

Cumulative Impacts

5.1 Introduction

As defined in 40 Code of Federal Regulations (CFR) 1508.7, cumulative impacts on the environment result “from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” The public and government agencies need to understand cumulative impacts to evaluate a proposed action and its alternatives in a broad perspective, including how the project might interact with impacts that persist from past actions, with present-day activities, and with other projects that are planned but have not been built yet. A cumulative impact assessment can reveal unintended consequences that might not be apparent when the project is evaluated in isolation instead of in a broader context.

The need to analyze cumulative impacts has influenced all components of the East Link Project environmental review process, including scoping, describing the affected environment, developing the alternatives, and evaluating environmental impacts. The cumulative impact assessment follows the National Environmental Policy Act (NEPA) (40 CFR 1500-12508), the approach recommended by the President’s Council of Environmental Quality (CEQ) in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ, 1997), and the following additional guidance documents:

- *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (Environmental Protection Agency, 1999)
- *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process* (Federal Highway Administration, 2003)
- *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ, 2005)
- Executive Order 13274 Indirect and Cumulative Effects Work Group Draft Baseline Report (ICF Consulting, 2005)

- Indirect and Cumulative Impact Analysis (National Cooperative Highway Research Program, 2006)

During the East Link scoping process and Draft Environmental Impact Statement (EIS) preparation, Sound Transit gathered information from other agencies and the public to identify impacts of past and present developments and reasonably foreseeable future actions that could interact with the East Link Project alternatives. Examples of these information sources include the following:

- King County and the cities of Seattle, Mercer Island, Bellevue, and Redmond provided land use plans, transportation plans, neighborhood plans, and lists of known, major land use proposals.
- The Washington State Department of Transportation (WSDOT) and King County Metro Transit provided information on planned transportation projects and developments.
- The Puget Sound Regional Council (PSRC) provided population and employment growth projections, travel forecasts, and land use projections.
- Other organizations and the public provided information on planned private projects, community values, and concerns.

This information was used to identify past and ongoing development trends, prepare growth projections, characterize reasonably foreseeable future actions, and identify and evaluate expected cumulative impacts to which the East Link Project could contribute.

5.2 Geographic and Temporal Boundaries of Cumulative Analysis

Consistent with regulatory guidance for a cumulative impact analysis, the development actions that were considered include those that are past, present, and reasonably foreseeable. For the purpose of this analysis, development actions were assigned to these three categories as follows:

- Past actions include nonnative settlements dating back to the 1800s and continuing trends in development patterns up to the present.

- Present actions are those projects by local, state or federal agencies just completed or under construction.
- Reasonably foreseeable future actions are those that have reached some local, state, or federal government approval and thus could be under construction at anytime between the present through 2030 (the East Link Project's design year).

The study area for cumulative analysis is generally a combination of the study areas defined in Chapter 3 for transportation facilities and in Chapter 4 for the various environmental resources. The exceptions are ecosystem-related resources, where broader study areas are necessary to capture how the effects from reasonably foreseeable future projects may interact to affect the function of larger ecosystem networks. Wildlife corridors are considered for avian species and other migratory animals or animals with large foraging areas. Fish habitats are considered at the watershed level for impacts on stream quality. The Puget Sound region study area applies to resources such as transportation, air quality (and greenhouse gases), energy, and, to some degree, the economics evaluation. Greenhouse gases are studied at the regional level, while it is acknowledged that the effects are felt on the global level. Social resources that may experience a range of cumulative impacts from new infrastructure projects, (such as land use, economics, social impacts and neighborhoods, public services, visual resources, and parklands) were generally analyzed within 1-half mile to 1 mile of the project alternatives. For built environmental resources (such as property, hazardous materials, geology, electromagnetic fields, utilities, historic and archaeological resources, and noise and vibration), the study area is approximately one-quarter mile or less around project alternatives. The study area for ecosystem resources (such as streams, wildlife, and wetlands) was defined based on regulatory requirements or up to 200 feet around the project alternatives, whichever was greater.

5.3 Past and Present Actions

Persisting impacts from past actions have shaped the project vicinity since the mid-19th century, and they continue to shape how the Seattle and Eastside areas are changing in response to activities and trends. Starting with the first nonnative settlements along the Duwamish River in the 1850s, a development sequence driven by timber harvesting, commercial fishing, shipbuilding, merchant shipping, railroads, aircraft manufacturing and other heavy industry, as

well as by development and expansion of the state and federal highway systems and by residential communities with their supporting infrastructure, have transformed the project vicinity from tidelands and forested wilderness to a densely populated, urban environment. As Seattle became increasingly urban, dispersed suburban-population growth spread to surrounding areas. Such growth was notable in the decades after World War II, and it rapidly accelerated from the 1980s to the present.

On the Eastside, homesteaders began to settle near Bellevue and Redmond in the 1890s. The Eastside remained rural for most of the first half of the 1900s, until roughly 1940 when the Lake Washington Floating Bridge (now I-90) – the first bridge over Lake Washington connecting Seattle and the Eastside – opened to traffic, leading to the creation of many auto-oriented suburban neighborhoods. During the 20 years following the opening of the bridge, the Eastside became the fastest growing part of the metropolitan area. Increasing traffic and delays on the Lake Washington Floating Bridge led to the completion of an additional crossing of Lake Washington, via the Evergreen Point Bridge (SR 520), in 1963. The rapid and continuing population growth and economic expansion that has persisted since that time in the Bellevue-Redmond area has accelerated urban development. The development associated with this growth trend has created persisting cumulative impacts such as diminished air and water quality, ambient noise, and visual impacts, as well as loss, deterioration, and fragmentation of fish and wildlife habitats, including wetlands.

Recognizing that the pressure of increasing population growth would continue and intensify, in 1990, PSRC adopted *VISION 2020*, a long-range plan for the four-county central Puget Sound region, and updated it in 1995 (PSRC, 1995). The plan established an integrated, long-range growth management, economic, and transportation strategy based on a vision of high-density, urbanized centers linked by a high-quality multimodal transportation system. PSRC's *Destination 2030*, the transportation element of *VISION 2020*, provides a long-range plan for transportation in the central Puget Sound region through the year 2030, including light rail (PSRC, 2001). In 2008, PSRC recommitted the *VISION 2020* plan in the *VISION 2040* update.

5.4 Reasonably Foreseeable Future Actions

In this Draft EIS, reasonably foreseeable future actions are future projects that will produce environmental impacts that could add to or interact with the East Link Project alternatives and other past and present actions to produce cumulative impacts. Reasonably foreseeable future actions are not speculative and are considered regardless of the agency, organization, or person serving as their proponent (CEQ, 1997). They must be likely to occur in the reasonably foreseeable future by virtue of being funded, approved, or under consideration for regulatory permitting; the subject of an environmental review process under NEPA or State Environmental Policy Act (SEPA); or part of an officially adopted planning document or publicly available development plan.

The following subsections provide a summary of the reasonably foreseeable future actions in the study area that could add to or interact with environmental impacts from the East Link Project alternatives and other past and present actions to produce cumulative impacts. Appendix F5 lists the projects considered in this analysis along with associated impacts declared during their environmental review process. The approximate locations of the regional transportation actions are shown in Exhibit 5-1. Specific public and private developments that were being planned or constructed at the time of Draft EIS preparation are shown in Exhibits 5-2 and 5-3 and are described, along with known/recorded impacts, in Appendix F5.

5.5 Cumulative Impact Assessment

Adverse and/or beneficial cumulative impacts could occur over the longer term during project operation, when effects of the East Link Project would add to or interact with long-term impacts of other past actions, present actions, and reasonably foreseeable future actions. Adverse cumulative impacts could occur over the short term during construction, when activities necessary to build the East Link Project would accumulate with impacts from other projects under construction at the same time. The following sections discuss expected cumulative impacts of project operation and construction on individual elements of the environment. The direct and indirect impacts of the project alternatives that could contribute to future cumulative impacts are discussed in Chapter 3 and 4.

Operation of the East Link Project would shift some vehicle trips to rail transit, thereby reducing

cumulative impacts on traffic and bus transit movement, air quality, noise levels, water quality, and energy consumption compared to future conditions projected under the No Build Alternative. Therefore, East Link's key contribution would be to reduce the adverse cumulative impacts on these resources to levels below where they would be without the project.

Because analyses of transportation (Chapter 3), air quality (Section 4.6), energy (Section 4.10), economics (Section 4.3), and noise and vibration (Section 4.7) cannot be isolated from influences outside the East Link Project, they inherently include the impacts of other projects or processes. As such, these five analyses of East Link alternatives already incorporate impacts from other reasonably foreseeable future actions. Therefore, these elements of the environment are only discussed briefly below.

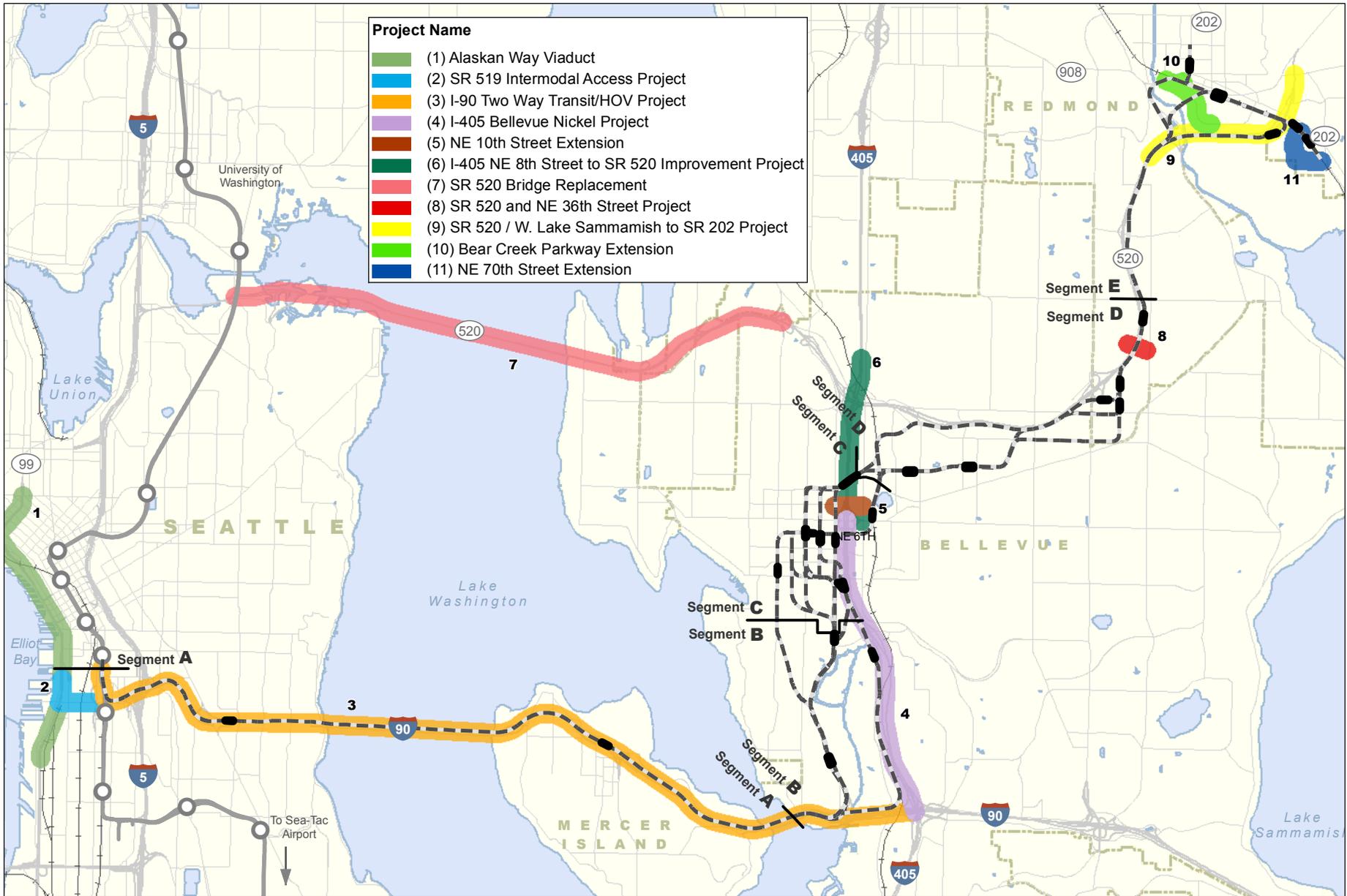
5.5.1 Transportation

The analysis of future traffic and transit impacts in Chapter 3 is a cumulative analysis based on the results of traffic modeling and ridership modeling that incorporates past, funded, and approved future actions, as well as projected growth that would result from development in the region.

Prior to construction of the project and under the No Build Alternative, I-90 is expected to operate with three general-purpose and one HOV lane in each direction, and the reversible center roadway for use by HOVs and Mercer Island residents. For better traffic management, WSDOT is considering managing this roadway differently in the future, including tolling all lanes or adding tolls for single-occupant users of HOV lanes, known as high-occupancy toll (HOT) lanes. Tolling of SR 520 was assumed in all East Link transportation modeling, and tolling may also occur on other regional freeways, including I-5 and I-405, which could alter user behavior patterns further, although these options have yet to be studied in detail by WSDOT.

As the East Link Project becomes operational, its contribution to cumulative impacts on transportation would be beneficial in at least two ways. First, East Link would contribute efficiencies in addition to those provided by the other reasonably foreseeable future transportation improvement projects listed in Appendix F5. The East Link Project would increase the number of person trips able to cross I-90 during peak periods compared to the No Build Alternative.

Both the No Build Alternative and the East Link Project assume tolling is implemented on SR 520 by year 2030 but is not in place by 2020. This is consistent

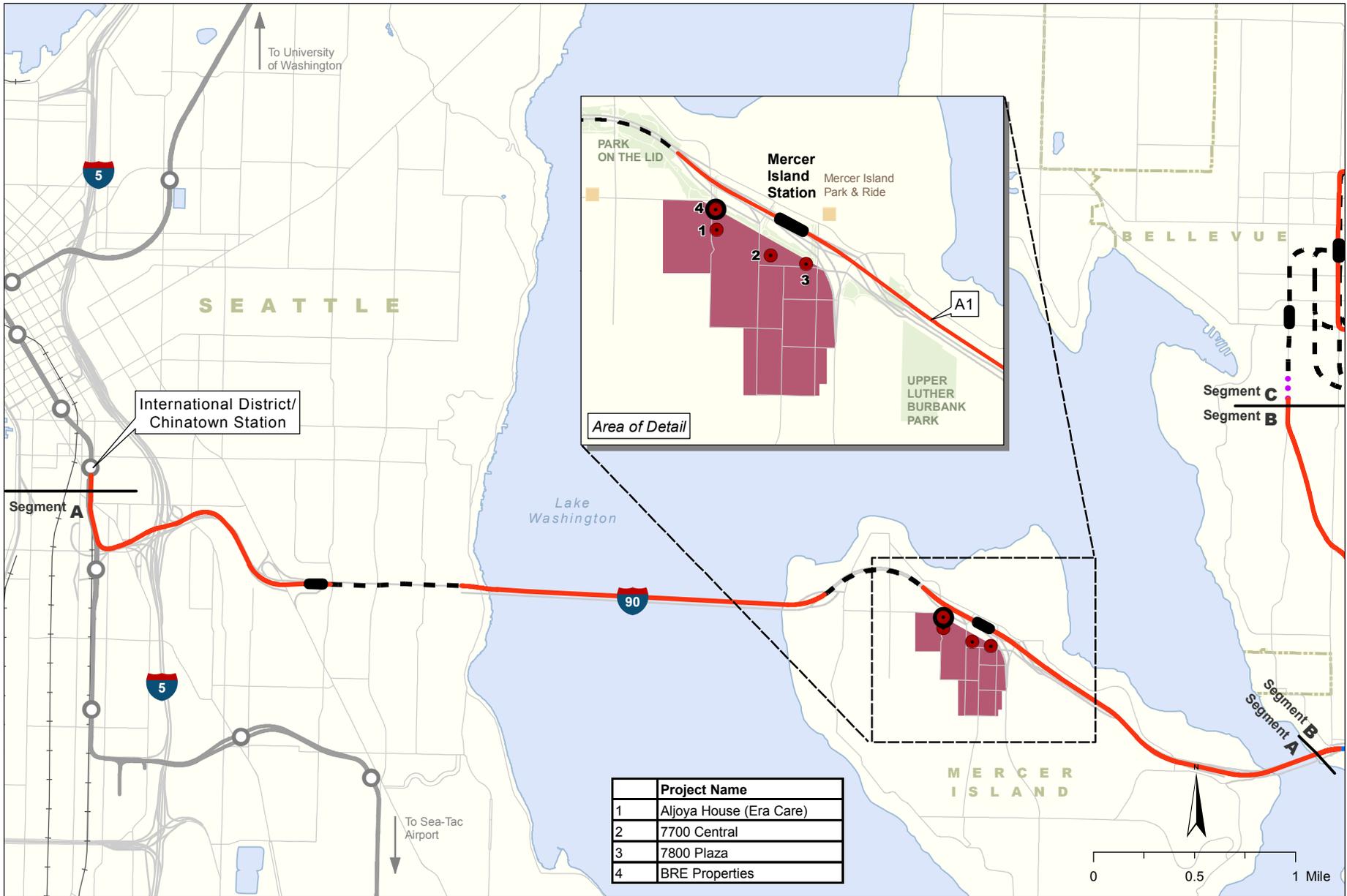


Source: Data from King County (2006), Sound Transit (2007), and CH2M Hill (2008).

- Proposed Station
- - - East Link Alternative Route
- Central Link Alignment and Station



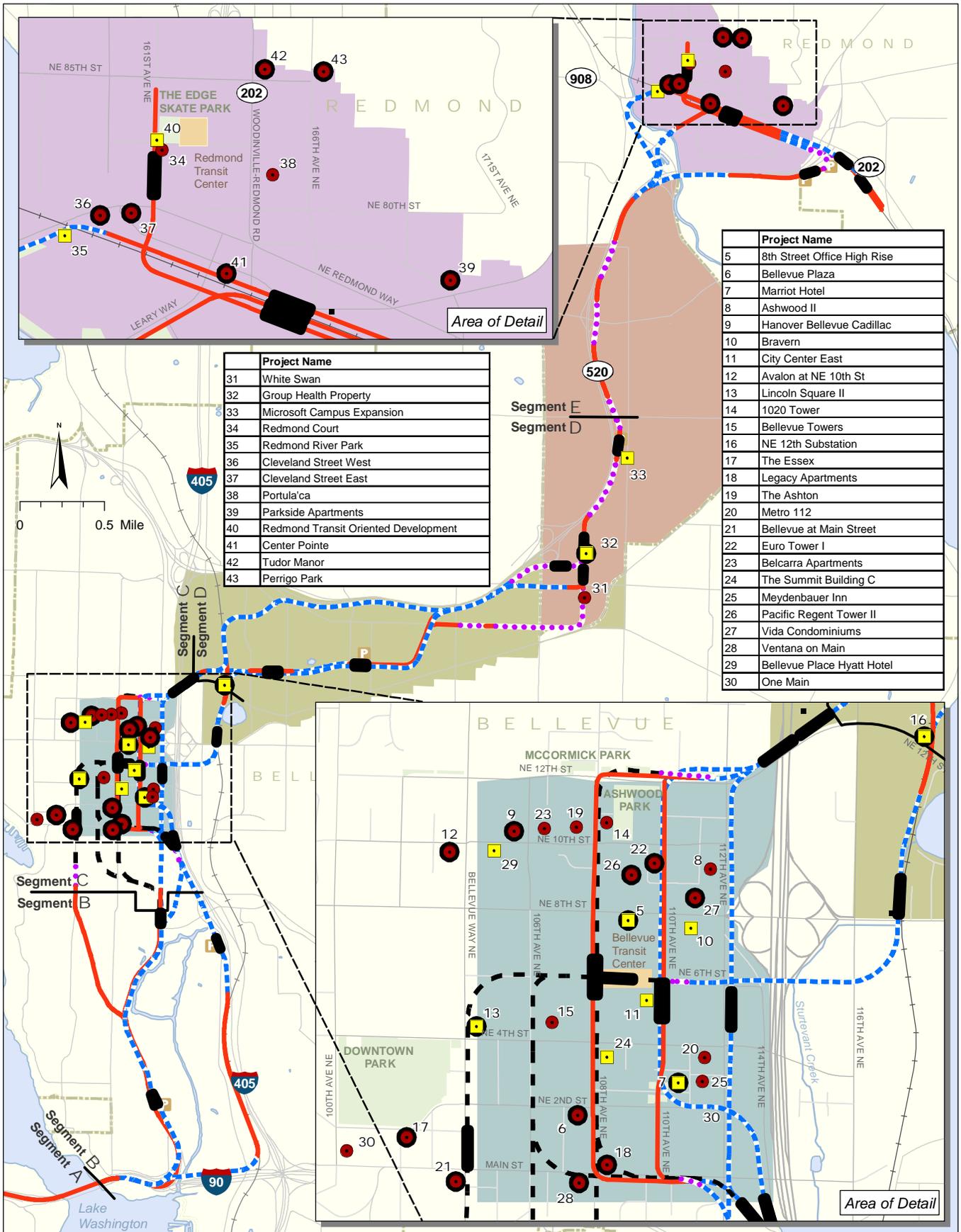
Exhibit 5-1 Foreseeable Future Transportation Projects Segments A,B,C,D, and E East Link Project



Source: Data from King County (2006), Sound Transit (2007), and CH2M HILL (2008).

- Residential Project
- R-Planning Phase
- Town Center District Plan
- At-Grade Route
- - - Elevated Route
- - - Retained-Cut Route
- - - Tunnel Route
- Proposed Station
- Central Link Alignment and Station

Exhibit 5-2 Foreseeable Future Land Use Development Projects Segment A
East Link Project



Source: Data from King County (2006) and CH2M HILL (2008).

- Commercial Project
- Residential Project
- Proposed Station
- At-Grade Route
- C-Planning Phase
- R-Planning Phase
- Redmond Downtown Neighborhood Plan
- Overlake Neighborhood Plan
- Elevated Route
- Retained-Cut Route
- Bel-Red Corridor Project
- Tunnel Route
- Downtown Implementation and Subarea Plan

Exhibit 5-3 Foreseeable Future Land Use Development Projects Segments B,C,D, and E
East Link Project

with the Draft EIS for the SR 520 Bridge Replacement and HOV Project, which is the only official document addressing the issue at this time. WSDOT may implement a toll on SR 520 in 2010, prior to the bridge replacement, as part of the Lake Washington Urban Partnership. The Urban Partnership is a cooperative agreement between the federal government, WSDOT, King County, and PSRC to reduce congestion across Lake Washington. The Urban Partnership proposes to employ innovative traffic-management tools for improving traffic flow along SR 520 and I-90 between Seattle and the Eastside. One of these tools would be a new variable tolling system that could improve traffic flow in the SR 520 corridor and provide a portion of the funding needed to replace the aging SR 520 Lake Washington floating bridge. If tolling is implemented before 2020 on the existing SR 520 four-lane facility, it is likely that travel demand on I-90 would increase similar to the traffic forecast for 2030.

Tolling on I-90 was not included in the traffic analysis for this Draft EIS because no specific plans have been made or studies published. In 2008, the state legislature created the Tolling Implementation Committee to evaluate tolling for financing the SR 520 Bridge Replacement and HOV Project, engage citizens and regional leadership in the evaluation, enhance understanding of tolling alternatives, and report to the governor and state legislature in January 2009. Several of the scenarios they are considering include a toll on I-90. If the State chooses to toll either all lanes of I-90 or convert the planned HOV lanes to high-occupancy toll (HOT) lanes, the distribution of vehicles over all lanes may become more balanced, allow higher travel speeds in all lanes, and reduce congestion. Even with tolling, however, I-90 would be congested in 2030 and overall person throughput would be equivalent to the No Build Alternative that is being studied in the East Link Project analysis.

The project would also increase the person capacity of the corridor and would result in lower vehicle miles and fewer vehicle hours traveled within the corridor compared to the No Build Alternative. However, East Link, in conjunction with other reasonably foreseeable future actions, could increase congestion on some local streets, particularly in the vicinity of transit centers and park-and-ride lots. As discussed in Chapter 3, all but one of these points of congestion can be mitigated.

During the 2- to 5-year period of civil construction, the East Link Project may add to and interact with construction impacts from other projects being built at the same time (see Exhibit 5-1). Construction in or near roadways typically requires temporary lane closures, detours, and traffic delays. Interactions among two or

more concurrent construction projects can intensify these impacts. However, most reasonably foreseeable future actions that can be reliably identified at present would be completed or near completion before East Link construction would begin.

Although the SR 520 Bridge Replacement and HOV Project is currently unfunded and does not have a definitive construction schedule, there is the potential that it could overlap with the construction of East Link on I-90. Construction on both Lake Washington corridors could cause cumulative traffic impacts to travel across the lake. WSDOT and Sound Transit have been coordinating and would continue to coordinate on the construction schedules for the two cross-lake projects to avoid major construction work on both corridors at the same time.

The final construction stages of the I-405 NE 8th Street to SR 520 Improvement Project, scheduled for completion in 2012, may overlap with the early schedule for construction startup on East Link Segment C, scheduled for 2013, producing a cumulative construction-related impact on traffic for about 1 year. This cumulative impact could slow or delay northbound and southbound traffic on I-405 during construction of a Segment C crossing of I-405. Other local developments and public infrastructure projects could contribute to cumulative traffic delays on local arterial streets over the construction period.

Following the selection, design, and scheduling of the East Link Project preferred alternative, Sound Transit would coordinate construction activities with proponents of other future projects and with appropriate federal and state agencies and regional and local jurisdictions where other projects in the vicinity of East Link would be built at the same time. This coordination would avoid or minimize construction-related cumulative impacts on transportation.

5.5.2 Acquisitions, Displacements, and Relocations

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, contains requirements applied to projects involving federal funding or approval and therefore was assumed to be part of the project description, along with the State of Washington's relocation and property acquisition regulations (Washington Administrative Code [WAC] 468-100). Acquisitions related to private redevelopment projects in the project vicinity were not included in this evaluation because they involve willing buyers and sellers. Although environmental documents are not currently available for all

reasonably foreseeable future actions shown in Exhibits 5-1 to 5-3, the Eastside could experience cumulative impacts from property acquisitions for major transportation projects, including the following:

- I-405 NE 8th Street to SR 520 Improvement Project would displace up to 61 businesses, 1 human service agency, and 3 residences.
- Transportation improvements related to the *Bel-Red Corridor Subarea Plan* (City of Bellevue, 2007), including extensions of NE 10th Street and NE 16th Street, and in Redmond, the Bear Creek Extension, would collectively displace up to 39 buildings (a mixture of commercial buildings and residences). Bellevue's implementation of the NE 16th arterial in the plan could result in modifications to the East Link alternatives in Segment D, which could affect the number of displacements.

Many of the areas where the East Link Project and other reasonably foreseeable future actions would be located are redeveloping to higher densities to accommodate the growing population and would provide increased housing and employment opportunities. Both the Bellevue and Redmond comprehensive plans (City of Bellevue, 2007; City of Redmond, 2007) include policies that encourage mixed-use and higher density redevelopment of the Bel-Red Corridor and the Overlake Neighborhood. These redevelopments are expected to provide relocation opportunities within Redmond and Bellevue. Sound Transit's study of currently available properties to which displaced residents and businesses could relocate indicates that there are numerous comparable properties available within Redmond and Bellevue. Because there are expected to be more residential and employment opportunities created by projects in these areas than are lost, an adverse cumulative impact due to property acquisition is not expected.

5.5.3 Land Use

Changes in transportation systems can influence changes in nearby land uses, either directly through acquisition or indirectly by providing new or improved access. The East Link Project, as well as other planned transportation and development projects, would be consistent with applicable land use plans and policies. These projects would provide mobility options and would help achieve higher land use densities, thereby reducing the area of land development in ways that are consistent with regional and local plans and policies. Although density would increase without light rail, light rail would facilitate

more dense urban centers, particularly near stations, than would occur without light rail. The East Link Project would help achieve goals that encourage high-density, transit-oriented development in a timelier manner. Land use changes would be greatest near rail stations due to increased transit accessibility and pedestrian activity, which are generally attractive to businesses and residents.

The East Link Project would require the acquisition of property and the conversion of existing land uses to transportation public right-of-way, which would reduce the amount of available land for development. The East Link Project, in conjunction with other planned projects in the project vicinity, would cumulatively contribute to this type of land use conversion. However, the land to be acquired by these projects constitutes only a small portion of the total residential, commercial, and public land in the project vicinity. In addition, these transportation projects would support high-density, mixed-use redevelopment, which would be a beneficial cumulative effect. Property acquired for staging areas or remnant land areas is expected to be available for redevelopment consistent with approved zoning following construction.

Although construction of the East Link Project and other planned projects would result in temporary impacts on existing land uses as a result of construction activities, such as earth-moving activities and truck traffic, these temporary impacts would not change the existing or future land use of the area. These temporary impacts on adjacent parcels may result in economic impacts, as discussed in the next section.

5.5.4 Economics

The East Link Project would result in business displacements through acquisitions of commercial properties to accommodate project alternatives. Less than 1 percent of the project vicinity's employment would be affected by business relocations. However, the areas that would be affected are primarily areas targeted for redevelopment. Other planned projects would also displace businesses and jobs within the project vicinity. It is likely that most of the displaced businesses could relocate in Bellevue and Redmond. Furthermore, planned private development projects would add jobs to the local economy, and denser, more diverse development could increase property and sales tax revenue for local jurisdictions. Therefore, East Link and other reasonably foreseeable future actions in the project vicinity have the potential to

stimulate economic growth and provide a beneficial cumulative impact.

Under the No Build Alternative, travel times on the I-90 Floating Bridge are expected to increase by 2030. The East Link Project is expected to result in a net decrease in travel times on the bridge (by 2030, travel times are expected to improve or stay the same as current travel times for most directions at most times of the day), thus benefiting freight movement. In addition, the East Link Project together with other planned transportation projects would generally result in lower vehicle miles and fewer vehicle hours traveled on most arterial streets within the corridor. These improvements are expected to be beneficial for freight mobility, with associated benefits for the local and regional economy.

Construction activity is commonly an economic indicator, in that more construction is consistent with stronger economy. Construction of infrastructure and development brings jobs and money to the local economy. Temporary adverse impacts of construction on adjacent businesses would occur, including potential increases in noise and dust, traffic congestion, visual intrusion, and increased difficulty in accessing properties. Access restrictions would be expected for some businesses in Segment C during the construction of cut-and-cover tunnels and stations and in Segment D for retained-cut construction. Adverse construction-related cumulative impacts would be greatest where multiple projects would be under construction in the same areas, primarily in the Downtown Bellevue, Bel-Red, and Overlake growth centers, where the continued execution of the Bellevue Downtown Implementation Plan, Bel-Red Subarea Plan, and Overlake Village Neighborhood Plan allow new private development projects. Although these projects will mostly occur on private property, construction may affect adjacent parcels and roadways and result in changes in access or local traffic circulations. Visitors may choose to avoid areas of intense construction, adversely impacting areas businesses.

5.5.5 Social Impacts, Community Facilities, and Neighborhoods

In general, neighborhoods served by light rail would benefit both from increased transit access and from potential development within station areas. The East Link Project, in conjunction with other projects related to transit-oriented development, would result in primarily beneficial cumulative impacts on neighborhoods. To the extent that displaced residents and businesses could successfully relocate in their

communities, neighborhoods (particularly those portions near station areas) may experience increased vitality in terms of improved access, residential infill, growth in employment base, and greater patronage of local businesses. In many neighborhoods, including Rainier Valley, South Bellevue, Downtown Bellevue, and Downtown Redmond, East Link and other transportation improvement projects would collectively enhance access options and reduce travel time for regional destinations.

Construction of the East Link Project and other planned projects could result in adverse cumulative impacts on neighborhoods and social facilities. Cumulative impacts could include temporary increases in traffic through the neighborhoods, changes in traffic patterns, and construction noise and dust. Construction activities can hinder access and interaction among neighborhoods due to increased congestion, detours, and lane or road closures. These impacts would be greatest if several projects in proximity were constructed at the same time.

5.5.6 Visual and Aesthetic Resources

The East Link Project and other reasonably foreseeable future projects would be consistent with applicable plans and policies related to the visual environment. The cumulative change would be a more densely developed urban environment in all areas, with the exception of Segment B.

Where land use policies permit, the visual change resulting from reasonably foreseeable future actions together with the East Link Project stations would likely include changes in development density and more pedestrian-oriented activity than with existing or no-build conditions. At the stations, primarily in Overlake and the Bel-Red corridor, East Link facilities would be more compatible visually than are the existing light industrial land uses because future developments are intended as transit-oriented development.

With few exceptions, the East Link Project would be visually compatible with the large arterials and freeways that it parallels. Improvements to several of these roadways are included as foreseeable future actions, such as the I-405 NE 8th Street to SR 520 Improvement, SR 520 East Lake Sammamish to SR 202, NE 10th Street Extension, and I-90 Two Way Transit and HOV Operations Projects. Although these projects include visual enhancements, they would incrementally enlarge the area of transportation-dedicated land, especially when positioned adjacent to one another. This cumulative impact would decrease the visual quality along these transportation corridors.

This decrease in visual quality would occur along some alternative routes in Segments B, C, and E.

In addition to becoming a part of the viewed environment, these infrastructure projects would provide new viewing opportunities for travelers. Depending on the combination of alternatives that would be chosen, the East Link Project would provide new and unique views of the adjacent landscape of the areas it would traverse. It would also help encourage denser development, which could help reduce regional impacts on the visual environment associated with low density development (e.g., loss of open space, reduction in vegetated areas, expansion of paved areas).

The East Link Project could contribute to cumulative impacts on the visual environment related to proximity impacts during construction, if any of the other planned projects are being constructed at the same time. Construction-related activities would increase the overall impacts on the surrounding visual environment.

5.5.7 Air Quality and Greenhouse Gases

The impact analysis for air quality in Section 4.6 was necessarily a cumulative analysis because it was based on the Puget Sound regional traffic forecasts, which include reasonably foreseeable transportation projects. The conclusion of the air quality analysis is that the East Link Project would reduce the cumulative release of car exhaust emissions to below future levels expected under the No Build Alternative, thereby providing a net benefit to local and regional air quality compared to the No Build Alternative.

One important component of air quality analysis is a projects' contribution to the greenhouse gas effect. Greenhouse gases contribute to climate change or global warming, which is an increase in the overall average temperature in the atmosphere. Global warming is a regional and ultimately a worldwide concern. Effects of the global warming trend are linked to more severe weather conditions, such as warmer temperatures and an increase in flooding and tornados occurrences. The changes in conditions caused by global warming lead to rise in sea levels and can change sensitive ecosystems. People may feel the effects of global warming as increasing smog conditions, stronger sun exposures, and economic effects caused by changes in growing seasons (Washington State Department of Ecology and University of Washington Climate Impacts Group, 2008; King County, 2007).

Petroleum fuels are considered one of the largest contributors of greenhouse gas emissions. Any process that burns fossil fuel releases carbon dioxide, the primary greenhouse gas, into the air. Two of the largest contributors to greenhouse gas emissions are transportation and energy production, although residences, offices, and industries contribute as well. Generally, improving fuel efficiency, reducing the burning of fossil fuels, conserving energy and using clean energy resources over combustible sources are methods of improving greenhouse gas effects.

The East Link Project is part of the ST2 Plan. In addition to East Link, this plan would extend light rail north and south of the Initial Link Segment and calls make several other transit improvements throughout the central Puget Sound region. East Link, alone and as part of the ST2, in conjunction with other reasonably foreseeable future land use development projects, would result in reduced automotive vehicle miles traveled for the Puget Sound region and, therefore, less petroleum consumed in the region.

Sound Transit has conducted a cumulative analysis on how the operation of the ST2 Plan would affect greenhouse gas emissions throughout the region over the No Build Alternative. The ST2 Plan is predicted to reduce overall regional CO₂ equivalent (CO₂e) by approximately 99,552 metric tonnes annually using current electric power fuel mix assumptions. Under the possible scenario of using non-carbon energy sources, the reduction could be as much as 178,334 metric tonnes – the equivalent of 414,731 barrels of oil a year, 931 railcars of coal a year, or preserving 1,244 acres of forest from deforestation (EPA, 2008).

The reduction of vehicles miles traveled due to transit in combination with increased densities in land use is demonstrated through other cities' experiences. In a recent publication by the Transit Cooperative Research Program, *Effects of TOD on Housing, Parking and Travel, Report 128*, August 2008, Robert Cervero shows that throughout the nation, transit-oriented development is reducing automobile trips approximately 30 to 60 percent. Important variables in the study were housing density, and distance to Central Business Development (the equivalent of "Urban Centers" for East Link). Generally, the higher the density and the closer (under 12 miles) to the central business district, the fewer automobile trips and more transit or non-motorized trips were taken, leading to a cumulative benefit of reducing greenhouse gas emissions.

Improving automotive speeds up to 45 miles per hour reduces the greenhouse gas emissions compared to automobiles that are idling or moving at slow speeds due to traffic congestion (Urban Land Institute, 2008).

East Link and other transportation improvement projects in the study area would cumulatively improve travel speeds for automotive travel as compared to the No Build Alternative for 2030.

While all these projects would expend energy to build and develop, the long term operation is an improvement over low density growth patterns that use more land area, requiring longer vehicle trips and more energy consumption.

Secondary effects of East Link, together with many of the reasonably foreseeable higher density development projects identified for this Draft EIS analysis would result in net benefit in greenhouse gas emissions over the No Build Alternative.

Cumulatively, the East Link Project may result in greater unquantifiable benefits of reducing greenhouse gas emissions in the long term. Light rail projects, under the right conditions, can result in higher concentrations of employment and housing developments than if the project did not exist, especially near stations (see land use discussion, Section 5.5.3). Denser developments generally have lower per unit energy consumptions and, depending on the availability of services nearby, can result in fewer vehicle trips, which in turn results in lower greenhouse gas emissions over the equivalent lower density employment and housing developments.

In addition, regional, state, and federal governments are adopting new regulations that will require reductions in greenhouse gas emissions, including the following:

- In February 2007, Washington Governor Christine Gregoire issued Executive Order 07-02 requiring state agencies to find ways to reduce greenhouse gas emissions and adapt to the future that climate change may create.
- On May 3, 2007, the Washington legislature passed Senate Bill 6001, which among other things, adopted the Governor Gregoire's Climate Change goals into state law. The law aims to achieve 1990 greenhouse gas levels by 2020, a 50 percent reduction below 1990 levels by 2030, and more by 2050.
- On December 19, 2007, President George W. Bush signed into law the Clean Energy Act of 2007, which requires in part that automakers boost fleet-wide gas mileage to 35 miles per gallon (mpg) by the year 2020. The current corporate average fuel economy (CAFE) standard for cars, set in 1984, requires manufacturers to achieve an average of 27.5 miles per gallon, while a second CAFE standard requires an average of 22.2 mpg for light

trucks such as minivans, sport utility vehicles, and pickups.

Cumulatively, these trends may change the trends of global warming.

The cumulative greenhouse gas savings with project operation cannot be realized without expended energy during construction. East Link, together with reasonably foreseeable future projects, would increase greenhouse gases emissions during construction.

5.5.8 Noise and Vibration

The Federal Transportation Administration's (FTA's) accepted methodology for noise and vibration analysis reflects both cumulative ambient noise conditions and project-specific noise and vibration impacts. Light rail noise, although less than noise from a typical delivery truck, may be distinguishable from other transportation noise because it moves through the area in periodic intervals. In addition, the project would realign some roadways, resulting in traffic noise impacts. Noise impacts from light rail and/or traffic would occur in Segments B, C, and E, and vibration impacts would occur in Segments C and E. Sound Transit has a policy to mitigate associated noise and vibration impacts as reasonable. Almost all East Link noise and vibration impacts could be avoided depending on the alternatives chosen. However, there could be residual vibration impacts in Segments C and E, which may be avoided during final design.

No other reasonably foreseeable future actions are expected to cause vibration impacts during project operation, so the few vibration impacts with the East Link Project would not cause a cumulative impact. Although Sound Transit is committed to mitigating project noise impacts, light rail would still contribute a new noise source and therefore would contribute to cumulative noise impacts. In addition, the indirect impact of East Link attracting more development around rail stations may result in more intense urban activities in some station areas, therefore adding cumulative noise to the surroundings.

During construction, the East Link Project would contribute noise and vibration impacts along with other nearby transportation and private development construction projects and cumulative impacts would be anticipated. This is particularly true for the tunnel alternatives in Segment C, where construction of high-rise buildings is proposed near East Link alternatives, but many projects currently planned may be completed before construction of East Link. Where necessary, Sound Transit would monitor noise and

vibration during construction to minimize related disturbances on residential and other sensitive areas.

5.5.9 Ecosystem Resources

As discussed in Section 5.3, the study area and surrounding vicinity have greatly changed over time due to past actions and development. There are only a few high-value fish and wildlife habitats remaining within the study area: Lake Washington, Mercer Slough Nature Park, Marymoor Park, the Sammamish River, Bear Creek, and several small streams and tributaries. These areas provide habitat for fish and wildlife, including federally listed threatened and endangered fish species and several federal and state species of concern, particularly birds. Reasonably foreseeable future actions that would affect these habitats incrementally contribute to the loss and/or degradation of these high-value habitats and adverse effects on associated wildlife.

Several planned transportation projects, such as the SR 520 Bridge Replacement and HOV Project, the I-405 Bellevue Nickel Project, Bellevue's Downtown Implementation Plan, and SR 520 West Lake Sammamish to SR 202 Project could contribute to cumulative impacts on high-value uplands and wetlands in the study area in conjunction with the East Link Project alternatives. Adverse impacts would include removing large trees, filling or altering wetland habitat, and increased impervious surfaces in the project vicinity. These, along with additional urban development, continue to reduce remaining available high-quality nesting and foraging areas for present wildlife species. These projects also have the potential to contribute to cumulative impacts on aquatic resources, including disturbance to stream channels, removal of riparian habitat, and increases in pollution-generating impervious surfaces.

The exceptions are efforts to enhance the Bear Creek and Kelsey Creek watersheds that cross through and extend beyond the East Link Project vicinity. The cities of Redmond and Bellevue have adopted plans to enhance stream habitat. The City of Bellevue is close to adopting the Bel-Red Plan, which has an element devoted to "The Great Streams Strategy" with its planned stream enhancements that include removing culverts where possible, removing impassable fish barriers, planting riparian vegetation along stream banks, and generally improving stream quality. These efforts are focused on Goff Creek and the West Tributary of Kelsey Creek, both of which are located in Segment D and empty through Mercer Slough Nature Park in Segment B. Also, the City of Redmond has a stream enhancement project north of SR 520 on Bear

Creek in Segment E. In addition to these projects, other state-permitted and locally permitted projects incrementally provide net benefit to stream suitability for fish. When a project affects a stream, the Washington State Department of Fish and Wildlife hydrologic code requires that impassable fish barriers be removed and improved to meet fish habitat suitability.

The East Link Project and other reasonably foreseeable future actions would be required to mitigate impacts to stream, wetlands, and high-value habitats in accordance with federal, state, and local regulations. Mitigation may include restoration or enhancement of degraded streams and wetlands and their associated buffers, providing water quality treatment for impervious surfaces that currently receive no treatment, removal of fish passage barriers, and planting disturbed areas with native vegetation. These mitigation measures benefit fish and wildlife habitat compared to existing conditions and improve conditions for federally listed threatened or endangered species, if present.

Construction associated with the East Link Project and other foreseeable future transportation and development projects would temporarily contribute to habitat loss resulting from vegetation removal for construction staging areas and access. Stream water quality could be affected by erosion and sedimentation from cleared areas and earthmoving activities. Each project would be required to comply with water quality protection regulations during construction. After construction, cleared areas would be revegetated.

5.5.10 Water Resources

The East Link Project and many of the foreseeable projects would add new impervious surface. Although many of the actions would be on currently developed sites or would be changes within existing paved rights-of-way, there would still be a net increase in total impervious surface and therefore an increase in stormwater runoff within the study area above existing conditions.

Light rail vehicles have been determined by the Washington State Department of Ecology (Ecology) to be clean, or noncontributors of contaminants into stormwater runoff. New impervious surfaces added by the East Link Project and other reasonably foreseeable future actions would include appropriate stormwater quantity and quality treatment in accordance with Ecology regulations. This mitigation would improve the treatment of some existing

stormwater drainages and thus provide an overall cumulative benefit on water quality.

The cumulative impacts of other reasonably foreseeable future actions may increase the number of automobile vehicles operating on impervious surfaces, resulting in the release of petroleum-related contaminants into stormwater runoff. East Link would reduce peak traffic loads from those projected under the No Build Alternative, thereby reducing some of the cumulative contaminant runoff from impervious surfaces. In summary, East Link would provide a direct beneficial cumulative impact related to impervious surfaces.

The East Link Project could contribute to cumulative turbidity and sedimentation in receiving streams during construction, if any of the other nearby planned projects were being constructed at the same time. However, as part of a stormwater pollution prevention plan (SWPPP), Sound Transit is committed to implementing a temporary erosion and sediment control plan (TESCP) and a water quality monitoring plan to minimize these impacts.

5.5.11 Energy

Reasonably foreseeable future actions would increase energy demand in the project vicinity. In terms of energy used for transportation, the operation of the East Link Project would decrease total energy consumption when compared to the No Build Alternative because the total vehicle miles traveled would decrease and the energy needed to power the East Link Project would be less than the vehicles it is replacing.

The East Link Project would also require energy to run the proposed maintenance facility. However, this facility is proposed on redevelopment sites, and therefore, it is unlikely that the change in use would draw more energy than currently used at these sites.

There would be a cumulative demand on energy during construction. However, both Puget Sound Energy and Seattle City Light growth projections resemble PSRC's in their long-term demand projections and have planned energy resources accordingly; therefore, this planned growth is not expected to have an impact on energy resources (Puget Sound Energy, 2007, and Seattle City Light, 2006). As with most construction projects, the energy used would be lost. But unlike other projects, the cumulative transportation energy savings would compensate for the construction energy use over time.

5.5.12 Geology and Soils

Existing urban development has already substantially altered geologic surface conditions throughout the East Link Project vicinity. Continued development associated with the reasonably foreseeable future actions would increase the amount of infrastructure placed in localized geologically sensitive areas such as steep slopes or seismic hazard areas. However, all projects must be constructed in accordance with state and local laws that require design and construction to seismic standards; therefore, a cumulative impact is not expected in operation or construction of reasonably foreseeable projects.

5.5.13 Hazardous Materials

Other than using lubricants, cleaning solvents, and other chemicals at the proposed maintenance facility, East Link would not result in risks of spilling hazardous materials during operation. East Link, along with other reasonably foreseeable future actions in the project vicinity, is likely to result in improved environmental quality by uncovering and removing existing soil and water contaminants. All project development would require the remediation of contaminated sites encountered in compliance with state and federal environmental regulations. Therefore, there would be a beneficial cumulative impact in the study area compared to existing conditions and the No Build Alternative.

During construction, there is a potential for any reasonably foreseeable future actions to have an accidental release of hazardous substances. In addition, construction of any future project could encounter or disturb previously unknown contamination that has not been controlled or cleaned up. Disturbing contaminated soil and/or groundwater has the potential to release contaminants into the environment where they could pose additional risk to human health and the environment. Sound Transit and other project proponents would implement measures to minimize this potential during construction and would document these measures in a spill prevention, control and countermeasures plan; a comprehensive hazardous substances management plan; and a SWPPP. With implementation of these measures, the risk of cumulative hazardous materials impacts would be low.

5.5.14 Electromagnetic Fields

East Link would not result in electromagnetic interference (EMI) that causes sensitive electronic equipment to malfunction. In addition, Sound Transit did not identify any areas where EMI would combine

with past, present, or future actions to result in human health effects. Therefore no EMI cumulative impacts would result from East Link.

Anywhere there are electrical currents, it is possible that stray currents could affect metal, water, or buried pipe or cable. Impacts such as corrosion of metal pipes could occur from the East Link Project and from any number of other current-generating sources. Sound Transit would use insulation to limit stray currents from the East Link Project and their potential impacts on nearby utilities.

5.5.15 Public Services

As the regional population has increased, so has the demand for public services. Demand for these services will continue to increase with the expected growth in regional population. The East Link Project would not itself add growth but would facilitate planned growth. Existing services and those intended to serve this planned growth would be available for users of a Sound Transit facility, including safety, police, and emergency service personnel. In addition, Sound Transit would provide security services dedicated to surveillance throughout the light rail system to minimize crime incidents.

East Link would be built in a dedicated right-of-way where accidents could not occur with other vehicles except in the few alternatives where conflicts with traffic at intersections or egresses and ingresses would be possible. Therefore, Sound Transit would train local emergency service personnel on how to respond to accidents with other vehicles.

The East Link Project, together with other reasonably foreseeable future actions, would alter roadway infrastructure, which would both improve and alter emergency service travel routes. Specifically, the conversion of the I-90 center roadway to East Link right-of-way would limit emergency services to the outer lanes, including the available HOV lanes. However, as discussed in Chapter 3, Transportation Impacts, congestion periods would be less with the project than without and emergency response times would be similar to or better than would be expected under the No Build Alternative.

As noted in the project description in Chapter 2, Sound Transit would coordinate with public service agencies regarding construction of the East Link Project and other proposed developments being built at the same time, thereby minimizing cumulative construction-related impacts on emergency response services.

5.5.16 Utilities

The East Link Project and other reasonably foreseeable future actions would increase the demand for electrical power. While a portion of the power needed for East Link would come from Seattle City Light, because the East Link alternatives are primarily located in the Puget Sound Energy service area, most of the power needs would be sought through Puget Sound Energy. East Link would represent less than one-half of one percent of Seattle City Light and Puget Sound Energy's yearly production in 2006, and system upgrades are planned to allow these utilities to meet the total projected demand in 2030. Development of additional generating capacity beyond what is currently planned by these providers is not expected in order to accommodate East Link and other reasonably foreseeable future actions (Puget Sound Energy, 2007; Seattle City Light, 2006).

Utilities, such as electric, water, sewer, gas or petroleum, and telecommunications conveyance facilities that would conflict with any of the project alternatives would be relocated before or during project construction. Other reasonably foreseeable future actions in the project vicinity would also be responsible for providing similar relocation options where utility conflicts occur.

Cumulative construction-related impacts could occur when projects that are constructed before East Link, such as the I-405 Bellevue Nickel Project, relocate utilities in areas that create new conflicts for the East Link alternatives. These situations would be minimized through advance construction coordination with utility providers. In many cases, relocation of utilities would permit utility providers a cost-effective opportunity to upgrade infrastructure, thereby reducing maintenance costs and resulting in a beneficial cumulative impact.

5.5.17 Historic and Archaeological Resources

Reasonably foreseeable future actions in the project vicinity would have no adverse impacts on historic or archaeological resources. East Link alternatives pass through some areas of high archaeological sensitivity, and Sound Transit would conduct pre-construction surveys and/or monitoring during construction. No direct or indirect impact on archaeological resources is expected; therefore, no cumulative impact is expected.

Project impacts on historic buildings and structures would be minimal and consist only of temporary impacts of noise and dust during construction. The only direct impact on a structure eligible for listing on

the National Register of Historic Places affects the Justice William White House. The Justice William White House would be moved to a location that maintains the historic context and the building's structural integrity, in consultation with the State Historic Preservation Office of Washington and the City of Redmond, and a no-adverse-impact determination is anticipated. Thus, the East Link Project is not expected to contribute to cumulative impacts.

5.5.18 Parkland and Open Space

East Link would not result in a net loss of parkland and open space after mitigation. The only identified reasonably foreseeable future action that may result in use of park property within the East Link Project vicinity is the SR 520 West Lake Sammamish to SR 202 Project. This project may include a relocation of the Bear Creek Trail for restoration of Bear Creek in the Bear Creek greenbelt, and it may include a trail under SR 520 connecting the Bear Creek Trail to Marymoor Park.

In combination with the other foreseeable projects, East Link Project could potentially cause cumulative impacts on parklands if construction periods overlap. In Segment E, the SR 520 West Lake Sammamish to SR 202 Project will have temporary construction impacts such as increased noise, dust, and access limitations at some of the same facilities as those that would be affected by East Link construction (i.e., Bear Creek Trail, Sammamish River Trail, East Lake Sammamish Trail, and Marymoor Park). However, although interruptions could occur periodically over several years, construction of the SR 520 West Lake Sammamish to SR 202 Project is expected to be completed before East Link construction would begin, minimizing construction-related interruption for park users at any given time.

5.5.19 Potential Mitigation Measures for Cumulative Impacts

Operational cumulative transportation, visual, noise, ecosystem, and water resource impacts could occur. Avoidance, minimization, and mitigation measures for East Link Project operation impacts on these resources are discussed in Chapters 3 and 4. However, most cumulative impacts would occur during construction rather than operation, so that in most cases mitigation would remain the responsibility of each project proponent to meet regulatory requirements during construction for direct impacts on resources such as ecosystems, water resources, hazardous materials, and historic and archaeological resources. Measures to

minimize, avoid, or mitigate East Link Project construction impacts are discussed in Chapters 3 and 4.

The reasonably foreseeable future projects that would be under construction at the same time as East Link would coordinate, as necessary, to minimize the potential cumulative effects of overlapping construction periods within the same area. Such coordination may reduce cumulative construction impacts related to transportation, reduced access, and increased dust and noise affecting businesses and residences, visual resources, reduced emergency service response times, and park uses.