan
28	Mixed Use Development
29	Mixed Use Development
30	Mixed Use Development
31	Mixed Use Development
32	Mixed Use Development
33	Mixed Use Development
34	University of Washington Campus Master Plan

Land Use Project

University of Washington Campus Master Plan

University of Washington Medical Center Master Plan

Park

Source: King County (2005) GIS Data (Streams, Streets), King County (2007) GIS Data (Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

N

0 500 1,000 2,000 Feet

Exhibit 6a. **Reasonably Foreseeable Future Actions**

Medina to SR 202: Eastside Transit and HOV Project

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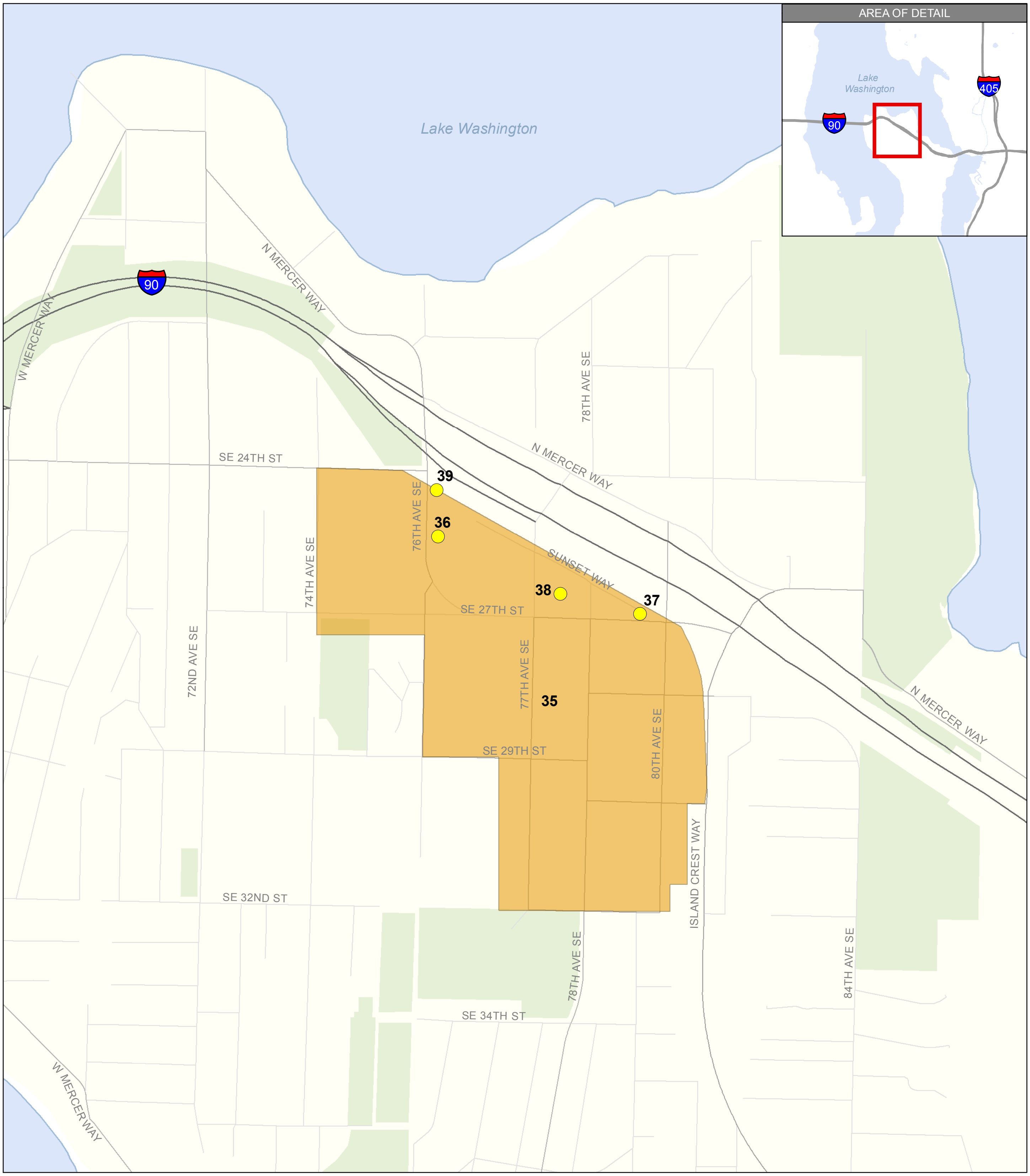

ID	Project
35	Town Center District Plan
36	Aljoya at Mercer Island (ERA Living Senior Housing)
37	7800 Plaza
38	7700 Central
39	BRE

Land Use Project

Mercer Island Town Center District Plan

Source: King County (2005) GIS Data (Streams, Streets), King County (2007) GIS Data (Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

N

0 250 500 1,000 Feet

Exhibit 6b. **Reasonably Foreseeable Future Actions**

Medina to SR 202: Eastside Transit and HOV Project

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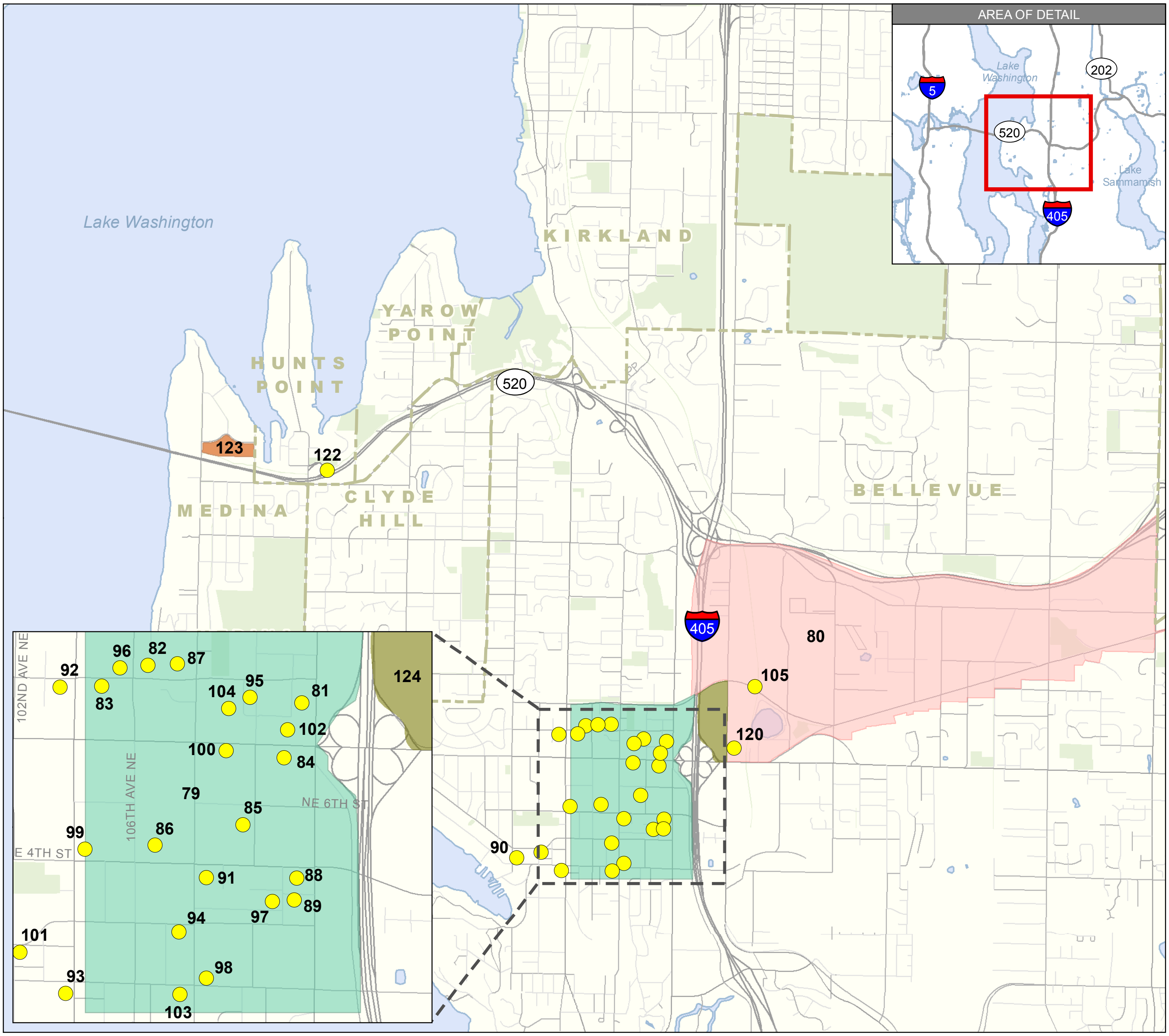

ID	Project
80	Bel-Red Corridor
81	Ashwood II
82	Belcarra Apartments
83	Bellevue Place Hyatt Hotel
84	Bravern
85	City Center East
86	Bellevue Towers
87	The Ashton
88	Metro 112
89	Meydenbauer Inn
90	One Main
91	The Summit Building C
92	Avalon at NE 10th Street
93	Bellevue at Main Street
94	Bellevue Plaza
95	Euro Tower I
96	Hanover Bellevue Cadillac
97	Marriott Hotel
98	Legacy Apartments
99	Lincoln Square II
100	8th Street Office Highrise
101	The Essex
102	Vida Condominiums
103	Vantana on Main
104	Pacific Regent Phase II
105	NE 112th Substation
120	Bellevue/Redmond Overlake Transportation (BROTS)(Bellevue/Redmond)
122	Expressway Nature Trail
123	Fairweather Nature Preserve Long Range Park Improvements
124	Overlake Hospital Master Plan

Land Use Project
Bel-Red Corridor Project
Downtown Implemention and Subarea Plan
Fairweather Nature Preserve Long Range Park Improvements
Overlake Hospital Master Plan
Park
City Limits

Source: King County (2005) GIS Data (Streams, Streets), King County (2007) GIS Data (Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

N
0 1,500 3,000 6,000 Feet

Exhibit 6c. **Reasonably Foreseeable Future Actions**

Medina to SR 202: Eastside Transit and HOV Project

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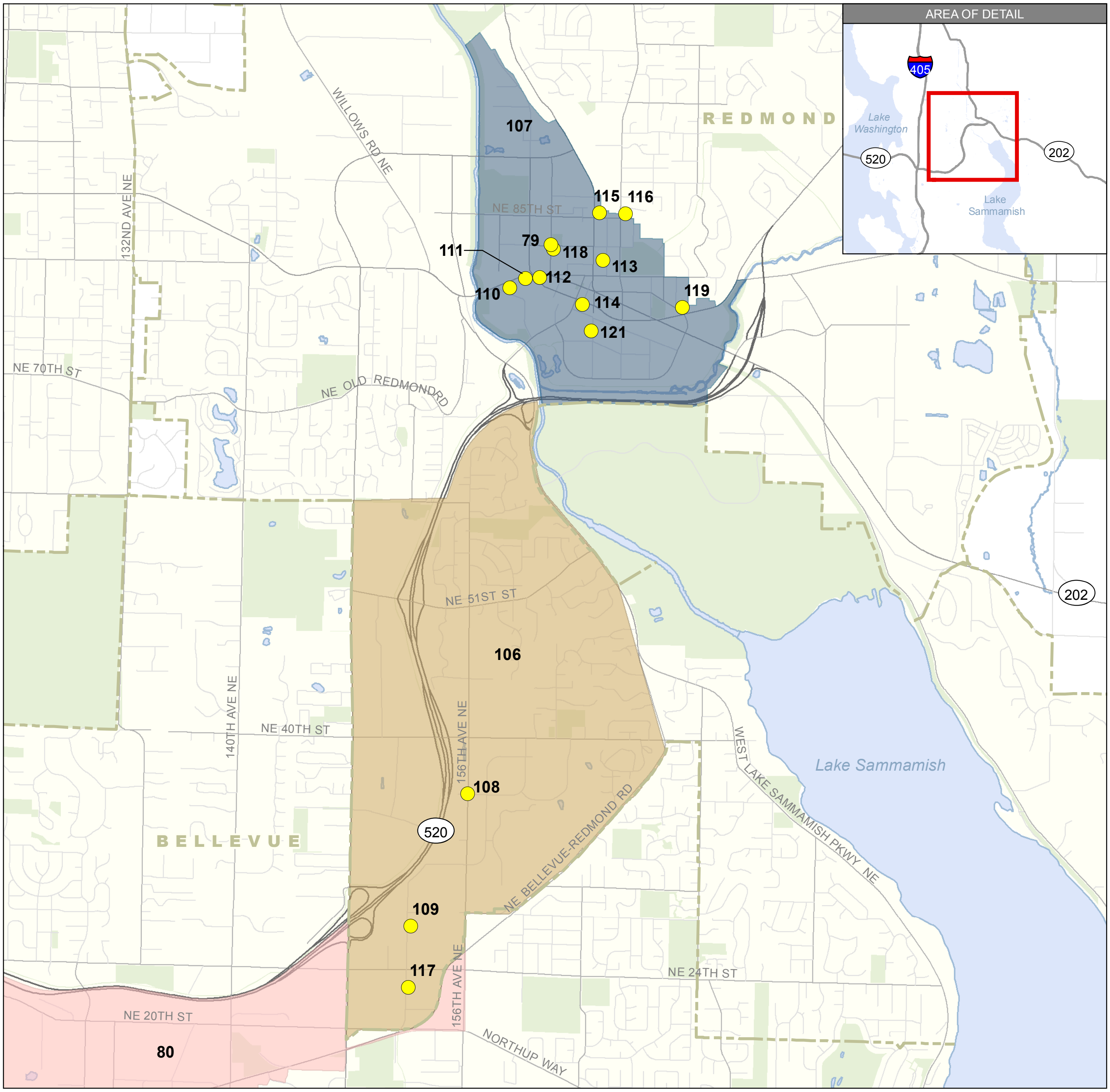

ID	Project
79	Downtown Implementation and Subarea Plan
80	Bel-Red Corridor Plan
106	Overlake Neighborhood Plan Update and Implementation (Redmond)
107	Redmond Downtown Neighborhood Plan
108	Microsoft Expansion (Microsoft/Redmond)
109	Group Health Property
110	Redmond River Park
111	Cleveland Street West
112	Cleveland Street East
113	Portula'ca
114	Center Pointe
115	Tudor Manor
116	Perrigo Park
117	White Swan
118	Redmond Court
119	Parkside Apartments
121	Redmond Transit Oriented Development

Land Use Project
Bel-Red Corridor Project
Overlake Neighborhood Plan
Redmond Downtown Neighborhood Plan
Park
City Limits

Source: King County (2005) GIS Data (Streams, Streets), King County (2007) GIS Data (Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

N
0 1,000 2,000 4,000 Feet

Exhibit 6d. **Reasonably Foreseeable Future Actions**

Medina to SR 202: Eastside Transit and HOV Project

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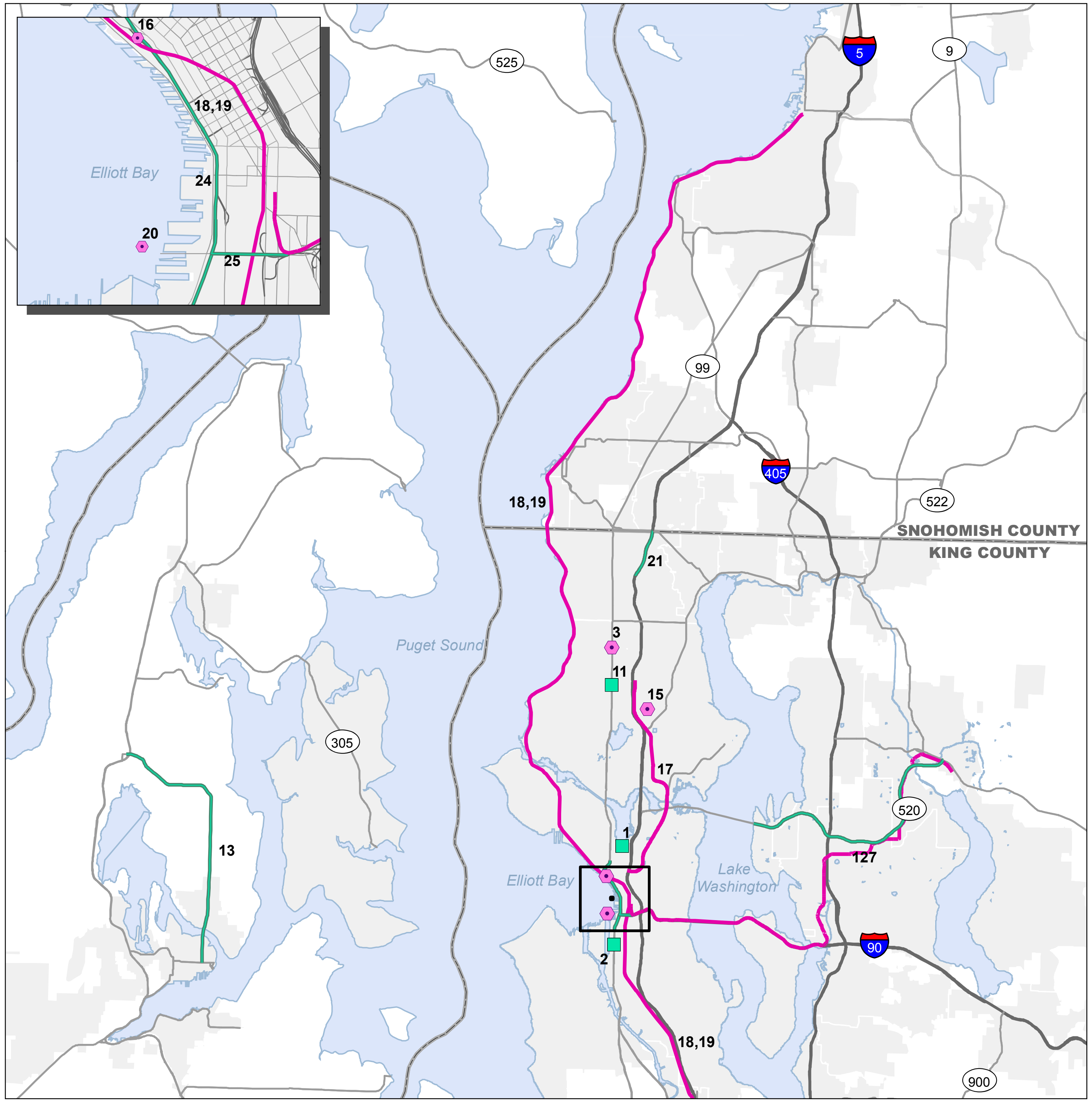
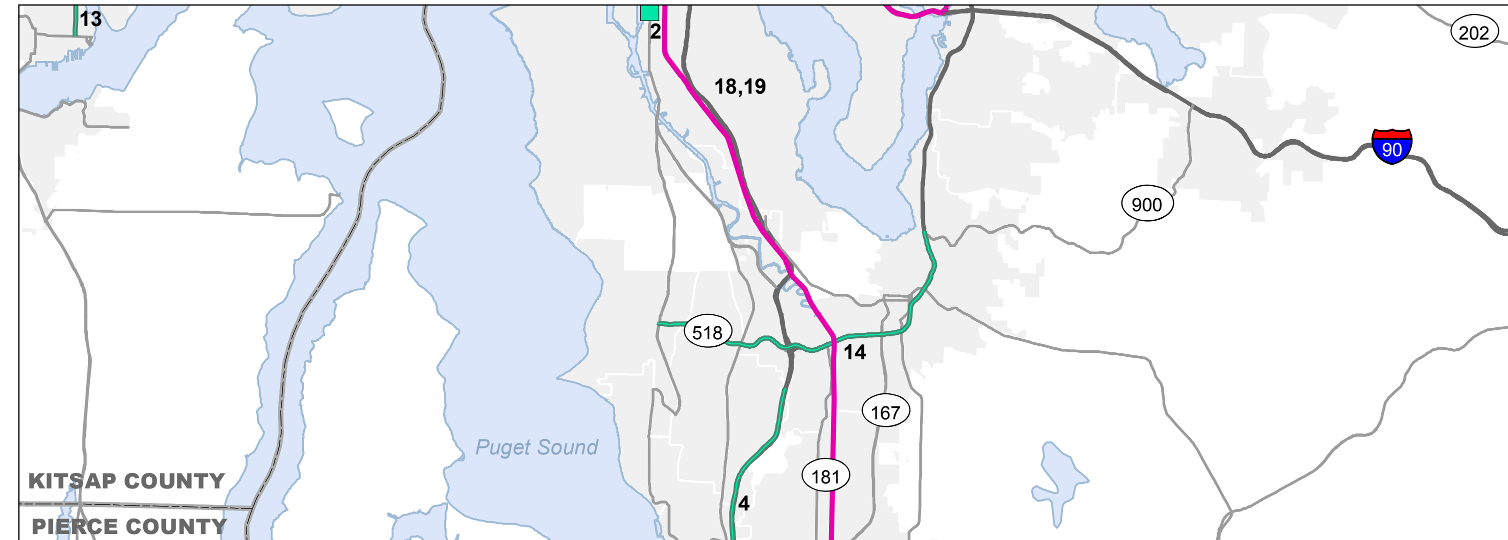
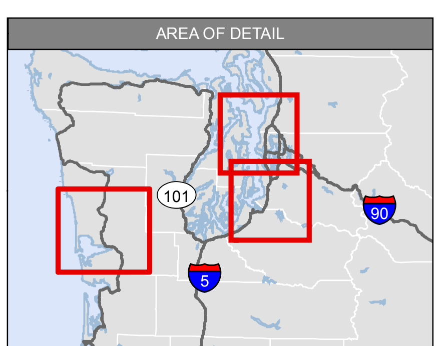




ID	Project
1	Mercer Corridor Improvements
2	Spokane Street Viaduct Project
3	King County *Transit Now*: Aurora, Ballard, West Seattle, Eastside, and Pacific Highway BRT Corridor
4	I-5: Pierce County Line to Tukwila Stage 4 HOV Program
5	I-5: Improvements - Port of Tacoma Road to the King/Pierce County Line
6	I-5: Pierce County Line to South 320th St
7	I-5: 38th St to Port of Tacoma Road
8	SR 16: Olympic Drive (Gig Harbor) to Union Ave (Tacoma)
9	SR 16: I-5 to Union Ave
10	SR 99: South 284th St to South 272nd St
11	SR 99: Aurora Ave North Corridor Transit/HOV Lanes (Shoreline)
12	SR 161: Jovita Blvd to South 360th St
13	SR 304: SR 3 to Bremerton Ferry Terminal
14	SR 518: Sea-Tac Airport to I-5/I-405 Interchange
15	Sound Transit: Light Rail between Sea-Tac Airport and Northgate
16	Seattle Street Car
17	North Link Light Rail Station at Husky Stadium
18	Sound Transit: Sounder Commuter Rail from Everett to Seattle
19	Sound Transit: Sounder Commuter Rail from Lakewood to Seattle
20	WSDOT Ferries: Bainbridge - Seattle Auto Ferry
21	I-5: NE 175th St to NE 205th St - Northbound Auxiliary Lane
22	SR 167: 15th St SW to 15th St NW
23	SR 167: SR 410 to 15th St SW
24	Alaskan Way Viaduct and Sea Wall Replacement Project
25	SR 519: Intermodal Access Project, Phase 2: South Atlantic Corridor (WSDOT)
126	Pontoon Construction Project
127	Medina to SR 202: Eastside Transit and HOV Project



Transit Project
SR 520 Pontoon Project
Roadway or Arterial Project
Roadway or Arterial Project
Transit Project
City Limits

N

0 2.5 5 10 Miles

Source: King County (2004) GIS Data (City Limits), WSDOT (2004) GIS Data (State Routes), CH2M HILL (2008) GIS Data (Park), WDOE (2001) GIS Data (Water Bodies). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6e. **Reasonably Foreseeable Future Actions**

Medina SR 202: Eastside Transit and HOV Project

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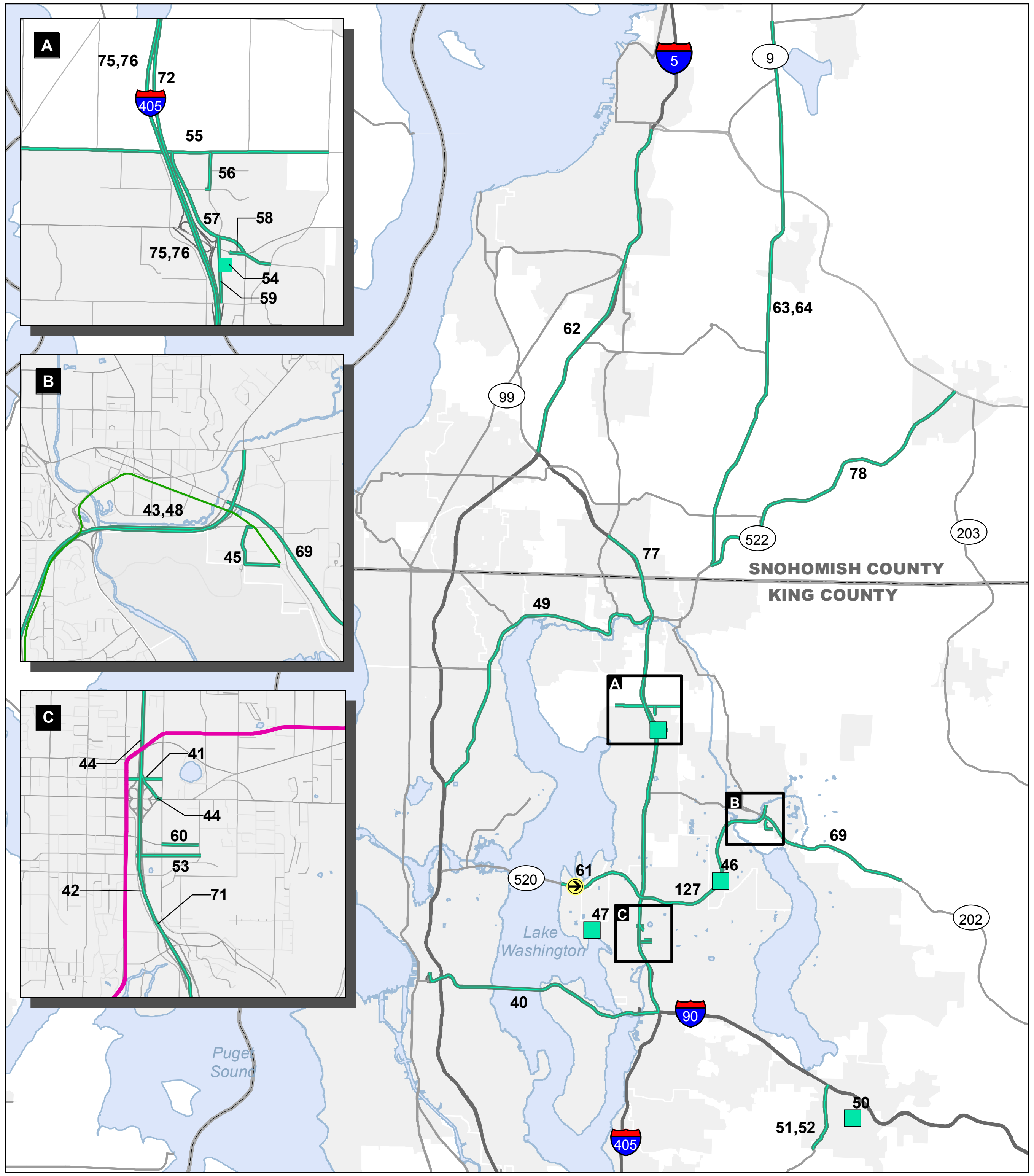
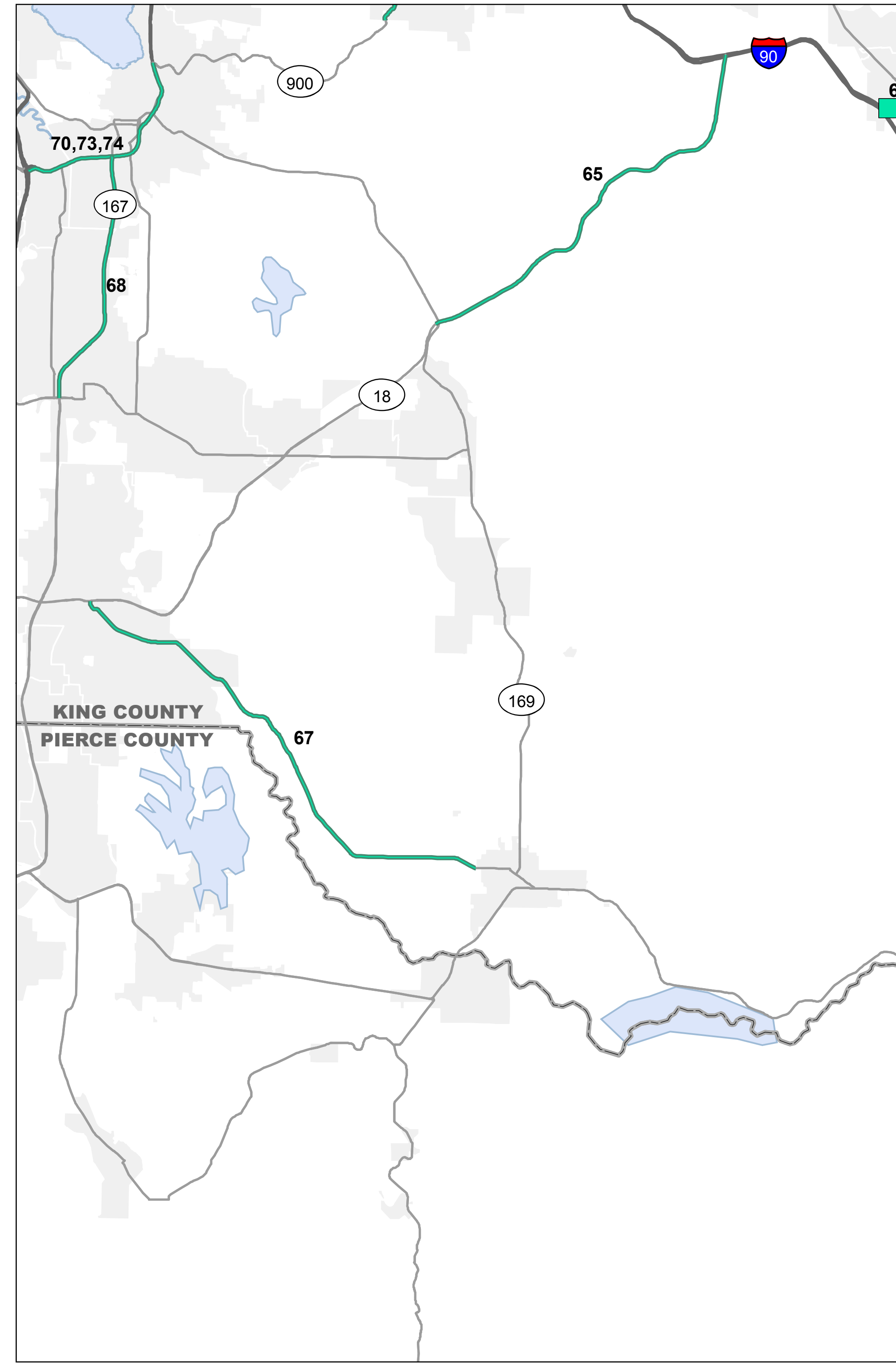
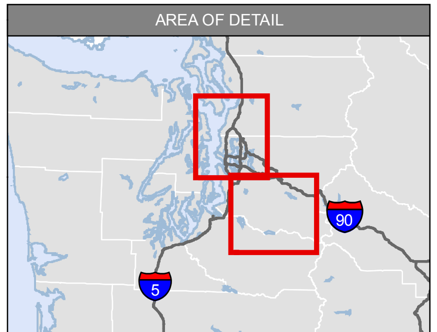




ID	Project
40	I-90 Two-Way Transit and HOV Operations (WSDOT and Sound Transit)
41	I-405: NE 10th St Ext. (WSDOT)
42	I-405 Bellevue Nickel Project: SE 8th St to I-90 (WSDOT)
43	SR 520: West Sammamish to SR 202 Project (WSDOT)
44	I-405: NE 8th St to SR 520 Braided Crossing (WSDOT)
45	NE 70th St Ext.
46	SR 520 and NE 36th St Project (Redmond)
47	Old Lake Washington Boulevard Right-of-Way
48	SR 520: West Lake Sammamish Parkway to SR 202
49	SR 522: I-5 to I-405 Multi-modal Project
50	SR 900: SE 78th St to Newport Way
51	SR 900: I-90 to Gilman Blvd
52	SR 900: Park and Ride Lot (Newport Way) to I-90 WB Ramp
53	NE 2nd St Ext.
54	NE 118th Ave NE Road Ext.: North of NE 116th St (new) to NE 118th St
55	NE 132nd St Road Improvements: 100th Ave to 132nd Ave
56	119th Ave NE Road Ext.: NE 128th St to NE 130th St
57	NE 130th St Road Ext.: Totem Lake Blvd to 120th Ave NE
58	NE 120th St Road Improvements: Extend NE 120th St to 120th Place
59	120th Ave NE Road Ext.: NE 116th St to NE 120th St
60	NE 4th St Ext.: 116th Ave NE to 120th Ave NE
61	24th St Culvert Fish-friendly culvert
62	I-5 Everett: SR 526 to US 2 HOV Lanes
63	SR 9: SR 522 to 176th St Phases 1B, 2, and 3
64	SR 9: 176th St to SR 92
65	SR 18: Issaquah Hobart Road to I-90 Widening
66	I-90: Eastbound Ramp to SR 202
67	SR 161: 176th to 234th St
68	SR 167: I-405 to SE 180th St
69	SR 202: SR 520 to Sahalee Way Widening
70	I-405: SR 181 to SR 167
71	I-405: (I-90 to SE 8th St) and (Main to I-90)
72	I-405: SR 522 to SR 520 (Stage II SR 522 to NE 70th St)
73	I-405 to I-5 to SR 181
74	I-405: I-405/SR 515 Ramp
75	I-405: I-405/NE 132nd Half Diamond - Access Ramps
76	I-405: NE 124th St to SR 522
77	I-405: NE 195th St to SR 527
78	SR 522: Snohomish River Bridge to US 2
127	Medina to SR 202: Eastside Transit and HOV Project

AREA OF DETAIL



- Utility Project
- Roadway or Arterial Project
- Roadway or Arterial Project
- City Limits
- County Boundary

N

0 2.5 5 10 Miles

Source: King County (2004) GIS Data (City Limits), WSDOT (2004) GIS Data (State Routes), CH2M HILL (2008) GIS Data (Park), WDOE (2001) GIS Data (Water Bodies). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 6f. **Reasonably Foreseeable Future Actions**

Medina SR 202: Eastside Transit and HOV Project

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4. Potential Indirect and Cumulative Effects

Air Quality

What direct and indirect effects would the project likely have on air quality?

The Build Alternative would produce the following direct effects on air quality (WSDOT 2009e):

- Exhaust and particulate emissions, such as carbon monoxide (CO), nitrogen oxides, and fugitive dust, would be released during construction from activities such as operation of heavy equipment and soil disturbance. These emissions would be temporary.
- Vehicle emissions would occur during operation of the project; the improved highway infrastructure resulting from the project, including expanded transit facilities and the provision of high-occupancy vehicle (HOV) lanes, would help to offset increases in vehicle emissions that could result from higher traffic volumes.

Air emissions from construction activities and project operation are not expected to cause a change from the baseline condition or a violation of National Ambient Air Quality Standards (NAAQS) or the Mobile Source Air Toxics Rule; the project meets conformity requirements in 40 CFR Parts 51 and 93. The project is expected to have a low potential for mobile source air toxic (MSAT) emissions. For additional detail, see the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Air Quality Technical Memorandum* (WSDOT 2009e). Construction effects on air quality would be temporary. WSDOT would utilize best management practices (BMPs) and design standards to avoid and minimize potential direct effects from project construction and operation.

Construction of the project could produce indirect effects on air quality if emissions or particulates were dispersed to locations distant from the construction zone; these effects would be temporary and limited to the construction period. No permanent indirect effects are expected to occur as a result of the project.

How was the cumulative effects assessment on air quality conducted?

The analyst based the air quality cumulative effects assessment on applicable federal regulations and standards. The Clean Air Act, last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set standards, referred to as NAAQS, for pollutants considered harmful to public health and the environment. The EPA has set federal standards for six principal air pollutants, called "criteria" pollutants: fine and coarse particulate matter, ozone, carbon monoxide, sulfur dioxide, and lead. Federal, state, and regional agencies operate ambient air monitors, some of which are located in the project area, to assure the region meets national air quality standards. Areas where air pollution levels persistently exceed the NAAQS may be designated as "nonattainment" areas and are subject to stricter regulations regarding air emissions from new industrial sources and transportation projects. An area may be considered a "maintenance" area if it was formerly a nonattainment area but currently is meeting NAAQS. Maintenance areas are subject to stricter regulation to maintain lower ambient air concentrations. The central Puget Sound area is designated as a maintenance area for carbon monoxide (CO). The analyst used the NAAQS as the benchmark to characterize present air quality and expected air quality trends in the reasonably foreseeable future with and without the project.

The analyst made the following assumptions:

- Ambient air quality is itself a cumulative effect, because ambient air quality is determined by the individual contributions of many individual emission sources.
- If a region is designated as a maintenance area (a former nonattainment area where maintenance regulations are in effect), its ambient air quality reflects the adverse cumulative effect of pollutant emissions from many sources.
- All present and reasonably foreseeable future actions, including transportation and land development projects, are and will be subject to regulatory limits on their pollutant emissions.

The study area for the air quality cumulative effects assessment is the central Puget Sound region, which includes portions of Pierce, King, Kitsap, and Snohomish counties (PSRC 2006).

The analyst used recent data from ambient air monitors near the project area, discussed in greater detail in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Air Quality Technical Memorandum* (WSDOT 2009e).

What trends have led to the present air quality condition in the study area?

The PSRC's *Transportation 2040 DEIS* (PSRC 2009a) provides an overview of air quality conditions and trends in the Puget Sound region, concluding that "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." The *Transportation 2040 DEIS* points out that 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. It notes that "[l]ocal oxygenated fuels programs, inspection and maintenance programs, and traffic control measures have also played a role in the declining CO emissions trend" (PSRC 2009a).

As discussed in the *Transportation 2040 DEIS* and in Chapter 3 of this technical memorandum, the Central Puget Sound Region, where the project area is located, has experienced accelerating population growth and industrial, commercial, and residential development, particularly during the second half of the twentieth century. This trend is likely to continue in the reasonably foreseeable future. Traffic volumes have increased with population, leading to increased automotive emissions, and the regional transportation infrastructure has expanded to accommodate the increasing traffic volume. At the same time, regional, county, and municipal transit systems have steadily improved, helping to counter the trend of increasing emissions (PSRC 2009a).

The central Puget Sound region is currently designated a maintenance area for CO and is in attainment for all other criteria pollutants. Federal, state, and regional agencies cooperate to coordinate jurisdictional responsibilities for air quality throughout the region. In addition to the EPA Office of Air Quality Planning and Standards, which establishes the NAAQS, the Washington State Department of Ecology (Ecology), PSRC, and the Puget Sound Clean Air Agency have established management goals and exercise jurisdiction at the state and regional levels. County and municipal air quality statutes contribute further to air quality regulation and management at local levels.

In general, air quality trends and projections in the Puget Sound Region conform to agency management goals to maintain air quality criteria pollutant levels below the NAAQS and to achieve steady improvement (PSRC 2009a). Recent ambient air monitoring data for monitors near the project location, presented in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Air Quality Technical Memorandum* (WSDOT 2009e), indicate that concentrations have been below the NAAQS for each of the six criteria pollutants for the past five years. Although five years may be too short a period to establish a reliable trend, the data do suggest that ambient air quality may be improving in the project vicinity, a trend reflected nationally. Cleaner cars, industries, and consumer products have contributed to cleaner air throughout much of the United States. EPA expects air quality to continue to improve as recent regulations are fully implemented and states work to meet national standards. Among these regulations are the Locomotive Engines and Marine Compression-Ignition Engines Rule, the Tier II Vehicle and Gasoline Sulfur Rule, the Heavy-Duty Highway Diesel Rule, the Clean Air Non-Road Diesel Rule, and the Mobile Source Air Toxics Rule (EPA 2008).

How is air quality likely to change in the reasonably foreseeable future without the project?

Air quality projections for the Puget Sound Region in the *Transportation 2040 DEIS* indicate that under the No Build Alternative, regional air quality is likely to improve between the present and 2040 (PSRC 2009a). Transportation improvement projects cumulatively enhance air quality, because traffic improvements smooth traffic flow and relieve congestion, reducing engine idling times and vehicle emissions (PSRC 2009a). Many traffic improvement projects are planned for the reasonably foreseeable future, as shown in Exhibit 6. For example, the provision of HOV lanes by the I-5 to Medina: Bridge Replacement and HOV Project would introduce a long-term improvement by reducing vehicle idling times and increasing transit and multiple-occupancy vehicle use on the SR 520 corridor beyond present levels. Another reasonably foreseeable major transportation project, the Sound Transit East Link Light Rail Project, would further contribute to a cumulative improvement in air quality in the study area. This planned component of a regional light rail system would connect downtown Seattle with Bellevue and Redmond, utilizing a right-of-way on the I-90 bridge across Lake Washington.

What would the cumulative effect on air quality likely be?

Project construction activities would make a small short-term contribution to an incremental effect on air quality by emitting exhaust gases and particulates into the atmosphere. Emissions from project construction activities would combine with other emissions from sources within the region. This incremental effect would be temporary and is not expected to cause a change from the baseline condition or a violation of the NAAQS (WSDOT 2009e).

During project operation, vehicles using the SR 520 corridor would release exhaust emissions into the atmosphere. It should be understood, however, that this happens now, and that the transit expansion and HOV lanes provided by the project would decrease the cumulative exhaust emission below the level expected under the No Build Alternative. The analysis shows that the project will produce an incremental improvement in air quality (WSDOT 2009e).

Because the Build Alternative 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 NAAQS. Because the project is not anticipated 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 also included in the current Regional Transportation Plan (RTP), *Destination 2030* (PSRC 2007), in the action alternatives evaluated in the *Transportation 2040 DEIS* (PSRC 2009a), and in the 2007-2010 Transportation Improvement Program (TIP), which lists all current transportation projects (PSRC 2009b). The RTP and the TIP meet the conformity requirements identified by federal and state regulations for CO.

How could cumulative effects on air quality be minimized?

Cumulative effects on air quality could be minimized by continuing advancements in automobile technology, fuel content regulations, and the increased availability of alternative fuels. Furthermore, Washington’s Commute Trip Reduction program continues to be the primary transportation demand management strategy in the central Puget Sound region. The program targets commutes in high-traffic areas, including strategies such as employee parking management and incentives for commuting by means other than driving alone (PSRC 2009b).

Cultural Resources

What direct and indirect effects would the project likely have on cultural resources?

Traditional cultural properties and archaeological sites relating to Native American cultures have not been identified in the project footprint and are not expected to be directly or indirectly affected by the project (WSDOT 2009d). Historic properties are defined as places listed in or eligible for listing in the National Register of Historic Places (NRHP). No known historically significant properties would be damaged, removed, or physically altered during project construction or operation. Project construction could temporarily affect historic properties in the vicinity through noise and fugitive dust from demolition and truck traffic, but these effects are not considered adverse under Section 106. Access to historic properties could be affected by detours, especially during construction of the Evergreen Point Road lid and improvements to Evergreen Point Road. These effects would be temporary and minor. The *SR 520, Medina to SR 202: Eastside Transit and HOV Project Cultural Resources Technical Memorandum* (WSDOT 2009d) provides more detail on expected direct effects on historic properties.

The Evergreen Point Road lid would directly benefit visual quality and noise levels as experienced from nearby historic properties. This landscaped lid would dampen sound, provide added green space, and reconnect neighborhoods that were divided when SR 520 was built in the 1960s, enhancing and partially restoring the setting of historic properties in these communities.

Noise walls have been incorporated into the project design along much of the roadway. They would have a beneficial effect on the adjacent historic properties by reducing noise below present levels. For more information on noise effects, see the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Noise Technical Memorandum* (WSDOT 2009h).

No indirect effects to cultural resources were identified for this project.

What would the cumulative effect on cultural resources likely be?

As documented in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Cultural Resources Technical Memorandum* (WSDOT 2009d), WSDOT determined that the project would have no direct or indirect effect on any identified cultural resource. For this reason, WSDOT concluded that the project would not contribute to a cumulative effect on cultural resources; (WSDOT, FHWA, and EPA 2008; WSDOT 2009d).

Ecosystems

What direct and indirect effects would the project likely have on ecosystems?

Ecosystems can be divided into three components: wetlands, fish and aquatic habitat, and wildlife. Project construction will directly affect wetlands, streams, and wildlife habitat but all of these effects will be mitigated as part of the project and design (WSDOT 2009i). The project includes beneficial and adverse impacts to wetlands, fish and aquatic habitat, and wildlife. No indirect effects were identified. Adverse effects include: temporary disturbance of approximately 1.6 acre of wetlands and 0.9 acre of wetland buffer, and permanent fill of approximately 7.0 acres of wetlands and 1.7 acres of wetland buffer; construction will temporarily disturb approximately 14 acres of wildlife habitat and 3.0 acres of riparian buffer; approximately 65 acres of wildlife habitat and 1.7 acres of riparian buffer will be permanently disturbed; there will be 0.24 acre of permanent stream channel impact (WSDOT 2009i). Channel realignments and culvert removals and replacements will result in a gain of approximately 980 linear feet of open-channel habitat within fish-bearing streams, including opening up approximately 860 linear feet of stream channel currently confined to culverts. Project operation will not adversely affect any federal, state, or local sensitive wildlife species. WSDOT will provide mitigation to compensate for any adverse effects on ecosystems. Once completed, the project will improve fish passage and stream alignments, resulting in long-term benefits to habitat quality and quantity for fish and aquatic species.

How was the cumulative effects assessment on ecosystems conducted?

WSDOT conducted a cumulative effects analysis because of the original direct effects and uncertainty regarding the full effectiveness of the mitigation on replacing functions. WSDOT used *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008) as the basis for assessing the cumulative effect of the project on wetlands, fish and aquatic habitat, and wildlife in combination with other past, present, and reasonably foreseeable future actions. The study area for indirect and cumulative effects on ecosystems is the central Puget Sound area. The time frame starts at 1850, when significant European settlement within the Puget Sound region began, and ends at 2030, the project design year.

The analysts collected existing data from relevant scientific literature describing typical potential effects of transportation projects on ecological resources and compared these to the potential effects of the Build Alternative. Transportation projects were specifically reviewed because they are long, linear structures that cut across landscapes, potentially affecting ecological resources differently than a site development project. The review focused on activities that have long-term or far-reaching effects on ecological systems.

For the wetlands analysis, the analysts consulted numerous digital and paper maps to determine the location of known and potential wetlands and examined digital sources including aerial photographs, National Wetlands Inventory data, King County Soil Survey, and current wetland mapping from local governments. Existing information was further supplemented with data collected in the field. The baseline (present-day) condition of fish populations and aquatic habitat, trends from past actions that have led to the baseline condition, and projected trends likely to influence the future condition of the resource were determined by consulting the scientific literature and a variety of relevant technical reports (PSRC 2009a; Good et al. 2005; WDF et al. 1993; WDFW 1998, 2002, 2004; Kerwin 2001). For wildlife and wildlife habitat, the analyst relied heavily on field reconnaissance as well as reports from the Washington Department of Fish and Wildlife and US Fish and Wildlife Service (WSDOT 2009i).

In some cases, identified direct or indirect effects of the project on other resources could indirectly affect wetlands and fish and wildlife habitat. Therefore, the analyst reviewed potential cross-disciplinary effects that could affect wetlands and fish and wildlife habitat. The review included other discipline reports and communication with other disciplinary specialists. The disciplines reviewed in detail were ecosystems, transportation, recreation, noise, and cultural resources.

What trends have led to the present condition of ecosystems in the study area?

The *Transportation 2040 DEIS* provides an overview of trends affecting ecosystems in the central Puget Sound region (PSRC 2009a). Although historical information specific to the study area is not readily available, Ecology estimates that about 20 to 40 percent of pre-settlement wetlands have been lost to development across Washington, with urbanized areas having a loss of 70 to 100 percent. Statewide wetland losses range from 700 to 2,000 acres per year, and it is not know how many acres of additional wetlands are degraded without being completely filled (Ecology 1990).

Changes to the ecosystem typically affect many aspects of the system. For example, a change to a wetland, such as filling, may degrade water quality and reduce the quantity and quality of habitat for fish and wildlife. There have been substantial alterations to the natural environment in central Puget Sound with the most significant from an ecosystem standpoint being construction of the Ship Canal and Ballard Locks, which lowered Lake Washington by 9 feet in 1916, and construction of SR 520 and the Evergreen Point Bridge in the 1960s. Additionally, wetlands within the region have been substantially affected by logging, agriculture, industrialization, and urban development, including increasing impermeable surface areas, altering ecosystem processes, and removing or fragmenting forested and riparian habitats, including wetlands.

Fish and aquatic habitat have been similarly affected by development and construction of the Ship Canal and Ballard Locks. In addition, water quality has deteriorated and barriers to fish passage have increased throughout central Puget Sound lakes and streams, from intensive development along the shorelines of the Ship Canal, Lake Washington, Lake Sammamish, the Sammamish River, and their respective tributaries. This, along with the introduction of invasive predator species, has impaired juvenile salmon outmigration and rearing. These and other past activities have led to substantial declines in runs of Pacific salmon and steelhead in central Puget Sound and damaged many other fish stocks considered by resource management agencies to be declining or at risk (Good et al. 2005; WDF et al. 1993; WDFW 1998, 2002, 2004). Furthermore, three fish species within the study area have been included for listing under the Endangered Species Act as threatened species; Chinook salmon, steelhead, and bull trout. Shared Strategy for Puget Sound, a collaborative initiative to restore and protect Puget Sound salmon runs, has developed recovery plans for central Puget Sound fish stocks (Chinook recovery plan, limiting factors analysis, etc.). These focus on improving water quality and freshwater habitat and on improving operations at the Ballard Locks (Shared Strategy for Puget Sound 2007).

Wildlife habitat within the project area has been substantially affected by past actions as well, including alteration of ecosystem processes, loss or alteration of forest habitat or other habitat, habitat fragmentation, invasive species, direct mortality from hunting, expansion of impervious surface, water pollution, and changes in surface water and groundwater flow regimes. These effects have resulted in substantial loss of wildlife habitat in the study area.

Transportation systems, which are a key component of the urban development pattern within the central Puget Sound region, have historically played a part in all these ecosystem changes (PSRC 2009a).

Local government wetland protection standards, which have been established in Washington only during the last two decades, differ from jurisdiction to jurisdiction and are not always sufficient to protect and maintain the long-term sustainability of wetland functions. Wetland mitigation has been only partially successful, and attention to ecological context and landscape-based approaches to natural resource conservation are still lacking. This is particularly true within urban locales such as the study area, where ecosystem processes have already been substantially altered (Sheldon et al. 2005).

How would ecosystems likely change in the reasonably foreseeable future without the project?

Under the No Build Alternative, wetlands in the study area would continue to decline with further development; however, increased protection of wetlands through regulation and restoration efforts will offset this decline. Many land development and transportation projects are under construction or planned for construction in the reasonably foreseeable future, as shown in Exhibit 6. Projects that have potential to affect wetlands can be grouped into two basic types: transportation and large-scale residential or commercial land developments. Specific examples include improvements to I-405 and surrounding local streets in Bellevue and the residential and retail development projects. These projects could cumulatively contribute to continuing wetland declines by altering ecosystem processes, changing surface water and groundwater flow, and increasing the total area of impervious surface. These effects, in turn, could alter plant and wildlife species diversity and habitat functions within the remaining wetlands and affect water quality and suitability of spawning and rearing habitat for fish. Regulatory and voluntary efforts to improve habitat will continue with or without the project.

What would the cumulative effect on ecosystems likely be?

As discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Ecosystems Discipline Report* (WSDOT 2009i), WSDOT has worked to avoid and minimize impacts to ecosystems during the scoping and design of this project. WSDOT avoided many impacts to resources through careful identification of sensitive areas early in the design process.

Where avoidance was not possible, effects were minimized by treating stormwater, providing wildlife habitat, and improving wetland functions. The project would make a beneficial contribution to ecosystem health along the SR 520 corridor, helping to reduce the cumulative effect of development on wetlands and aquatic habitat. Through best management practices, 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, fisheries resources, and wildlife would be small and would not lead to substantial fish mortality, changes to fish populations or subpopulations, habitat loss or degradation, or decreased wetland function.

Considered with the effects of past, present, and reasonably foreseeable future actions, the project would have a negligible contribution to cumulative effects on wetlands, streams and wildlife in the area.

How could cumulative effects on ecosystems be minimized?

The federal wetland regulatory goal of No Net Loss and recently updated state 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, 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 U.S. Army Corps of Engineers, and the EPA.

Large-scale restoration plans and activities are currently being designed and implemented to slow, or even halt, the present downward trends in Puget Sound fish populations. For example, Shared Strategy for Puget Sound, mentioned previously, is a cooperative effort of federal, Tribal, state, and local governments, businesses, and conservation groups. Fifteen watersheds, including Lake

Washington, are participating in the Shared Strategy to identify actions to recover salmon stocks and obtain the commitments and funding necessary to set the actions in motion. Goals in Lake Washington include improvements to fish access and passage, riparian restoration, improvements in water quantity and quality, and protection and preservation of existing high-quality habitat.

Eastside communities have comprehensive plans and critical areas ordinances that guide future community development so that adverse cumulative effects on natural resources, including wildlife, can be alleviated. In addition, voluntary efforts by individual developers, at relatively small additional cost, could create small but cumulatively meaningful new or enhanced habitat areas to slow and offset cumulative habitat loss from past and ongoing development. Such measures could include using native plants in landscaping, designing curved or irregular rather than straight boundaries between forested and lawn areas, providing vegetated buffers along streams, and maintaining protected wildlife movement corridors of undisturbed forest between undeveloped areas.

Economics

What direct and indirect effects would the project likely have on economic activity?

As discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Land Use, Economics, and Relocation Technical Memorandum* (WSDOT 2009j), the Build Alternative would create jobs and income for those directly employed by firms associated with the construction of the project. This direct employment would in turn generate an indirect economic benefit by employing other local firms that supply construction materials. Wages spent by construction workers would in turn generate income and sales tax revenue in the study area. This effect is expected to last the entire length of the construction period and would be focused on the study area (Pierce, King, Kitsap, and Snohomish counties).

The project would not result in any unavoidable adverse direct or indirect effects on the regional economy. Beneficial indirect economic effects may accrue from the hiring of vendors and purchasing of materials and supplies required for project construction, leading to increased employment throughout the relevant parts of the supply chain in the short term.

What would the cumulative effect on economic activity likely be?

No direct or indirect adverse effects were identified and therefore the project would not contribute to a cumulative effect on economic activity. This is because there is little expected difference between the No Build and Build alternatives in the study area as measured to the end of the design life of the project in 2030.

Energy and Climate Change

What direct and indirect effects would the project likely have on energy?

As discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Energy Technical Memorandum* (WSDOT 2009g), the construction and operation of the Build Alternative would consume large amounts of energy resources, particularly petroleum. Because greenhouse gases (GHGs) released during construction and operation come primarily from the fuel burned, GHGs would be emitted by these activities and would be roughly proportional to these activities.

Operation of the Build Alternative would consume slightly less energy than the 2030 No Build Alternative. However, the approximate 0.1 percent difference in energy consumption between the Build and No Build alternatives falls within the margin of error for current methodologies. Therefore, energy consumption during operations for the Build and No Build alternatives should be considered equivalent. Likewise, and based on the precision of the methodology used to estimate emissions during operations, the Build and No Build alternatives are equivalent in their contributions to GHG emissions.

The energy analysis did not identify indirect effects on energy or GHG emissions could result from project construction or operation. Energy supplies are sufficient to build and operate the project without placing abnormal demands on energy sources outside of the region.

How was the cumulative effects assessment on energy conducted?

The energy analysis team identified expected cumulative effects of the Build and No Build alternatives by following *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008). First, the energy analysts considered how past and present actions have already affected the study area. Next, the analysts added the expected direct and indirect effects of the alternatives on energy, as discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Energy Technical Memorandum* (WSDOT, 2009g). Finally, the analysts considered the probable effects of other reasonably foreseeable future actions that are planned but have not yet been built. The analysts combined the expected direct and indirect effects of the project with the effects of these past, present, and reasonably foreseeable future actions to produce a cumulative picture of how energy might be affected between now and 2030, the project design year.

The study area for the energy and GHG cumulative effects assessment is the central Puget Sound region, which includes portions of Pierce, King, Kitsap, and Snohomish counties.

What trends have led to the present energy condition in the study area?

Transportation is a major consumer of energy in the study area. This trend started locally in the 1920s, when the Eastside was connected to the Seattle area by ferries and roadways. Growth in the Eastside area accelerated after construction of the Lake Washington Pontoon Bridge in 1940 just south of Bellevue. Completion of the Interstate Highway System in 1956 further contributed to high mobility and the use of single-occupancy vehicles. There currently is a network of interstates, freeways, and local roads throughout the region. The transportation infrastructure requires maintenance, upgrades and expansion, and new projects to meet the demand for traffic volumes in the project area. New land developments to house people and provide places for work and play also require the consumption of energy. This trend occurs across the United States and in many parts of the world.

How would energy consumption likely change in the reasonably foreseeable future without the project?

Numerous transportation and land development projects are under way or proposed for the central Puget Sound region, as shown in Exhibit 6. These include the Sound Transit East Link Light Rail Project, various improvement projects along I-405, and the I-5 to Medina: Bride Replacement and

HOV Project (see Exhibit 6). There are also approximately 23 known large land development projects planned in the Bellevue area alone.

The construction of any of these reasonably foreseeable future actions would consume energy and emit GHGs into the atmosphere. Projects that improve traffic mobility would allow vehicles to travel at more efficient speeds, which would reduce energy consumption and GHG emissions when compared to the No Build alternative. Specifically, projects that encourage the use of HOV lanes and mass transit should have a greater effect on reducing GHGs and conserving energy.

For a more detailed discussion of construction- and operation-related effects on energy and GHG emissions, see the *SR 520, Medina to SR 202: Eastside Transit Project Energy Technical Memorandum* (WSDOT 2009g).

What would the cumulative effect on energy likely be?

The construction and operation of the SR 520, Medina to SR 202: Eastside Transit and HOV Project would consume energy and emit GHGs into the atmosphere. Operation of the project would not be measurably different from the No Build alternative and thus would not contribute to a cumulative effect. Construction of the project would have a temporary release of emissions. WSDOT has taken steps to minimize fuel use during construction to reduce GHG emissions by construction equipment by setting up construction areas, staging areas, and material transfer sites in ways that reduce equipment and vehicle idling.

Considered with the effects of past, present, and reasonably foreseeable future actions, the project would have a negligible contribution to cumulative effects on energy and climate change.

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

Global climate change is being addressed at local, regional, national, and international levels. In our state, the legislature has set in law state GHG and vehicle miles travelled (VMT) reduction goals. Governor Christine Gregoire, by executive order 09-05 “Washington’s Leadership on Climate Change,” created partnerships aimed at reducing transportation-related GHG emissions. WSDOT is active in the state-wide and regional efforts to reduce vehicle miles travelled and GHG emissions. These efforts will build on the many programs WSDOT has in place that reduce GHG and VMT including: Commute Trip Reduction Program, Growth and Transportation Efficiency Center Program, and Vanpool Investment Program (largest program in the country - eliminated 203 million drive-alone miles statewide in 2008). The region's transportation plan prepared by PSRC contains a series of recommendations that address energy and GHG.

Environmental Justice

What direct and indirect effects would the project likely have on low-income, minority, or limited-English proficiency populations?

As described in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Environmental Justice Technical Memorandum* (WSDOT 2009k), because no direct or indirect effects were identified, the project would not contribute to a cumulative effect on low-income, minority, or LEP populations.

What would the cumulative effect on low-income, minority, or limited-English proficiency populations likely be?

There were no direct or indirect effects identified that would contribute to a cumulative effect on low-income, minority, or limited-Enginish proficiency populations for this project.

In reaching this conclusion, the analysts began by defining the study area for cumulative effects on low-income, minority, and LEP residents as the central Puget Sound region as presented in the *Transportation 2040 DEIS* (PSRC 2009a). Next, the analysts reviewed technical memoranda and discipline reports prepared for the following disciplines: air quality; cultural resources; ecosystems; land use, economics, and relocations; noise; public services and utilities; social elements; transportation; and visual quality and aesthetics to identify potential direct and indirect effects of the Build Alternative that could contribute to a cumulative effect on low-income, minority, or LEP populations.

Analysts then identified other past, present, and reasonably foreseeable future actions that could contribute to a cumulative effect on low-income, minority, or LEP populations through 2030, the project design year. To identify these actions, analysts researched local and regional comprehensive, land use, and transportation plans, and reviewed the present and reasonably foreseeable future actions prepared by WSDOT to support the analyses in this technical memorandum, shown in Exhibit 6.

Geology and Soils

What direct and indirect effects would the project likely have on geology and soils?

Direct effects related to geology and soils from construction of the project would be temporary and could include fugitive dust and erosion associated with soil disturbances from grading, operations, demolition of existing structures or bridge construction, . Other direct effects related to geology and soils during construction of the project could include topographic changes, loss of topsoil, slope instability, aggregate use, groundwater flow or elevation changes, and long-term settlement that would occur after the project is completed. With the exception of topographic changes, these direct effects are taken into consideration during the design of the project and mitigated. Visual effects from topographic changes are minimized (see Visual Quality).

Indirect effects of project construction related to geology and soils would involve aggregate or granular soil use that would preclude their use for other projects and lead to the depletion of this resource in the project vicinity. Aggregate depletion is viewed as a minor indirect effect for this project. No indirect effects were identified for project operation.

How was the cumulative effects assessment on geology and soils conducted?

The analysts identified cumulative effects relating to geology and soils by following *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008). First, the analysts considered other past and present projects that have already altered geology and soils in and around the SR 520 corridor from their original condition. The most important of these past actions was the original construction of the SR 520 corridor. Next, the expected direct and indirect effects of the project on geology and soils were added. Finally, the probable effects of other projects that are planned but not yet built were considered.

The analysts considered other past, present, and reasonably foreseeable actions along with expected direct and indirect effects of the project to produce a comprehensive view. This allowed them to visualize the future condition of geology and soils in the study area and to understand how the effects of past, present, and reasonably foreseeable future actions might add to, and interact with, the expected effects of the Build Alternative in coming years.

The study area for the geology and soils cumulative effects assessment is the central Puget Sound region, which includes portions of Pierce, King, and Snohomish counties. The time frame for the analysis is the period from the original construction of the SR 520 corridor in the 1960s through 2030, the project design year.

What trends have led to the present geology and soils condition in the study area?

The study area has undergone multiple glaciations which have deposited a variety of soil types and shaped the general topography of the region. Rainfall and volcanic and seismic events have also influenced geological conditions. The geology and topography of the study area affect different geologic hazards such as erosion and landslides, and seismic hazards such as liquefaction, ground shaking, faulting, and permanent ground displacement (Landau Associates 2008; PSRC 2009a; WSDOT 2009l).

Human activities that have altered soils and topography include lowering of Lake Washington's surface elevation and construction of the SR 520, I-405, and other large structures. During the region's urbanization, resources for construction, such as sand and gravel, were plentiful and located nearby. Often the disposal of excavated soils and construction debris was nearby.

The risk of liquefaction due to seismic events is not predictable in location, size or time. Seismic events are not evaluated as a cumulative effect due to their unpredictability. However, past experience with geologic hazards such as landslides and seismic events has led to a better understanding of soil conditions, construction techniques, and improved seismic design. For example, during the original construction of SR 520, Lawton Clay was encountered. At the time, this type of soil was not fully understood, and a landslide occurred. Today there is a greater understanding of how soils behave in certain conditions, and geologic hazards are mitigated through engineering design and appropriate construction techniques.

Roadway and bridge design codes have been improved to provide better protection for the public, resulting in facilities that are more capable of resisting seismic events without damage. The current minimum seismic design standard for highway projects is no collapse during an earthquake with approximately a 1000-year recurrence interval; liquefaction is specifically addressed in the American Association of State Highway and Transportation Officials (AASHTO) design standards (AASHTO, 2009).

How would geology and soils likely change in the reasonably foreseeable future without the project?

Under the No Build Alternative, SR 520 in the project area would not be expected to result in topographic changes, soil erosion, or landsliding. This is because the soil is likely fully consolidated, slopes are stable and soil erosion should be stabilized by existing mature vegetation. There are several projects planned for the SR 405 corridor in the Bellevue area but these are not expected to have significant changes to topography or soil stability. The large housing and retail developments in the Bellevue area are likely to change topography and would likely further deplete aggregate resources.

New construction takes into consideration the effects of seismic events and associated ground shaking and soil liquefaction. As new projects are constructed, they are built to the current standards and are less likely to be damaged or destroyed. Existing structures, including the existing bridges over SR 520, will continue to be monitored and retrofitted, if necessary, for seismic stability through the design year of 2030.

What would the cumulative effect on geology and soils likely be?

Construction of the Build Alternative would have a minor contribution to aggregate depletion in the area, in combination with the effects of past, present and reasonably foreseeable future actions (as shown in Exhibit 6). By design, the project would have a beneficial effect with regard to seismic and soil stability.

How could cumulative effects on geology and soils be minimized?

While the incremental reduction of aggregate supply cannot be avoided, the cumulative effect of aggregate and granular soils depletion during construction projects could be partially mitigated through efforts to re-use existing demolition debris or re-use excavated soils. Excavated soils can be used as fill either onsite or at other locations in the project vicinity. Although topographic changes cannot be avoided, these changes can be minimized by constructing retaining walls instead of cutting slopes, thereby improving the stability of a steep slope. While some seismic hazards such as faulting cannot be avoided, structures can be designed to reduce the effects of ground shaking and liquefaction. In Washington, regional and community planning are coordinated under the Growth Management Act. Both *Vision 2040* and the *Transportation 2040 DEIS* incorporate provisions to help ensure that future development patterns avoid seismically hazardous areas (PSRC 2008, 2009a).

Hazardous Materials

Hazardous materials are not in and of themselves a resource that would be evaluated for cumulative effects. Hazardous materials, however, could affect resources including air and water. Hazardous materials could be associated with contaminated soils and groundwater, building materials encountered through demolition, releasing hazardous materials used at construction sites into the environment due to accidental spills, and encountering underground storage tanks. Depending on the contamination, there could be risks to worker safety and public health in addition to the environmental damage.

However, the risk of encountering hazardous materials for this project is low and there are several safeguards in place to minimize temporary impacts including the WSDOT Spill Prevention Control and Countermeasures (SPCC) Plan for construction projects. See the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Hazardous Materials Technical Memorandum* (WSDOT 2009m) for additional information.

Land Use

What direct and indirect effects would the project likely have on land use?

The Build Alternative would convert approximately 12 acres of land from its existing use to a transportation land use as WSDOT right of way. These existing land uses would be permanently removed or relocated to a new location to accommodate WSDOT transportation right of way. The locations where these localized but permanent land use changes would occur are illustrated in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Land Use, Economics, and Relocation Technical Memorandum* (WSDOT 2009j). WSDOT recognizes there may be some temporary effects during construction in the properties adjacent to the study area. These would include temporary construction easements that remove land from other uses during construction and increased noise, dust, and odor due to construction equipment operations (WSDOT 2009j).

The Build Alternative would not result in indirect land use effects after construction. The existing land uses in the project area are well established and generally consistent with the applicable comprehensive plan and zoning designations. In addition, regional land use planning decisions are established in adopted regional and local land use plans, and these plans considered transportation planning decisions and future transportation improvements, including the SR 520, Medina to SR 202: Eastside Transit and HOV Project, I-5 to Medina: Bridge Replacement and HOV Project, and the SR 520 Pontoon Construction Project.

How was the cumulative effects assessment on land use conducted?

To conduct the cumulative effects assessment on land use, the analyst relied primarily on two regional planning documents: *Vision 2040* and the *Transportation 2040 DEIS* (PSRC 2008, 2009a), as well as *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008). Together, *Vision 2040* and the *Transportation 2040 DEIS* encompass regional planning for the area likely to receive cumulative land use effects to which the project could contribute. *Vision 2040* is Puget Sound Regional Council's (PSRC's) long-range growth management, economic, and transportation strategy for the central Puget Sound region, which includes King, Kitsap, Pierce, and Snohomish counties. *Vision 2040* contains numerous land use-related policies that emphasize concentrating growth in urban centers and connecting those centers with an efficient, transit-oriented, multimodal transportation system. The multicounty planning policies provide an integrated framework for addressing land use, economic development, transportation, other infrastructure, and environmental planning at various levels throughout the central Puget Sound region. Land use decisions are considered and made at the regional level, and the decisions are implemented in local comprehensive plans. Land use plans for local jurisdictions must be consistent with *Vision 2040* (PSRC 2008).

The *Transportation 2040 DEIS* uses integrated transportation and land use modeling to examine six alternative future transportation scenarios, including a Baseline Alternative and five action alternatives. Each action alternative describes a different way by which the comprehensive planning in Vision 2040 could be implemented through transportation improvements. Each alternative would improve efficiency and expand the regional transportation system's ability to handle future demand, while at the same time supporting the region's goals for managing urban growth and protecting the environment (PSRC 2009a).

The *Vision 2040* and *Transportation 2040 DEIS* documents used as the basis for the cumulative effects assessment on land use (and other disciplines) provide comprehensive planning for long-range growth management, transportation, and economic planning for the central Puget Sound region by PSRC, the agency with jurisdictional responsibility for such planning. The documents identify trends which have affected land use in the region and provide projections of how land use is likely to change in the reasonably foreseeable future: from the present through the year 2040. Reasonably foreseeable future actions, including this project, are included in the projections, providing an objective and publicly accessible basis for the cumulative effects assessment.

What trends have led to the present land use condition in the study area?

The Central Puget Sound region has experienced accelerating population growth and industrial, commercial, and residential development, particularly during the second half of the twentieth century, and this trend is likely to continue in the reasonably foreseeable future. According to the *Transportation 2040 DEIS*, the total number of housing units has increased from approximately 683,000 in 1970 to 1,484,000 units in 2006 in the Central Puget Sound region. The percent of single-family units has decreased from 75 to 68 percent, and multi-family units have increased 25 to 32 percent between 1970 and 2006 (PSRC 2009a).

How would land use likely change in the reasonably foreseeable future without the project?

The *Transportation 2040 DEIS* concludes 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 (PSRC 2009a). Regional growth will be incremental in nature, adding to an already established urban footprint of over 3.5 million people and 1.5 million existing housing units. The *Transportation 2040 DEIS* also concludes much of the forecast growth will occur as infill development in areas that are already urbanized. This in-fill development will require new transportation and land development projects such as the SR 520 Bridge Replacement Project, 23 development projects in the Bellevue area and Bel-Red corridor, and improvements to I-405 in the Bellevue area.

PSRC performed an analysis of the development pattern changes that could result from the transportation alternatives in the *Transportation 2040 DEIS*, and has concluded that none of the action alternatives in the *DEIS* would lead to future land use and development pattern changes that are substantively different than the Baseline Alternative (PSRC 2009a).

What would the cumulative effect on land use likely be?

The proposed project is part of the desired future as outlined in the PSRC plan. The Build Alternative's contribution to the cumulative effect on land use would not be adverse or substantial in combination with other past, present, and reasonably foreseeable future actions. The Build Alternative's relative contribution (approximately 12 acres converted from existing land use to transportation right of way) would not be measurable compared to the total cumulative effect.

Regional land use decisions are determined at the regional level and are implemented in local comprehensive plans that must be consistent with *Vision 2040*. The *Transportation 2040 DEIS* land use analysis incorporates reasonably foreseeable changes in the Puget Sound's future land use, population, employment, and travel behavior, including the SR 520, Medina to SR 202: Eastside Transit and HOV Project, and subsequent development would be planned according to the development regulations of the local jurisdiction.

How could the cumulative effect on land use be minimized?

The *Transportation 2040 DEIS* suggests general strategies for urban land use that would mitigate adverse effects of transportation projects on land use at the regional or cumulative level (PSRC 2009a). Among these MPP-En-7 calls for mitigating noise from many sources including transportation and MPP-DP-14 calls for creating sustainable communities with greater connectivity for non-vehicular and mass transit modes of transportation. Regional and local planning organizations are the focal points for gathering public input and suggesting priorities for the future land uses.

Noise

What direct and indirect effects would the project likely to have on noise?

The direct effects associated with the Build Alternative are presented in detail in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Noise Technical Memorandum* (WSDOT, 2009h).

Construction would cause increased noise from construction vehicles and equipment, existing structure demolition, and other activities such as grading, trucks using haul routes that typically would have little truck traffic, and the change in pattern of regular traffic due to road closures and detours. It is also possible that some locations may see a reduction in noise levels, as people turn to alternative forms of transportation, including bicycling, walking and use of mass transit options, including car pooling. If there is a reduction in traffic in a given area, a reduction in noise can also be expected. Traffic would need to be reduced by half to obtain a noticeable decrease in noise of 3 A-weighted decibels (dBA). No indirect effects were identified.

Once project construction is complete, most if not all of the direct effects would be reduced or eliminated. Because the traffic noise study uses future predicted traffic that includes other planned projects and commuting projections, the direct effects of the project, along with traffic noise from other area roadways, would likely be the dominate noise source in the corridor (PSRC 2009a).

How was the cumulative effects assessment for noise conducted?

The analysts identified cumulative effects on noise for the Build Alternative by following a process recommended by WSDOT: *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008) in addition to the various guidance documents, plans, and policies cited in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Noise Technical Memorandum* (WSDOT, 2009h).

As part of the traffic noise analysis, project staff measured and modeled noise levels at representative noise sensitive properties along the project corridor. Currently, there are approximately 120 residences in the SR 520 project study area that meet or exceed the Washington State NAC of 66 dBA L_{eq} (equivalent sound pressure level in A-weighted decibels).

What trends have led to the present noise conditions in the study area?

Road noise is created from a combination of engine, exhaust, and tire sounds (PSRC 2009a). As the number of daily trips has increased on SR 520, so has the road noise. Additionally, in-filling has occurred with more residences close to the roadway than when it was first constructed. As SR 520 was not constructed with noise attenuation, such as noise walls, the level of disturbance has increased over time. Because the highway is nearing maximum capacity, the potential additional level of noise possible in 2030 under the No Build alternative is not expected to be perceptible to the average person.

How would noise conditions likely change in the reasonably foreseeable future without the project?

The *Transportation 2040 DEIS* states that transportation is the largest contributor of noise in urban and suburban areas (PSRC 2009a). The anticipated growth in the Central Puget Sound region translates into additional noise levels, much of which will likely be associated with transportation and transit. However, the cumulative effects analysis for all alternatives in *Transportation 2040 DEIS* indicates that there is no difference between the alternatives in 2030 and concludes that these alternatives would not result in additional cumulative effects at the regional level.

With or without the project, the cumulative study area noise levels would be dominated by traffic on SR 520, along with other major highways and roadways. Major noise producing roadways include: I-405, Bellevue Way and Lake Washington Boulevard, 84th Avenue NE, 92nd Avenue NE and NE 28th Street. Noise from other local unrelated highway and roadway improvement projects along with industrial, commercial and residential construction projects will continue to add to the noise environment in and around the SR 520 corridor.

Under the No Build Alternative, noise levels would be expected to increase by only 1 to 2 dBA L_{eq} in most locations within the study area by the year 2030. It is important to note that a change of less than 3 dBA is not normally noticeable to most people with average hearing. However, with this increase, noise levels would exceed the NAC at an additional 19 residences, bringing the total direct noise effects up to 139 from the current estimate of 120.

What would the cumulative effect on noise likely be?

The Build Alternative will reduce noise adjacent to the roadway by constructing noise barriers and lids at several locations. While the Build Alternative is not expected to have a cumulative effect on the regional noise levels, the project will have measurable reductions of noise in the study area (500 feet to either side of the roadway). The total number of residences experiencing high noise levels (exceeding the NAC) would be reduced from 139 (under no action) to 16 under the proposed Build alternative. Most of the remaining properties exceeding the NAC do so because of traffic noise radiating from arterial roads, such as Bellevue Way and Lake Washington Boulevard, 84th Avenue NE, 92nd Avenue NE and NE 28th Street.

How could the cumulative effect on noise be minimized?

Construction and operational-related mitigation measures such as those listed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Noise Technical Memorandum* (WSDOT 2009h) are required to meet current regulations. Construction of the project would beneficially affect the project area with the installation of noise mitigation including noise walls and lids, all of which reduce noise levels from present conditions. Additionally, other projects including those by WSDOT would include noise analysis and mitigation as appropriate.

Vision 2040 is the PSRC's long-range growth management, economic, and transportation strategy for the central Puget Sound Region, which encompasses King, Kitsap, Pierce, and Snohomish counties (PSRC 2008). *Vision 2040* contains numerous policies that emphasize concentrating growth in urban centers and connecting those centers with an efficient, transit-oriented, multimodal transportation system. These policies include a specific item to mitigate noise from traffic, industries, and other sources.

Social Elements, including Public Services and Utilities

What direct and indirect effects would the project likely have on social elements?

As described in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Social Elements Technical Memorandum* (WSDOT 2009p), the direct effects on the social elements in the study area during construction are mainly annoyance impacts, which will be temporary during construction. These include increased noise, generation of fugitive dust and exhaust emissions, views of construction activities and equipment that alter visual quality and aesthetics, and traffic congestion and lane closures. Drivers and residents located on or near the corridor would experience these temporary effects. Traffic congestion and lane closures during construction could also negatively affect the travel and response times of emergency response vehicles, such as ambulances, and police and fire vehicles. After construction, the addition of HOV lanes and shoulders will benefit emergency responders and police, by allowing them to more easily pass traffic. In addition, construction activities may result in direct effects on utilities related to temporary outages needed to reroute or protect in place utilities.

Because the study area is located in an urban area that has been developed there are no anticipated changes in land use, no changes in traffic patterns and no new access to previously undeveloped property. The project would not change or induce any land use related effects that result in the need for additional services and utility providers would not be affected by the project during operations. Because the project would not induce growth it would not indirectly increase demands on public services and utilities (see the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Land Use, Economics, and Relocation Technical Memorandum* [WSDOT 2009j] for further information).

There are few social resources (i.e., parks, libraries, churches, community centers, and schools) located in the study area. Operation of the project would have no direct effects on any of the social elements that would result in indirect effects. The project does have the potential to result in positive indirect benefits related to air quality because of the potential reduction in single occupancy vehicle and the increases in transit, carpools, and vanpools anticipated. Additionally, the lids are intended to provide pedestrian and non-motorized access to both sides of SR 520, which could increase social cohesion in the neighborhoods bisected by the original roadway construction (WSDOT 2009f).

The direct effects identified above are either beneficial or temporary in nature. The analyst did not identify any indirect effects on public services and utilities. Because there are no adverse direct or indirect effects on social elements including public services and utilities, a cumulative effects analysis is not required.

What is the cumulative effect on social elements likely to be?

No direct or indirect effects were identified that would contribute to cumulative effects for social elements. There were several temporary adverse direct effects identified related to construction. However, these do not contribute to a long-term cumulative effect. The analyst did identify beneficial effects, such as improved transit and HOV services, improved response time for emergency vehicles, and community connections via lids.

Transportation

What direct and indirect effects would the project have on transportation?

Detailed results for the direct effects on transportation are reported in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Transportation Discipline Report* (WSDOT 2009f). No indirect effects on transportation were identified. This project produces direct beneficial effects on transportation; no adverse indirect effects are anticipated.

A highway project can directly affect elements of the local and regional transportation network such as capacity, circulation, access, safety, and level of service. The transportation analysis conducted for the Build Alternative focuses on the potential effects that the project might have on traffic volumes and the flow of vehicular traffic for both freeway and local street traffic, and nonmotorized travel, transit, and parking.

The quantitative analysis emphasizes the effects that a project may have on the flow of vehicular traffic. The traffic analysis includes study of both freeway and local street traffic; the studies are further stratified by times of day, mode of travel, and specific measures of effectiveness. In addition to vehicle traffic, several other transportation elements are evaluated including transit, nonmotorized, parking, and construction traffic. The magnitude of effects is based on a comparison of the No-Build

Alternative to the Build Alternative at the project design horizon. The design horizon for the Medina to SR 202 project is the year 2030.

How was the cumulative effects assessment on transportation conducted?

The analysts identified cumulative effects on transportation for the Build Alternative by following a process recommended by WSDOT: *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008). The transportation discipline team used the SR 520 travel demand model to analyze the potential cumulative effects of the project alternatives. WSDOT decided that the transportation system modeled for the year 2030 cumulative effects scenario should include the following regional transportation improvement projects that will likely to be implemented by 2030 but were not yet funded at the time of analysis:

- I-5 to Medina: SR 520 Bridge Replacement and HOV Project;
- Regional high-priority projects;
- High-priority local arterial projects within the study area that have either undergone or are currently undergoing some form of environmental review; and
- All components of the Sound Transit program that were approved by the voters in November 2008. Major elements of the program include:
    - Extension of light rail south to Star Lake/Redondo, North to Lynnwood and East to Overlake Transit Center via I-90.
    - Modifications to some Sound Transit bus routes currently serving the east side that will be replaced by the expansion of light rail.
    - Additional service on Sound Transit commuter rail service.

The analysis provides an estimate of anticipated travel demand throughout the region, as well as an evaluation of cross-lake travel that specifically compares travel demand and mode choice between SR 520 and I-90.

The team developed the project travel demand model with a background network assumption that matched the project description and then validated the model against actual data for the SR 520 corridor. The team then modeled the No Build, Build Alternative, and cumulative effects scenarios to obtain travel demand forecasts for each scenario at several locations on I-5, I-405, I-90, SR 522, and SR 520. The forecasts were reported for both daily and p.m. peak periods. The primary measures used to make the comparisons included vehicle trips and person trips.

What trends have led to the present transportation condition in the study area?

Chapter 3 provides a detailed history of the project study area and gives the local and regional context in which SR 520 was developed. From the 1850s to about the 1920s, the Eastside was developing for agriculture, coal, and timber harvesting. There were a number of other speculative business ventures as well. Most notably was the development of estates by wealthy Seattle citizens in the Medina, Hunts Point, Clyde Hill, and Yarrow Point area. A significant change in development patterns occurred in 1940 when the Lake Washington Pontoon Bridge was constructed near the location of current day I-90 floating bridges. Medina, Hunts Point, Clyde Hill, Yarrow Point and Bellevue each incorporated in the 1950s in response to growing development pressures and the desire to control and shape that development. Suburbanization also occurred after post-World War II in the greater Seattle area, much as was occurring across the United States. The Eastside communities experienced exceptional growth from 1950 to today.

Along with this exceptional growth in population came increased use of vehicles and increasing transportation infrastructure demands. Capacity of the SR 520 floating bridge has been exceeded several times in recent history and demand is projected to increase. Just 16 years after the bridge was opened four times as many cars and trucks as planned were crossing the bridge each day. By 1988, that number had increased to seven times the original figure, and the bridge had become one of the state's worst traffic bottlenecks. The project area is the link between the SR 520 bridge and the Eastside communities as well as to other north-south routes throughout the Eastside. Opening of the parallel Homer M. Hadley Floating Bridge on I-90 in 1989 provided additional traffic capacity, but not enough to offset the growth in traffic across the lake. There have been past and recent improvements to the highways and local streets to meet demand. This also includes improvements to transit and non-motorized means of transportation. Employment growth on the Eastside has exceeded growth in Seattle such that since the late 1980's traffic volumes in both directions are virtually equal.

PSRC's *Vision 2040* estimates significant population and employment increases in the Puget Sound region between 2007 and 2040. Transportation infrastructure will be a key element in regional development that meets the *Vision 2040* goal that future land use and transportation development can occur in a sustainable manner, accommodating the expected economic growth and increased population without resulting in deterioration of the environment.

How would transportation likely to change in the reasonably foreseeable future without the project?

In the reasonably foreseeable future, regional population growth will add more travel demand to an already congested transportation system. Travelers will continue to face congestion in some areas, particularly during the morning and evening commutes. As described in PSRC's *Transportation 2040 DEIS*, investments in the region's transportation system will be targeted to preserve the existing system, improve system efficiency, increase choices to users, and provide strategic capacity improvements to meet future travel needs (PSRC 2009a).

Between now and the year 2030, regional population is projected to grow by 1.1 million people, over 850,000 new jobs will be added, and the transportation system will need to accommodate close to 50 percent more traffic (PSRC 2007). The largest forecasted increases on the Eastside are Downtown Redmond, the Redmond/Overlake area, and Downtown Bellevue. Accident rates are expected to continue to increase.

I-405 will become severely congested due to substantial growth in regional population and employment, affecting SR 520 freeway operations without or with project. The following conditions would be typical for both the No Build Alternative and the Build Alternative.

- Eastbound, I-405 congestion in the afternoon would back onto the SR 520 corridor and extend as far back as the floating bridge.
- This congestion would also affect westbound SR 520 traffic as far back as the 51st/40th Street NE interchange.

Regional growth in population will also affect local traffic operations. In the vicinity between 84th Avenue NE and 108th Avenue NE, traffic volumes would increase up to 28 percent. Local street traffic congestion is likely to worsen over today's conditions. Some intersections will operate at level of service (LOS) E or worse (scale of A to F with A being best and F being worst) compared to the higher level of service today.

What would the cumulative effect on transportation likely be?

Construction activities would have a minor, short-term contribution to cumulative effects by causing travel delays and congestion due to lane and road closures and detours.

The project would have a beneficial effect, implementing regional planned transportation improvements and maintain or improve traffic conditions within the SR 520 corridor. Under the Build Alternative, in conjunction with other regional transportation projects, traffic conditions within the project corridor are expected to be similar to or better than those estimated for the project if other planned actions did not occur.

Increases in carpool and transit demand are projected under both the Build and No Build Alternatives. This is largely due to improvements to the HOV lane system between Redmond and Seattle. However, the increase in HOV demand associated with the No Build Alternative would not be as large as with the Build Alternative.

How could the cumulative effect on transportation be minimized?

The total cumulative effect of the project combined with other regional transportation improvements is essentially mitigation for existing congestion, lack of non-motorized and transit facilities, traffic safety issues, and problems with traffic circulation. The proposed transportation improvements will result in a beneficial cumulative effect for most methods of transportation including highway, HOV, transit, nonmotorized, and local streets. Transportation demand management strategies such as bicycle friendly facilities and multi-use trails, pedestrian-oriented design, and improvements to public transportation will continue to be implemented across the transportation system. Similarly, transportation system management tools such as intelligent transportation systems (e.g., equipping emergency vehicles and transit with devices that give them priority at traffic signals, use of changeable message signs alerting drivers to road problems or lane closures ahead, etc.), access management, ramp metering, and preferential treatment for HOV will continue to be measures used to mitigate cumulative effects.

Visual Quality and Aesthetics

What direct and indirect effects would the project likely have on visual quality and aesthetics?

As discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Visual Quality and Aesthetics Technical Memorandum* (WSDOT 2009o), the Build Alternative would produce direct effects on visual quality from both construction and operation of the Build Alternative. Direct effects associated with demolition and construction activities that would be temporary.

Views from the community onto the highway would be affected by the loss of mature vegetation and the presence of retaining walls topped with noise walls. Visual quality for drivers would be similarly affected. In addition to the noise walls, construction of new bridges and specifically the landscaped lids will also change the visual quality and character in the study area.

There are no indirect effects on visual quality.

How was the cumulative effects assessment for visual quality and aesthetics conducted?

The analyst based the visual quality cumulative effects assessment on the results of the FHWA visual quality impacts assessment for direct effects and followed WSDOT's *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008). The FHWA visual quality assessment described the current visual character, quality, and context of the project area and expected direct effects upon the study area. From this baseline the analyst identified the indirect impacts that may contribute to a cumulative effect and the visual resources that may experience those cumulative impacts to consider in the analysis. Reasonably foreseeable actions from other agencies or jurisdictions that may affect visual resources were also considered for their potential to contribute to cumulative impacts. The analyst made the following assumptions:

- The time frame for this cumulative effects assessment is from the time when Euro-Americans began to settle in the Puget Sound region to roughly 2040. This is consistent with the PSRC's *Transportation 2040 DEIS*. In addition, jurisdictions and communities typically develop strategic plans for ten, twenty, and thirty year windows. Strategic plans provide value-based goals that indicate the intended direction of growth and development and the role that aesthetic values and civic character should play in development.

- The study area for the visual quality cumulative effects assessment is the Central Puget Sound Region, which includes portions of Pierce, King, Kitsap, and Snohomish counties (PSRC 2009a) and includes the SR 520 Bridge Replacement and HOV Project as a reasonably foreseeable future action that could be completed prior to construction of the Eastside Project.

What trends have led to present visual quality and aesthetics conditions in the study area?

The present condition of the visual quality and character of the Eastside project area is that of a mature rural residential landscape with single-family homes on large lots and nearby cities and urban centers. Vegetation is the principal feature that defines the visual character of the Eastside, with a tree canopy that is nearly continuous and markedly mature. Shorelines and views of water also figure prominently in the character and visual quality of the Points communities north of SR 520. Prior to the construction of the SR 520 and I-90 bridges in the 1940's and 1960's, the Eastside was largely agrarian.

The transformation of this landscape began with the arrival of the Euro-Americans in the mid-1800s. These settlers logged, mined, moved hills and rivers, and developed the Seattle and Lake Washington areas on a scale faster and larger than previous actions by the indigenous peoples. The Eastside did not develop as quickly because overland routes were around the ends of the lakes and these routes were long and slow. The dense forest landscape gave way to a rural agrarian landscape until construction of the SR 520 and I-90 bridges in the 1940's and 1960's. The landscape then changed into an urban landscape.

How would visual quality and aesthetic conditions likely change in the reasonably foreseeable future without the project?

Visual quality is a function of the character and quality of the built environment and the extent to which siting and design of buildings and transportation facilities are sensitive to visual resources. Therefore, the overall cumulative effect of the urbanization trend on visual quality will depend on how well important views, open spaces, historic buildings and landforms are preserved and protected.

Under the No Build Alternative, visual quality and character would continue to change because the trend of accelerating population growth and development is expected to continue into the reasonably foreseeable future (PSRC 2009a). The population of the Points Communities, Kirkland, Bellevue, and Redmond is expected to grow by over 77,000 between 2000 and 2030 (PSRC 2009a). Employment in Kirkland, Bellevue, and Redmond is growing even faster, with a 57-percent increase in jobs projected between 2000 and 2030 (PSRC 2009a). Three major redevelopment projects currently in the planning stages adjacent to SR 520 are projected to add up to 10,000 new households and up to 12.5 million square feet of office and retail space if they are built. The continuation of urbanization could result in altered views throughout the area and of the Eastside.

In addition to the growth trend, the SR 520 floating bridge must be replaced eventually because it is approaching the end of its useful life. Connecting a new floating bridge to the Eastside at Medina would affect the current visual quality and character of the Evergreen Point Road area to some degree even if the SR 520 Eastside project is not built.

Under the No Build Alternative the visual character and visual quality of most of the corridor would remain as it is currently. The mature roadside vegetation that is character-defining of the roadway and an important element in screening views of the roadway would not be removed. Noise walls and landscaped lids would not be added to the roadway and therefore would not cause visual changes for either the roadside or the community-side view.

What would the cumulative effect on visual quality likely be?

The proposed action will have a minor contribution **to the** visual **impacts of past present and future actions.** The existing roadway is currently a dominant feature of the viewshed. As such, SR 520 is classified as semi-urban between Interstate 5 (I-5) and I-405. The semi-urban roadside is defined as a transitional landscape where built elements begin to dominate natural elements. Community plans and input from residents indicate that the proposed lids, sound walls, and new landscaping would be desired. Additionally, the project would provide additional recreation opportunities including providing trail connections at the Evergreen Point Road lid.

How could the cumulative effect on visual quality and aesthetics be minimized?

The cumulative effect on visual quality and aesthetics in the project area could be minimized by local and regional jurisdictions' efforts. These efforts might include local land use zoning and regulations, community preservation activities, establishing architectural standards for noise walls and bridges, preserving important stands of vegetation, preserving important views and community gathering places, and adding landscaping and revegetating disturbed areas.

Water Resources

What direct and indirect effects would the project likely have on water resources?

Water resources include surface water, groundwater, and stormwater. As discussed in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Water Resources Discipline Report* (WSDOT 2009n), the Build Alternative would produce direct effects on the quality and volume of stormwater where lanes are added. This in turn will affect surface water downstream of the project, including Lake Washington. However, this will be a beneficial effect because the stormwater currently collected on SR 520 is not treated by stormwater facilities. Proposed stormwater treatment facilities will improve water quality and slow the inputs of water into local streams.

There are no identified indirect effects to stormwater or surface water. There are no identified direct or indirect effects to groundwater in the study area. There would be no direct or indirect effects to water resources in the restriping portion of the project.

How was the cumulative effects assessment for water resources conducted?

The study area is the same as defined in the *SR 520, Medina to SR 202: Eastside Transit and HOV Project Water Resources Discipline Report* (WSDOT 2009n). For this analysis, the time frame has an assumed start date of 1941, when water quality began to measurably decline in Lake Washington due to sewage discharge, and an endpoint of 2030, which represents the design year for the project.

The baseline condition of water resources were determined by consulting the scientific literature and a variety of relevant technical reports (King County 2009a, King County 2009b, and Tetra Tech ISG, Inc. and Parametrix, Inc. 2003). Information was mapped using GIS to aid in analyses. The analysts obtained discharge data for stormwater evaluations in addition to consulting with WSDOT and local partners.

The analysis compared the potential future conditions against the existing conditions for stormwater and by default for surface water. The approaches described in this section comply with the WSDOT *Environmental Procedures Manual* (WSDOT 2009b) and *Guidance on Preparing Cumulative Impact Analyses* (WSDOT, FHWA, and EPA 2008).

What trends have led to the present water quality condition in the study area?

The baseline conditions are the result of increasing development in the study area, and the discharge of untreated stormwater from the surrounding impervious surfaces to these receiving environments. This includes the existing SR 520 roadway in the project area, which currently does not have stormwater treatment. The likely future condition of the surface water bodies of the study area will be a gradual and steady improvement in quality resulting from the decrease in discharge of pollutants in stormwater from the continuing development and redevelopment of public and private lands in the study area. These newly developed and redeveloped properties will institute stormwater treatment following Ecology's regulations which will contribute to these gradual improvements.

Lake Washington

The overall present water quality in the study area is, in part, the result of efforts to remove secondary treated sewage from Lake Washington (King County 2009a). The lake received increasing amounts of secondary treated sewage between 1941 and 1963, which resulted in eutrophication and declined water quality of the lake. Establishment of Metro in 1958 and the construction of a significant amount of infrastructure (e.g., trunk lines and interceptors to carry sewage to treatment plants built at West Point and Renton) resulted in dramatic improvements in water quality (King county 2009a). Data collected from 1990 through 2001 indicate that the quality of Lake Washington's water supports and is consistent with the lake's beneficial uses (Tetra Tech ISG, Inc. and Parametrix, Inc. 2003).

Lake Washington appears to be in stable ecological condition with respect to water quality following the pre-sewer diversion period of over-enrichment. Lake Washington has some of the best water quality for a large lake entirely within a major metropolitan area, anywhere in the world (Tetra Tech ISG, Inc. and Parametrix, Inc. 2003).

Local Streams

Study area receiving surface waters – Fairweather Creek, Cozy Cove Creek, and Yarrow Creek (including West and East Tributaries of Yarrow Creek) – are currently under pressure from the discharge of untreated storm water from a number of sources, including the SR 520 roadway in the project area. Surface water bodies in the Eastside project area receive urban runoff from roadways, commercial and industrial neighborhoods, and residential areas.

King County has recently compiled and summarized water quality conditions for two of the local streams found in the study area – Fairweather Creek and Yarrow Creek. Between 1975 and the present, the County has collected a variety of conventional parameters for each of these water bodies: temperature, dissolved oxygen, turbidity, total dissolved solids, pH, conductivity, and nutrients (ortho-phosphate, total phosphate, ammonia-nitrogen, nitrate+nitrite- nitrogen, total nitrogen) (King County 2009b). Water quality conditions for most of these parameters in Fairweather Creek have been improving or unchanged, with long-term declines recorded in dissolved oxygen and temperature. In contrast, Yarrow creek has a record of no change or long-term declines in a number of these parameters (King County 2009b). Overall, the conditions are likely the result of the extensive build-out that has occurred in this area, and the future trends are likely mixed, with some parameters continuing to improve while others are likely to continue to decrease.

How would water resource conditions likely change in the reasonably foreseeable future without the project?

Current regulations effectively regulate point discharge (end of pipe) from new projects but do not effectively regulate non-point discharges or pre-regulation point source discharges. Study area receiving environments (namely Lake Washington) are currently under pressure from the discharge of untreated storm water from a number of sources, including the current SR 520 roadway and the greater Seattle area. Surface water bodies in the Eastside project area receive urban runoff from roadways and residential areas. While Lake Washington overall water quality is improved over recent historic conditions and water quality is considered excellent for most parameters, the lake is still listed by Ecology as impaired because of bacterial contamination.

New construction and upgrades to existing stormwater and wastewater treatment and discharge systems would improve water resources in the study area under the No Build alternative. SR 520 from I-5 to I-405 currently contributes to water quality degradation to local streams and Lake Washington. The SR 520: I-5 to Medina Bridge Replacement and HOV Project (Exhibit 6) would include designing and constructing new stormwater treatment facilities across the project length, including the floating bridge, which would improve water resources in Lake Washington as well as other discharge receiving waters along the route. New land development actions in the project area will also require new or improved stormwater treatment facilities, which will improve water quality conditions in Lake Washington.

What would the cumulative effect on water resources likely be?

The Build Alternative will contribute incremental benefits to water quality in relation to the impacts of past present and future actions. Operation of the new SR 520 stormwater treatment facilities would reduce the amounts of pollutants (pounds per year) discharged to study area receiving waters as well as a reduction in the concentrations of pollutants (mg/L) discharged at any one time to the same receiving environments. An additional benefit would be habitat improvement associated with reductions in peak flows to streams. These are all beneficial cumulative effects that will be measurable within local streams but not likely to be measurable within the adjacent bays and Lake Washington.

How could the cumulative effect on water resources be minimized?

The cumulative effect of land development and transportation improvement projects on water quality could be minimized by continuing application of stormwater treatment technologies as reasonably foreseeable future actions are constructed and operated. The requirement that new and redeveloping projects apply stormwater treatment guidelines and policies would likely result in a reduction in overall pollutant loading to the project area receiving environments as the majority of the stormwater in the study area currently goes untreated. In addition to regulatory approaches, regional and local voluntary efforts to improve water quality could provide additional benefits.

Additionally, regional development strategies such as Smart Growth, the enforcement of regulations such as Growth Management Act and zoning, and region-wide transportation planning could also beneficially affect water resources.

5. References

AASHTO (American Association of State Highway and Transportation Officials). 2009. Guide Specifications for LRFD Seismic Bridge Design. Edition 1.

City of Bellevue. 2006. History. http://www.ci.bellevue.wa.us/history.htm. Accessed February 2009.

City of Clyde Hill. 2009. History of Clyde Hill. HUhttp://www.clydehill.org/history.htmlUH. Accessed February 2009.

City of Medina. 2008. History of Medina. April 18, 2008. HUhttp://www.medina-wa.gov/index.asp?Type=B_BASIC&SEC=%7B0EF1CA38-E35B-489B-8446-8B309737C420%7D. Accessed February 2009.

Ecology (Washington Department of Ecology). 1990. *Washington's Wetland Resources.* In: *Focus—Wetlands Law.* Olympia, Wash.

Ecology (Washington Department of Ecology), U.S. Army Corps of Engineers Seattle District, and Environmental Protection Agency Region 10. 2006a. *Wetland Mitigation in Washington State, Part 1: Agency Policies and Guidance.* Version 1, Publ. #06-06-011a, March 2006. Accessed on July 26, 2009 at: http://www.ecy.wa.gov/biblio/0606011a.html

Ecology, U.S. Army Corps of Engineers Seattle District, and Environmental Protection Agency Region 10. 2006b. *Wetland Mitigation in Washington State, Part 2: Developing Mitigation Plans.* Version 1, Publ. #06-06-011b, March 2006. Accessed on July 26, 2009 at: http://www.ecy.wa.gov/biblio/0606011b.html

EPA (U.S. Environmental Protection Agency). 2008. *National Air Quality Status and Trends through 2007*. November 2008.

FHWA (Federal Highway Administration). 1987. *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. Federal Highway Administration Technical Advisory T 6640.8A.

_____. 2009. Indirect Effects Analysis Checklist. Federal Highway Administration. Accessed online February 25, 2009 at: http://nepa.fhwa.dot.gov/ReNepa/ReNepa.nsf/All+Documents/7412AEC9CA4872EF85257108006CB342/$FILE/IEA%20checklist%20FHWA.pdf

Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-66, 598 p.

GRCC (Greater Redmond Chamber of Commerce). 2009. History of Redmond. http://www.redmondchamber.org/index.php?page=history. Accessed February 18, 2009.

Kerwin, J. 2001. Salmon and Steelhead Habitat Limiting Factors Report for the Cedar – Sammamish Basin (Water Resource Inventory Area 8). Washington Conservation Commission, Olympia, Washington.

King County. 2009a. The Lake Washington Story. http://www.kingcounty.gov/environment/waterandland/lakes/lake-index/washington.aspx. Accessed August 11, 2009.

King County. 2009b. King County Ambient Stream Monitoring Program - Long Term Trend Analysis. http://green.kingcounty.gov/WLR/Waterres/StreamsData/reports/trends.pdf. Accessed August 11, 2009.

Knauss, Suzanne. 2003. Yarrow Point – Thumbnail History. HistoryLink.org. June 30, 2003. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&File_Id=4212. Accessed February 2009.

Landau Associates. 2008. *Draft Geotechnical Design Study* prepared for HDR Engineering, Inc. December 15, 2008.

Louis Berger Group, Inc. 2002. *National Highway Cooperative Research Program Report 466 Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects.* Project B25-10(02) FY ’96. Transportation Research Board, National Research Council. Washington, D.C.: National Academy Press, 109 pp. Accessed online February 25, 2009 at: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_466.pdf

PSRC (Puget Sound Regional Council). 2006. *2007–2010 Regional Transportation Improvement Program*. September 2006.

_____. 2007. *Destination 2030 Update: Metropolitan Transportation Plan for the Central Puget Sound Region*. April 2007.

_____. 2008. *VISION 2040*. April 2008. Accessed online July 25, 2009 at www.psrc.org.

_____. 2009a. *Transportation 2040 Draft Environmental Impact Statement*. Seattle, Washington May 2009. Available online at: http://psrc.org/transportation/t2040/t2040-pubs/trans2040-deis

_____. 2009b. *Central Puget Sound Regional 2007-2010 Transportation Improvement Program*. Available at: http://www.psrc.org/projects/tip/currenttip/index.htm.

Rochester, Junius. 1998. Medina – Thumbnail History. HistoryLink.org. http://www.historylink.org/essays/output.cfm?file_id=1059 Accessed December 2008.

Shared Strategy for Puget Sound. 2007. Puget Sound Salmon Recovery Plan. http://www.sharedsalmonstrategy.org/plan/index.htm

Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, T. Granger, S. Stanley, and E. Stockdale. 2005. *Wetlands in Washington State - Volume 1: A Synthesis of the Science*. Washington State Department of Ecology Publication #05-06-006. Olympia, WA. March 2005.

Stein, Alan J. 1998a. Kirkland – Thumbnail History. HistoryLink.org. October 25, 1998. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=208. Accessed February 2009.

Stein, Alan J. 1998b. Redmond – Thumbnail History. HistoryLing.org. November 9, 1998. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=304. Accessed February 2009.

Stein, Alan J. 1998c. Bellevue – Thumbnail History. HistoryLink.org . November 9, 1998. http://www.historylink.org/essays/output.cfm?file_id=313 Accessed December 2008.

Tetra Tech ISG, Inc. and Parametrix, Inc. 2003. Sammamish/Washington Analysis and Modeling Program. Lake Washington Existing Conditions Report. September 2003. Submitted to King County Department of Natural Resources and Parks, Water and Land Resources Division.

WDF (Washington Department of Fisheries), Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI): Summary Report. Washington Department of Fisheries, Olympia, Washington. 212 pp.

WDFW (Washington Department of Fish and Wildlife). 1998. 1998 Washington State Salmonid Stock Inventory. Appendix: Bull Trout and Dolly Varden. Washington Department of Fish and Wildlife, Olympia, Washington. 437 pp.

_____. 2002. 2002 Washington State Salmon and Steelhead Stock Inventory (SASSI). Washington Department of Wildlife, Olympia, Washington.

_____. 2004. Changes to the Bull Trout and Dolly Varden Stock Inventory in 2004. Washington Department of Fish and Wildlife, Olympia, Washington. 441 pp.

WSDOT. 2006. *SR 520 Bridge Replacement and HOV Project Draft Environmental Impact Statement*. August 18, 2006.

_____. 2008. *Highway Runoff Manual*. Washington State Department of Transportation. Publication M31-16. June 2008.

_____. 2009a. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Environmental Assessment*. November 2009.

_____. 2009b. *Environmental Procedures Manual.* Washington State Department of Transportation. Publication Number M31-11. http://www.wsdot.wa.gov/environment/

_____. 2009c. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Agency Coordination and Public Involvement Discipline Report*. November 2009.

_____. 2009d. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Cultural Resources Technical Memorandum*. November 2009.

_____. 2009e. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Air Quality Technical Memorandum*. November 2009.

_____. 2009f. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Transportation Discipline Report*. November 2009.

_____. 2009g. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Energy Technical Memorandum*. November 2009.

_____. 2009h. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Noise Technical Memorandum*. November 2009.

_____. 2009i. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Ecosystems Discipline Report*. November 2009.

_____. 2009j. *SR 520, Medina to SR 202*: *Eastside Transit and HOV Project Land Use, Economics, and Relocation Technical Memorandum*. November 2009.

_____. 2009k. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Environmental Justice Technical Memorandum*. November 2009.

_____. 2009l. *SR 520, Medina to SR 202*: *Eastside Transit and HOV Project Geology and Soils Technical Memorandum*. November 2009.

_____. 2009m. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Hazardous Materials Technical Memorandum*. November 2009.

_____. 2009n. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Water Resources Discipline Report*. November 2009.

_____. 2009o. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Visual Quality and Aesthetics Technical Memorandum*. November 2009.

_____. 2009p. *SR 520, Medina to SR 202: Eastside Transit and HOV Project Social Elements Technical Memorandum*. November 2009.

WSDOT, FHWA, and EPA (Washington State Department of Transportation, Federal Highway Administration, and U.S. Environmental Protection Agency). 2008. *Guidance on Preparing Cumulative Impact Analyses*. Available online at: http://www.wsdot.wa.gov/NR/rdonlyres/1F0473BD-BE38-4EF2-BEEF-6EB1AB6E53C2/0/CumulativeEffectGuidance.pdf