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No. 67549-4-I

**COURT OF APPEALS, DIVISION I
OF THE STATE OF WASHINGTON**

CASCADE BICYCLE CLUB, FUTUREWISE & SIERRA CLUB,

Appellants,

v.

PUGET SOUND REGIONAL COUNCIL,

Respondent.

BRIEF OF RESPONDENT

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I. INTRODUCTION

In May 2010, after three years of extensive public involvement and interagency cooperation, the Puget Sound Regional Council (“PSRC”) adopted a 30-year transportation plan known as Transportation 2040 (“*T2040*”). PSRC agrees with Cascade Bicycle Club, Futurewise, and Sierra Club (collectively “Cascade”) that reducing greenhouse gas emissions is vitally important for our state. For that reason, *T2040* reflects a rigorous analysis of greenhouse gas emissions and includes specific strategies that will reduce those emissions.

Cascade challenges *T2040* based on two strained interpretations of the state’s greenhouse gas statute, RCW 70.235.020. First, Cascade claims that the phrase “the state shall limit emissions” in RCW 70.235.020 is actually a mandate applicable to regional planning entities like PSRC. Not only is that an unsustainable interpretation of the statute, but it also fails as a factual matter: Under RCW 47.80.020, PSRC is a “voluntary association of local governments” engaged in regional planning, and is not “the state.”

Second, in arguing that RCW 70.235.020 applies to PSRC, Cascade assumes that the statute requires certain sectors and geographic areas of the state to reduce greenhouse gas emissions by their proportionate share. The statute includes no such language. In order for its argument to succeed, Cascade must read into the statute a proportionate-

share requirement so that Cascade can then assert that PSRC violated that “requirement.” Cascade may wish the law provided for this, but it does not. Cascade’s request to rewrite the statute is better addressed to the legislature than the judiciary.

Resolution of these issues could have far-ranging consequences for all 14 of the regional planning entities in Washington like PSRC, as well as the hundreds of counties and cities that make up those entities. If RCW 70.235.020 is a mandate on each of them, as would be the case under Cascade’s creative interpretation of “the state,” this would result in sweeping and potentially counterproductive new requirements well beyond the law.

Cascade also challenges the adequacy of the *T2040* Environmental Impact Statement (“EIS”) under the State Environmental Policy Act (“SEPA”). But Cascade’s arguments stem from its fundamentally flawed interpretation of RCW 70.235.020. The EIS at 2,100+ pages was crafted after years of review and comment by agencies, the scientific community, interest groups, and the public. Regarding greenhouse gases, in fact, the EIS has received “high marks” from the state’s Department of Ecology and is posted on Ecology’s website as an example of “how to properly analyze greenhouse gases and climate change in a non-project EIS.” CP 367.

PSRC adopted *T2040* with its proactive measures to reduce greenhouse gas emissions. PSRC is confident that *T2040* and the EIS comply with all applicable legal requirements. The superior court below agreed. This Court should affirm.

II. STATEMENT OF THE ISSUES

1. Under RCW 70.235.020, “the state” must reduce greenhouse gas emissions for Washington as a whole. Did PSRC act legally in adopting *T2040* where PSRC is not “the state” and is not required to meet statewide limits?

2. Under SEPA, an EIS must disclose a proposal’s probable significant environmental impacts. In evaluating seven alternatives informed by years of research and analysis, with greenhouse gas emissions as a key issue, did PSRC correctly determine that the EIS sufficiently discloses the plan’s probable impact on greenhouse gas emissions?

III. STATEMENT OF THE CASE

A. PSRC.

PSRC is a voluntary association of local governments whose mission is to ensure a thriving central Puget Sound region through planning for transportation, economic development, and growth

management. CP 789 ¶ 2–3; CP 79 at PSRC 00028955.¹ PSRC’s members include King, Kitsap, Pierce, and Snohomish counties, 73 cities and towns within the region, four port districts, the region’s transit agencies, the Washington State Department of Transportation (“WSDOT”), the Washington State Transportation Commission, and local tribes. CP 79 at PSRC 00029156–57. WSDOT and the Transportation Commission each has only one representative on PSRC’s Executive Board, and together they account for less than six percent of the total vote of Board membership. *Id.* at PSRC 00028714.

The Executive Board and a General Assembly govern PSRC. *Id.* at PSRC 00001253. The General Assembly is composed of all member jurisdictions and agencies. *Id.* PSRC has a number of other boards and working groups that advise the Executive Board, including the Transportation Policy Board, which was largely responsible for *T2040*. *Id.*

A small part of PSRC’s funding comes from the state of Washington. PSRC receives approximately 72 percent of its revenue from federal grants, 6 percent from state grants, and the remaining 22 percent

¹ The administrative record was converted to a file exhibit pursuant to KCLR 79(2)(d). CP 79, 120. Citations to the administrative record will reference the Clerks’ Papers where the file exhibit is noted, followed by the administrative record number (*e.g.*, CP 79 at PSRC 00028955). For the convenience of the Court, pertinent parts of the administrative record are attached to this brief as appendices. Where a document is attached, a parallel citation to the appropriate appendix is provided (*e.g.*, CP 79 at PSRC 00001209, *infra* at B-3).

from dues paid by PSRC members and other local sources. *Id.* at PSRC 00029206.

RCW 47.80.020 allows formation of Regional Transportation Planning Organizations (“RTPOs”) like PSRC: “Each regional transportation planning organization shall be formed through the voluntary association of local governments within a county, or within geographically contiguous counties.” There are 14 RTPOs in the state. CP 79 at PSRC 00029215.

Those local governments that wished to be a part of PSRC created the organization through an interlocal agreement (the “Interlocal Agreement”). CP 789 ¶ 2, CP 79 at 00029206. The Interlocal Agreement distinguishes between PSRC and local and state governments, and defines the relationship between PSRC and other levels of government. CP 79 at PSRC 00028711.

As the transportation planning entity for the Puget Sound region, PSRC also serves as the designated Metropolitan Planning Organization (“MPO”) under federal law. The metropolitan area planning that MPOs perform is very similar to the planning function of an RTPO. CP 789 ¶ 2. As the MPO and the RTPO for the central Puget Sound region, PSRC is required by both federal and state law to develop a long-range regional

transportation plan. 23 U.S.C. § 134; RCW 47.80.023(2), .030. PSRC created *T2040* to fulfill that requirement.

B. *T2040* AND THE EIS.

T2040 is a transportation plan for the four-county Puget Sound region to address its transportation needs for the next 30 years. CP 789 ¶ 4. The plan grapples with our region's dramatic growth forecast: the region is expected to add 1.5 million people and 1.2 million jobs by 2040. CP 79 at PSRC 00001209; *infra* at B-3. Due to that growth, the demand for travel within and through the region is expected to increase by about 40 percent by 2040. *Id.* at PSRC 00003309.

T2040 was developed to address three basic goals: reducing congestion and improving regional mobility while accommodating forecasted growth in population and employment; reconciling the need for transportation facilities with their environmental impacts, including greenhouse gas emissions linked to climate change; and developing a sustainable method of transportation funding. *Id.* at PSRC 00001212, *infra* at B-6. Throughout the process of developing *T2040*, PSRC identified climate change as a key issue. *Id.* at PSRC 00003349, *infra* at F-3.

Importantly, *T2040* does not itself implement or operate any particular project or program. *Id.* at PSRC 00001211, *infra* at B-5.

Implementation of the plan is the responsibility of cities, counties, the state, federal agencies, transit agencies, ports, tribal nations, and others. *Id.*

1. Development of T2040 and the EIS.

PSRC started the process of developing a new regional transportation plan in June 2007. CP 79 at PSRC 00003769. Once a public outreach effort was developed, PSRC undertook a year-long EIS “scoping” process to determine the range of alternatives and environmental impacts the EIS for the plan would evaluate. *Id.* PSRC held six public meetings in 2007 and early 2008 to receive public and agency comment on the scope of the EIS. *Id.* Over 950 comments were received from agencies and the public on a variety of topics, including greenhouse gas emissions. *Id.* at PSRC 00003770; *see also id.* at PSRC 00002332–42.

The next phase of plan development, between January 2008 and May 2009, was an intensely analytical one, aimed at developing alternatives for study in a Draft EIS. *Id.* at PSRC 00003770. Over an 18-month period, PSRC worked with other jurisdictions, interest groups, and the public to define plan alternatives. *Id.* During this period, PSRC also completed detailed modeling and analysis. *Id.*

This analytical phase culminated when PSRC issued a Draft EIS in May 2009. *Id.* at PSRC 00003771. The Draft EIS described the environmental impacts—including greenhouse gas emissions—for a

“Baseline” alternative in which only those projects that had already been funded would be undertaken, otherwise maintaining existing transportation conditions. *Id.* at PSRC 00000084. The Draft EIS compared the Baseline environmental impacts to five alternatives with varying transportation improvements and programs. *Id.* at PSRC 00000075–116.

The public and agency comment period on the Draft EIS occurred from May to July 2009. *Id.* at PSRC 00003771. In addition to general public notice of the availability of the Draft EIS and opportunity to comment, five workshops were conducted throughout the region. *Id.* at PSRC 00001307, *infra* at C-43; 3771. PSRC reviewed over 2,000 comments made on the Draft EIS. *Id.* at PSRC 00001307, *infra* at C-43. Based on public and agency comment, technical input, and additional modeling, PSRC then added a Preferred Alternative to the Final EIS, to be evaluated alongside the Baseline and five alternatives from the Draft EIS. *Id.*

In March 2010, PSRC released a draft of *T2040* and issued the Final EIS. *Id.* at PSRC 00003755–73. The Final EIS totals over 2,100 pages. *Id.* at PSRC 00001185–3294.

2. Adoption of T2040

After three years of public review involving nearly 500 public meetings, technical input, interagency consultation, and evaluation of

environmental impacts in a lengthy EIS, the PSRC General Assembly adopted *T2040* in May 2010. CP 79 at PSRC 00003761, 3773. *T2040* was based on the Preferred Alternative identified through the EIS process, which included miles of biking and walking facilities focused on access to transit stations and completing regional trail links, replacement of several vulnerable roadways (Alaskan Way Viaduct and SR 520 floating bridge), completion of missing links in the highway network, expansion of some roadways to support the regional growth strategy of concentrating growth in urban centers, and more transit service than any other alternative. *Id.* at PSRC 00001300–01, *infra* at C-36–37. A central part of *T2040* is a four-part strategy for reducing greenhouse gas emissions. *Id.* at PSRC 00003349–51, *infra* at F-3–5.

C. REDUCING GREENHOUSE GAS EMISSIONS.

1. *Transportation Strategies and Greenhouse Gas Emissions.*

In analyzing greenhouse gas emissions, PSRC consulted a wide variety of technical materials, studies, and policy papers from international, national, state, regional, and local sources. *See* CP 79 at PSRC 00001685–94. Two reports, in particular, were important in informing PSRC about the extent to which transportation strategies could reduce greenhouse gas emissions. One report, *Moving Cooler*, was prepared by the Urban Land Institute with thirteen co-sponsors. *Id.* at

PSRC 00022277–82. The second report, *Leading the Way: Implementing Practical Solutions to the Climate Change Challenge*, was prepared by Washington State’s 2008 Climate Advisory Team. *Id.* at PSRC 00023286–882.

Moving Cooler quantifies the efficacy of transportation strategies to reduce greenhouse gases. *Id.* at PSRC 00022287. The study focuses on strategies to reduce miles traveled, to shift travel to more efficient modes of transportation, and to improve the efficiency of the transportation network. *Id.*

Moving Cooler’s conclusion is stark: Even with a bundle of transportation strategies that represents a “maximum effort scenario,” by 2050, greenhouse gases from surface transportation can be reduced by only 24 percent. *Id.* at PSRC 00022291. Even with this reduction, greenhouse gas emissions from surface transportation will still remain *above* 1990 emissions levels. *Id.* at PSRC 00022292. PSRC took note of this conclusion and the strategies that constituted the maximum effort scenario because, in part, RCW 70.235.020 refers to limiting emissions below 1990 levels. *Id.* at PSRC 00004265, *infra* at G-11. The maximum effort scenario—which still would not reduce greenhouse gas emissions to the 1990 level—assumed all of the following measures had been implemented:

- Higher parking costs, including a minimum fee of \$200.00 per year for residential on-street parking, and a federal tax on all commercial parking of \$5.00 per day, per space;
- An increased gas tax of \$2.71 per gallon;
- A vehicle toll for entering all downtowns, employment centers, and retail centers;
- A peak hour toll in urban and rural areas of 65 cents per mile;
- A 5-cent-per-mile toll on all rural interstates regardless of congestion;
- A 12-cent-per-mile vehicle miles traveled (“VMT”) fee;
- Increased land use densities;
- Increased traffic calming and bike and walkway improvements;
- Converting highway lanes to High Occupancy Vehicle lanes; and
- Expanded transit and reduced transit fares.

CP 291 at PSRC S00029341–54.

Moving Cooler demonstrates that it is possible to reduce greenhouse gas emissions from on-road vehicles through a variety of strategies, but that even with extraordinary measures, the reductions cannot reduce transportation emissions to 1990 levels. CP 79 at PSRC 00022292. *Moving Cooler* informed PSRC about the limited greenhouse gas reductions that are possible through transportation planning alone, without also making changes in vehicle fuel or fleet.

The second report, *Leading the Way*, reaches a similar conclusion. *Leading the Way* concludes that aggressive policies specific to one sector, like transportation planning, can “complement, but cannot supplant,” the

necessary centerpiece to a program that will successfully limit greenhouse gas emissions. *Id.* at PSRC 00023299. That centerpiece is a market-based policy, often referred to as “cap and trade.” *Id.* The report concludes that “[sector-specific policies] alone cannot (and are not intended to) achieve the longer-term goals in the absence of this market signal.” *Id.* at PSRC 00023299.

PSRC’s own research and analysis is consistent with the *Moving Cooler* and *Leading the Way* studies. As early as January 2008, PSRC’s Transportation Policy Board was advised that even with aggressive land-use changes, complete bicycle/pedestrian networks, and substantial transit improvements, emissions from surface transportation would continue to rise due to population growth, and thus would be above base year levels. *Id.* at PSRC 00005931. PSRC’s conclusions, as well as those of *Moving Cooler* and *Leading the Way*, are included in *T2040* and the *T2040* EIS. *Id.* at PSRC 00002461–62, *infra* at E-5–6.

2. Greenhouse Gas Emissions and the EIS.

One of the principal themes of the EIS is reducing greenhouse gas emissions. The EIS’s Executive Summary specifically discusses the state emissions limits set in RCW 70.235.020; Chapter 6, “Air Quality and Climate Change,” discusses greenhouse gas emissions at length; and Appendix L of the EIS, “Greenhouse Gas Four-Part Strategy,” is devoted

entirely to the topic. CP 79 at PSRC 00001221, *infra* at B-15; 1456, *infra* at D-12; 2459, *infra* at E-3. The EIS lists one of the objectives of *T2040* as “find[ing] creative ways to address climate change.” *Id.* at PSRC 00001210, *infra* at B-4. In listing the “challenges” addressed by the *T2040* alternatives, the EIS calls out “Environmental Concerns: Reduce greenhouse gas emissions linked to climate change and the water quality impacts on Puget Sound.” *Id.* at PSRC 00001212, *infra* at B-6.

An important part of addressing environmental concerns is accurately measuring impacts. In measuring potential greenhouse gas emissions, PSRC used 2006 as the base year for *T2040*. PSRC used 2006 as a base year rather than 1990 because the travel forecasts, which are an essential part of overall modeling, were based on extensive 2006 Household Activity Survey data for the entire region, which is the latest data available. CP 79 at PSRC 00002444–48, 3334. The 2006 Survey was of 4,700 households in the region and consisted of household and person demographics, a two-day travel and activity diary, attitude questionnaires, and a stated preference/choice experiment survey. CP 291 at PSRC S00030583–93. In determining how alternative projects and programs can affect the number of cars and trucks on the road in the future, the comparison in *T2040* is to the fully documented 2006 base year for all elements of the analysis. Comparable data for 1990 travel patterns are not

available, so PSRC used 2006 as its base year to make the most accurate projections possible. When discussing RCW 70.235.020, *T2040* referred to 2006 as a “surrogate” for 1990, merely because 2006 is the closest year to 1990 for which PSRC had complete data. *See, e.g.*, CP 79 at PSRC 00003351, *infra* at F-5.

Citing to *Moving Cooler* and *Leading the Way*, the EIS notes that a variety of strategies are needed to effectively reduce emissions from the transportation sector, and that the types of strategies within PSRC’s long-range planning function (land use, user fee, and transportation-choice strategies) will not alone reduce emissions below 2006 levels. *Id.* at PSRC 00001221–22, *infra* at B-15–16; 1467–73, *infra* at D-23–29. In fact, the EIS shows that emissions levels from transportation will continue to rise over the years due to population growth. *Id.* at PSRC 00003349, *infra* at F-3. The EIS states that only with technological improvements to vehicles and fuels, including changes to the vehicle fleet, would emissions levels from transportation fall below 2006 levels. *Id.* at PSRC 00001222, *infra* at B-16. The EIS also notes that PSRC “does not have a direct role in determining the region’s future approach to vehicle and fuel technologies.” *Id.*

The EIS also notes that the limits in RCW 70.235.020 are statewide in nature and that there has been no determination of how that

statewide limit would translate into limits for particular sectors or geographic areas. *Id.* Nonetheless, the EIS observed that greenhouse gas research and legislation would continue to evolve, and that PSRC's boards have directed that *T2040* should be flexible and adaptable to respond to new guidance and directions. *Id.* at PSRC 00001223, *infra* at B-17.

The Department of Ecology commented on PSRC's forward-looking position toward reducing greenhouse gas emissions in Ecology's December 2010 Report to the governor and the legislature ("Ecology 2010 Report"). Ecology commented as follows:

PSRC took a proactive stance to address the state's GHG [greenhouse gas] limits and VMT [Vehicle Miles Traveled] reduction benchmarks in the Transportation 2040 process. Their Environmental Impact Statement created as part of the SEPA process evaluated each planning scenario for GHG emissions as well as VMT. The data produced an evaluation process that helped inform the region and state on potential benefits of a combination of strategies in reducing emissions and VMT.

CP 291 at PSRC S00029511. The cornerstone of this proactive stance on reducing greenhouse gas emissions is PSRC's four-part greenhouse gas strategy.

3. *The Greenhouse Gas Four-Part Strategy.*

The reduction of greenhouse gas emissions is a central component of *T2040*. Climate change is noted as a "key issue." CP 79 at PSRC 00003349, *infra* at F-3. *T2040* discusses the RCW 70.235.020

emissions limits in three places. *Id.* at PSRC 00003349–50, *infra* at F-3; 3459; 4265, *infra* at G-11. The state’s emission limits, and the relationship of the EIS alternatives to them, was specifically discussed at no fewer than eight separate Transportation Policy Board and Executive Board meetings. *Id.* at PSRC 00005931, 5934, 10746, 10752, 11212–16, 11491, 11493, 15852, 15388, 15407, 15409, 15910, 15952, 16183–85.

Because reducing greenhouse gas emissions was identified as a key issue, PSRC adopted a four-part greenhouse gas strategy as part of *T2040*. CP 789 ¶ 4, CP 79 at PSRC 00002457–62, *infra* Appendix E. *T2040* states: “An evaluation of greenhouse gas emissions and vehicle miles traveled per capita was conducted in the process to develop Transportation 2040. The results of this analysis and additional research have produced a four-part greenhouse gas strategy that is a central part of Transportation 2040.” CP 79 at PSRC 00003349, *infra* at F-3.

The four parts of the greenhouse gas reduction strategy are:

- *Land Use*: Implementing regional planning policies favoring compact and concentrated growth to achieve a better jobs-to-housing ratio;
- *User Fees*: Phasing in tolls and other roadway user fees;
- *Choices*: Increasing investments in transit, regional light rail, and walking and bicycle facilities; and
- *Technology*: Improving fuel efficiency and the availability of electric and other alternative fuel vehicles.

Id. at PSRC 00003349–51, *infra* at F-3–5. The first three components are directly related to the provisions adopted in *T2040*. But the Technology component is beyond the scope of PSRC’s transportation planning role. *Id.* at PSRC 00001222, *infra* at B-16.

Despite being outside its specific role, PSRC committed to assisting—and is assisting—others in evaluating improvements to fuels and the vehicle fleet, which “will play a crucial role in reducing emissions.” *Id.* at PSRC 00003350, *infra* at F-4. PSRC conducted research and analysis in consultation with the Environmental Protection Agency, WSDOT, Ecology, and the Puget Sound Clean Air Agency. *Id.* The PSRC-led research showed that additional emissions reductions could be achieved through increased use of electric and other alternative fuel vehicles, less carbon-intensive fuels, and improved fuel efficiency of passenger and freight fleets. *Id.* at PSRC 00003351, *infra* at F-5. *T2040* commits PSRC to continue working with agencies to identify emissions reduction strategies. *Id.* And *T2040* commits PSRC to revisiting elements of the adopted plan as new information is developed, or in response to federal and state legislative actions. *Id.* at PSRC 00003317; 3351, *infra* at F-5; 3425.

The Ecology 2010 Report also commented on PSRC’s four-part greenhouse gas strategy:

Transportation 2040's four-part greenhouse gas reduction strategy is flexible, and is designed to incorporate anticipated specific guidance to the region and the transportation sector. Analysis shows that with compact land use patterns, aggressive implementation of pricing and technology, along with increased transportation choices, the strategy has the potential to reduce regional GHGs from transportation by up to 28 percent below 2006 levels. These results show that Transportation 2040 is on the right track toward reducing GHG emissions associated with transportation in the Puget Sound region.

CP 291 at PSRC S00029511.

IV. ARGUMENT

Cascade asserts that PSRC's adoption of *T2040* was illegal under RCW 70.235.020, arguing that PSRC is "the state" for the purposes of the statute. Cascade also challenges the adequacy of PSRC's EIS. The superior court held that PSRC did not violate RCW 70.235.020 because PSRC is not "the state" (CP 790 ¶ 3); that the statute mandates the state of Washington achieve emissions limits for the state *as a whole* (*id.*); that PSRC's EIS was adequate under SEPA (*id.* ¶ 4), and that Cascade, therefore, failed to state a claim upon which relief could be granted (*id.* ¶ 3). This Court should affirm.

A. STANDARD OF REVIEW AND BURDEN OF PROOF.

1. *Constitutional Writ Claim.*

On appeal from a trial court decision on writ of review, the appellate court reviews the agency's record de novo to determine if the

local body's action was either illegal or arbitrary and capricious. *City of Des Moines v. PSRC*, 97 Wn. App. 920, 925, 988 P.2d 993 (1999). Cascade's constitutional writ claim hinges on the interpretation of RCW 70.235.020, so PSRC's adoption of *T2040* is reviewed for error of law. *Id.* Statutory interpretation is a question of law and is reviewed de novo. *Sound Infiniti, Inc. v. Snyder*, 169 Wn.2d 199, 206, 237 P.3d 241 (2010) (citing *Bostain v. Food Express, Inc.*, 159 Wn.2d 700, 708, 153 P.3d 846 (2007)). And dismissal for failure to state a claim is also a legal question, which is reviewed de novo. *Matsyuk v. State Farm Fire & Cas. Co.*, 155 Wn. App. 324, 329, 229 P.3d 893 (2010) (citing *San Juan County v. No New Gas Tax*, 160 Wn.2d 141, 164, 157 P.3d 831 (2007)).

In addition, the party asserting the invalidity of agency action has the burden of proof, *Torrance v. King County*, 136 Wn.2d 783, 790, 966 P.2d 891 (1998), a point that Cascade never acknowledges.

2. SEPA Claim.

Cascade's challenge to the adequacy of the EIS is reviewed de novo, granting substantial weight to PSRC's determination that the EIS is adequate. The adequacy of an EIS statement is a legal question entitled to de novo review, but "an agency's determination of adequacy shall be afforded substantial weight." *King County v. Cent. Puget Sound Growth Mgmt. Hearings Bd.*, 138 Wn.2d 161, 183, 979 P.2d 374 (1999) (citing

Weyerhaeuser v. Pierce County, 124 Wn.2d 26, 37–38, 873 P.2d 498 (1994)). Substantial weight is also required by statute. SEPA mandates that “in any action involving . . . the adequacy of a ‘detailed statement’, the decision of the governmental agency shall be accorded substantial weight.” RCW 43.21C.090.

As it did below, Cascade attempts to turn the language of the courts around, stating that although substantial weight must be given to the agency’s determination under SEPA, the decision is “ultimately a question of law for the court to determine *de novo*.” Appellants’ Opening Brief at 20. By reversing the order in which courts customarily present this standard of review, Cascade diminishes the clear importance that courts place on the “substantial weight” requirement. Contrary to Cascade’s characterization, the accurate standard for this type of SEPA challenge is as follows: “*Although* the review is *de novo*, the court *must give* ‘substantial weight’ to the agency’s determination that an EIS is adequate under SEPA.” *Glasser v. City of Seattle*, 139 Wn. App. 728, 740, 162 P.3d 1134 (2007) (emphasis added). Cascade bears the burden of demonstrating that the EIS is inadequate despite the substantial weight that must be accorded to PSRC.

B. ADOPTION OF *T2040* WAS LEGAL.

The crux of Cascade’s argument is that the statutory emissions limits in RCW 70.235.020 apply to individual entities that Cascade contends make up “the state.” In addition, Cascade implies that the statute requires greenhouse gas emissions reductions in *each* sector of Washington’s economy and *each* geographic region of the state in an amount proportionate to that sector’s or region’s share of total emissions. Neither argument is supported by the statute, and thus Cascade cannot support its claim that adoption of *T2040* was illegal.

1. *Adoption of T2040 Was Legal Because PSRC Is Not the State.*

For *T2040* to violate RCW 70.235.020, PSRC must be “the state.” Cascade’s argument that PSRC is “the state” and that *T2040* is illegal is flawed on many levels: Under a plain-language analysis of the statute, PSRC is simply not “the state”; PSRC is not an “agent” of the state due to its role as the Puget Sound region’s MPO or RTPO; PSRC is not “the state” by operation of the Interlocal Cooperation Act; and adopting Cascade’s interpretation of the statute would lead to consequences unintended by the legislature.

a. *The Plain Meaning of “the state” Does Not Include PSRC.*

In interpreting a statute, a court’s “fundamental objective is to ascertain and carry out the legislature’s intent, and if the statute’s meaning is plain on its face, then the court must give effect to that plain meaning as an expression of legislative intent.” *Dep’t of Ecology v. Campbell & Gwinn, LLC*, 146 Wn.2d 1, 9–10, 43 P.3d 4 (2002); *see also State v. Watson*, 146 Wn.2d 947, 954, 51 P.3d 66 (2002).

The language of RCW 70.235.020 is clear: it applies to “the state.”

The statute provides as follows:

(1)(a) *The state* shall limit emissions of greenhouse gases to achieve the following emission reductions for Washington state:

- (i) By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels;
- (ii) By 2035, reduce overall emissions of greenhouse gases in the state to twenty-five percent below 1990 levels;
- (iii) By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to fifty percent below 1990 levels, or seventy percent below the state’s expected emissions that year.

RCW 70.235.020(1)(a) (emphasis added). PSRC, a regional planning agency, is not “the state.”

Cascade’s attempt to expand “the state” to include PSRC is contrary to the basic facts regarding PSRC’s formation, history, and governance. PSRC is a voluntary, self-governing, independent, regional

entity. It is true that two members of PSRC's 32-member Executive Board are representatives of the state, but their combined voting power on the Executive Board is 5.20 percent. CP 79 at PSRC 00028714, 3443. This minority voting power hardly suggests that PSRC is "the state."

Furthermore, Cascade has conceded that PSRC is not a state agency for purposes of RCW 70.235.050 or under Washington's Administrative Procedures Act. CP 151, 154. And Cascade's assertion that the term, "the state," "is uniformly defined to include all agencies, subdivisions, and instrumentalities of the state" cannot withstand close scrutiny. Appellants' Opening Brief at 23. Cascade catalogues a variety of statutes that variously define "the state," but RCW 70.235 is not among them. *See id.* at n.74. Cascade may wish that the legislature had adopted an expansive definition of "the state" in this instance, but it did not. Cascade now asks this Court to write Cascade's preferred statutory definition of the term into RCW 70.235 to suit its own policy goals.

Cascade also emphasizes the mandatory language of RCW 70.235.020. Appellants' Opening Brief at 21. But this only serves to distract from the subject of that mandate: "the state." When our legislature uses the term "the state," it is referring to the state of Washington. Indeed, Cascade's interpretation of "the state" is inconsistent with the use of the term throughout the statute. As just one example, the statute considers that

“the state” may participate in and generate revenue from a market-based system of limiting greenhouse gas emissions. *See* RCW 70.235.005(4); RCW 70.235.005(6); and RCW 70.235.030(1)(b)(iii). It is nonsensical to think of PSRC as “the state” in these terms, as PSRC lacks the authority to adopt or generate revenue from a cap-and-trade type system.

Moreover, where the legislature intended to provide direction to RTPOs like PSRC, it did so expressly. For example, as part of the same legislative package as the state’s emission limits in RCW 70.235.020, H.B. 2815 also directed WSDOT to adopt goals to reduce annual per capita VMTs based on future benchmarks, and required WSDOT, specifically *in collaboration with RTPOs*, to report to the legislature on strategies to meet these benchmarks.² Certainly the legislature knew about RTPOs, and the role they could play. Yet RCW 70.235.020 does not designate responsibilities or requirements for RTPOs, and the legislature

² Laws of 2008, ch. 14, § 8 (codified at RCW 47.01.440). This directive was consistent with the overall statutory structure, which was collectively characterized as “An Act relating to *creating a framework* for reducing greenhouse gases emissions in the Washington economy.” *Id.* (emphasis added); *see also* Exec. Order No. 09-05 at 3 (2009) (directing WSDOT to work with PSRC and other RTPOs to “cooperatively develop and adopt regional transportation plans that will, when implemented . . . reduce greenhouse gases”). Executive Order 09-05 contains no reference to or discussion of RCW 70.235.020 as applicable to, or enforceable against, entities such as PSRC. To the contrary, it contemplates a framework in which RTPOs are collaborative partners in the continuing development of strategies to reduce greenhouse gas emissions.

has not adopted subsequent legislation to set specific greenhouse gas reduction requirements for RTPOs or MPOs, as other states have.³

Rather than reading “the state” in isolation, as Cascade does, the Court must look to the statute as a whole. *See Campbell & Gwinn*, 146 Wn.2d at 9–10. In doing so, the only reasonable interpretation is that “the state” refers to the state *as a whole*. Cascade invites the Court to “torture the clear meaning of words to rewrite the statute.” *Glens Falls Ins. Co. v. Murray Plumbing and Heating Corp.*, 330 F.2d 800, 804 (9th Cir. 1964). This is an invitation the Court should decline.

b. PSRC’s Roles as MPO and RTPO Do Not Make It “the state” or an Agent of the State.

Cascade grossly mischaracterizes PSRC’s role when it states that PSRC “acts as the state’s agent for the listing of and selection of projects.” Appellants’ Opening Brief at 27. By doing so, Cascade hopes to use PSRC’s roles as MPO and RTPO to make it “the state.” But this argument ignores the separate and distinct function that RTPOs serve in the larger transportation-planning context. The transportation-planning system is structured to ensure that a comprehensive and cooperative planning

³ In other states, there has been a specific role established for MPOs. Like Washington’s statute, both California and Oregon’s greenhouse gas reduction statutes lack specific directives to (or even mention of) MPOs. Cal. Health & Safety Code § 38500 *et seq.*; Or. Rev. Stat. § 468A.200 *et seq.* But both California and Oregon have passed companion statutes setting out specific requirements for MPOs. Cal. Gov’t Code § 65080 *et seq.*; 2010 Or. Laws Spec. Sess. ch. 85. Washington has not enacted such a companion statute.

process occurs at the federal, state, regional, and local levels. Indeed, the legislature has made clear that RTPOs are separate from “the state” for purposes of transportation planning:

While significant authority for transportation planning is vested with local agencies and *regional transportation planning organizations* under the growth management act, the legislature recognizes that certain transportation issues and facilities cross local and regional boundaries and are vital to the statewide economy and the cross-state mobility of people and goods. Therefore, *the state* has an appropriate role in developing statewide transportation plans that address state jurisdiction facilities and services as well as transportation facilities and services of state interest.

RCW 47.06.010 (emphasis added).

PSRC agrees that it plays “an essential part in state transportation planning.” Appellants’ Opening Brief at 26. But its part is to produce a *regional* transportation plan. Under RCW 47.01.071, it is up to the state, not PSRC, to produce the *statewide* transportation plan. In fact, Cascade has it backwards in alleging that the regional transportation plan is the tool to make local plans consistent with the statewide plan. Appellants’ Opening Brief at 5–6. Under RCW ch. 47.80, PSRC’s role is to certify that local plans are consistent with the *regional* plan; it is up to the state to create a *statewide* plan from the various regional plans. Consistency between the various plans and PSRC’s collaborative work with the state and other agencies, does not transform PSRC into “the state.”

Cascade also takes issue with the superior court's characterization of PSRC as a "voluntary regional planning board," arguing that financial interests essentially make membership mandatory, thus making PSRC the state's "agent." Appellants' Opening Brief at 25. But the superior court is correct. According to the statute, PSRC is a *voluntary* organization for regional transportation planning. *See* RCW 47.80.020. According to the facts, PSRC is a voluntary organization: many local governments have voluntarily joined PSRC, but not all. For example, 73 of the region's 82 cities and towns are PSRC members. CP 79 at PSRC 00029156. In sum, there is no support for Cascade's argument that RCW 70.235.020 applies to RTPOs.

c. PSRC Is Not "the state" by Operation of the Interlocal Cooperation Act.

Cascade argues that PSRC is "the state" because it is formed under the Interlocal Cooperation Act, and the Washington State Transportation Commission and WSDOT are among its many members. A fundamental flaw to this argument lies in the fact that the Transportation Commission and WSDOT are among PSRC's "statutory members," which means that their membership in PSRC is derived not from the Interlocal Agreement, but from state statute. *See* CP 79 at PSRC 00028702. The Interlocal Agreement was formed by the "member agencies," *i.e.*, counties, cities,

towns, and federally recognized tribes. *Id.* WSDOT and the Transportation Commission are members of PSRC because they are required to be members under statutes governing RTPOs.

Cascade's argument is also based on the false premise that organizations formed by interlocal agreement inherit all of the rights and responsibilities of their constituent members. The one case that Cascade cites for this proposition is *Harvey v. County of Snohomish*, 124 Wn. App. 806, 103 P.3d 836 (2004), *rev'd on other grounds*, 157 Wn.2d 33, 134 P.3d 216 (2006). In *Harvey*, the court held that a county and county agency remained responsible for their legal obligations, even though they had delegated those obligations to a third agency formed through an interlocal agreement. *Id.* at 813–14 (citing RCW 39.34.030(5)).⁴

Cascade's faulty logic arises from its backward application of the case. Rather than arguing that WSDOT and the Transportation Commission are not shielded from liability by joining PSRC, Cascade appears to argue that because these two of PSRC's many members are representatives of the state and have obligations under state law, PSRC inherits all of those same obligations. The non sequitur conclusion is a

⁴ On review, the Washington Supreme Court did not find need to reach the issue of the interlocal agreement, noting that it "was not raised nor argued by the parties at the trial court . . . [and was] raised for the first time by the Court of Appeals sua sponte." *Harvey v. County of Snohomish*, 157 Wn.2d 33, 41, 134 P.3d 216 (2006).

misapplication of *Harvey*. PSRC's members include counties, cities, towns, port districts, transit agencies, and local tribes. It is beyond reason to think that PSRC inherits all of the rights and responsibilities of these entities simply by forming an interlocal agreement with them.

d. Cascade's Interpretation Would Lead to Absurd Results.

Cascade's interpretation of RCW 70.235.020 would result in "unlikely, absurd or strained consequences" not intended by the legislature. *Kilian v. Atkinson*, 147 Wn.2d 16, 21, 50 P.3d 638 (2002). PSRC is one of 14 RTPOs in Washington; subscribing to Cascade's interpretation of "the state" would mean that each of the 14 RTPOs would qualify as "the state."

In addition, Cascade never clarifies how broad it believes "the state" is. Cascade argues that RCW 70.235.020 applies to PSRC because "PSRC is organized under state statute and in part is funded by the state and governed by the state." Appellants' Opening Brief at 25 (citations omitted). Using this definition, the greenhouse gas limits would apply to the state itself, all the RTPOs, and any number of entities that are organized under, partially funded by, and governed by the state: cities, counties, and many non-profit and for-profit corporations. Under Cascade's view, each of these entities (with some undefined role for the

state itself) would need to calculate its proportionate share of the statewide limits and develop some means of accurately monitoring its emissions in order to meet that share. Moreover, because no enforcement mechanism is described in the statute, the enormous task of enforcing the statute as to all of these entities of the state would apparently be left to the judiciary. Such an interpretation is absurd and not what the legislature intended.

2. *Adoption of T2040 Was Legal Because RCW 70.235.020 Sets Greenhouse Gas Emissions Limits for the State as a Whole.*

Because PSRC is not “the state,” the Court’s inquiry need go no further. But Cascade proceeds on the assumption that the emissions limits in RCW 70.235.020 apply to PSRC and asserts that *T2040* is illegal because it fails to meet those standards. Cascade then purports to analyze “the extent of [PSRC’s] noncompliance” with its own annotations on a PSRC graph. Appellants’ Opening Brief at 37. But this argument wrongly assumes that the legislature intended RCW 70.235.020 to be applied on a proportionate-share basis, with each geographic region and sector calculating the limits necessary for it to contribute to the overall goal.

a. *RCW 70.235.020 Sets “Overall” Emissions Limits for the State.*

We turn again to a plain-language interpretation of the statute to refute Cascade’s argument. Here, the plain meaning of the statute can be derived from the language that the legislature used: “The state shall limit

emissions of greenhouse gases to . . . reduce *overall emissions* of greenhouse gases . . .” RCW 70.235.020(1)(a) (emphasis added).

Each of the emissions reduction limits in the statute contains this “overall” emissions language, applying to “overall” emissions in the state. When the legislature required reductions in “overall” greenhouse gas emissions, it required reductions across the state as a whole, without regard to the geographic region or to the sector in which they occur. Those reductions could come from many sources, or from just one. They could come from a single sector or geographic area, or from many. The legislature required only that statewide reductions *as a whole* net the specified reductions.

In RCW 70.235.020(1), the legislature tasked Ecology with developing a plan for making those specified statewide reductions. If the statute were as formulaic as Cascade contends—requiring each entity of the state to take the actions necessary to make proportionate greenhouse gas emissions reductions in the sector and geographic area over which that entity has jurisdiction—the legislature would not have required Ecology to develop a plan. The plan would serve no purpose, since—according to Cascade—the legislation already imposes clear requirements.

The many positive steps that have already been taken to reduce overall emissions for the state also undercut Cascade’s proffered

interpretation of the statute. In its 2008 Plan, Ecology reported to the legislature on the effects of efforts already taken to reduce greenhouse gas emissions. The report included efforts made on transportation, energy efficiency, renewable energy, and government operations. CP 79 at PSRC 00023913–22. All told, these existing measures are expected to account for nearly half of the statewide emissions reductions specified for 2020. *Id.* at PSRC 00023903.⁵

Perhaps the most important development in reducing statewide greenhouse gas emissions is the state’s 2011 agreement with TransAlta. TransAlta is the single biggest source of greenhouse gas emissions in the state. CP 365 ¶ 12. TransAlta and the state of Washington recently reached an agreement to phase out the state’s coal-fired energy production. *See* Laws of 2011, ch. 180. This action will result in a sizeable decrease in the state’s total emissions, propelling Washington forward toward meeting statewide emissions reductions. CP 365 ¶ 12.

The statutory interpretation implied by Cascade’s argument is inapposite. Cascade’s interpretation implies that the legislature required

⁵ In the Ecology 2010 Report, Ecology updated the status of greenhouse gas emission reduction efforts, concluding that some measures would reduce emissions less than first thought, while additional measures had been taken since 2008 that would lead to additional reductions. For example, sales of biodiesel had unexpectedly declined, but electric vehicles had unexpectedly become available. CP 291 at PSRC S00029508. In accounting for these changes, Ecology still projected that the measures now in place will produce about 45 percent of the reductions required by 2020. *Id.* at S00029506.

proportionate reductions for each sector and geographic area, which flatly ignores the legislature’s consistent use of the word “overall” and the subsequent steps taken to reduce emissions statewide. Furthermore, the interpretation renders the legislature’s instructions to Ecology meaningless. Cascade’s interpretation violates two central principles of statutory construction: each word in a statute is there for a reason, and the legislature is presumed not to undertake useless acts. *See Kilian*, 147 Wn.2d at 21 (“Statutes must be construed so that all the language is given effect and no portion is rendered meaningless or superfluous.”); *see also Oak Harbor Sch. Dist. v. Oak Harbor Educ. Ass’n*, 86 Wn.2d 497, 500, 545 P.2d 1197 (1976). Thus, Cascade’s interpretation of RCW 70.235.020 cannot be correct.

b. Nothing in RCW 70.235.020 Sets Limits on Greenhouse Gas Emissions that Apply Proportionately to Specific Sectors or Geographic Areas.

Not only does Cascade disregard the legislature’s use of “overall” when referring to greenhouse gas emissions reductions, but Cascade also cannot point to any provision of the statute that could be read to set proportionate limits on specific sectors, geographic areas, or government entities. The omission is understandable; there is no such provision.

Cascade's reading of RCW 70.235.020 reflects its own policy preferences, not the law as written.

To the contrary, the legislature made clear that reductions should *not* be made proportionately. RCW 70.235.005(3)(c) (the "findings" section) declares that the state will "reduce emissions at the lowest cost to Washington's economy, consumers, and businesses." The legislature also expressed its intent that the state will "minimize the potential to export pollution, jobs, and economic opportunities." *Id.*

To reduce emissions at the "lowest cost" necessarily requires the state to consider various options, and eliminate those that would unduly burden Washington's economy, consumers, and businesses in favor of those that would come at the lowest cost to the economy. Similarly, if the state must ensure that its greenhouse gas emissions reduction efforts do not send pollution, jobs, and economic opportunities to other states, it must be able to discriminate among alternatives on that basis. There are many sectors causing greenhouse gas emissions that must be considered: electricity, residential/commercial/industrial, transportation, the fossil fuel industry, industrial processes, waste management, agriculture, and forestry. CP 79 at PSRC 00021413.

There would be no way to further this legislative intent if Cascade's reading of the statute were correct. If the state must make

proportionate reductions in each sector and geographic area, then it must do so regardless of cost and regardless of whether pollution, jobs, and economic opportunities are sent elsewhere. Under Cascade's interpretation, the state would have to reduce greenhouse gas emissions proportionately in each sector and each geographic area even if it could reduce overall emissions at a lower cost by focusing on certain sectors or geographic areas. That interpretation is contrary to legislative intent.

PSRC is not alone in rejecting Cascade's interpretation of the statute. Ecology agrees that reductions cannot be both proportionate *and* made at the "lowest cost." In the Ecology 2010 Report to the legislature, Ecology wrote that:

Ecology does not believe each sector should be required to reduce emissions consistent with its proportionate share of emissions. Instead, we must work to identify the lowest-cost and most easily implemented reduction strategies.

CP 291 at PSRC S00029466. This statement is consistent with the plan that Ecology developed in 2008, which does not call for proportionate reductions by sector or geographic region. As the agency charged by the legislature with implementing the greenhouse gas emissions reduction statute, Ecology's interpretation of RCW 70.235.020 is entitled to "great weight." *See Port of Seattle v. Pollution Control Hearings Bd.*, 151 Wn.2d 568, 593, 90 P.3d 659 (2004).

The declaration of Janet Adair, Special Assistant on climate change to the Director of Ecology, is instructive as to why proportionate reductions by sector are an inappropriate method of achieving statewide limits. CP 489.⁶ She notes that most of the lowest cost strategies are from sectors other than transportation, and “reductions from transportation and clean energy are less cost effective.” CP 491. Ms. Adair concludes that pursuing proportionate reductions from each sector would undermine achieving reductions at the lowest possible cost. CP 492.

In sum, this Court should not construe RCW 70.235.020 in a vacuum, but should consider the entire statute when ascertaining the subsection’s meaning. *See Campbell & Gwinn*, 146 Wn.2d at 11. Among other provisions, the Court should consider the legislature’s statement of intent, which “can be crucial” to interpreting the statute. *See Towle v. Dep’t of Fish & Wildlife*, 94 Wn. App. 196, 207, 971 P.2d 591 (1999). Cascade’s interpretation of the statute directly conflicts with the legislature’s statement of intent in RCW 70.235.005(3) that greenhouse gas emission reductions should be made at the “lowest cost,” while

⁶ The Adair Declaration was the subject of a motion to strike in the proceedings below. CP 471–94. Cascade’s motion to strike was denied. CP 791. Cascade does not assign error to that decision.

minimizing the potential to export pollution, jobs, and economic opportunities.⁷

3. A Policy in VISION 2040 Did Not Commit PSRC to “Meet” RCW 70.235.020.

VISION 2040 is the region’s growth strategy and it contains the multicounty planning policies adopted pursuant to the Growth Management Act. Relying on a single policy statement, EN-20, in the 144-page VISION 2040 document, Cascade argues that VISION 2040 committed PSRC to comply with RCW 70.235.020, and so that statute must apply to PSRC. Cascade, however, has taken a single general policy out of context and reached the wrong conclusion. VISION 2040 includes no less than 21 separate policies related to reducing greenhouse gas emissions and related environmental impacts. CP 291 at PSRC S00030154.

⁷ In arguing for “per sector” compliance with RCW 70.235.020, Cascade also fails to take into account that PSRC’s planning is limited to on-road vehicles. PSRC does not have jurisdiction over truck movements at industrial facilities, cargo handling equipment, ocean-going vessels, commercial or military aircraft, or freight rail. In addition, Ecology has identified three ways to reduce emissions from on-road vehicles: reducing VMT, increasing use of clean fuels, and increasing use of clean vehicles. CP 291 at PSRC S00029506–11. Of these three methods, PSRC’s jurisdiction extends only to VMT. CP 79 at PSRC 00001222, *infra* at B-16. If PSRC were required to proportionately reduce greenhouse gas emissions from the transportation sector in the Puget Sound region, then all reductions would have to come only from on-road cars, buses, and trucks, and with only one of the three methods found to be effective. This is a nonsensical result, and one that the legislature could not have intended when it enacted RCW 70.235.020.

In VISION 2040, general goals and policies are given focus through adoption of “action” items. The “action” item on climate change is policy En-Action-7, which states that PSRC will work with others to prepare an action plan that “should investigate ways” to address climate change and reduce greenhouse gas emissions. CP 291 at PSRC S00030155. (*T2040* does that and more.) No specific greenhouse gas reduction levels are included in EN-Action-7 or any other policy or action item. Read as whole, VISION 2040 did not commit PSRC to reducing emissions to a specific level, and certainly did not commit PSRC to the specific reductions in RCW 70:235.020.

Furthermore, policy EN-20 refers to “state initiatives and directives” and PSRC has unquestionably complied with those state initiatives that apply to it. For example, RCW 47.01.440 requires WSDOT to convene a collaborative process to assist state, regional, and local entities in reducing VMT, and to include RTPOs in that process. That statute creates a specific role for PSRC, and PSRC has participated in that process. In contrast, RCW 70.235.020 imposes greenhouse gas emission reduction requirements only on “the state,” but creates no initiatives or directives that apply to entities like PSRC. Thus, Cascade’s claim related to VISION 2040 is without merit.

C. UNDER THE RULE OF REASON, THE T2040 EIS IS ADEQUATE.

Cascade also asserts that T2040 violates SEPA because the EIS prepared for T2040 is inadequate. The flawed premise that underlies this claim is that PSRC is required to meet the statewide emissions limits in RCW 70.235.020 or some unstated proportional share of those limits.

As discussed above, the adequacy of an EIS is a question of law, reviewed de novo. See *Klickitat County Citizens Against Imported Waste v. Klickitat County*, 122 Wn.2d 619, 633, 860 P.2d 390 (1993). But PSRC's decision that the EIS is adequate must be accorded substantial weight. See, e.g., *id.*; see also RCW 43.21C.090.

Washington courts review challenges to the adequacy of an EIS under the "rule of reason." See, e.g., *Residents Opposed to Kittitas Turbines v. State Energy Facility Site Evaluation Council*, 165 Wn.2d 275, 311, 197 P.3d 1153 (2008). Under this test, a "reasonably thorough discussion of the significant aspects of the probable environmental consequences is all that is required." *Solid Waste Alt. Proponents (SWAP) v. Okanogan County*, 66 Wn. App. 439, 442, 832 P.2d 503 (1992).

In applying the rule of reason, courts examine whether the environmental impacts of the proposed action were "sufficiently disclosed,

discussed, and substantiated by supportive opinion and data.” *Citizens Alliance to Protect Our Wetlands (CAPOW) v. City of Auburn*, 126 Wn.2d 356, 362, 894 P.2d 1300 (1995). Courts will analyze whether the EIS provided decision makers with sufficient information so as to allow for an informed decision. *See Residents Opposed to Kittitas Turbines*, 165 Wn.2d at 311–13. As the Washington Supreme Court described:

[A]n EIS is not a compendium of every conceivable effect or alternative to a proposed project, but is simply an aid to the decision making process. That is, the EIS need include only information sufficiently beneficial to the decision making process to justify the cost of its inclusion. Impacts or alternatives which have insufficient causal relationship, likelihood, or reliability to influence decision makers are “remote” or “speculative” and may be excluded from an EIS.

Klickitat County Citizens, 122 Wn.2d at 641. Cascade’s specific SEPA arguments are briefly addressed below.

1. There Was No Violation of RCW 70.235 to Be Disclosed in the EIS.

Cascade claims that the EIS is inadequate because it fails to disclose the extent to which the identified greenhouse gas emissions impacts would exceed the statutory limits set in RCW 70.235.020. This claim fails for multiple reasons.

First, for the reasons discussed in Part IV.B above, PSRC had no legal requirement to meet the overall state emissions limits set forth in RCW 70.235.020. Cascade’s repeated emphasis on PSRC’s obligation to

disclose its “violation” of that statutory provision is inapt. Showing the “extent of the plan’s violation of the state’s GHG reduction requirements,” would require there to be a statutory limit that is specific to the Puget Sound region’s on-road transportation sector, and require “the state” to be interpreted as including PSRC. Neither is appropriate in light of the analysis presented previously. The EIS is not rendered inadequate because it sensibly refrains from labeling the plan a “violation” of inapplicable emissions limits.

Second, it is important to note what Cascade *does not* claim regarding the EIS. Cascade makes no claim that the EIS failed to adequately describe or disclose the potential impacts of *T2040* on climate change, or any other element of the environment.⁸ Rather, Cascade’s sole SEPA argument is based on a failure to disclose an alleged statutory violation—one that we have shown has no basis. In making this argument, Cascade neglects to understand the underlying purpose of the EIS: to disclose environmental impacts in sufficient detail to permit an informed, reasoned decision. *See, e.g., CAPOW*, 126 Wn.2d at 362. SEPA does not require that a project be free of environmental impacts, nor does it require projects to halt when impacts are identified. In fact, project impacts are

⁸ In light of the extensive analysis devoted to climate change in the *T2040* EIS, such an argument would be nonsensical. The *T2040* EIS’s thorough coverage of climate change and greenhouse gas emissions is discussed in Part III.C *supra*.

anticipated under SEPA. *See, e.g.*, WAC 197-11-440(6)(c)(v); *see also* *CAPOW*, 126 Wn.2d at 368–69.

Here, the EIS discloses all reasonably anticipated impacts, and Cascade’s only complaint is that the analysis “fails” to disclose the extent to which the alternatives exceed the limits in RCW 70.235.020.

Appellants’ Opening Brief at 45. There is no allegation that the impacts of climate change are misstated. Thus, the EIS meets SEPA requirements, and, under the rule of reason, is adequate.

Third, Cascade is wrong in implying that the EIS obfuscates the discussion of RCW 70.235.020. *See, e.g.*, Appellants’ Opening Brief at 43 (“The EIS as well obscures the point.”). Contrary to Cascade’s assertions, PSRC *did* address RCW 70.235.020’s statutory limits, and there are references to the statutory emissions throughout the EIS. *See, e.g.*, CP 79 at PSRC 00001221, *infra* at B-15; 1456, *infra* at D-12; 2459, *infra* at E-3.

Cascade also criticizes the EIS for not comparing the emissions from the EIS alternatives to the 1990 statewide limits in RCW 70.235.020. But proper methodology matters to PSRC. As explained throughout the EIS and *T2040*, PSRC knew that the state had selected 1990 as its base year for emissions, but PSRC also knew that there are no 1990 base year data for emissions attributed to on-road vehicles in the Puget Sound region (or any other region of the state) from which projections can be made. *Id.*

at PSRC 00003351, *infra* at F-5; 4265, *infra* at G-11. Household travel patterns are a critical part of forecasting travel demand and emissions, and PSRC had 2006 data from a survey of 4,700 households in the region that would allow them to make those forecasts in a methodologically sound manner. As an MPO, PSRC is also required under federal regulations to use the latest available data in preparing transportation plans. *See* 23 C.F.R. § 450.322(e). Thus, PSRC needed to use the 2006 data for its forecasts, which was the latest and best available information. The EIS clearly discloses that all of the alternatives would result in emissions above 2006 levels. *See, e.g.*, CP 79 at PSRC 00001465, *infra* at D-21. No one was misled or confused by reliance on 2006 as the base year condition. *T2040* noted that emissions had increased from 1990 to 2006 (*id.* at PSRC 00003351, *infra* at F-5), and the EIS comment letters by Appellants acknowledged that very point. *Id.* at PSRC 00002896, 2965.

Finally, Cascade's fixation on RCW 70.235.020 contradicts the underlying purpose of SEPA. SEPA requires that "the *environmental* effects of the proposed action are sufficiently disclosed, discussed, and substantiated by supportive opinion and data." *Klickitat County Citizens*, 122 Wn.2d at 644 (emphasis added). The EIS does exactly what is required: the environmental impacts of the alternatives are reviewed thoroughly, methodically, and in detailed fashion. In fact, Ecology has

posted the PSRC EIS on its website and holds it out as “an example of how to properly analyze greenhouse gases and climate change in a non-project EIS.” CP 367.⁹

2. The EIS Included a Reasonable Range of Alternatives.

Cascade also claims that the EIS is inadequate because it “fails to develop alternatives or mitigations fully compliant with the state’s GHG requirements.” Appellants’ Opening Brief at 38. Again, Cascade relies on the faulty assumption that *T2040* violates RCW 70.235.020. But Cascade also fails to demonstrate that the alternatives presented in the EIS were inadequate under the rule of reason.

In compliance with SEPA, the EIS presents a wide range of reasonable alternatives. Reasonable alternatives are defined as “actions that could feasibly attain or approximate a proposal’s objectives, but at a lower cost or decreased level of environmental degradation.” WAC 197-11-786; *see also* WAC 197-11-440(5)(b). Washington courts give a great deal of discretion to the agency in developing the range of alternatives,¹⁰

⁹ Cascade also alleges that *T2040* is an irreversible and irretrievable commitment of resources due to the “violation” of RCW 70.235.020. *See* Appellants’ Opening Brief at 41–42. There is no “violation,” and moreover, *T2040* includes a process to regularly evaluate and update *T2040* in light of new information, legislative action, and the changing needs of the region. CP 79 at PSRC 00003318. Given that amendment process, there is nothing “irreversible or irretrievable” about the *T2040* EIS or *T2040* itself.

¹⁰ *See* R. Settle, *The Washington State Environmental Policy Act: A Legal and Policy Analysis* § 14.01[2][b], at 14-62, 14-62.1 (4th ed. 1993) (“[T]he mandatory range of alternatives is subject to quite lenient judicial supervision under the rule of reason.”).

and in determining what alternatives are reasonable. *SWAP*, 66 Wn. App. at 445 (“The agency’s decision should be given great weight.”).

Recall that the EIS was the culmination of a rigorous, multi-year process by which PSRC defined its objectives, identified the major challenges and issues to be addressed by the EIS alternatives, and formulated seven different plan alternatives. CP 79 at PSRC 00001270, *infra* at C-6. This comprehensive process of alternative selection and analysis culminated in a document that complies with all SEPA requirements and fulfills the basic purpose of SEPA; the *T2040* EIS provides decision makers with sufficient information to make a reasoned decision on the proposed action. *See, e.g., CAPOW*, 126 Wn.2d at 370.

Reasonable alternatives under SEPA include only those actions “that could *feasibly* attain or approximate a proposal’s objectives.” WAC 197-11-440(5)(b) (emphasis added).¹¹ While Cascade claims that there must be an alternative capable of meeting the limits in RCW 70.235.020—or some derived proportional share of those limits—

¹¹ It is important to note that in developing the alternatives for the EIS, PSRC was required under SEPA to select actions “that could feasibly attain or approximate a proposal’s objectives, but at a lower environmental cost or decreased level of environmental degradation.” WAC 197-11-440(5)(b). Although the EIS certainly included objectives for *T2040* related to reducing greenhouse gas emissions, *T2040* also included many other objectives related to the development of an efficient, effective regional transportation system. Cascade may prefer an alternative that curtails any increases in vehicle traffic, but this ignores our region’s anticipated population growth of 1.5 million. The EIS alternatives needed to respond to a variety of objectives, not just greenhouse gas emissions.

they offer no suggestion for how this could be achieved. There is an explanation for Cascade's omission. The reality is that there is no feasible way for PSRC to craft an alternative capable of meeting overall, statewide greenhouse gas emissions requirements in RCW 70.235.020.

The emissions reductions achievable through on-road transportation and land-use strategies available to PSRC are modest in scope, as proven by PSRC's analysis and by the *Moving Cooler* and *Leading the Way* studies. For example, Alternative 5 in the EIS would have imposed tolls on every vehicle on every highway and every arterial in the entire four-county region, and even then, emissions from on-road vehicles would still be above the base year conditions. CP 79 at PSRC 00001217, *infra* at B-11; 1236, *infra* at B-30. To achieve reductions below 2006 emissions levels, the EIS disclosed that it is necessary to have a substantially different fuel and vehicle fleet mix—facets of the transportation sector that are beyond PSRC's planning function and are dependent on legislative action.

The EIS contains a reasonable range of alternatives. And PSRC was not required under SEPA to include unreasonable, infeasible alternatives in its EIS. Under the rule of reason, and giving substantial weight to PSRC's determination that the EIS was adequate, Cascade's claims to the contrary are meritless.

3. The EIS Presented Reasonable Mitigation Measures to Address Applicable Impacts.

Cascade also claims that the EIS is inadequate for failing to develop “mitigations fully compliant with the state’s GHG reduction requirements.” Appellants’ Opening Brief at 38. This claim is once again based on PSRC’s alleged noncompliance with an inapplicable statute. Cascade calls for measures “that would significantly mitigate the violation of statutory limits” *Id.* at 49. But, again, no such violation exists.

Second, Cascade suggests that the mitigation presented in the EIS must be tied to the greenhouse gas limits in RCW 70.235.020. *Id.* This is incorrect. Under SEPA, the EIS is to discuss “reasonable mitigation measures that would significantly mitigate [the significant impacts of alternatives including the proposed action].” WAC 197-11-440(6)(a). The mitigation contained in the EIS for *T2040*, therefore, must relate to the climate-change impacts identified in *T2040*, not alleged noncompliance with an inapplicable statute.

Here, the mitigation identified in the EIS is adequate under the rule of reason. As detailed above, the EIS contains extensive discussion of the potential environmental impacts of *T2040* on climate change, and offers a four-part strategy that *will reduce* greenhouse gas emissions arising from on-road vehicles in Puget Sound, compared to a plan without mitigation

measures. The EIS exceeds the requirements of SEPA and is adequate under the rule of reason.

Finally, in citing the SEPA rules requiring discussion of mitigation in the EIS, Cascade fails to acknowledge that SEPA contemplates that there may be impacts identified in an EIS for which no reasonable or feasible mitigation exists. *See, e.g.*, RCW 43.21C.031(1) (“Discussions of . . . significant environmental impacts which cannot be mitigated should be consolidated . . .”); *see also* WAC 197-11-440(6)(c)(v) (“Summarize significant adverse impacts that cannot or will not be mitigated.”). The basic purpose of the EIS is not to provide a remedy for every identified impact,¹² but rather to provide sufficient information regarding the environmental impacts of a proposal so that decision makers can make a reasoned determination on the proposal. *See, e.g., CAPOW*, 126 Wn.2d at 370. The conclusions from the EIS were discussed at numerous PSRC Executive Board and Transportation Policy Board meetings, and the EIS sufficiently informed decision makers of the proposal’s impacts. Cascade’s arguments to the contrary lack merit.

¹² *See Residents Opposed to Kittitas Turbines*, 165 Wn.2d at 312 (“However, a FEIS does not require inclusion of specific remedies of each environmental impact.”).

4. The EIS Did Not Fail to Disclose Inconsistency with VISION 2040 Because There Is No Inconsistency to Disclose.

Finally, Cascade claims that the EIS is inadequate for failing to disclose inconsistency with one policy statement in VISION 2040. The direct response is that no inconsistency was disclosed because there is no inconsistency. Cascade focuses on a single VISION 2040 policy referring generally to compliance with state initiatives and directives. But RCW 70.235.020 does not include any initiative or directive for which PSRC is responsible.

Beyond that, as documented previously, the EIS discussed state initiatives and directives for climate change, including RCW 70.235.020, and specifically detailed how much each of the alternatives in the EIS would reduce greenhouse gas emissions, compared to base year conditions. The EIS discloses that *T2040* would substantially reduce greenhouse gas emissions below a “business as usual” approach, but without improvements to vehicle fuel and fleet mix, it is not possible to reduce emissions below base year conditions.

V. CONCLUSION

Cascade advances novel interpretations of RCW 70.235.020 because it wishes the law were different. But Cascade advances its argument in the wrong forum; if the statute should be rewritten to apply to

RTPOs or “agents” of the state, or to adopt a “proportionate share” approach, then the statute should be rewritten by the legislature.

PSRC agrees that greenhouse gas emissions are a serious environmental concern. PSRC proactively addressed greenhouse gas emissions in *T2040* and has committed to the ongoing advancement of improved emissions reduction strategies. PSRC has also committed to adapting its plans as our knowledge base expands and federal and state policies and laws take greater shape. Above all, PSRC has complied with the law, the superior court has agreed, and this Court should affirm.

RESPECTFULLY SUBMITTED this 1ST day of December, 2011.

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APPENDIX A

RCW 70.235.020

Greenhouse gas emissions reductions — Reporting requirements.

(1)(a) The state shall limit emissions of greenhouse gases to achieve the following emission reductions for Washington state:

(i) By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels;

(ii) By 2035, reduce overall emissions of greenhouse gases in the state to twenty-five percent below 1990 levels;

(iii) By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to fifty percent below 1990 levels, or seventy percent below the state's expected emissions that year.

(b) By December 1, 2008, the department shall submit a greenhouse gas reduction plan for review and approval to the legislature, describing those actions necessary to achieve the emission reductions in (a) of this subsection by using existing statutory authority and any additional authority granted by the legislature. Actions taken using existing statutory authority may proceed prior to approval of the greenhouse gas reduction plan.

(c) Except where explicitly stated otherwise, nothing in chapter 14, Laws of 2008 limits any state agency authorities as they existed prior to June 12, 2008.

(d) Consistent with this directive, the department shall take the following actions:

(i) Develop and implement a system for monitoring and reporting emissions of greenhouse gases as required under RCW 70.94.151; and

(ii) Track progress toward meeting the emission reductions established in this subsection, including the results from policies currently in effect that have been previously adopted by the state and policies adopted in the future, and report on that progress.

(2) By December 31st of each even-numbered year beginning in 2010, the department and the *department of community, trade, and economic development shall report to the governor and the appropriate committees of the senate and house of representatives the total emissions of greenhouse gases for the preceding two years, and totals in each major source sector. The department shall ensure the reporting rules adopted under RCW 70.94.151 allow it to develop a comprehensive inventory of emissions of greenhouse gases from all significant sectors of the Washington economy.

(3) Except for purposes of reporting, emissions of carbon dioxide from industrial combustion of biomass in the form of fuel wood, wood waste, wood by-products, and wood residuals shall not be considered a greenhouse gas as long as the region's silvicultural sequestration capacity is maintained or increased.

[2008 c 14 § 3.]

Notes:

***Reviser's note:** The "department of community, trade, and economic development" was renamed the "department of commerce" by 2009 c 565.

APPENDIX B

Puget Sound Regional Council

Transportation 2040

Final Environmental Impact Statement
—Executive Summary—

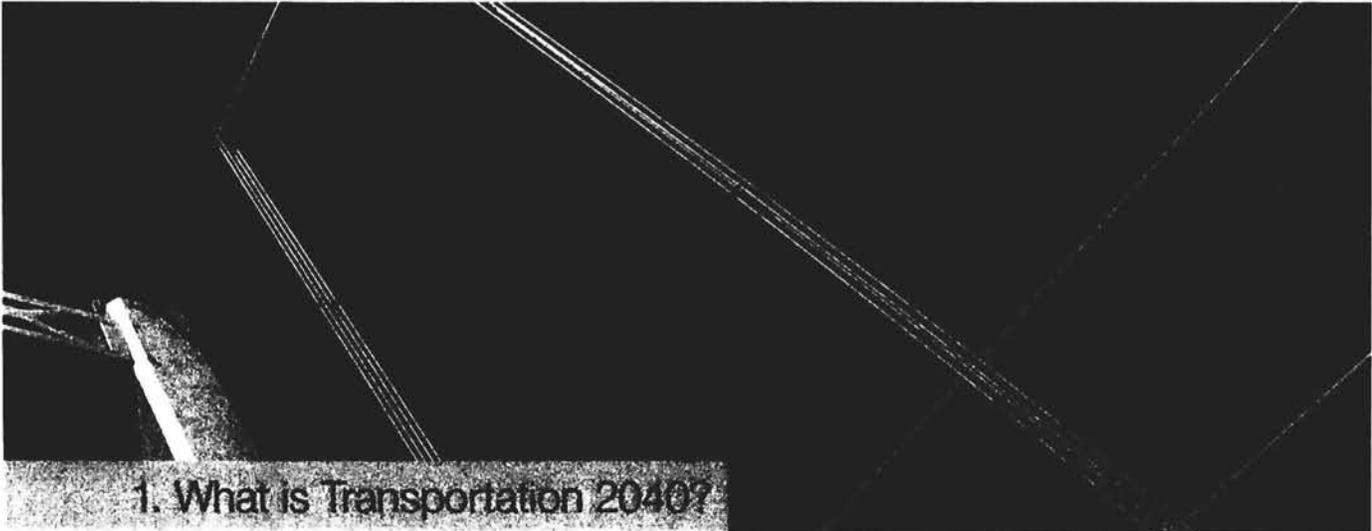
March 19, 2010

Tacoma Narrows Bridge image courtesy of Washington State Department of Transportation.

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206-464-7532 • fax 206-587-4825 • info@psrc.org • www.psrc.org

PSRC-00001208



1. What is Transportation 2040?

The Puget Sound Regional Council (PSRC) has prepared Transportation 2040, a new transportation plan to address critical issues such as congestion and mobility, the environment, and transportation finance in the central Puget Sound region. Transportation 2040 will be integrated with VISION 2040 and the Regional Economic Strategy to accommodate the addition of 1.5 million people and 1.2 million jobs in the region by 2040.¹ Ranked 15th among U.S. Metropolitan Areas in 2006 with a population of 3.5 million people, these increases continue several decades of dramatic growth.

This Executive Summary presents the findings of the Final Environmental Impact Statement (FEIS) for Transportation 2040, which analyzes six alternatives and a Preferred Alternative to address the travel demands forecast for the region.

The regional transportation plan covers a metropolitan area encompassing King, Kitsap, Pierce, and Snohomish counties. It addresses mobility needs across all modes of travel for the future, including:

- Aviation
- Ferries
- Nonmotorized
- Roadways
- Transit

The plan includes personal and commercial travel for all vehicle types (automobiles, trucks, and buses on the roadway and ferry systems, as well as trains and airplanes). Commercial travel includes vehicles that move people and goods in addition to providing essential services.

What is a regional transportation plan?

A regional transportation plan is a comprehensive document that states the objectives and actions for the region to meet its mobility needs.

What is in the Executive Summary?

- An overview of the purpose and need for Transportation 2040
- Background information on the central Puget Sound region
- A description of the alternatives evaluated including the Preferred Alternative
- A summary of the analysis in the FEIS and a listing of potential effects on the built and natural environment
- Next steps in the Transportation 2040 planning process

2. What is the purpose of and need for Transportation 2040?

The purpose of Transportation 2040, as identified in the State Environmental Policy Act (SEPA) scoping process in fall 2007, is to address the following question:

How can the region best provide the mobility required to support a growing population to the year 2040, sustain the region's environment and economic vitality, improve system safety and efficiency, and enhance the region's overall quality of life?

¹ The period of analysis throughout Transportation 2040 is between 2006 and 2040.

To address this question, Transportation 2040 needs to accomplish the following:

- Extend the current regional transportation plan (Destination 2030) horizon to the year 2040
- Support VISION 2040 and the Regional Economic Strategy
- Meet federal and state requirements

3. What are the objectives of Transportation 2040?

What is the difference between plan-level and project-level environmental review?

This is a plan-level or non-project (rather than a project-level) Final Environmental Impact Statement (FEIS) per WAC 197-11-442.

Accordingly, the alternatives are defined and the environmental effects are evaluated at a relatively broad level. More detailed project-specific environmental review will be developed as appropriate in the future for projects identified in the Transportation 2040 plan that are selected for implementation by their sponsors: Washington State Department of Transportation (WSDOT), transit agencies, counties, and cities.

The SEPA scoping process identified the following objectives for the plan to accomplish:

- Prioritize projects and make strategic investments to produce the greatest net benefits to users of the system (both for personal and commercial travel) and to the environment, with a specific environmental focus on climate change factors and the health of Puget Sound waters.
 - Improve personal mobility and people-moving capacity in the central Puget Sound region.
 - Improve freight mobility to increase the health of the national, state, and regional economy.
 - Meet the region's present and anticipated travel needs.
 - Continue to preserve, maintain, and improve the existing urban and rural transportation system.
 - Ensure that the urban and rural transportation system is safe, efficient, integrated, reliable, sustainable, secure, and usable.
 - Focus investments on creating a highly efficient multimodal transportation network that will provide access to, mobility within, and connections between centers.
 - Use the latest innovation and technology to creatively and efficiently manage congestion and delay, improve safety and operational efficiency, manage demand, and enhance transportation choices that affect all types of freight movement.
 - Improve access to services, education and training, jobs, and recreation for special needs populations.
- Enhance the role that transportation plays in human health and community livability for all residents, including reducing deaths and injuries on the regional transportation system and providing more opportunities for walking and bicycling.
 - Define financially viable and sustainable funding sources for implementing the transportation plan.
 - Improve the region's water and air quality and find creative ways to address climate change.
 - Support the implementation of regional and local growth plans.

The purpose and need statement and plan objectives provide the framework for the seven evaluation criteria and four areas of policy analysis used in the Policy Analysis and Evaluation Criteria Report.

4. What is the Transportation 2040 FEIS?

This FEIS informs the public, agencies, and decision makers about the environmental consequences (both positive and negative) of the actions proposed in the Transportation 2040 plan. In November 2007, PSRC concluded that the development of a transportation system to accommodate projected population and employment growth would likely result in significant impacts on the environment. At that time, PSRC issued a Determination of Significance, pursuant

to SEPA — Revised Code of Washington (RCW) 43.21C.030 (2) (c) and Washington Administrative Code (WAC) 197-11-360.

The FEIS reviews environmental effects at a regional planning (non-project) level, concentrating on the long-term results of implementing the Transportation 2040 plan alternatives including the Preferred Alternative. The FEIS is also intended to provide guidance for further project-level SEPA and National Environmental Policy Act (NEPA) compliance for future individual transportation projects.

PSRC will adopt Transportation 2040 as the transportation plan for the Puget Sound region, but will not be responsible for implementing the projects and strategies that are included in the plan. Choosing to move forward with planning and implementation of individual projects is the responsibility of city, county, state, and federal agencies; ports; transit agencies; tribal nations; and non-governmental organizations. The region's efforts to maintain, improve, and manage the transportation system can be found within the combined plans, projects, and programs of these project sponsors. Sharing responsibility for the region's future are the transportation system's users — the general public, institutions, businesses, and industries — whose daily transportation choices affect the region's character, environmental quality, and economic health.

What is a Determination of Significance?

A threshold determination is made to determine whether or not an EIS is required. If the lead agency's SEPA official makes a determination of significance (DS) it is because significant potential impacts on the environment are expected and an EIS is required.

If a determination of non-significance (DNS) is made, there are no significant potential environmental impacts expected.

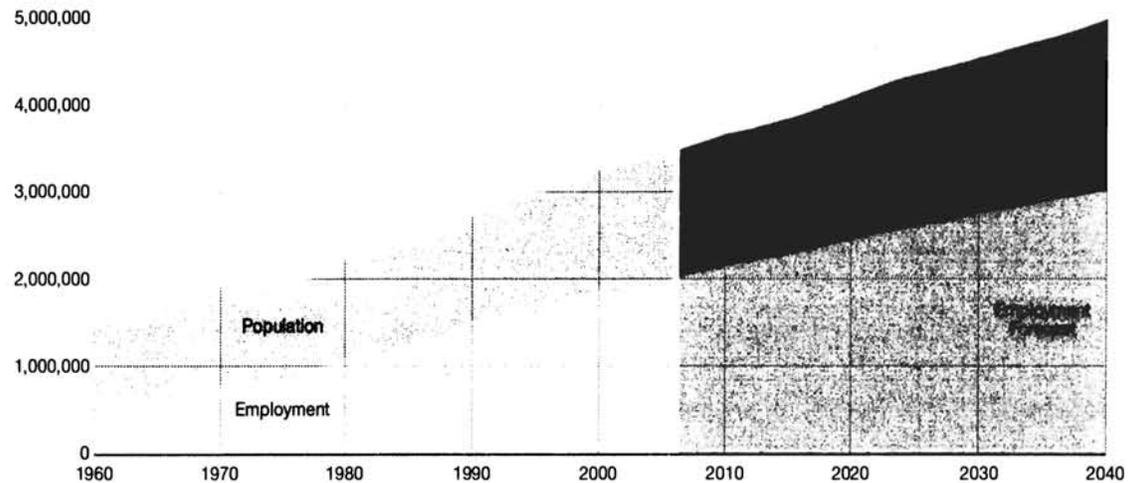
5. What are the projections for the region's population, employment, and housing?

The region was home to more than 3.5 million residents in 2006 and is forecast to grow by an additional 1.5 million persons between 2006 and 2040, an increase of 42%, with the region's population reaching nearly 5 million by 2040.

In 2006, the region's employment base was 1.94 million jobs, and is forecast to grow by an additional 1.2 million jobs by 2040. This is an increase of 60%, with the region's employment reaching over 3.1 million by 2040.

The region's housing stock comprised 1.48 million units in 2006, and is forecast to grow by an additional 800,000 net new housing units by 2040. This is an increase of 56%, with the region's housing stock reaching 2.3 million units by 2040 (refer to Exhibits 1-1 and 1-2).

Exhibit 1-1. Population and Job Growth Trends and Forecasts



Source: PSRC

Exhibit 1-2. Housing Trends and Forecast

	1970	1980	ESTIMATED			FORECAST			
			1990	2000	2006	2010	2020	2030	2040
Housing Units	682,600	901,500	1,134,200	1,348,100	1,483,800	1,547,400	1,796,800	2,036,500	2,310,300
Percent Single Family	75%	77%	69%	69%	68%	68%	67%	65%	63%
Percent Multifamily	25%	23%	31%	31%	32%	32%	33%	35%	37%

Source: Census Bureau, Office of Financial Management (OFM), PSRC – 2005 Puget Sound Economic and Demographic Forecasts.
 Notes: Forecast housing units estimated from the 2005 Puget Sound Economic Forecaster (PSEF) model forecasts of households by structure type.

8. What challenges are addressed by the Transportation 2040 plan alternatives?

The purpose and need statement identified a number of objectives that this plan will address. These objectives became the basis for the development of the key issues and for the evaluation framework used to evaluate the alternatives. Through the scoping process, three major challenges/issues emerged: congestion and mobility, the environment, and transportation finance. These issues were considered in the development of the alternatives by varying the amount of efficiency and strategic capacity programs and the level and type of financial investments in the action alternatives. In particular, each action alternative includes various levels of tolling to evaluate the implications of these strategies on congestion, the environment, and transportation finance.

What is the Growth Management Act?

Washington's Growth Management Act provides the framework for planning at all levels in the state, including identifying and protecting critical environmental areas, developing multicounty and countywide planning policies, and crafting local comprehensive plans. Multicounty planning policies (and the related countywide planning policies) provide a common planning framework for local and regional planning in the central Puget Sound region.

Tolling

All plan alternatives include some form of tolling or user fees to help fund improvements. Tolling options include:

- High Occupancy Toll (HOT) lanes
- Freeway and bridge tolls
- Ferry fares
- Arterial road tolls
- Vehicle miles traveled fees

- **Congestion and Mobility: Reduce congestion for all types of freight and person travel.**

The first challenge is to address how the region can maintain and improve regional mobility with the forecast growth in population and employment.

- **Environmental Concerns: Reduce greenhouse gas emissions linked to climate change and the water quality impacts on Puget Sound.**

The second major challenge is to learn how to reconcile the need for transportation facilities and their uses with growing concerns about how to protect and restore the quality of the built and natural environment. Transportation activities, if unmitigated, are a major source of water and air pollutants, including greenhouse gas emissions.

- **Transportation Finance: Support the development of sustainable transportation funding.**

The third challenge, although not a component of this Environmental Impact Statement, is transportation finance, and is discussed only in the Executive Summary to provide background information. Sustainable funding is a critical implementation issue for any of the alternatives and is part of the region's federal requirement to produce a financially constrained plan.

Transportation 2040 provides additional information on travel trends, physical constraints, and the environmental concerns that need to be addressed to meet the region's commitment to environmental stewardship. It also supports the region's policy to develop an urban environment that promotes healthy, active lifestyles.

7. What alternatives have been analyzed in the Transportation 2040 FEIS?

This FEIS includes analysis of seven plan alternatives — a Baseline Alternative plus six action alternatives, including a Preferred Alternative. The Preferred Alternative includes elements of the previous six alternatives. Each alternative describes how transportation investments can improve efficiency and expand the system’s ability to handle future demand, while at the same time support the region’s goals for managing urban growth and protecting the environment. Exhibit 1-3 illustrates the relative level of investment for each element of the Transportation 2040 alternatives.

Transportation 2040 Alternatives

For more details, please refer to Appendix A: Transportation 2040 Alternatives Report in the FEIS on the enclosed CD.

Improving efficiency means making better use of the existing system and managing growing demand more effectively, particularly during peak morning and evening travel hours. Efficiency can be improved through shifts in the chosen route, the time of travel, the mode of travel, and the patterns of trips taken to work and other activities.

Strategic expansion means increasing capacity by making investments in both capital facilities and operations. These investments include projects to relieve roadway bottlenecks; expanded and new transit lanes, transit services, and fleets; vanpools and carpool programs; high occupancy vehicle (HOV) lanes; bicycle and pedestrian trails, sidewalks, and paths; and ferry terminals and related service.

All plan alternatives have some consistent elements and others that vary. These are described below.

Consistent Growth Assumptions

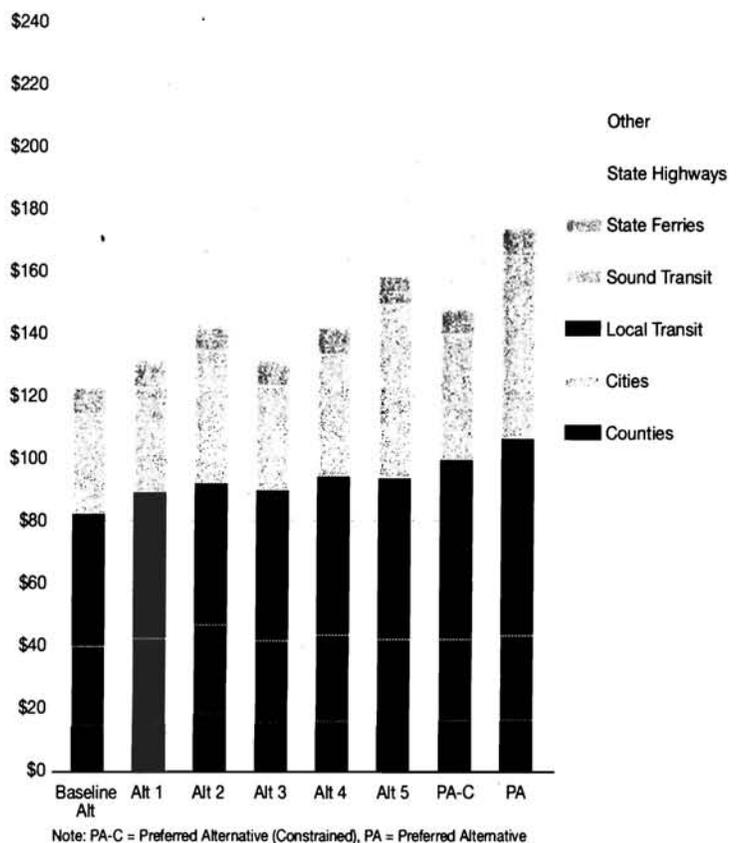
Each alternative was analyzed using the same future land use policy and strategy assumptions for growth management as established in VISION 2040. The existing year 2006 population base is also consistent. The analysis found minimal population and employment growth differences among the alternatives in the year 2040 at the regional level.

Consistent Transportation Assumptions

The Baseline Alternative is the starting point for comparing the alternatives. The action alternatives start with the policies, plans, and funded projects included in the Baseline Alternative. Each alternative also includes the current base year (2006) transportation facilities in the region.

In addition, the action alternatives and the Preferred Alternative include an identical set of core investments to improve safety and security and to support transportation options for special needs populations. These core investments focus on improvements that extend beyond the assumed funding level and are therefore not contained in the Baseline Alternative.

Exhibit 1-3. Elements and Investment Levels of the Transportation 2040 Alternatives (Millions of 2008 Dollars)



Core investments would include improved roadway crossings, safety projects, improved signal coordination, completion of freeway system ramp metering and coordination with arterial signals, and Freight Action Strategy (FAST) freight mobility projects.

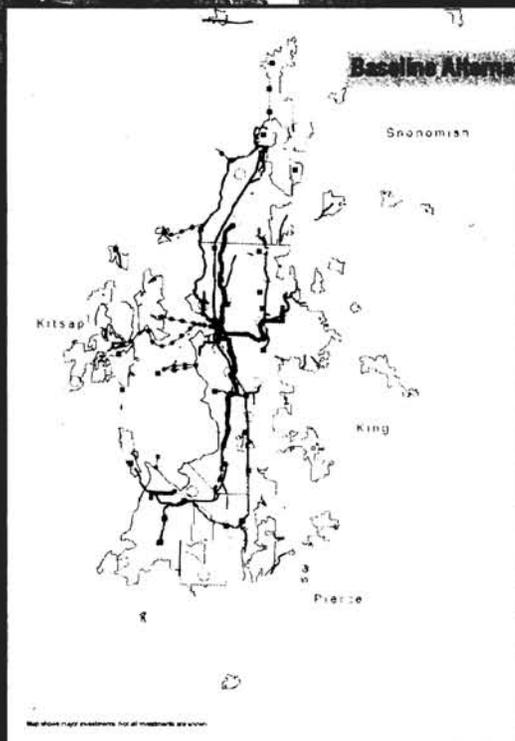
Differing Transportation Assumptions

The action alternatives differ by the new projects, policies, and programs implemented in each, and by how new projects and programs (and to a lesser extent existing projects and programs) are financed. The different levels of investment in projects and programs are shown in Exhibit 1-3 and described in the subsequent sections.

All action alternatives contain components to expand and complete the walking and bicycling network and ways to connect this network to transit stations and ferry terminals, although at different levels of investment and emphasis. Each action alternative also includes programs to reduce vehicle miles traveled and to reduce greenhouse gas emissions, again at different levels.

The action alternatives differ in how the region would distribute investments in efficiency and expansion. The approaches range from modest improvements with limited funds to a dramatic shift in priorities resulting in a new type of transportation system.

Tolling also plays a role in each alternative. The alternatives explore how different approaches to tolling can help manage congestion and also pay for improvements.

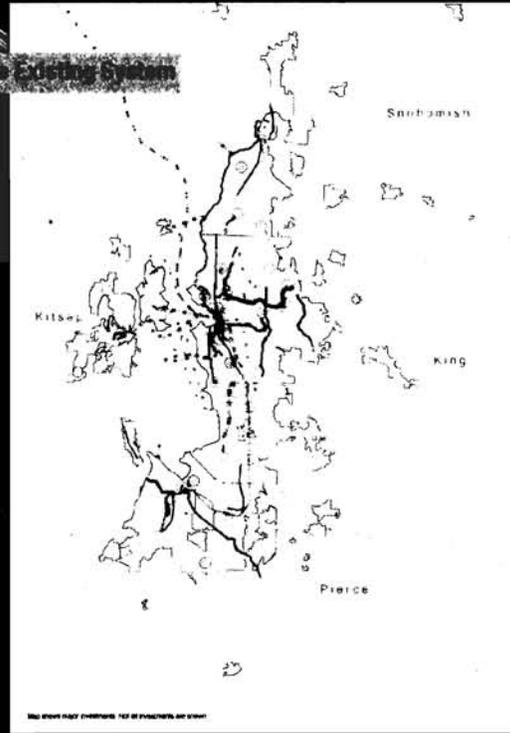


Baseline Alternative (SEPA No-Action Alternative): Build Funded Projects

The Baseline Alternative is funded almost completely with “current law” traditional revenue sources — gas tax, sales tax, state and federal grants and loans, local general fund revenues, permit and licensing fees, and limited tolling (on the Tacoma Narrows Bridge and the auto ferry system). The Baseline Alternative would build state highway projects funded under the state’s “nickel” gas tax and Transportation Partnership Account (TPA) programs, plus Sound Transit’s Phase 2 plan (ST2), approved by voters in November 2008. It would sustain existing ferry service and demand management programs and make modest additions to transit service, including King County Metro’s Rapid Ride and Community Transit’s Swift bus rapid transit (BRT). Beyond “current law” funding, the Baseline Alternative assumes that the region would find sufficient additional revenue to fully maintain and preserve the existing transportation system.

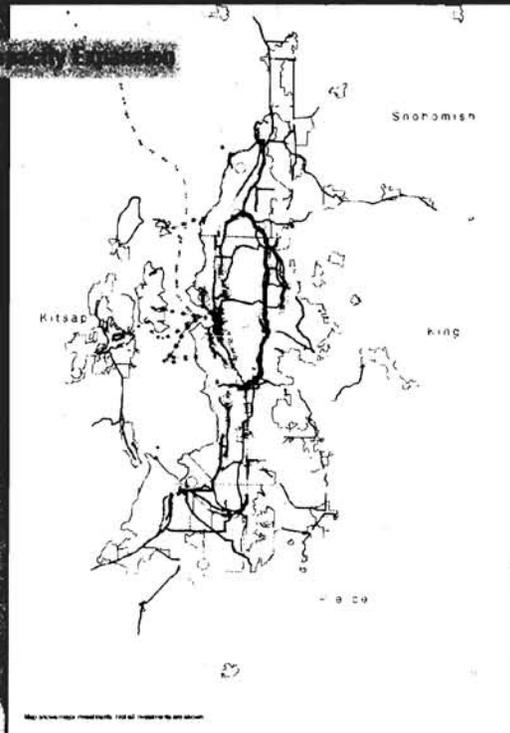
Alternative 1: Emphasize the Efficiency of the Existing System

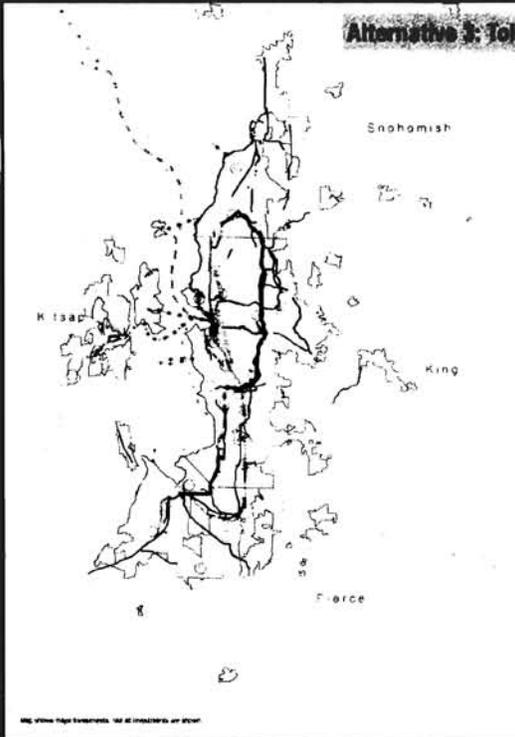
This alternative is designed to recognize that one possible future goal is to make the most of our existing transportation system. This scenario includes efficiency improvements through significant investments in programs to manage demand and in technology to manage roadways. This management strategy includes converting the existing HOV network to a one-lane high occupancy toll (HOT) system with limited capacity investments to provide a two-lane HOT system on much of I-405. In addition, Alternative 1 includes a substantial increase in bus service. Together, these strategies are designed to do a better job of moving people and goods on the existing system by providing options that would reduce both demand for peak hour travel and demand for drive-alone trips.



Alternative 2: Emphasize Roadway and Transit Capacity Expansion

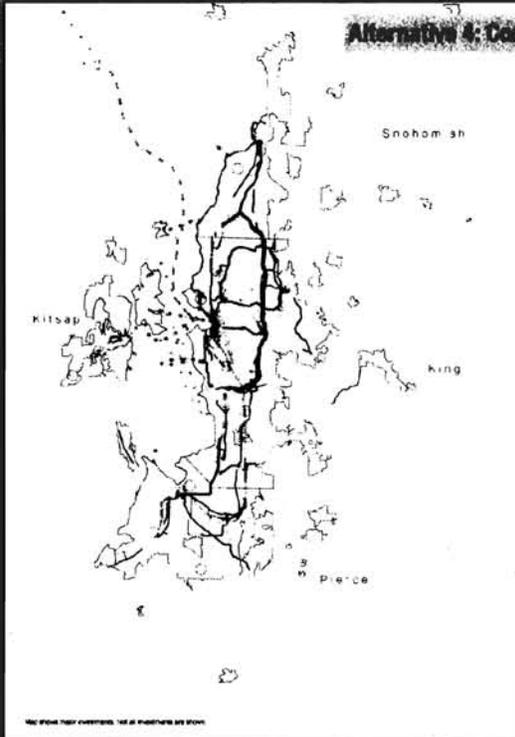
This alternative most resembles the current plan, Destination 2030. Alternative 2 adds the most roadway capacity through lane additions to existing highways, the creation of several new highways (SR 167 Extension, SR 509 Extension, and the Cross-Base Highway), and added lanes on the regional arterial network. It adds considerable light rail capacity and a new auto ferry route across Puget Sound. It adds pedestrian and bicycle infrastructure in key locations. Its demand management, bus service, and system management investments are similar to the Baseline Alternative. Its most significant management strategy is the establishment of a two-lane HOT system on much of the regional freeway network (with some one-lane HOT facilities) to manage congestion and provide revenue to supplement traditional funding sources. Traditional funding sources would provide the majority of the financing.





Alternative 3: Toll Revenues Expand Capacity and Improve Efficiency

Alternative 3 would expand capacity and improve efficiency primarily in the central portion of the Puget Sound region. This alternative proposes a significant shift in the way our region collects and allocates transportation funds. Instead of collecting revenue through traditional funding sources, major freeways where improvements are planned would be tolled, and toll revenues would be spent on highway improvements in the tolled corridors. These revenues would be sufficient to fund significant portions of highway projects including lane additions on the central regional freeways, reconfiguration of ramps and interchanges for efficiency such as those on I-5, and new facilities such as the SR 167 Extension, SR 509 Extension, and the Cross-Base Highway. Traditional revenues would fund other efficiency and management programs including substantial bus service investments, strategic arterial roadway expansion, and new off-road trail infrastructure in the corridors connecting the regional centers to form a nonmotorized network. Alternative 3 includes the same light rail program as the Baseline Alternative (ST2). The highway tolling rates would be set to also serve a demand management function and minimize impacts on adjacent arterials.

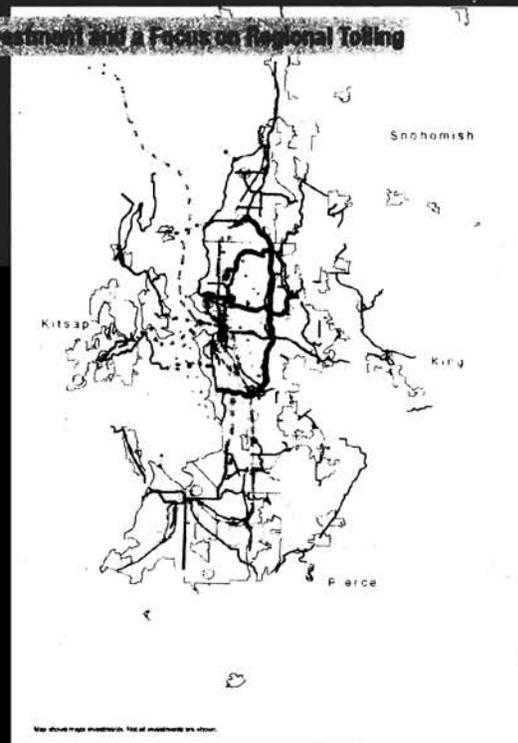


Alternative 4: Combine Traditional Revenues and Tolls to Maximize Efficiency

This alternative combines traditional revenue sources and highway tolling to create funding for a broad array of investments. In this alternative, nearly the entire highway network would be tolled, and toll rates would be set to maximize efficiency rather than to generate revenue. It includes strategic roadway expansion to alleviate congestion at bottlenecks and chokepoints, integrated system management and operational coordination across multiple modes, a light rail network beyond ST2, significant bus service increases, and strategic arterial roadway expansion. It would add new bicycle and pedestrian infrastructure in the regional centers and their connecting corridors.

Alternative 5: Reduce Emissions with Limited Highway Investment and a Focus on Regional Tolling

Alternative 5 would include limited highway investments and focus on transit and nonmotorized programs. This alternative proposes a shift from dependence on fuel-based revenues to creating a system with greatly enhanced travel choices. In Alternative 5 all freeway and arterial roadways would be subject to tolls (or similar user fees) designed to maximize system efficiency. Toll revenue would replace some traditional funding sources and be applicable to a wide variety of investments, including elimination of bottlenecks and chokepoints on freeway and arterial roadways, expansion of arterials and highways in strategic locations, and creation of sophisticated roadway and transit management systems. Other than the Preferred Alternative, Alternative 5 contains the largest expansion of light rail or other high capacity transit, the largest increase in bus service, and the largest expansion of dedicated nonmotorized infrastructure. Altogether, these policies and investments are designed to also reduce carbon dioxide emissions.

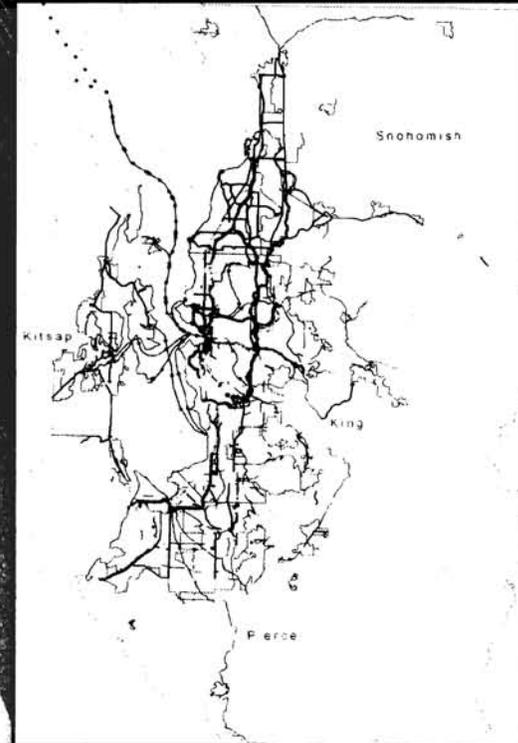


Preferred Alternative

The Preferred Alternative includes elements of the other five action alternatives, as well as the projects and programs included in the Baseline Alternative and core investments, and some programs and projects that were not included in previous alternatives. As described below, the Preferred Alternative is designed to improve the region's transportation system through a combination of investments in system efficiency, strategic expansion, transit, ferry, bike and pedestrian improvements, as well as investments to preserve the existing transportation system. The Preferred Alternative financial strategy is based on a phased approach of transitioning away from current gas taxes toward the implementation of new user fees.

The Preferred Alternative includes:

- more transit service than all other alternatives
- more miles of biking and walking facilities focused on access to transit stations and centers and completing regional trail links than all other alternatives
- current levels of vehicle ferry service, and additional passenger ferries



- replacement of several vulnerable roadways including the Alaskan Way Viaduct and SR 520 Floating Bridge
- completion of missing links in the highway network such as SR 509, SR 167, and the Cross Base Highway
- expansion of local arterials and state highways in limited but strategic ways to service growth in urban growth centers

Preferred Alternative Preservation

Consistent with the other alternatives, preservation, operation and maintenance is prioritized and represents approximately 60% of the Preferred Alternative costs.

Preferred Alternative System Efficiency

The Preferred Alternative emphasizes greatly expanded employer and residential programs to reduce unnecessary travel and increase use of transit, vanpools, bicycling, and walking. The Preferred Alternative includes an aggressive program of advanced technology on arterials and freeways, including better signal coordination, active traffic management, new and expanded traveler information services, and transit-specific technologies to ensure on-time performance and provide customers with more complete, up-to-date travel information. Consistent with the other alternatives, the Preferred Alternative supports the state's Target Zero program (refer to Chapter 4: Transportation for more information) and continues progress on regional security programs.

Preferred Alternative Strategic Expansion

The Preferred Alternative includes investments in integrated strategies that support all forms of travel. The Preferred Alternative completes or replaces the network of roadway projects necessary to support development of the centers identified in VISION 2040 and keep freight moving to support a strong economy, such as SR 167, SR 509, SR 520 floating bridge, US 2 and SR 3. The Preferred Alternative contains approximately 950 new roadway lane miles, which represents the second highest level of roadway investment (Alternative 2 contains approximately 1,200 new roadway lane miles) and a 7% increase over 2006 levels.

Users of the new highway capacity would directly pay for improvements through tolling, which would also reduce congestion and emissions. Local roadways would be expanded to support transit and improve the efficiency of people and freight movement, especially to provide access to and within centers.

Preferred Alternative Transit

The Preferred Alternative would implement a comprehensive transit strategy, including completion of ST2 projects and additional Link light rail extensions to Everett, Tacoma, and Redmond. The Preferred Alternative includes more light rail miles than any other alternative, and the largest expansion of commuter rail of any alternative, equal to Alternative 5. The Preferred Alternative includes more local transit investment than any other alternative: over 100% more service than 2006 in peak periods and over 80% more service off-peak. All-day service with high frequencies (generally every 15 minutes) would be emphasized.

Preferred Alternative Ferry

The Preferred Alternative includes three new passenger ferry routes on Lake Washington and six new passenger ferry routes on Puget Sound. The Preferred Alternative includes the most new passenger ferry service, one route more than Alternative 5.

Preferred Alternative Bicycle and Pedestrian

The Preferred Alternative would prioritize pedestrian and bicycle facilities within regional growth centers and within ¼ mile of transit passenger facilities. Missing links in regional trails would be completed. The Preferred Alternative includes 553 miles of new off-road trails, more than any other alternative.

Preferred Alternative Financial Strategy

The Preferred Alternative financial strategy is based on a phased approach of transitioning away from current gas taxes toward the implementation of new user fees, which could include tolls, VMT charges, and other pricing approaches to fund and manage the transportation system. There should be a relationship between the tax, fee, or toll and the use of the revenues. However, it is anticipated that the region would continue to rely on traditional funding sources and financial instruments as it makes a transition to a more sustainable financial strategy.

Preferred Alternative Project and Program Categories

The Preferred Alternative includes two categories of programs and projects: (1) Constrained, and (2) Unprogrammed. These categories recognize the federally approved structure for regional plans and the range of uncertainty that is inherent in long-range transportation planning programs.

Financially Constrained: This category is a federally required component of the plan where project and program costs must be accounted for and balanced with reasonably expected revenues over the life of the plan.

Unprogrammed: This category represents projects and programs that are included in the Preferred Alternative but are not subject to the requirement of having a corresponding funding strategy and may be more illustrative or aspirational in nature.

The Preferred Alternative contains both the financially constrained and the unprogrammed programs and projects.

How does this FEIS analyze the constrained portion of the Preferred Alternative?

The Preferred Alternative in this FEIS contains both the financially constrained and the unprogrammed programs and projects (sometimes referred to as the full Preferred Alternative). Accordingly, most of the environmental disciplines analyze the potential effects of the Preferred Alternative. However, for instances when the constrained portion of the Preferred Alternative would result in greater effects upon the environment, such as in certain analyses in Chapter 4: Transportation and Chapter 6: Air Quality and Climate Change, the effects of the constrained portion of the Preferred Alternative are analyzed.

A. How was the Preferred Alternative developed?

The development of a Preferred Alternative was a three-year effort involving ongoing public involvement, agency consultation, and environmental analysis. The major elements of this effort included:

- *Background and Tool Development:* The program started with the development of background information on transportation issues, such as growth, the economy, congestion, funding, environment, and health. Tools were developed to better inform the public and decision makers on specific areas that benefit or are affected by transportation programs, including land use, travel times, reliability, and safety. The tools include the development of a new benefit-cost model.
- *Scoping:* Through scoping, a list of issues, strategies, programs, and projects were developed. A set of three critical issues were identified: Congestion and Mobility, Environment, and Transportation Funding.
- *Alternatives Development:* Based on the issues and programs identified in scoping, alternatives were constructed to represent different transportation policy choices. The levels and type of investment, management, and funding strategies varied among the alternatives.
- *Criteria:* Criteria were developed to evaluate key issues, particularly mobility, environment, economy, and equity. When possible, criteria were based on monetary values to provide quantitative information for the benefit-cost analysis.
- *Alternative Evaluation:* The alternatives included three types of evaluation:
 - *Policy Review:* All of the projects and programs in the alternatives were evaluated and found compliant with the VISION 2040 policies.
 - *Environmental Impact Statement (EIS):* A Draft Environmental Impact Statement (DEIS) was used to evaluate the impact of the alternatives on the environment. This FEIS responds to comments on the DEIS and also includes an analysis of the Preferred Alternative.

- *Criteria:* Criteria evaluation and reporting for each of the alternatives includes both qualitative and quantitative analysis.
- *Public Involvement:* The process included continuous public involvement and consultation with member agencies, including over 450 meetings, public notices, ongoing information posted on the Internet, and other materials. PSRC conducted a focused effort to provide outreach to seek input from low-income and minority populations and people with special transportation needs. Over 2000 comments on the DEIS were received and have been reviewed.
- *Recommendation:* The Preferred Alternative includes the programs and projects contained in the Draft Transportation 2040 Plan, which was designed through lengthy consultation with many stakeholders (refer to the Public Involvement and Consultation Appendix in the Transportation 2040 Plan). Those consulted included all of PSRC's standing committees and boards, technical committees formed for the plan update process, and numerous nonprofit or private entities. The stakeholders considered many aspects of the proposals in the course of recommending inclusion in the plan, including proposal maturity, proposal support for regional policies and objectives as set forth in VISION 2040, and the analysis results from the DEIS. Ultimately, the Transportation Policy Board recommended the investments included in the draft plan to the Executive Board, endorsed the draft plan as the basis for the Preferred Alternative evaluated in this FEIS.

9. What areas of controversy and uncertainty were identified?

VMT reduction benchmarks

The State of Washington has enacted VMT reduction benchmarks. These benchmarks are not requirements, but were enacted to encourage measurement of VMT as part of an overall greenhouse gas reduction strategy. In early 2009, Governor Gregoire issued an Executive Order, which requires a collaborative process to review the VMT reduction benchmarks and report on whether they should be changed, especially related to alternative fuel vehicles, and the economic and other impacts of VMT reduction benchmarks. The report is due by the end of 2010. The analysis conducted for Transportation 2040 has demonstrated that VMT per capita in the region is already meeting the state's 2020 benchmark, and additional reductions for all alternatives are estimated by 2040 (refer to Chapter 6 for more information). Given this state directive, PSRC is reporting progress on VMT reduction and has incorporated specific actions within the four-part greenhouse gas strategy to support VMT reduction.

PSRC continues to work with WSDOT, other metropolitan planning and regional transportation planning organizations around the state, and additional stakeholders on the requirements of Governor Gregoire's Executive Order.

PSRC's General Assembly, Executive Board, and Transportation Policy Board had to balance many issues in developing the Preferred Alternative for Transportation 2040. Many of these issues were identified in DEIS comment letters. Responses to specific comments are included in Appendix N of this FEIS, and some of the more frequently raised comments are summarized in this section. Areas of potential controversy and uncertainty included future land uses; climate change and greenhouse gas emissions; qualitative versus quantitative analysis methods; and impacts to low income and minority populations (environmental justice). Each of these topics is discussed below.

Future Land Use Assumptions

Land use assumptions for all alternatives, including the Preferred Alternative, are based on the VISION 2040 Regional Growth Strategy. This plan, adopted in 2008, provides guidance for where future population and employment growth should be located to achieve the goals of VISION 2040. The Regional Growth Strategy is based on regionwide growth forecasts organized around "regional geographies," which are groups of cities that share similar characteristics, along with categories for unincorporated urban areas and rural areas. There are four types of regional geographies for cities: metropolitan cities, core cities, larger cities, and small cities. The Regional Growth Strategy plans for an increased role in accommodating growth for metropolitan cities and core cities, as well as larger cities. The Regional Growth Strategy anticipates a corresponding decreased role for smaller cities, unincorporated urban growth areas (UGAs), and rural areas.

Some comments on the DEIS stated that the actual population growth distribution is dramatically at variance with the Regional Growth Strategy. The comments state, in recent years, that more population growth has occurred in smaller cities, unincorporated UGAs, and rural areas than was recommended by the Regional Growth Strategy. The comments

recommended using future projections of these past growth patterns as the basis for Transportation 2040's land use assumptions instead of the patterns prescribed by the Regional Growth Strategy.

PSRC considered the approach recommended by the comments, but determined that the Regional Growth Strategy is appropriate to use as the basis for future land use projections because it is adopted regional policy. By adopting VISION 2040, the region's cities and counties have agreed to revise their existing land use plans with the intention of supporting the growth patterns in the Regional Growth Strategy. In the short time since the adoption of VISION 2040 in 2008, many cities and counties have not yet revised their land use plans. Once the revisions are complete, more years may pass before land use patterns begin to reflect the intent of the revised plans. This lag time between implementing new land use plans and achieving tangible results has created some uncertainty as reflected in the comments noted above. The regional population and employment growth trends will be monitored over time and compared to the Regional Growth Strategy. If necessary, adjustments will be considered in future regional land use and transportation plan updates.

Climate Change and Greenhouse Gas Emissions

Greenhouse Gas Reduction Goals

The state of Washington has adopted greenhouse gas emission reduction goals to reduce emissions to 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050. These goals are statewide reduction goals, across all sectors and sources of emissions. While these goals are enacted in state law, the state has not yet assigned targets for the regions of the state, or for individual sectors (transportation, energy, housing, etc.). The federal government has also not yet set national greenhouse gas reduction goals, and current federal legislation being considered by Congress would require specific state goals and targets at least two years beyond the enactment of federal legislation.

Greenhouse Gas Reduction Achievements in Transportation 2040

Notwithstanding the absence of specific requirements and guidance, the PSRC Transportation Policy Board has taken a proactive stance to address the state's climate change goals in the Transportation 2040 Update process. Based on PSRC's analyses and research, as well as data and research conducted at the national level, the Transportation 2040 alternatives include a four-part greenhouse gas strategy. Recognizing that it will require a variety of strategies and tools to effectively reduce emissions from the transportation sector, the four-part strategy contains the following elements:

- *Land Use:* Building upon the VISION 2040 Regional Growth Strategy to further the goal of providing jobs vs. housing balance, and to pursue additional refinements through strategies such as transit-oriented development facilities.
- *User Fees:* Recognizing its critical role in reducing VMT and emissions, transition the region over time to a user fee/roadway pricing system.
- *Choices:* Continue to provide traveler alternatives to the single-occupant vehicle, and continue research into the costs and benefits of various strategies.
- *Technology:* Recognizing that improvements to vehicles and fuels will play a crucial role in reducing emissions, PSRC has undertaken research with the Washington State Department of Ecology (Ecology) on the potential technological advances that may be likely in our region by the year 2040.

Each EIS alternative was evaluated for greenhouse gas emissions, as well as total and per capita VMT (refer to Chapter 6: Air Quality). This evaluation included the land use patterns outlined in the Regional Growth Strategy in all alternatives, while the level of user fees and provision of transportation choices varied across alternatives. Alternative 5 included the most aggressive usage of user fees in an effort to identify the maximum potential reduction in greenhouse gas emissions. The evaluation did not assume technological improvements to fuels or the vehicle fleet. Alternative 5 would provide the greatest reduction of carbon dioxide emissions below the 2040 Baseline Alternative, and the Preferred Alternative would result in carbon dioxide emissions reductions from mobile sources similar to Alternative 5.

Greenhouse Gas Strategy

For more information about PSRC's Greenhouse Gas Strategy, refer to Appendix K: Greenhouse Gas 4-part Strategy.

However, without assuming technological improvements in fuels and vehicle fleet in combination with appropriate land use, user fee, and transportation choice strategies, no alternative would reduce emissions below 2006 levels, which is the PSRC modeled base year.

Additional Strategies to Reduce Greenhouse Gas Emissions beyond Transportation 2040

As noted above, the alternatives in Transportation 2040 include land use, user fee, and transportation choice strategies designed to reduce greenhouse gas emissions. PSRC, through its long-range planning function, has a direct role in determining the region's future approach with these strategies. However, PSRC does not have a direct role in determining the region's future approach to vehicle and fuel technologies.

Nonetheless, in response to comments and in an effort to encourage greenhouse gas reduction efforts, PSRC tested additional strategies to reduce greenhouse gas emissions.

In collaboration with the Washington State Department of Ecology, PSRC developed two technology scenarios: a "likely" scenario, which is probable given current trends and conservative assumptions about fuel prices and other incentives to change technology, and an "aggressive" scenario, which assumes a higher degree of concerted effort to transition the vehicle fleet to a more energy efficient approach. These scenarios were based on national research and in consultation with the Environmental Protection Agency, the Washington State Department of Transportation and the Puget Sound Clean Air Agency.

Combining a technology scenario with the land use, user fee, and transportation choice strategies outlined above could enable any Transportation 2040 alternative to reduce carbon dioxide emissions below 2006.

Uncertainty Regarding the Greenhouse Gas Reduction Goals

As noted above, the alternatives in Transportation 2040 include land use, user fee, and transportation choice strategies designed to reduce greenhouse gas emissions. These strategies could reduce greenhouse gas emissions forecasts for most alternatives below the 2040 Baseline Alternative. It was further noted that, while the region's vehicle and fuel technological advancement is not subject to PSRC's long-range planning process, advancements in technology could reduce emissions for all alternatives below 2006 levels. However, it is difficult to determine whether any Transportation 2040 alternative would reach the 1990 statewide greenhouse gas reduction goals. This difficulty is due to the following factors.

Comparison difficulties:

- The statewide goal lists targets for 2035 and 2050, but not 2040, the future model year used in Transportation 2040.
- The statewide goal includes baseline emissions from 1990, but in order to compare PSRC's 2040 modeled emissions forecasts to a 1990 emissions level, the 1990 level would need to be configured within PSRC's model. As noted above, PSRC's model includes a base year of 2006. The resources required to update a base year within the modeling framework are significant and are not useful to PSRC for other reasons. Therefore, it is not practicable to produce the 1990 baseline information.

Share difficulties:

- As noted above, goals are statewide reduction goals, across all sectors and sources of emissions. The goal does not specify what portion of the emission reduction should be borne by the transportation sector.
- Similarly, the goal does not specify what portion of the emissions reduction should be borne by the central Puget Sound region.

During the Transportation 2040 planning effort, PSRC has evaluated a broad range of potential strategies for greenhouse gas reduction. Based on the uncertainties and difficulties outlined above, this evaluation showed that, solely from within the context of long-range transportation planning, it is not possible to state with certainty whether the transportation sector in the central Puget Sound region would be able to reach the 1990 greenhouse gas reduction goals set by the state of Washington.

Conclusion

PSRC has taken a proactive stance at addressing the reduction of greenhouse gas emissions, beginning with the multicounty planning policies and the Regional Growth Strategy contained in VISION 2040 and continuing with the analysis work and investment strategies contained in Transportation 2040. This is an emerging area, with research and legislation continuing to evolve at both the state and national levels. PSRC's boards have directed that Transportation 2040 should be flexible and adaptable in order to respond to new guidance and directions on a variety of issues, including climate change.

Qualitative Versus Quantitative Analysis Methods

Impacts of the Transportation 2040 alternatives are analyzed in either qualitative or quantitative terms. Much of the quantitative analysis was done using techniques that are common in transportation analyses, including land use and transportation demand modeling, air quality modeling, and financial analysis. Other areas of policy and potential impacts are difficult to quantify given uncertainty in the current state of science. This does not imply that these benefits and costs are not important, but merely that they are best stated in qualitative terms.

The advantages of a quantitative approach are that both benefits and costs can be combined to assess the potential economic consequences of a particular transportation alternative. The disadvantage is that measures not based on monetary values, such as growth management or economic prosperity, cannot be directly included. The full set of evaluation criteria recognizes the advantages of a quantitative approach but includes qualitative measures to provide a more comprehensive assessment of each alternative.

Human Health

Given the current available literature, quantitative estimates of human health costs have been included as appropriate. Assessing the active living human health impacts of transportation is an emerging area of research, but one that does not appear to have resulted in consensus on methods of analysis and magnitudes of costs. Human health impacts of transportation associated with air pollutants and accidents have been quantified in Appendix D.

Benefits of Walking and Bicycling Trips

Because of constraints on how bicycling and walking trips are represented in the current modeling framework, measuring user benefits has proven to be challenging. Existing model platforms do not effectively measure user benefits resulting from walking and bicycling trips. This challenge can only be overcome through the development of new modeling practices and new data elements that sufficiently represent the possibilities for walking and bicycling trips at a much higher level of detail.

PSRC recognizes the importance of these issues and has provided a qualitative assessment of potential costs and benefits as appropriate. These qualitative assessments were an integral part of the decision-making process.

As science advances and new quantification approaches come into use, PSRC will strive to keep its analysis methods at the forefront of good planning practice.

Impacts to Low Income and Minority Populations

Comments on the DEIS expressed concern about potential impacts to low-income and minority populations, particularly regarding the effects of tolling. Specific concerns included:

- *Regressivity of tolls:* Tolls could represent a disproportionate burden on low-income drivers.
- *Method of toll payment:* Paying for a toll transponder could be difficult for low-income populations. Populations with limited-English proficiency might experience difficulties acquiring and using transponders.
- *Use of toll revenues:* Comments advocated for reinvestment of toll revenues to provide alternatives to single-occupant vehicle travel within the tolled corridors.

- *Cost-benefit analysis methodology:* The cost-benefit analysis in the DEIS showed lower positive user benefits for low-income populations than for high-income populations.

The effect of tolling on low-income and minority populations is an area of emerging research, so the relative regressivity of paying for transportation improvements through tolling versus taxes on gas or sales is not well understood. Specific toll rates, facility locations, methods of toll payment, and use of toll revenues are topics likely to be discussed in detail in the years ahead and future tolling plans would require approval by the Washington State Legislature. PSRC recognizes that the equity effects of tolling are an area of controversy and uncertainty, and will continue to address this issue as planning efforts continue in the future. For more information, refer to Chapter 17: Environmental Justice.

10. What criteria were used to evaluate the alternatives?

VISION 2040 is the organizing framework for evaluating the alternatives. The Regional Growth Strategy and the goals, objectives, and policies in VISION 2040 guided the development of the evaluation criteria and the organization of the policy analysis. The evaluation criteria provide the methodology to measure progress toward achieving VISION 2040. The evaluation criteria were developed to address the overarching goals of the transportation planning process. Individual metrics were developed to quantify different aspects of the evaluation criteria. The criteria measures are grouped into seven categories:

- Mobility
- Finance
- Growth Management
- Economic Prosperity
- Environmental Stewardship
- Quality of Life
- Equity

These criteria include metrics that are a different means to measure transportation benefits (or impacts) than used historically. For example, VMT is a commonly used proxy for measuring congestion or air quality impacts. These criteria metrics directly measure congestion as a function of travel-time savings and directly measure the cost of emissions as a function of vehicle speeds and distance.

Many of the measures in the criteria are estimated in monetary values so they can be included in an estimate of a benefit-cost result. The advantages of the benefit-cost result are that both benefits and costs can be combined to assess the potential economic benefit (or cost) of a particular transportation alternative. The disadvantage is that some measures cannot be converted to monetary terms. The full set of evaluation criteria recognizes the advantages of this method and combines this with other quantitative and qualitative measures to provide a more comprehensive assessment of each alternative. Exhibit 1-4 summarizes the criteria results.

Exhibit 1-4. Evaluation Criteria

EVALUATION CRITERIA	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
MOBILITY							
M1. Travel Time Savings	\$1,850	\$2,510	\$3,440	\$2,890	\$3,560	\$5,020	\$6,390
M2. Improved Reliability Benefits	\$290	\$410	\$1,000	\$1,140	\$1,290	\$1,070	\$1,180
M3. Vehicle Operating & Ownership Benefits	-\$93	-\$189	-\$125	\$200	\$13	\$73	\$213
M4. Other User Benefits	\$17	\$38	\$77	-\$15	-\$457	\$89	\$34
FINANCE							
F1. Facility Operating Cost	-\$360	-\$160	-\$300	-\$510	-\$1,030	-\$1,570	-\$2,600
F2. Capital Cost	-\$640	-\$2,310	-\$1,670	-\$1,650	-\$1,700	-\$1,560	-\$2,770
F3. Operating Revenues	\$180	\$257	\$2,940	\$3,660	\$7,100	\$3,500	\$5,360
F4. Influence of Finance on the Economy	-\$134	-\$363	-\$46	\$44	\$138	\$224	\$103
GROWTH MANAGEMENT							
GM1. Population	nc	nc	nc	nc	nc	nc	nc
GM2. Employment	nc	nc	nc	nc	nc	nc	nc
GM3. Jobs to Housing Balance	nc	nc	nc	nc	nc	nc	nc
GM4. Population & Jobs in Centers	nc	nc	nc	nc	nc	nc	nc
ECONOMIC PROSPERITY							
EP1. Benefits to Low & High-wage Employment	\$382	\$441	\$555	\$431	\$370	\$1,060	\$1,380
EP2. Benefits to Cluster Employment	\$56	\$116	\$179	\$142	\$49	\$297	\$373
EP3. Benefits to Freight-Related Employment	\$55	\$86	\$97	\$81	\$52	\$171	\$226
ENVIRONMENTAL STEWARDSHIP							
ES1. Vehicle & Stationary Emission Benefits	-\$14	-\$35	\$19	\$31	\$94	\$38	\$72
ES2. Impervious Surfaces	nc	-	-	nc	nc	-	-
ES3. Agriculture & Natural Resource Lands	nc	-	nc	nc	nc	nc	nc
ES4. Energy Usage from Vehicle & Building Use	nc	nc	+	+	+	+	+
QUALITY OF LIFE							
QL1. Accident Cost Savings	-\$94	-\$177	-\$52	\$1	\$168	-\$26	\$32
QL2. Non-motorized Travel	nc	-	nc	+	+	+	+
QL3. Redundancy (Roads & Transit)	nc	nc	nc	nc	nc	nc	nc
EQUITY							
E1. Geographic Distribution of Benefits	+	nc	+	-	nc	nc	nc
E2. Income Distribution of Benefits	nc	nc	nc	-	-	nc	nc
E3. Benefits to Personal & Commercial Users	nc	nc	nc	-	-	nc	nc
E4. Benefits to Environmental Justice Populations	+	+	+	+	+	+	+

All comparisons to the 2040 Baseline Alternative: \$\$ in millions in the year 2040; positive values are benefits, negative values are costs; all monetary values are additive except for the Economic Prosperity benefits which are benefits to a subset of the region. nc is no significant change, - is negative change, + is positive change, PA-C is Preferred Alternative-Constrained, PA is Preferred Alternative.

11. What potential impacts could result from each of the alternatives?

TRANSPORTATION

Impacts Common to All Alternatives

- All alternatives estimate an increase in person and vehicle trips, as well as total VMT resulting from growth in population and employment. Each action alternative includes all the investments made under the Baseline Alternative. All plan alternatives would invest in numerous major transportation projects, and would share both the environmental impacts and ongoing operational benefits.

How does this FEIS analyze the constrained portion of the Preferred Alternative?

The Preferred Alternative in this FEIS contains both the financially constrained and the unprogrammed programs and projects (sometimes referred to as the full Preferred Alternative). Accordingly, most of the environmental disciplines analyze the potential effects of the Preferred Alternative. However, for instances when the constrained portion of the Preferred Alternative would result in greater effects upon the environment, such as in certain analyses in Chapter 4: Transportation and Chapter 6: Air Quality and Climate Change, the effects of the constrained portion of the Preferred Alternative are analyzed.

- From 2006 to 2040, the estimated number of vehicles owned within the region would increase with every alternative, and the differences among alternatives are insignificant. Total vehicles owned in 2040 would range from 3,759,000 to 3,847,000 vehicles, a difference of about 2%.
- Daily vehicle hours traveled (VHT) would grow with all alternatives. Each of the alternatives would result in different levels of VHT.
- In 2006, the region experienced 281,000 hours of daily freeway delay and 560,000 hours of delay on the arterials, for a total of 841,000 hours per day. By 2040, total delay on freeways and arterials is forecast to increase for all alternatives.
- Average vehicle occupancy would remain fairly stable or increase slightly for each alternative. Compared to the 2006 average of 1.6 persons per vehicle, in 2040 vehicle occupancy would range from 1.5 to 1.6 persons per vehicle for the different alternatives.
- From 2006 to 2040, the average work trip length (in miles) would remain relatively steady at between 12 and 13 miles per work trip, compared to the base year average of 13 miles per work trip in 2006. Non-work trip lengths would decrease for all alternatives, to between 4 and 5 miles per non-work trip, compared to the base year's average of 6 miles per trip in 2006. Non-work trip length for the Preferred Alternative (Constrained) and the full Preferred Alternative would be about 5 miles.
- Average work trip times (in minutes) would increase for all alternatives, compared to the base year 2006 trip times. The full Preferred Alternative would maintain the same trip times experienced in 2006, at 36 minutes.
- Average travel time for all trips would remain steady, at between 20 and 22 minutes for all the alternatives, compared with 21 minutes in 2006.
- Average vehicle travel speeds on the region's arterial streets are forecast to decline from 2006 to 2040. Differences in arterial travel speeds among the alternatives are not significant. In 2040, all alternatives would yield average daily speeds of about 20 miles per hour (mph) on arterial streets during peak hours and 26 mph during off-peak hours.
- The number of ferry passengers would increase between 2006 and 2040 in all alternatives, and each alternative would add several new passenger-only ferry routes.
- Walking and bicycling trips would increase for each alternative.
- All action alternatives would produce time saving benefits to single-occupancy vehicles, high-occupancy vehicles, transit, and commercial users compared to the Baseline Alternative.

- Each action alternative would provide net positive benefits to environmental justice populations compared to the Baseline Alternative.
- Amtrak does not have any current plans for additional passenger routes in the region; therefore, none of the plan alternatives include specific investments in new intercity passenger rail.
- The FEIS discusses the potential impacts of a range of airport system strategies being considered within a state-wide Long-term Air Transportation Study (LATS). Airport system demand management strategies, stewardship strategies, and land use strategies would likely have positive impacts on the region. Major capacity strategies include redistributing activity to airports that have excess capacity, expanding capacity at airports with capacity constraints, and building new airports. All of these strategies could result in new traffic, airport noise, and other impacts at airports where growth is encouraged, but have the potential to reduce future impacts at capacity-constrained airports, such as Sea-Tac International.
- All of the alternatives include projects that improve nonmotorized travel to provide accessible public transportation system connections. The varying increases in targeted special needs services and facilities could provide expanded and better transportation options for those who do not drive a vehicle.
- Freight mobility is considered as an important element in all major projects. Investments specific to truck freight include the projects that are a part of the FAST Corridor Partnership — a combination of strategically selected grade separations, capacity expansion, and Intelligent Transportation System (ITS) projects to benefit freight. These investments appear across all the action alternatives.

Impacts Specific to Individual Alternatives

Unique transportation system impacts are shown by the following categories: roadway system, vehicle trips, trip times and lengths, auto travel (vehicle miles traveled, vehicle hours traveled, and delay), vehicle speeds, travel mode share, transit travel, ferry travel, nonmotorized trips, freight and goods, and accident cost savings. Additional discussions of impacts on land use, air quality, etc. follow.

Roadway System Improvements

Exhibit 1-5 shows the additional roadways (measured in lane miles) for both freeways and arterials. Compared to the base year 2006 roadway system:

- In total roadway system improvements, the Baseline Alternative would expand the system by 3%, Alternative 2 would expand it by 9%, and the Preferred Alternative would expand it by 7%.

Exhibit 1-5. New Roadways (Lane Miles)

LANE MILES	2006	BASELINE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
	BASE YEAR	ALT							
Freeway	2,616	2,741	2,856	3,138	3,001	2,957	2,824	2,964	3,011
Arterial	10,189	10,412	10,495	10,875	10,540	10,532	10,505	10,588	10,752
Total	12,805	13,153	13,352	14,013	13,540	13,489	13,329	13,551	13,764
CHANGE FROM 2006									
Freeway	—	124	240	522	384	341	208	347	395
Arterial	—	223	306	686	350	342	315	398	563
Total	—	348	546	1,208	735	683	523	746	958
PERCENT CHANGE FROM 2006									
Freeway	—	5%	9%	20%	15%	13%	8%	13%	15%
Arterial	—	2%	3%	7%	3%	3%	3%	4%	6%
Total	—	3%	4%	9%	6%	5%	4%	6%	7%

Vehicle Trips by Time of Day

Exhibit 1-6 shows the average daily vehicle trips by time of day for each alternative.

What is peak spreading?

Peak spreading is an increase in the duration of a peak period, or "rush hour." It results from individual travelers deliberately changing their travel behavior to avoid congestion or to avoid higher tolls associated with peak periods or to comply with incentives that encourage people to avoid traveling during peak periods.

- Compared to the base year 2006, Alternative 2 would have the greatest increase in total daily trips (42%) while the Preferred Alternative would have the smallest increase (36%).
- Alternative 2 is the only alternative with more total daily trips than the Baseline Alternative.
- The largest relative increase in daily vehicle trips for all alternatives ranges from 48% for the Constrained Preferred Alternative to 70% for Alternative 5 occurring at night due to peak spreading.
- All action alternatives would accommodate more PM peak period trips than the Baseline Alternative.

Exhibit 1-6. Average Daily Vehicle Trips (Trips by Time Period and Change from Baseline)

SCENARIO	2006	BASELINE		ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
	BASE YEAR	ALT	ALT							
AM Peak Period	1,469,000	1,984,000	1,985,000	2,014,000	1,997,000	1,974,000	1,882,000	1,976,000	1,932,000	
Midday	3,277,000	4,742,000	4,609,000	4,653,000	4,604,000	4,596,000	4,424,000	4,514,000	4,442,000	
PM Peak Period	1,910,000	2,512,000	2,632,000	2,636,000	2,631,000	2,591,000	2,545,000	2,617,000	2,579,000	
Evening	1,441,000	2,015,000	2,020,000	2,072,000	2,025,000	2,007,000	2,004,000	2,002,000	1,990,000	
Night	594,000	916,000	904,000	931,000	897,000	921,000	1,010,000	878,000	893,000	
Total	8,691,000	12,169,000	12,151,000	12,306,000	12,153,000	12,089,000	11,864,000	11,986,000	11,835,000	
PERCENT CHANGE FROM 2006										
AM Peak Period		35%	35%	37%	36%	34%	28%	35%	32%	
Midday		45%	41%	42%	40%	40%	35%	38%	36%	
PM Peak Period		32%	38%	38%	38%	36%	33%	37%	35%	
Evening		40%	40%	44%	41%	39%	39%	39%	38%	
Night		54%	52%	57%	51%	55%	70%	48%	50%	
Total		40%	40%	42%	40%	39%	37%	38%	36%	

Source: PSRC travel demand model.

Note: Figures above for freeway and arterial lane miles are from PSRC's travel demand model and differ from other lane mile data derived from PSRC's Geographic Information System or other sources.

Trip Times and Lengths

Exhibit 1-7 shows the average trip times and lengths.

- When work trips and non-work trips are combined, the Baseline Alternative would have the longest average trip time (22 minutes) and Alternative 5 and the Preferred Alternative would have the shortest average trip time (20 minutes).
- All action alternatives have shorter work trip times than the Baseline Alternative. Compared to the Baseline Alternative (42 minutes), the full Preferred Alternative would result in average work trips of 36 minutes (14% less).

Exhibit 1-7. Average Daily Trip Times and Lengths (Times in Minutes, Lengths in Miles)

TRIP TYPE	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
TRIP TIMES (MINUTES)									
Work	36	42	38	38	39	41	42	37	36
Non-work	18	18	18	18	18	18	16	17	17
Total	21	22	21	21	21	21	20	21	20
TRIP LENGTHS (MILES)									
Work	13	13	13	13	13	12	13	13	13
Non-work	6	5	5	5	5	5	4	5	5
Total	7	6	7	7	6	6	6	6	6
PERCENT CHANGE FROM 2006 IN TRIP TIMES									
Work		16%	7%	5%	10%	14%	16%	4%	1%
Non-work		1%	-1%	0%	-2%	-4%	-10%	-5%	-9%
Total		6%	2%	2%	2%	2%	-3%	-2%	-5%
PERCENT CHANGE FROM 2006 IN TRIP LENGTHS									
Work		-2%	-1%	0%	-2%	-6%	-5%	-4%	-3%
Non-work		-11%	-7%	-3%	-10%	-14%	-22%	-11%	-14%
Total		-8%	-4%	-1%	-7%	-10%	-16%	-8%	-10%

Auto Travel — Vehicle Miles Traveled, Vehicle Hours Traveled, and Delay

Total VMT, vehicle hours traveled, and system delay are shown in Exhibit 1-8.

Total daily VMT is projected to grow through 2040 for each alternative. Compared to the base year 2006, total daily VMT would increase from 79 million miles to between 94 million and 111 million miles. Total regional VMT growth would be the least (18%) in Alternative 5 and the most (39%) in Alternative 2.

From 1990 to 2006, the region's per capita VMT remained fairly stable, at about 22.5 miles per day. Results of the travel demand model for the action alternatives indicate this trend will continue and will actually decrease over the coming 30 years. Daily VMT per capita is projected to decrease from 22.5 miles in the base year for all alternatives. Contributing factors to this decrease include increases in transit use, ridesharing, walking and bicycling trips, and shorter average trip lengths.

- Alternative 5 would result in the greatest per capita VMT (18.9%) decrease from the current 22.5 miles to 18.9 miles.
- Alternative 2 would have only a very slight reduction in per capita VMT (1%) from 22.5 to 22.2 miles.
- All other alternatives would reduce per capita VMT from 5% to 10% by 2040.

Exhibit 1-8. Auto Travel (Average Daily Vehicle Miles Traveled, Vehicle Hours Traveled, Delay Hours)

SCENARIO	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
VEHICLE MILES AND HOURS TRAVELED									
VMT	79,457,000	102,519,000	106,628,000	110,801,000	104,058,000	101,642,000	94,063,000	102,539,000	99,511,000
VMT per Capita	22.5	20.6	21.4	22.2	20.9	20.4	18.9	20.6	19.9
VHT	2,962,000	4,241,000	4,220,000	4,274,000	4,007,000	4,037,000	3,685,000	3,843,000	3,607,000
VEHICLE DAILY HOURS									
Freeway	281,000	513,000	469,000	458,000	224,000	215,000	136,000	190,000	141,000
Arterial	560,000	932,000	884,000	884,000	943,000	1,011,000	897,000	866,000	749,000
Total Delay	841,000	1,445,000	1,353,000	1,341,000	1,167,000	1,226,000	1,034,000	1,055,000	890,000
Delay per Capita (min.)	14.3	17.4	16.3	16.1	14.0	14.7	12.4	12.7	10.7
CHANGE FROM 2006 IN VEHICLE MILES AND HOURS TRAVELED									
VMT		29%	34%	39%	31%	28%	18%	29%	25%
VMT per Capita		-9%	-5%	-1%	-7%	-10%	-16%	-9%	-12%
VHT		43%	42%	44%	35%	36%	24%	30%	22%
CHANGE FROM 2006 IN VEHICLE DELAY HOURS									
Freeway		83%	67%	63%	-20%	-24%	-52%	-32%	-50%
Arterial		66%	58%	58%	68%	81%	60%	55%	34%
Total		72%	61%	60%	39%	46%	23%	25%	6%
Delay per Capita		21%	14%	13%	-2%	3%	-13%	-11%	-25%

Total vehicle hours traveled (VHT) are a product of total VMT and average travel speed.

- All alternatives would increase daily VHT from 3 million hours per day in the base year 2006 to between 3.6 million and 4.3 million in 2040.
- Alternative 2 would experience the highest level of VHT (4.3 million, an increase of 44%), while the Preferred Alternative would have the lowest (3.6 million, an increase of 22%).
- Increases in total delay would range from 6% in the Preferred Alternative to 72% in the Baseline Alternative, while delay on arterials would grow by between 34% and 81%.
- Freeway delay differs substantially among the alternatives. The Baseline Alternative and Alternatives 1 and 2 increase delay over 2006 levels, while Alternatives 3, 4, 5, and the Preferred Alternative reduce freeway delay. The freeway delay differences are a result of several factors, including increased vehicle trips and use of tolling and/or travel demand management.

Vehicle Speeds

Average daily vehicle speeds by facility type and time period are shown in Exhibit 1-9.

- Arterial speeds are predicted to decrease from 22 mph in 2006 to a range from 20 to 22 mph for all alternatives in 2040.
- Differences among the alternatives are not significant, with all peak hour speeds ranging from 22 to 25 mph and non-peak speeds ranging from 25 to 29 mph

In contrast, freeway travel speeds are projected to vary considerably across the alternatives. From 2006, some alternatives show a decrease in speed and others show an increase.

- Alternatives 3, 4, 5, and the Preferred Alternative show freeway speed increases, ranging from 45 to 49 mph in 2040 compared to 41 mph for the base year 2006. The freeway speed increases are a result of several factors including transit system improvements, tolling, and other travel demand management strategies.

Alternatives 1 and 2 have freeway speed decreases ranging from 38 to 39 mph compared to 41 mph for 2006.

Exhibit 1-9. Auto Performance (Average Daily Speeds by Facility Type and Time Period)

SCENARIO	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
AUTO SPEEDS									
Daily: Freeway	41	35	38	39	45	45	48	47	49
Daily: Arterial	22	20	20	20	20	20	21	21	22
Peak: Freeways & Arterials	24	22	22	23	23	23	23	24	25
Off-peak: Freeways & Arterials	29	25	27	28	28	26	26	28	29
PERCENT CHANGE FROM 2006 IN SPEEDS									
Daily: Freeway		-14%	-8%	-4%	11%	10%	17%	15%	21%
Daily: Arterial		-8%	-6%	-7%	-8%	-9%	-5%	-6%	-1%
Peak: Freeways & Arterials		-10%	-8%	-5%	-4%	-5%	-4%	0%	4%
Off-peak: Freeways & Arterials		-11%	-5%	-3%	-3%	-9%	-8%	-1%	1%

Travel Mode Share

Average daily person trips by travel mode for all alternatives are shown in Exhibit 1-10.

- Work trips by transit are much higher (10% in 2006) than for non-work trips and this share is projected to increase with all alternatives, ranging from 15% in Alternative 2 to 19% in Alternative 5 and the Preferred Alternative.
- For non-work trips, transit's share is approximately 2% for all alternatives. For the base year, the 2006 transit share of non-work trips was 1%.
- When work and non-work trips are combined, transit's share varies from a low of 4% for the Baseline Alternative and Alternative 2, to a high of 5% for Alternative 5 and the Preferred Alternative. Transit share of all trips in the base year 2006 was 3%.
- Work trips by carpool, HOV, and walking and bicycling are also projected to increase their shares in the action alternatives compared to the Baseline Alternative.
- The single-occupant vehicle share is projected to decrease from 65 to 70% compared to 75% for the base year 2006.

Exhibit 1-10. Mode Share for Work, Non-Work, and All Trips

MODE SHARE	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
WORK TRIPS									
Single-occupant Vehicle (SOV)	75.3%	69.5%	68.2%	70.3%	68.5%	67.5%	65.2%	67.1%	65.1%
Carpool – HOV	8.9%	8.6%	8.3%	8.3%	9.1%	9.4%	9.0%	9.1%	9.4%
Transit	10.4%	16.0%	16.7%	15.4%	16.2%	16.9%	19.0%	17.4%	19.0%
Walk/Bike	5.5%	5.9%	6.8%	6.0%	6.2%	6.3%	6.8%	6.5%	6.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NON-WORK TRIPS									
SOV	37.2%	38.6%	38.4%	38.9%	38.3%	38.0%	37.4%	37.9%	37.4%
Carpool – HOV	49.9%	46.3%	46.5%	46.6%	46.6%	46.6%	45.6%	46.6%	46.6%
Transit	1.4%	1.8%	2.4%	2.0%	2.0%	2.1%	2.4%	2.4%	2.5%
Walk/Bike	11.4%	13.3%	12.7%	12.6%	13.0%	13.3%	14.6%	13.1%	13.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ALL TRIPS									
SOV	43.4%	43.7%	43.4%	44.2%	43.4%	43.0%	42.0%	42.8%	42.0%
Carpool – HOV	43.3%	40.0%	40.1%	40.1%	40.3%	40.4%	39.5%	40.3%	40.4%
Transit	2.9%	4.2%	4.8%	4.2%	4.4%	4.5%	5.2%	4.9%	5.3%
Bike/walk	10.4%	12.0%	11.7%	11.5%	11.9%	12.1%	13.3%	12.0%	12.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Transit Travel

Transit ridership for each alternative is summarized in Exhibit 1-11. Compared to the Baseline Alternative, the action alternatives have higher transit boardings in nearly every category and higher total transit boardings.

Alternative 5 and the Preferred Alternative result in substantially higher transit ridership than the 2006 base year: ferry ridership is up by 351%, commuter and light rail ridership by over 3,000%, and bus ridership by 94%. The full Preferred Alternative was projected to have increases of 241%, 3,155%, and 106% in ferry, rail, and bus ridership, respectively.

Exhibit 1-11. Transit Travel (Average Daily Boardings by Mode)

TRANSIT TYPE	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
TRANSIT BOARDINGS									
Ferry	11,800	37,600	38,900	37,700	45,100	46,500	53,200	36,700	40,200
Rail	5,800	151,300	155,500	159,200	135,800	147,200	208,500	164,400	188,800
Bus	367,500	599,900	703,600	592,500	646,900	662,900	712,400	717,100	756,400
Total	385,100	788,800	898,100	789,400	827,800	856,600	974,100	918,300	985,400
PERCENT CHANGE FROM 2006 IN TRANSIT BOARDINGS									
Ferry		219%	230%	219%	282%	294%	351%	211%	241%
Rail		2,509%	2,581%	2,645%	2,241%	2,438%	3,495%	2,734%	3,155%
Bus		63%	91%	61%	76%	80%	94%	95%	106%
Total		105%	133%	105%	115%	122%	153%	138%	156%

Ferry Travel

Ferry ridership for each alternative is summarized in Exhibit 1-12. The number of passengers and autos using the ferry system for each alternative would have implications for other transportation modes, mainly the roadway and transit systems, but also for the walking and bicycling system. Auto ferry impacts would result from increased vehicular traffic on the roadways serving ferry terminals. Passenger ferry activity would increase the need for connecting transit service at passenger ferry terminals, as well as investments in walking and bicycling facilities to serve passengers.

- Total daily boardings on the ferry system would range from almost 68,000 in the Baseline Alternative to 88,000 in Alternative 5, a 30% increase over the Baseline Alternative and a 146% increase over 2006.
- Walk-on trips are projected to increase sharply in response to new passenger ferry service, increasing between 219% in the Baseline Alternative and Alternative 2 to over 350% in Alternative 5.
- Drive-on traffic would increase the most (58%) with Alternative 2 and the least (5%) with Alternative 3.

Exhibit 1-12. Ferry Travel (Average Daily Person Trips by Boarding Mode)

SCENARIO	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
AUTO AND TRANSIT FERRY PERSON TRIPS									
Ferry Walk-ons	11,800	37,600	38,900	37,700	45,100	46,500	53,200	36,700	40,200
Ferry SOV	17,400	22,300	19,500	21,700	22,900	24,000	24,200	21,200	21,400
Ferry Carpool	4,600	4,900	8,100	5,800	5,900	4,800	8,200	7,200	7,200
Ferry Trucks	1,900	2,900	2,300	3,000	2,000	2,200	2,400	2,200	2,300
Total	35,700	67,700	68,800	68,200	75,900	77,500	88,000	67,300	71,100
PERCENT CHANGE FROM 2006 IN FERRY BOARDINGS									
Ferry Walk-ons		219%	230%	219%	282%	294%	351%	211%	241%
Ferry Drive-ons		53%	21%	58%	5%	16%	26%	28%	29%
Total		90%	93%	91%	113%	117%	146%	89%	99%

Nonmotorized Trips

Total nonmotorized trips (bicycling and walking) are shown in Exhibit 1-13.

- Compared to the Baseline Alternative, all action alternatives would have more nonmotorized trips, other than Alternative 2.
- Daily work trips via walking and bicycling in the year 2040 would range from 508,000 for Alternative 2 (92% more than 2006) to 627,000 for Alternative 5 (137% more than 2006). Walking and bicycling trips to work are projected to increase from 103% to 130% in the other alternatives.
- Most daily walking and bicycling trips are non-work related (about 80% of all trips). In 2006, non-work walking and bicycling trips totaled 1,447,000. The alternatives would all result in increased non-work walking and bicycling trips, ranging from a 58% increase in Alternative 2 to an 85% increase in Alternative 5.

Exhibit 1-13. Nonmotorized Trips (Average Daily Walking and Bicycling Trips)

TRIP TYPE	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
WALK, BICYCLE, AND "WALK TO TRANSIT" TRIPS									
Work	265,100	538,200	572,000	508,200	540,700	557,200	627,200	571,100	609,700
Non-work	1,447,000	2,381,400	2,383,500	2,293,100	2,373,200	2,428,900	2,679,000	2,440,300	2,515,500
Total	1,712,200	2,919,600	2,955,500	2,801,300	2,913,800	2,986,100	3,306,200	3,011,400	3,125,100
PERCENT CHANGE FROM 2006									
Work		103%	116%	92%	104%	110%	137%	115%	130%
Non-work		65%	65%	58%	64%	68%	85%	69%	74%
Total		71%	73%	64%	70%	74%	93%	76%	83%

The number of new off-road walking and bicycling facilities vary significantly among the alternatives (refer to Exhibit 1-14).

- The Baseline Alternative would add 30 miles of new facilities to the 570 miles of off-road facilities existing in the base year 2006.
- Alternatives 1 to 4 would each increase the system by just over 30%. The Preferred Alternative would add a significantly larger number of new facilities (553 miles), nearly doubling the off-road facilities between 2006 and 2040.

These quantities do not include existing or potential future sidewalks and bicycle lanes adjoining the region's roadways.

Exhibit 1-14. Investment in Off-road Walking and Off-road Bicycling Facilities (Miles)

	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
New miles of facilities		30	177	175	170	175	488	348	553
Total miles of facilities (2040)	570	600	747	745	740	745	1,058	918	1,123

Accident Cost Savings

Accident cost savings result from improved safety (reduced numbers and severity of traffic accidents) on the transportation system. Benefits are measured in reduced property damage, reduced injury accidents, and reduced accidents with fatalities. Annual accident cost savings for all alternatives are shown in Exhibit 1-15.

Alternatives 1 through 3 and the Preferred Alternative (Constrained) show lower accident savings (higher accident costs) than the Baseline Alternative. Alternative 4 shows no measurable difference in accident cost (or savings) compared to the Baseline Alternative, while the full Preferred Alternative shows modest accident reduction savings benefits.

This analysis does consider accident reductions that can be achieved with targeted safety programs such as Washington State's Strategic Highway Safety Plan, Target Zero.

Exhibit 1-15. Annual Accident Reduction Benefits Compared to the 2040 Baseline Costs (Millions of 2008 Dollars)

	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
Property Damage Only	-\$5	-\$10	-\$3	\$1	\$9	-\$1	\$2
Injury Accidents	-\$71	-\$134	-\$39	\$0	\$127	-\$20	\$24
Accidents with Fatalities	-\$17	-\$33	-\$10	\$0	\$31	-\$5	\$6
Total	-\$94	-\$177	-\$52	\$1	\$168	-\$26	\$32

FREIGHT AND GOODS

Alternatives 2 and 3 would provide significant added capacity along heavy freight corridors (SR 509 and SR 167), providing freight mobility benefits. Alternatives 3, 4, 5, and the Preferred Alternative would toll all, or portions of, the highway system and reduce average freeway delay, providing benefits to freight users.

Other freight benefits are reflected throughout aggregate performance of the road network through the measurement of user benefits. Truck freight-related user benefits increase as a share of total user travel benefits with Alternatives 3, 4, 5, and the Preferred Alternative. On a per trip basis, medium and heavy trucks would receive the greatest benefits. While the full Preferred Alternative generates the greatest total benefit to all four user categories, Alternative 5 would produce the greatest per trip benefit for heavy trucks.

Freight benefits would account for less than 50% of total benefits with Alternatives 1 and 2, compared to 52% for Alternative 3, 64% for Alternative 4, and 68% for Alternative 5. Alternative 3 would have the greatest overall user benefit and Alternatives 4 and 5 would have the greatest benefit to freight users.

What are user benefits?

Benefits to users include travel time savings, travel reliability benefits, changes to vehicle ownership, and operating costs and other changes to consumer surplus that result from tolling and pricing policies.

For more information about the methodology used to calculate user benefits, refer to Appendix D: Policy Analysis and Criteria Evaluation Report.

Exhibit 1-16. Commercial Travel Benefits by Vehicle Type (Millions of 2008 Dollars)

VEHICLE TYPE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
Light Commercial	\$122	\$160	\$263	\$270	\$314	\$318	\$375
Medium Truck	\$358	\$430	\$867	\$1,012	\$1,138	\$987	\$1,154
Heavy Truck	\$499	\$602	\$1,182	\$1,322	\$1,478	\$1,177	\$1,399
Total Commercial	\$979	\$1,192	\$2,312	\$2,604	\$2,930	\$2,482	\$2,928
Share of Commercial	46%	42%	52%	64%	68%	40%	37%
Passenger	\$1,130	\$1,673	\$2,100	\$1,459	\$1,388	\$3,747	\$4,886
Total Users	\$2,109	\$2,865	\$4,412	\$4,063	\$4,318	\$6,229	\$7,814

LAND USE, POPULATION, EMPLOYMENT, AND HOUSING

Impacts Common to All Alternatives

The amount of population and employment growth does not vary among alternatives. From 2006 to 2040, all assume an additional 1.5 million persons, an additional 1.2 million jobs, and approximately 800,000 additional housing units. In addition, all seven of the alternatives are consistent with VISION 2040. Therefore, none of the alternatives would result in impacts to land use, employment, population, or housing beyond those described in the VISION 2040 Final Environmental Impact Statement.

Impacts Specific to Individual Alternatives

PSRC has performed an analysis of the development pattern changes that could result from the transportation alternatives and concluded that none of the action alternatives would substantively alter future land use and development patterns from the Baseline Alternative.

AIR QUALITY AND CLIMATE CHANGE

What does

maintenance status mean?

Areas that have violated any of the National Ambient Air Quality Standards are designated "nonattainment." Once these areas have subsequently met and maintained the standard for a period of time, they are redesignated as "maintenance" areas.

Impacts Common to All Alternatives

All of the alternatives remain below the motor vehicle emissions budgets for carbon monoxide and particulate matter less than 10 microns in diameter (PM₁₀), which are the two pollutants for which the region is in maintenance status and to which conformity must be demonstrated. The region is currently in attainment of the new 8-hour ground-level ozone standard, but a portion of the region was recently designated nonattainment to the fine particulate standard (PM_{2.5}). PSRC is working with the region's air quality consultation partners to prepare analyses and a plan to bring the region back into attainment to this pollutant. As shown in Exhibit 1-17, emission trends compared to the base year 2006 show a decrease for the criteria pollutants but an increase for carbon dioxide. As described in Chapter 6: Air Quality

and Climate Change, regulatory and technological improvements have played a significant role in the declining trend in these emissions. Because carbon dioxide emissions from mobile sources are more directly related to the amount of carbon in the fuel and the amount of fuel burned, the trend for these emissions is different than that of the other pollutants. The criteria pollutants are more affected by vehicle emission control technologies and improvements in fuel combustion. Carbon is the main component of petroleum fuels; therefore, carbon dioxide emissions are less affected by these technologies and more so by improving the fuel economy of vehicles and lowering the carbon content of fuels.

Impacts Specific to Individual Alternatives

Compared to the Baseline Alternative, Alternative 2 results in the largest increase in emissions for all pollutants, primarily due to the increase in vehicle miles traveled for this alternative. Alternative 1 also results in an increase of emissions for all pollutants compared to the Baseline Alternative. Alternatives 3 and 4 result in a mix of increases and decreases, depending on the pollutant. Alternative 5 results in the least emissions for all pollutants, again primarily due to the decrease in VMT from the Baseline Alternative. The Preferred Alternative reduces emissions of all pollutants compared to the Baseline Alternative. The Preferred Alternative has lower emissions of all pollutants than Alternatives 1 through 4, while emissions are higher than in Alternative 5. The results from the Preferred Alternative are closest to the results of Alternative 5 than any of the other alternatives. The financially constrained portion of the Preferred Alternative has higher emissions than the full Preferred Alternative, and demonstrates a mix of increases and decreases compared to the other alternatives, depending on the pollutant.

Exhibit 1-17. Emissions (Annual Tons)

	2006 BASE YEAR	BASELINE ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA-C	PA
CO ₂ Mobile	17,158,000	23,648,000	23,708,000	24,020,000	22,789,000	22,568,000	21,257,000	22,308,000	21,526,000
CO ₂ Buildings	8,893,000	13,176,000	13,154,000	13,086,000	13,105,000	13,136,000	13,169,000	13,245,000	13,141,000
Total CO ₂	26,051,000	36,824,000	36,862,000	37,106,000	35,894,000	35,704,000	34,426,000	35,553,000	34,667,000
CO	497,400	387,800	402,200	418,200	394,600	386,300	354,600	387,600	374,900
NO _x	57,900	13,700	14,200	14,700	14,100	13,900	13,000	13,900	13,500
VOC	34,500	17,800	18,100	18,600	17,500	17,300	15,900	17,000	16,300
PM _{2.5}	1,770	520	540	550	530	520	490	530	510

NOISE

Impacts Common to All Alternatives

All alternatives contain new transportation facilities that would generate noise. Noise during construction could be bothersome to nearby residents and businesses. Construction noise would vary widely both in range and hours over

the course of implementation of the program. Individual projects would generate disturbances in their general vicinity during construction.

Impacts Specific to Individual Alternatives

The alternatives contain varying levels of new transportation infrastructure and it is likely that those with the most new infrastructure would result in the greatest noise effects. Alternative 2 contains the highest number of new miles of road and rail, while the Baseline Alternative contains the lowest, followed by Alternative 1. Therefore, Alternative 2 would likely result in the most noise effects and the Baseline Alternative would likely result in the fewest.

Of the action alternatives, Alternative 1 would likely result in the lowest number of noise effects. The number of effects resulting from Alternatives 3, 4, and 5 would likely fall between the overall number of effects expected for Alternatives 1 and 2.

All alternatives also increase total VMT compared to the 2006 base year. At a regional scale, the VMT increase would increase the relative amount of noise generated by the transportation system.

The Preferred Alternative includes the second-greatest number of new miles of roads and rail. Therefore, the Preferred Alternative would likely result in the second-greatest number of noise effects. However, most of the new miles of roads and rail would be built along existing transportation corridors. New transportation facilities constructed in existing transportation corridors are less likely to result in negative noise effects than those built in new corridors. Conversely, the Preferred Alternative adds the most miles of new freeway and arterial lane miles in new corridors. Therefore, noise effects from the Preferred Alternative in new corridors would likely be higher than other alternatives.

The Preferred Alternative includes the greatest number of miles of nonmotorized facilities, which include bicycle and recreation trails. Projects that expand and enhance nonmotorized travel often result in positive noise effects by providing quieter alternatives to vehicular travel.

VISUAL AND AESTHETIC RESOURCES

Impacts Common to All Alternatives

All of the alternatives affect the built and natural environment through new infrastructure, at least to the level found in the Baseline Alternative. However, specific effects on visual resources would depend on the nature of the existing landscape and the proximity of proposed transportation improvements to sensitive resources and viewpoints. Individual projects can also incorporate measures to avoid and/or minimize potential impacts to visual resources, and add features that improve the existing visual character of an area.

Particulate matter is the primary cause of reduced visibility or haze affecting specific national park and wilderness areas. Ground-level ozone (also known as smog) can also cause reduced visibility. This decrease would result in a positive effect on visibility and views to important landmarks such as Mount Rainier for all alternatives. All alternatives decrease particulate matter and the precursor pollutants for ozone (nitrogen oxides and volatile organic compounds) compared to the 2006 base year.

Impacts Specific to Individual Alternatives

The alternatives contain varying levels of new transportation infrastructure and it is likely that those with the most new infrastructure would result in the greatest effect on visual and aesthetic resources. Alternative 2 contains the greatest number of new miles of road and rail, while the Baseline Alternative contains the fewest. Of the action alternatives, Alternative 1 contains the fewest number of new miles of roads and rail. Therefore, Alternative 2 would likely result in the highest number of effects on visual and aesthetic resources and the Baseline Alternative would likely result in the lowest number. Among the action alternatives, Alternative 1 would likely result in the lowest number of effects on visual and aesthetic resources. The number of effects resulting from Alternatives 3, 4, and 5 would likely fall between the overall number of effects expected for Alternatives 1 and 2.

The Preferred Alternative includes the second-greatest number of new miles of roads and rail. Therefore, the Preferred Alternative would likely result in the second-greatest number of effects on visual resources. However, most of the new miles of roads and rail would be built along existing transportation corridors. New transportation facilities constructed in existing transportation corridors are less likely to negatively affect visual resources than those built in new corridors. Conversely, the Preferred Alternative adds the most miles of new freeway and arterial lane miles in new corridors. Therefore, visual effects from the Preferred Alternative in new corridors would likely be higher than other alternatives.

The Preferred Alternative includes the greatest number of miles of nonmotorized facilities, which include bicycle and recreation trails. Projects that expand and enhance nonmotorized travel often result in positive visual effects by providing more viewpoints for visual resources without diminishing the nearby visual environment.

WATER QUALITY AND HYDROLOGY

Impacts Common to All Alternatives

In terms of hydrology and water quality, all alternatives would result in new or replaced impervious surfaces, including impervious surfaces that generate pollutants. It should be noted that new infrastructure projects are often built on existing impervious surface, so the new projects offer an opportunity to improve existing stormwater treatment methods, resulting in improved water quality. These opportunities would be discussed in detail in future project-level environmental review. For the purposes of this analysis, however, new impervious surface is used to provide a rough comparison among the plan alternatives. New impervious surfaces can increase the frequency of peak flow rates and the volume of stormwater runoff. Both of these could result in increases in impacts to stream beds, stream banks, and altered wetlands. Eroded sediment can be deposited as the stream slope decreases, which could lead to drainage problems and local flooding. In addition, large areas of new impervious surface could reduce groundwater recharge and summer low flow rate, and increase summer water temperatures.

The construction-related impacts would be temporary and could be minimized or prevented through the proper implementation of best management practices. Construction impacts could include erosion and sedimentation, compaction, and soil disturbance during staging, in-water construction for culverts or bridges, and dewatering.

Impacts Specific to Individual Alternatives

What are the limitations of the proximity analysis?

The purpose of the proximity analysis was to identify relative potential for impacts among alternatives, not to identify absolute numbers of potential impacts. As these projects are implemented, the actual number of impacts would be far fewer than shown, since the projects would be designed to avoid these impacts.

Total acres of impervious surface due to new lane miles and park-and-ride stalls were assumed to be a surrogate for impacts caused by new impervious surfaces. Alternative 2 contains the greatest number of new acres of impervious surface and the Preferred Alternative has the second-greatest number. The Baseline Alternative contains the fewest number of new acres of impervious surface. Of the action alternatives, Alternative 1 contains the fewest number of new acres of impervious surface. Therefore, Alternative 2 would likely result in the highest number of effects on water quality and hydrology and the Baseline Alternative would likely result in the lowest number. Among the action alternatives, Alternative 1 would likely result in the lowest number of effects on water quality and hydrology. The number of effects resulting from Alternatives 3, 4, 5 and the Preferred Alternative would likely fall between the overall number of effects expected for Alternatives 1 and 2.

A proximity analysis (refer to Exhibit 1-18) of the projects included in each alternative found that the Preferred Alternative would have the most projects located within Federal Emergency Management Agency (FEMA) flood areas, while the Baseline Alternative would have the fewest. Of the action alternatives, Alternative 1 would have the fewest projects located within FEMA flood areas.

Exhibit 1-18. Projects in the Vicinity of Flood Zones

PROJECT TYPE	BASELINE						PA
	ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	
Transit, Roadway, & Ferry Related Projects	50	82	205	113	117	106	232
Nonmotorized Projects	7	19	41	39	41	108	105*

* Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

ECOSYSTEMS AND ENDANGERED SPECIES ACT ISSUES

Impacts Common to All Alternatives

Habitat loss/fragmentation, pollution, and alterations of ecological processes would be similar for all alternatives. Much of the region's transportation system is already in place, and the most common type of improvements for all alternatives involve the replacement or expansion of existing facilities within the urban area.

Construction impacts could include vegetation removal, soil disturbance, potential soil erosion, increased impervious surface, and increased sedimentation in surface waters.

Impacts Specific to Individual Alternatives

A proximity analysis of the projects included in each alternative found that the Preferred Alternative would have the most projects located within existing significant habitat areas, while the Baseline Alternative would have the fewest. Of the action alternatives, Alternative 1 would have the fewest projects located within existing habitat areas (refer to Exhibit 1-19).

Exhibit 1-19. Potential Project Impacts to Significant Habitat Areas

PROJECT TYPE	BASELINE						PA
	ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	
Transit, Roadway, & Ferry Related Projects	51	98	210	126	131	128	243
Nonmotorized Projects	10	28	42	40	42	111	109*

* Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

ENERGY

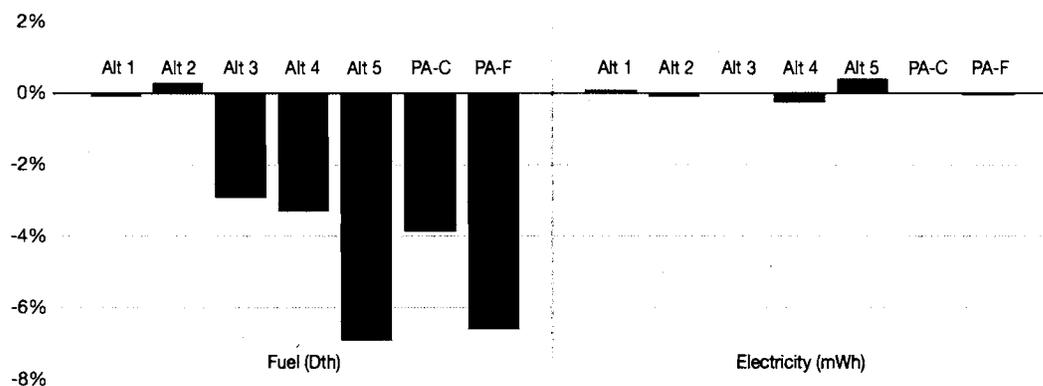
Impacts Common to All Alternatives

All of the alternatives would provide additional transportation infrastructure, including roadway, transit, and other investments that would have an impact on energy consumption, both in terms of construction and operations. Many of these investments would provide more alternatives to driving alone, which could result in more efficient energy consumption. As shown in Exhibit 1-20, the difference among all the alternatives for electricity use for vehicles and buildings is minimal.

Impacts Specific to Individual Alternatives

As shown in Exhibit 1-20, the Baseline Alternative and Alternatives 1 and 2 have similar fuel use for vehicles and buildings, while Alternatives 3 and 4 have lower fuel use than the Baseline Alternative, but not as low as Alternative 5. Alternative 5 has the lowest fuel consumption. The Preferred Alternative (Constrained) and full Preferred Alternative have slightly more fuel consumption than Alternative 5.

Exhibit 1-20. Fuel and Electricity Use for Vehicles and Buildings, Change from the 2040 Baseline



EARTH

Impacts Common to All Alternatives

The entire central Puget Sound region may be subjected to earthquakes and is considered to have a moderate to high seismic risk. Facilities associated with the ferry system, as well as road and transit facilities located near the coast, could be subject to potential tsunami hazards following earthquakes. Much of the region’s infrastructure already occurs in areas subject to geologic hazards. Because all alternatives build on the existing system, they would be subject to impacts from geologic hazards that could potentially occur at any location in the region. Potential impacts that could occur during construction include landslides, vibration, dewatering, and erosion, and water quality impacts from construction over or near water.

Impacts Specific to Individual Alternatives

All of the alternatives contain similar amounts of new infrastructure, measured as a percentage of the total system (3 to 9%). Alternative 2 contains the greatest number of new miles of road and rail, and the Preferred Alternative contains the second-greatest number of new miles. The Baseline Alternative contains the fewest number of new miles. Of the action alternatives, Alternative 1 contains the fewest new miles of roads and rail. Therefore, Alternative 2 would likely result in the highest number of seismic hazards, with the Preferred Alternative slightly lower, and the Baseline Alternative would likely result in the lowest number. Among the action alternatives, Alternative 1 would likely result in the lowest number of seismic hazards. The number of effects resulting from Alternatives 3, 4, 5, and the Preferred Alternative would likely fall between the overall number of effects expected for Alternatives 1 and 2.

All alternatives also increase total vehicle trips compared to the 2006 base year, although Alternative 2 is the only action alternative with a higher number of vehicle trips than the Baseline Alternative. The higher number of trips would increase the impact from an earthquake or other geologic hazard because more vehicles would be exposed to the hazard.

ENVIRONMENTAL HEALTH

Impacts Common to All Alternatives

The development of new or improved transportation facilities included in all the alternatives has the potential for encountering contaminated materials. Operation and maintenance of the region’s transportation system could involve the use of materials that can affect environmental functions and human health.

Impacts Specific to Individual Alternatives

New project locations were compared to the locations of identified hazardous waste sites. The presence of a hazardous materials site in proximity of a planned transportation project does not necessarily increase the risk for negative environmental health effects. In many cases, the construction of new transportation projects includes remediation of nearby hazardous material sites. However, based solely on the proximity between projects and waste sites, the data indicate that the Preferred Alternative would likely result in the highest number of effects on environmental health and the Baseline Alternative would likely result in the lowest number. Based on this location comparison, Alternative 1 was found to have the fewest number of hazardous waste sites within 100 feet of a project. Therefore, among the action alternatives, Alternative 1 would likely result in the lowest number of effects on environmental health (refer to Exhibit 1-21).

Exhibit 1-21. Projects Within 100 Feet of a Hazardous Materials Site

PROJECT TYPE	BASELINE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	PA
	ALT						
Transit, Roadway, & Ferry Related Projects	24	38	56	41	48	48	80
Nonmotorized Projects	1	13	8	8	9	21	15*

* Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

PUBLIC SERVICES AND UTILITIES

Impacts Common to All Alternatives

Given the minor land use differences among the alternatives, few land-use related effects are expected on public services and utilities from the alternatives. These effects could include solid waste generation, sanitary sewer generation, water supply usage, and increased emergency service responses. There could be differences among the alternatives in terms of safety, access, and mobility for fire, police, and health services, as well as safety, access, and mobility to schools. Most public service providers would experience relatively few long-term adverse effects from the alternatives. In most cases, public services would benefit from improved transportation services and facilities, although at different levels among the transportation alternatives. Effects on public services and utilities during construction may be unavoidable, but would be temporary. General public service vehicles such as school buses, mail delivery vehicles, and solid waste collection trucks would experience delays due to traffic congestion. Emergency service vehicles could also experience increased delays, and response calls could potentially increase as congestion contributes to additional accidents.

What are the limitations of the proximity analysis?

The purpose of the proximity analysis was to identify relative potential for impacts among alternatives, not to identify absolute numbers of potential impacts. As these projects are implemented, the actual number of impacts would be far less than shown, since the projects would be designed to avoid these impacts.

Impacts Specific to Individual Alternatives

All of the action alternatives are estimated to have less delay than the Baseline Alternative. Among the action alternatives, Alternative 1 is estimated to result in the most delay and Alternative 5 is estimated to result in the least delay. Therefore, Alternative 1 would likely result in the most negative effect to the provision of public services. Alternative 5, which is estimated to reduce delay below the 2006 base year in addition to the 2040 Baseline Alternative, would likely result in the most positive effects to the provision of public services.

The Preferred Alternative (Constrained) is estimated to have the second-least delay of the action alternatives. Therefore, the Preferred Alternative (Constrained) would likely result in the second most positive effects to the provision of public services. While the full Preferred Alternative is estimated to have less delay, the constrained portion of the Preferred Alternative is noted here because, as explained in Chapter 3: Plan Alternatives, chapters in this FEIS will address either the full or constrained plan, whichever would have the greater effect upon the environment.

PARKS AND RECREATION RESOURCES

Impacts Common to All Alternatives

Some significant unavoidable adverse effects on parks and recreational resources could occur under the alternatives. If acquisition of parkland is required for specific transportation projects, the amount of available parkland may be reduced. Although parks and recreational facilities would typically be avoided, use of parklands or other direct impacts may occur, particularly when other physical constraints limit the location of infrastructure. New transportation facilities on parcels adjacent to designated agricultural and forested lands could induce pressure to convert natural resource lands to urban uses incompatible with their function as open space.

Impacts Specific to Individual Alternatives

New project locations were compared to the locations of identified parks and recreation resources. Based on the proximity between projects and resources, the data indicate that the Preferred Alternative would likely result in the most effects on parks and recreation resources and the Baseline Alternative would likely result in the fewest. Among the action alternatives, Alternative 1 would likely result in the fewest effects on parks and recreation resources (refer to Exhibit 1-22).

Exhibit 1-22. Projects in the Vicinity of Parks and Open Spaces

PROJECT TYPE	BASELINE						PA
	ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	
Transit, Roadway, & Ferry Related Projects	8	14	37	21	19	24	42
Nonmotorized Projects	7	29	36	35	36	91	83*

* Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

HISTORIC AND CULTURAL RESOURCES

Impacts Common to All Alternatives

Effects to historic, cultural, and archaeological resources are possible with any of the alternatives. Impacts to historic resources are most likely when land is disturbed as part of constructing new or expanded transportation facilities. Construction activities have the potential to disturb archaeological sites and alter, damage, or remove historic properties.

Impacts Specific to Individual Alternatives

New project locations were compared to the locations of identified historic and cultural resource sites. Based on the proximity between projects and resources, the data indicate that the Preferred Alternative would likely result in the most effects on historic and cultural resources and the Baseline Alternative would likely result in the fewest. Among the action alternatives, Alternative 1 would likely result in the fewest effects on historic and cultural resources (refer to Exhibit 1-23).

Exhibit 1-23. Historic, Archeological, or Cultural Resources Within 100 Feet of a Project

PROJECT TYPE	BASELINE						PA
	ALT	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	
Transit, Roadway, & Ferry Related Projects	23	32	51	30	45	48	75
Nonmotorized Projects	0	13	7	7	7	29	17*

* Alternative 5 included many small bike concepts in urban centers throughout the region. During review of the DEIS alternatives, it was discovered that many of these concepts were already built, others were unable to find a sponsor, and others were deleted for other reasons. Concurrently, a smaller number of long nonmotorized projects were added to the Preferred Alternative that weren't in Alternative 5. This explains why the total nonmotorized mileage increased for the Preferred Alternative relative to Alternative 5, but the number of project proximity impacts decreased.

ENVIRONMENTAL JUSTICE

Environmental Justice analysis is optional under SEPA, however, Metropolitan Planning Organizations follow federal guidance to assess impacts on minority and/or low-income populations in the region.

Effects Common to All Alternatives

All action alternatives include continued expansion of transit and rideshare services, as well as projects that provide improvements for nonmotorized travel. These services, systems, and facilities provide improved mobility at a lower cost than travel by private automobile.

Effects Specific to Individual Alternatives

The equity analysis in Chapter 4 found that due to improved travel times and reliability, all action alternatives would be more beneficial than the Baseline Alternative, for environmental justice populations and the population as a whole.

Tolling could have adverse impacts but could also bring benefits to low-income populations. It is more difficult to determine whether the effect on low-income or minority populations would be considerably more severe or greater in magnitude than the effect suffered by the general population. This difficulty is due to the following factors:

- It is clear that toll payment represents a burden for low-income users. What is not clear, and presents an opportunity for future research, is whether paying for transportation improvements through tolling is more or less equitable than through gas taxes or other traditional funding sources.
- Often, tolling projects are coupled with transportation infrastructure or transit service improvements within the tolled corridor. It is unclear at the plan level whether the benefits of these improvements would outweigh the burden of the tolls.
- Tolling improves mobility, which results in travel time benefits for all populations.

Specific toll rates, facility locations, methods of toll payment, and use of toll revenues are topics likely to be discussed in detail in future project-level environmental review. In some instances, there may be significant unavoidable adverse impacts to specific groups of minority and low-income populations. If so, mitigation would be developed to partially offset these impacts.

HUMAN HEALTH

This topic was requested for study through public comments received during scoping. Topics that address human health include:

- Safety (incidence of accidents) and avoidance of inactivity (promotion of walking and bicycling trips)
- Air quality
- Environmental health and proximity
- Noise, including potential noise increases from transportation, industry, and other sources in the urban environment
- Water quality
- Proximity and degree of risk of exposure to hazardous materials

These topics are discussed in specific chapters of the FEIS.

12. How would these impacts be mitigated?

Mitigation measures are identified for all of elements of the environment in Chapters 4 through 18 of the FEIS.

This FEIS is a plan-level or non-project (rather than a project-level) EIS, per WAC 197-11-442. Accordingly, alternatives are defined and environmental effects are evaluated at a broad level. Similarly, potential measures to mitigate these environmental effects are discussed broadly. More detailed project-specific impacts and mitigation measures will be identified in future project-level review for projects identified in the Transportation 2040 plan that are selected for implementation by their sponsors: WSDOT, transit agencies, counties, and cities.

All of the Transportation 2040 alternatives contain similar project types, so the mitigation measures identified would be similar for all alternatives. However, each alternative contains different quantities of new projects and programs, so the amount of mitigation required could differ by alternative, and would likely correspond to the magnitude of impacts discussed in the response to Question 11.

13. What are the next steps?

After the release of the FEIS, PSRC will take the following steps:

- PSRC will continue to collect and review comments on the Draft Transportation 2040 Plan and will present these comments for consideration at the meeting of the General Assembly in spring 2010 (currently scheduled for May 2010).
- Based on a recommendation from PSRC's Transportation Policy Board and the Executive Board, the General Assembly will adopt Transportation 2040.
- Following the adoption of Transportation 2040, a project and program prioritization process will be developed (approximately two years, starting in summer 2010).

Overview of Contents in the FEIS

The Transportation 2040 FEIS is a plan-level environmental impact assessment consistent with SEPA requirements. Because of the scope of a regionwide proposal that spans a 30-year period, the document is complex, but is presented to highlight the vital information concerning potential impacts. The content is also consistent with the requirements of SEPA non-project actions. The contents are as follows:

Fact Sheet

1. Executive Summary
2. Introduction and Background
3. Plan Alternatives
4. Transportation
5. Land Use, Population, Employment, and Housing
6. Air Quality and Climate Change
7. Noise
8. Visual Quality and Aesthetic Resources
9. Water Quality and Hydrology
10. Ecosystems and Endangered Species Act Issues
11. Energy
12. Earth
13. Environmental Health
14. Public Services and Utilities
15. Parks and Recreation
16. Historic and Cultural Resources
17. Environmental Justice
18. Human Health

Appendices:

- A. Transportation 2040 Alternatives Report
- B. Regional Trends and Forecasts
- C. VISION 2040's Multicounty Planning Policies
- D. Policy Analysis and Evaluation Criteria Report
- E. Technical Description of the Modeling Framework
- F. Public Scoping Process
- G. List of Endangered, Threatened, and Sensitive Wildlife Species and Their Habitats
- H. List of Rare Plants
- I. Transportation 2040 Alternatives Analysis Congestion Management Process Report
- J. Environmental Resource Agency Consultation
- K. Data Analysis and Forecasting at the PSRC, New Tools Within an Integrated Modeling Framework
- L. Greenhouse Gas 4-part Strategy
- M. Environmental Justice Public Outreach Summary Report
- N. Public Outreach, Comment, and Response



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Chip Vincent, City of Renton — PSRC Regional Staff Committee
Elizabeth Warman, The Boeing Company — Business/Labor
Mark Weed, Greater Seattle Chamber of Commerce — Business/Labor
Luella Wells, League of Women Voters of Washington — Community/Environment
Vacant — Muckleshoot Tribal Council
Vacant — PSRC Transportation Enhancements Committee
Vacant — The Suquamish Tribe
Vacant — Thurston Regional Planning Council
Vacant — Washington State House Transportation Committee



PUGET SOUND REGIONAL COUNCIL MEMBERSHIP

Counties

- King County
- Kitsap County
- Pierce County
- Snohomish County

Cities and Tribes

- Algona
- Arlington
- Auburn
- Bainbridge Island
- Beaux Arts Village
- Bellevue
- Black Diamond
- Bonney Lake
- Bothell
- Bremerton
- Buckley
- Burien
- Clyde Hill
- Covington
- DuPont
- Duvall
- Eatonville
- Edgewood
- Edmonds
- Enumclaw
- Everett
- Federal Way
- Fife
- Fircrest
- Gig Harbor
- Granite Falls
- Hunts Point
- Issaquah
- Kenmore
- Kent
- Kirkland
- Lake Forest Park
- Lake Stevens
- Lakewood
- Lynnwood
- Maple Valley
- Marysville
- Medina
- Mercer Island
- Mill Creek
- Milton
- Monroe
- Mountlake Terrace
- Muckleshoot Indian Tribal Council
- Mukilteo
- Newcastle
- North Bend
- Orting
- Pacific
- Port Orchard
- Poulsbo



- Puyallup
- Redmond
- Renton
- Ruston
- Sammamish
- SeaTac
- Seattle
- Shoreline
- Skykomish
- Snohomish
- Snoqualmie
- Starwood
- Steilacoom
- Sultan
- Sumner
- The Suquamish Tribe
- Tacoma
- Tukwila
- University Place
- Woodinville
- Woodway
- Yarrow Point

Statutory Members

- Port of Bremerton
- Port of Everett
- Port of Seattle
- Port of Tacoma
- Washington State Department of Transportation
- Washington Transportation Commission

Associate Members

- Port of Edmonds
- Daniel J. Evans School of Public Affairs
- Island County
- Puyallup Tribe of Indians
- Snoqualmie Tribe
- Thurston Regional Planning Council
- The Tulalip Tribes

Transit Agencies

- Community Transit
- Everett Transportation Service
- Kitsap Transit
- Metropolitan King County
- Pierce Transit
- Sound Transit

APPENDIX C

Chapter 3 Plan Alternatives

1 What geographic area does the Transportation 2040 plan cover?

The central Puget Sound region is made up of King, Kitsap, Pierce, and Snohomish counties, and their 82 cities and towns (refer to Exhibit 3-1). The major metropolitan cities of the region are Seattle and Bellevue in King County, Bremerton in Kitsap County, Tacoma in Pierce County, and Everett in Snohomish County.

2 What makes up the region's Metropolitan Transportation System?

The Metropolitan Transportation System (MTS) for the central Puget Sound region facilitates the movement of people and goods making local, regional, national, and international trips. These trips range from traveling to work or school, flying across the country, or shipping Washington-made products overseas.

These trips are made using a variety of travel choices. Those choices are key elements of the MTS.

Roadway System

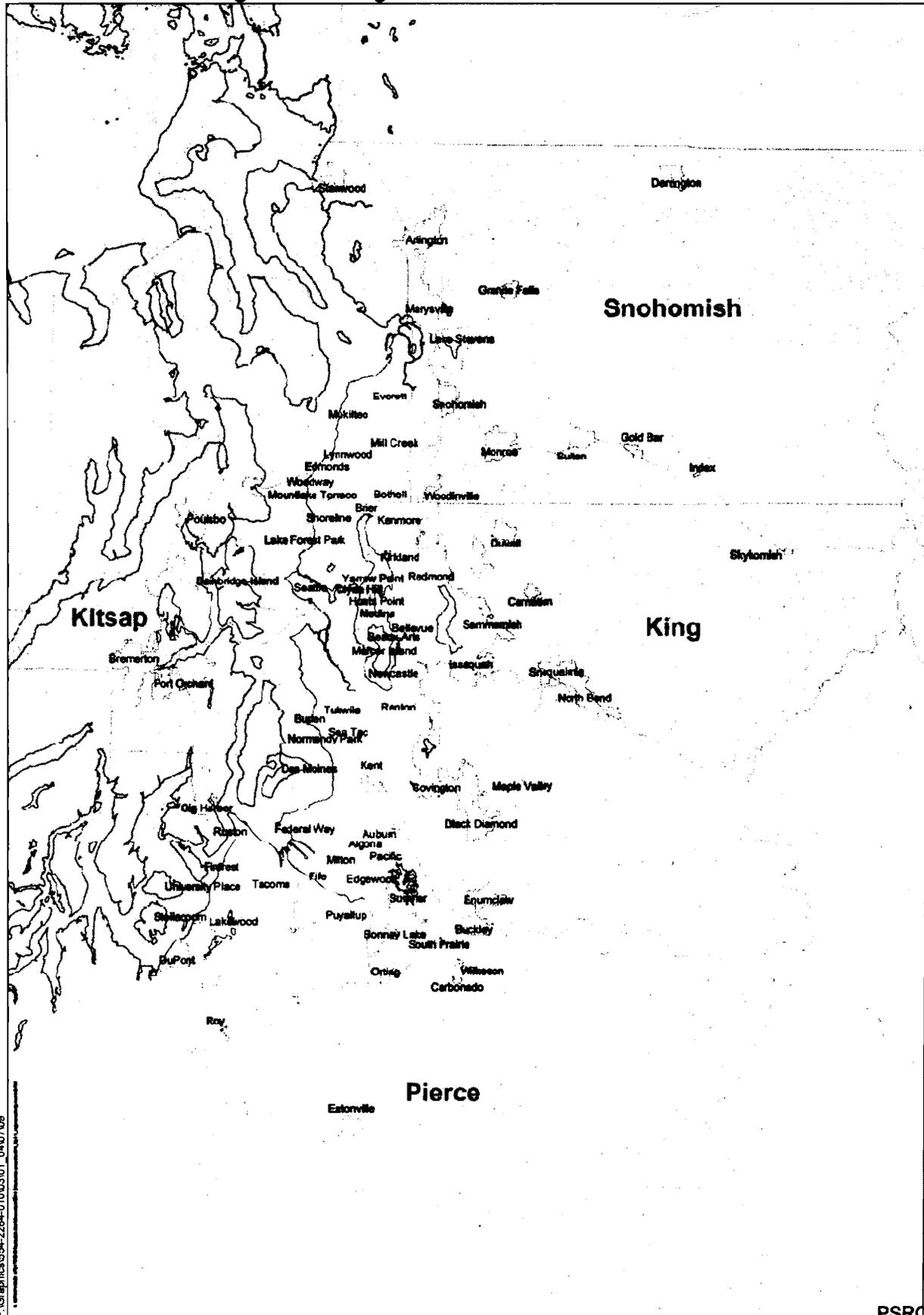
The region has thousands of miles of roadways ranging from interstate highways to residential streets. Roadways are the primary means for moving people and goods from one location to another in the region and beyond. The interstate system, which includes Interstate 5 (I-5), Interstate 405 (I-405), and

What is included in the Metropolitan Transportation System (MTS)?

The MTS promotes facilities and services for carrying out activities crucial to the social and economic health of the central Puget Sound region. Components of the MTS include:

- Roadway system
 - Ferry system
 - Transit systems
 - Nonmotorized system
 - Freight and goods system
 - Intercity passenger rail system
 - Regional airport system
 - Transportation System Management
 - Transportation Demand Management
-

Exhibit 3-1. Central Puget Sound Region Cities and Towns



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Interstate 90 (I-90), was created to support national commerce and defense needs. Together with state routes and U.S. Highways, the interstate highways are vital corridors connecting the central Puget Sound region to the rest of the state and the nation.

Ferry System

The region's ferry transportation system is the largest in the United States. It functions as a vehicle-carrying marine highway to move people and goods across Puget Sound, and as a high-capacity transit system that moves thousands of passengers daily. Washington State Ferries (WSF) operates the major routes across the Sound, with additional routes provided by Pierce County and the Kitsap Ferry Company.

Transit Systems

The region is served by regional and local public transit providers. Sound Transit, the Central Puget Sound Regional Transit Authority, is responsible for a mass transit system featuring commuter rail, light rail, and express bus services in King, Pierce, and Snohomish counties. Local transit service is provided by Community Transit (Snohomish County), Everett Transit, King County Metro Transit, Kitsap Transit, and Pierce Transit. The City of Seattle also operates monorail and streetcar services. These operators provide fixed-route and demand-responsive transit services, as well as vanpool services. Special needs transportation is provided by public transportation providers (both fixed-route and demand response service) and community-based and private transportation providers (usually demand response).

Nonmotorized System

The regional nonmotorized system consists of bicycle and pedestrian facilities, including dedicated bicycle and pedestrian paths, sidewalks, and bicycle routes or lanes on roadways.



Sound Transit's light rail service from Sea-Tac Airport to downtown Seattle started operation in 2009.

Source: Parametrix, Inc.

March 2010

PSRC-00001267

Freight and Goods System

The regional freight and goods system consists of roadways, port facilities, railroads and rail yards, and airport facilities, which serve to move freight within and through the region. The system includes the following types of facilities:

- *Freight Roadways.* These are roadways throughout the system that carry more than 4 million tons annually and are designated as critical for freight movement by the state of Washington (WSDOT, 2007). These include all of the region's interstate highways and some of the most important state routes and arterials.
- *Ports.* Everett, Seattle, and Tacoma provide marine deepwater ports to accommodate ocean-going container ships that carry cargo in and out of the region. The ports of Seattle and Tacoma are among the busiest ports in the United States, and along with the Port of Everett, continue to improve facilities to accommodate changing domestic and international needs.
- *Airports.* Two major airports in the region serve freight: the Seattle-Tacoma International Airport (Sea-Tac Airport) and King County International Airport (Boeing Field).
- *Railroads.* Two major national railroads serve the central Puget Sound region and provide intercontinental service: Burlington Northern Santa Fe and Union Pacific. Local distribution is provided by Tacoma Rail in Pierce County to the Port of Tacoma and by the Ballard Terminal Railway in Seattle.

Intercity Passenger Rail

Using major national railroads, Amtrak passenger rail trains provide service between Eugene, Oregon, and Vancouver, B.C. (Amtrak Cascades); Seattle and Los Angeles (Coast Starlight); and Seattle and Chicago (Empire Builder).

Regional Airport System

The MTS focuses on six regionally significant aviation facilities, among more than 25 aviation facilities throughout the four-county region: Sea-Tac Airport, Boeing Field, Paine Field,



Planning for future growth in aviation is an important challenge for the region.

Source: Parametrix, Inc.

Renton Municipal Airport, Harvey Field in Snohomish County, and Auburn Municipal Airport.

Transportation System Management Programs

These programs and facilities focus on operating the region's multimodal transportation system as safely and efficiently as possible through the use of information, control, and communications technologies. Many jurisdictions and agencies are involved in these programs, including the Washington State Department of Transportation (WSDOT), the region's transit operators, and local governments. Systems range from emergency management to traveler information to signal timing.

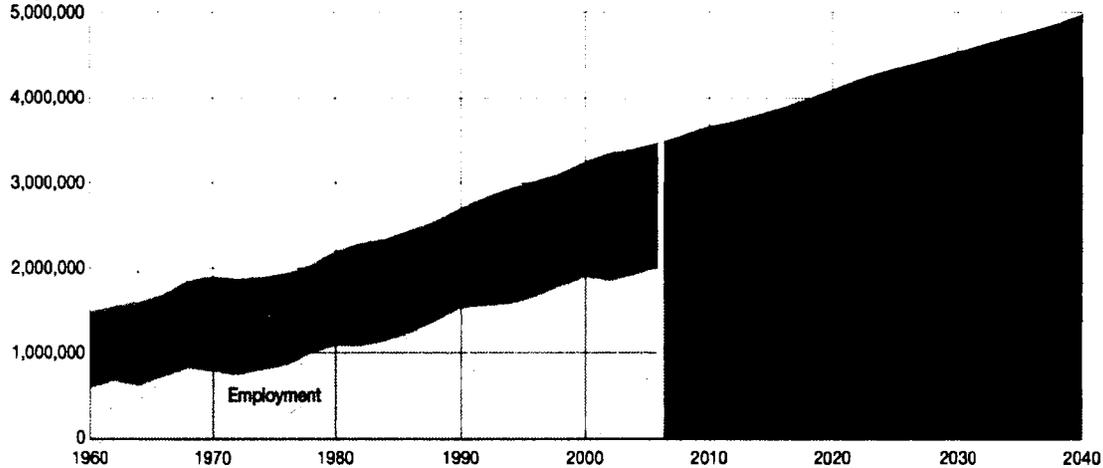
Transportation Demand Management Programs

These programs and strategies seek to improve the efficiency of the transportation system by promoting alternatives to driving alone, such as by shifting trips out of peak travel periods; using rideshare, transit, bicycling, or walking; or reducing the need for trips.

3 What challenges are addressed by the Transportation 2040 plan alternatives?

PSRC forecasts indicate that as the region adds 1.5 million people and 1.2 million jobs by 2040 (refer to Exhibit 3-2), people in the region will likely take 19.1 million trips daily. Those trips will be made by vehicle, bicycle, transit, ferry, or on foot, and represent an overall 39 percent increase over trips in 2006.

**Exhibit 3-2
Population and Job Growth Trends and Forecasts**



To address this growing regional travel demand, the State Environmental Policy Act (SEPA) scoping process helped to identify a number of objectives that this plan will address. These objectives became the basis for the development of major issues and for the evaluation framework being used to evaluate the alternatives. Through the scoping and related processes three major challenges/issues emerged: congestion and mobility, the environment, and transportation finance. These issues were considered in the development of the alternatives by varying the amount of efficiency and strategic capacity programs and the level and type of financial investments in the action alternatives. In particular, each action alternative includes various levels of tolling to evaluate the implications of these strategies on congestion, the environment, and transportation finance.

Congestion and Mobility: Reduce congestion for all types of freight and person travel.

The first challenge is to address how the region can maintain and improve regional mobility with forecasted growth in population and employment.

Tolling

All plan alternatives include some form of tolling or user fees to help fund improvements. Tolling options include:

- High-occupancy toll (HOT) lanes
 - Freeway and bridge tolls
 - Ferry fares
 - Arterial road tolls
 - Vehicle miles traveled fees
-

Environmental Concerns: Reduce greenhouse gas emissions linked to climate change, and reduce water quality impacts on Puget Sound.

The second major challenge is to learn how to reconcile the need for transportation facilities and their uses with growing concerns about how to protect and restore the quality of the built and natural environment. Transportation activities, if unmitigated, are a major source of water and air pollutants, including greenhouse gas emissions.

Transportation Finance: Support the development of sustainable transportation funding.

The third challenge, although not a component of this Environmental Impact Statement, is transportation finance. Information on transportation finance issues is included in the Transportation 2040 plan. Sustainable funding is a critical implementation issue for any of the alternatives and is a part of the region's federal requirement to produce a financially constrained plan.

Transportation 2040 provides additional information on travel trends, physical constraints, and the environmental concerns that need to be addressed to meet the region's commitments to better environmental stewardship. It also supports the region's policy to develop an urban environment that promotes healthy, active lifestyles.

4 What alternatives are being analyzed by the Transportation 2040 FEIS?

This Final EIS (FEIS) analyzes seven plan alternatives—a Baseline Alternative plus six action alternatives, including the Preferred Alternative. Each alternative describes how transportation investments can improve efficiency and expand the system's ability to handle future demand, while at the same time support the region's goals for managing urban growth and protecting the environment.

Transportation 2040 Alternatives

Please refer to Appendix A for more details on the Transportation 2040 alternatives.

3-8 Plan Alternatives

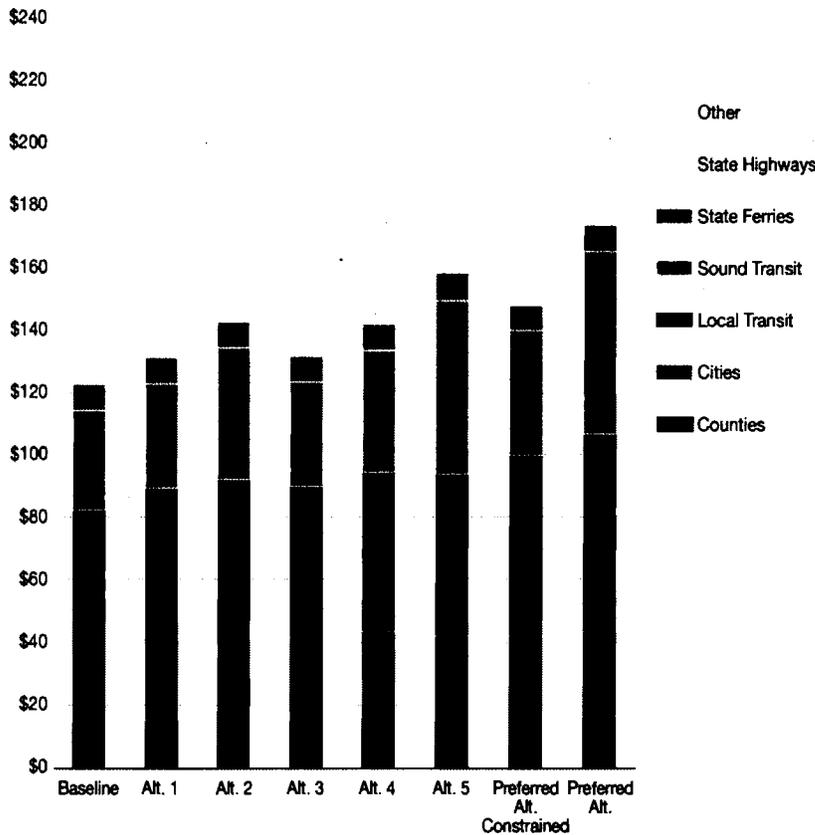
Improving efficiency means making better use of the existing system and managing growing demand more effectively, particularly during peak morning and evening travel hours. Efficiency can be improved through shifts in the chosen route, the time of travel, the mode of travel, and the patterns of trips taken to work and other activities.

Strategic expansion means increasing capacity by making investments in both capital facilities and operations. These investments include projects to relieve roadway bottlenecks; expanded and new transit lanes, transit services, and fleets; vanpools and carpool programs; high-occupancy vehicle (HOV) lanes; bicycle and pedestrian trails, sidewalks, and paths; and ferry terminals and service.

Some elements are consistent among all plan alternatives, and others vary. Exhibit 3-3 illustrates the relative level of investment for each element of the Transportation 2040 alternatives. These elements are described below.

Exhibit 3-3¹
Program Investments in the Transportation 2040 Alternatives

(millions of 2008 dollars)



What is the difference between the Preferred Alternative (Constrained) and the Preferred Alternative?

The Preferred Alternative includes two categories of programs and projects: (1) Constrained, and (2) Unprogrammed. These categories recognize the federally approved structure for regional plans and the range of uncertainty that is inherent in long-range transportation planning programs.

The Preferred Alternative contains both the financially constrained and the unprogrammed programs and projects.

How does this FEIS analyze the constrained portion of the Preferred Alternative?

The Preferred Alternative in this FEIS contains both the financially constrained and the unprogrammed programs and projects (sometimes referred to as the full Preferred Alternative). Accordingly, most of the environmental disciplines analyze the potential effects of the Preferred Alternative. However, for instances when the constrained portion of the Preferred Alternative would result in greater effects upon the environment, such as in certain analyses in Chapter 4: Transportation and Chapter 6: Air Quality and Climate Change, the effects of the constrained portion of the Preferred Alternative are analyzed.

Consistent Growth Assumptions

Each alternative was analyzed using the same future land use policy and strategy assumptions for growth management as established in VISION 2040. The base year 2006 population is also consistent. The analysis found minimal population and employment growth differences among the alternatives in the year 2040 at the regional level.

Consistent Transportation Assumptions

The Baseline Alternative is the starting point for comparing the alternatives. The action alternatives start with the policies, plans, and funded projects included in the Baseline Alternative.

¹ This exhibit has changed since the DEIS

Each alternative also includes the current base year (2006) transportation facilities in the region.

In addition, the action alternatives include an identical set of core investments to improve safety and security and to support transportation options for special needs populations. These core investments focus on improvements that extend beyond the existing funding level and are therefore not contained in the Baseline Alternative.

Core investments would include improved roadway crossings, safety projects, improved signal coordination, completion of freeway system ramp metering and coordination with arterial signals, and Freight Action Strategy (FAST) freight mobility projects.

Differing Transportation Assumptions

The action alternatives differ by the new projects, policies, and programs proposed in each, and by how new projects and programs (and to a lesser extent existing projects and programs) are financed. These different levels of investment in projects and programs are shown in Exhibit 3-3 and described in the subsequent sections.

All action alternatives contain components to expand and complete the walking and bicycling network and ways to connect this network to transit stations and ferry terminals, although at different levels of investment and emphasis. Each action alternative also includes programs to reduce vehicle miles traveled and to reduce greenhouse gas emissions, again at different levels.

The action alternatives differ in how the region would distribute investments in efficiency and expansion. The approaches range from modest improvements with limited funds to a dramatic shift in priorities resulting in a new type of transportation system.

Tolling also plays a role in each alternative. The alternatives explore how different approaches to tolling can help manage congestion and also pay for improvements.

5 Which programs and projects are included in the Baseline Alternative (SEPA No-Action Alternative): Build Funded Projects?

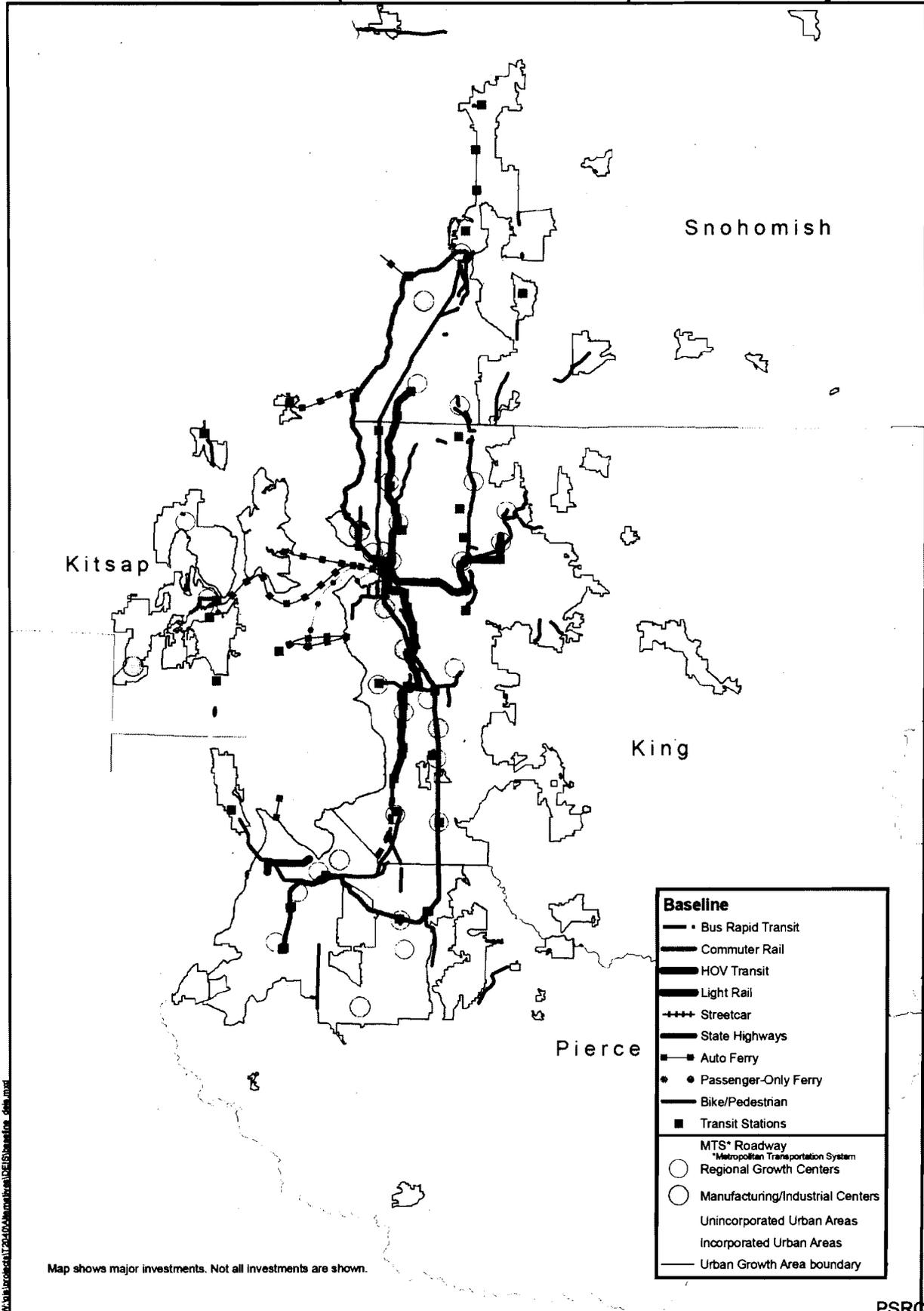
The Baseline Alternative is funded mostly with “current law” traditional revenue sources—gas tax, sales tax, state and federal grants and loans, local general fund revenues, permit and licensing fees, and limited tolling (on the Tacoma Narrows Bridge and the ferry system). The Baseline Alternative would build state highway projects funded under the state’s “nickel” gas tax and Transportation Partnership Account (TPA) programs, plus the Sound Transit Phase 2 (ST2) plan, approved by voters in November 2008. It would sustain existing ferry service and demand management programs and make modest additions to transit service, including King County Metro’s RapidRide and Community Transit’s Swift bus rapid transit (BRT). Beyond current law funding, the Baseline Alternative assumes that the region would find sufficient additional revenue to fully maintain and preserve the existing transportation system.

The programs and projects included in the Baseline Alternative are described below and are shown in Exhibits 3-4 and 3-5.

Why is a “No Action” alternative required?

The State Environmental Policy Act (SEPA) requires the evaluation of the no-action alternative, which at times may be more environmentally costly than the action alternatives, or may not be considered “reasonable” by other criteria. Still, it provides a benchmark to which the other alternatives can be compared.

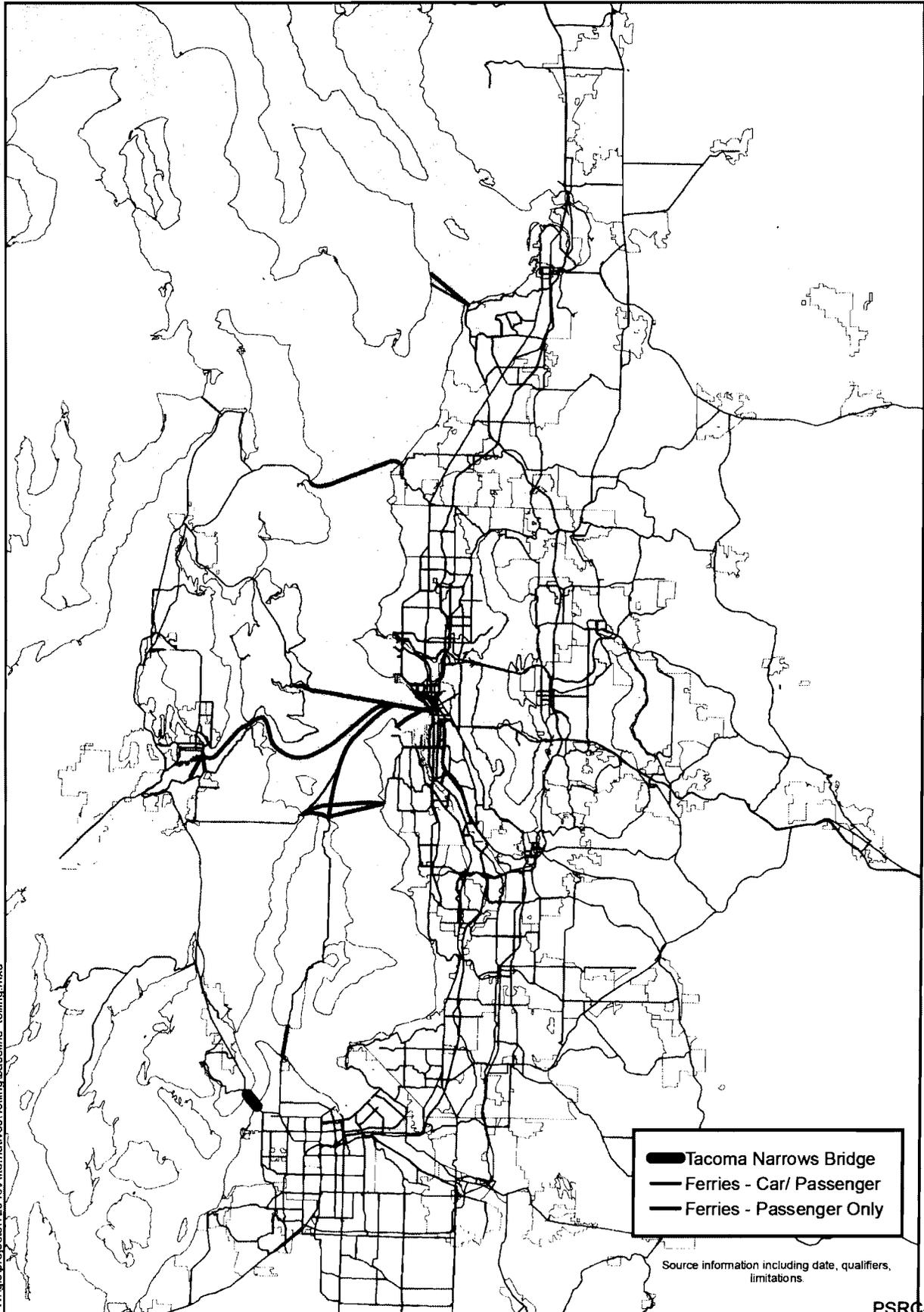
Exhibit 3-4. Baseline Alternative (SEPA No-Action Alternative): Build Funded Projects



www.wa.gov/transportation/DEIS/Exhibit3-4.pdf

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Exhibit 3-5. Baseline Alternative Tolling Map



PSRC-0001277

Baseline Alternative System Efficiency

Baseline Alternative Demand Management

The Baseline Alternative assumes that participation in employer demand management programs will continue at existing levels (714 employment sites with 100 or more employees). Support continues for Growth and Transportation Efficiency Center (GTEC) programs in Seattle, Bellevue, and Tacoma, and the regional growth center in the Redmond/Overlake area. Parking management programs will vary from jurisdiction to jurisdiction, as will investments in “complete streets,” bicycle and pedestrian networks, and local development regulations to induce mixed-use development near transit centers and rail stations.

Baseline Alternative System Management

This program will include ramp metering, Intelligent Transportation Systems (ITS), corridor management, transit signal priority, incident detection and management, active traffic management and speed harmonization programs, and 511 and traveler information systems. The Baseline Alternative assumes that the state and the region can maintain and preserve existing ferry routes (and service levels), terminals, the fleet, and current passenger-only service.

Baseline Alternative Strategic Expansion

Baseline Alternative Roadways

The roadway improvements in the Baseline Alternative are limited to those funded by the state’s “nickel” and Transportation Partnership Act funding programs, plus a few other investments funded under current law. Tolling is limited to those facilities where it exists or is planned (on the ferry system and the Tacoma Narrows Bridge until the tolls are lifted).

Baseline Alternative Transit

The Baseline Alternative assumes that funds are available to maintain current levels of transit services for core, community connector, and specialized types of service and to increase service across all providers by, on average, approximately 1 percent per year. Core service operates all day at a high

What are Growth and Transportation Efficiency Centers (GTECs)?

GTECs are defined areas (generally with higher employment and/or population) within which cities are encouraged to expand.

frequency serving a high volume of riders. Community connector transit provides less frequent service to areas with lower ridership. Specialized transit offers service to specific destinations at limited times of day, such as peak hour trips to centers from park-and-ride lots.

The Baseline Alternative includes funding to complete Sound Transit's Phase 1 and 2 programs, which will expand the light rail, commuter rail, and express bus network. The region's other transit agencies will implement 6-year plans, including King County Metro's RapidRide BRT projects and Community Transit's SWIFT services along SR 99 in Snohomish and King counties.

Baseline Alternative Ferry

The Baseline Alternative assumes that the state and the region can maintain and preserve existing ferry routes (and service levels), terminals, the fleet, and current passenger-only service.

Baseline Alternative Bicycle and Pedestrian

The Baseline Alternative includes completion of selected trail extensions and bicycle lanes. Sidewalk completions or improvements are subject to funding availability and based on local plans and regulations.

Baseline Alternative Funding

The Baseline Alternative would be funded using current law revenues primarily from traditional sources (gas tax, sales tax, etc.). Toll revenues would also be available from the ferry system (fares), tolls on the State Route (SR) 167 high-occupancy toll (HOT) lanes, and from the Tacoma Narrows Bridge.

Baseline Alternative Preservation

In general, the Baseline Alternative assumes that existing facilities will maintain their capacity through year 2040 (exceptions are noted in Appendix A: Alternatives Technical Report). The state and the region are planning two major replacement efforts for the Alaskan Way Viaduct and Seawall Replacement Program and the SR 520 Bridge Replacement and

HOV Project. The regional plan update made the following assumptions to allow regional planning to proceed while these processes reach their own conclusions:

Alaskan Way Viaduct

All alternatives, including the Baseline Alternative, assume that sufficient resources have been committed to preserve the viaduct or replace it in ways that would be equivalent to the current viaduct's capacity (three lanes in each direction through the downtown core).

SR 520 Bridge Replacement

The Baseline Alternative assumes that sufficient resources have been committed to preserve the bridge in ways that would maintain the current capacity (two lanes each direction at the middle of Lake Washington on the bridge section).

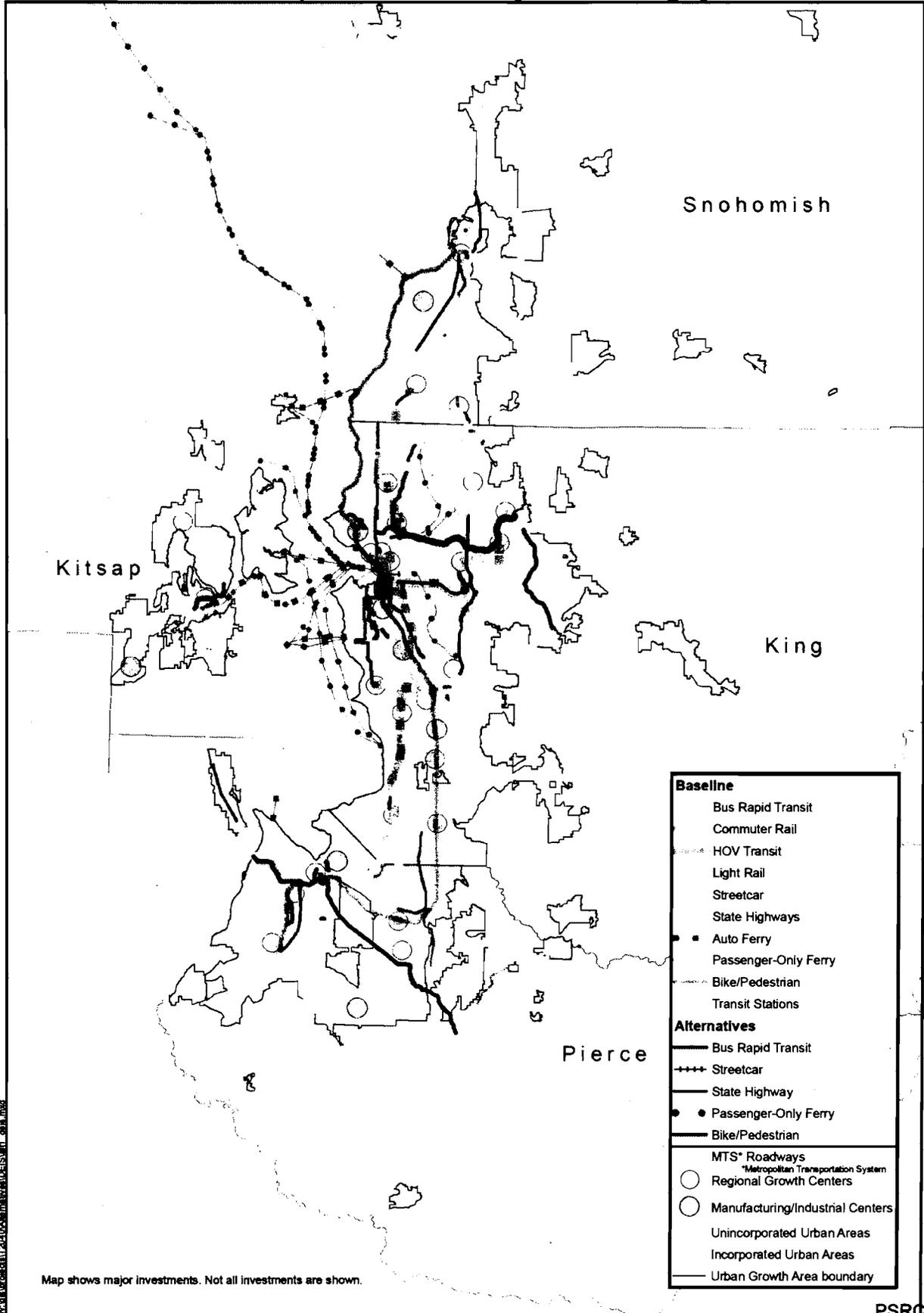
Alternatives 1 through 5 include replacing the existing Evergreen Point Bridge (referred to herein as the SR 520 floating bridge) with a six-lane structure (two general-purpose lanes and one managed lane in each direction).

6 Which programs and projects are included in Alternative 1: Emphasize the Efficiency of the Existing System?

This alternative is designed to recognize that one possible future goal is to make the most of our existing transportation system with limited funding. This scenario includes efficiency improvements through significant investments in programs to manage demand and in technology to manage roadways. This management strategy includes limited use of tolling by converting the existing HOV network to a one-lane HOT system with limited capacity investments to provide a two-lane HOT system on much of I-405. In addition, Alternative 1 includes a substantial increase in bus service. Together, these strategies are designed to do a better job of moving people and goods on the existing system by providing options that would reduce both demand for peak hour travel and demand for drive-alone trips.

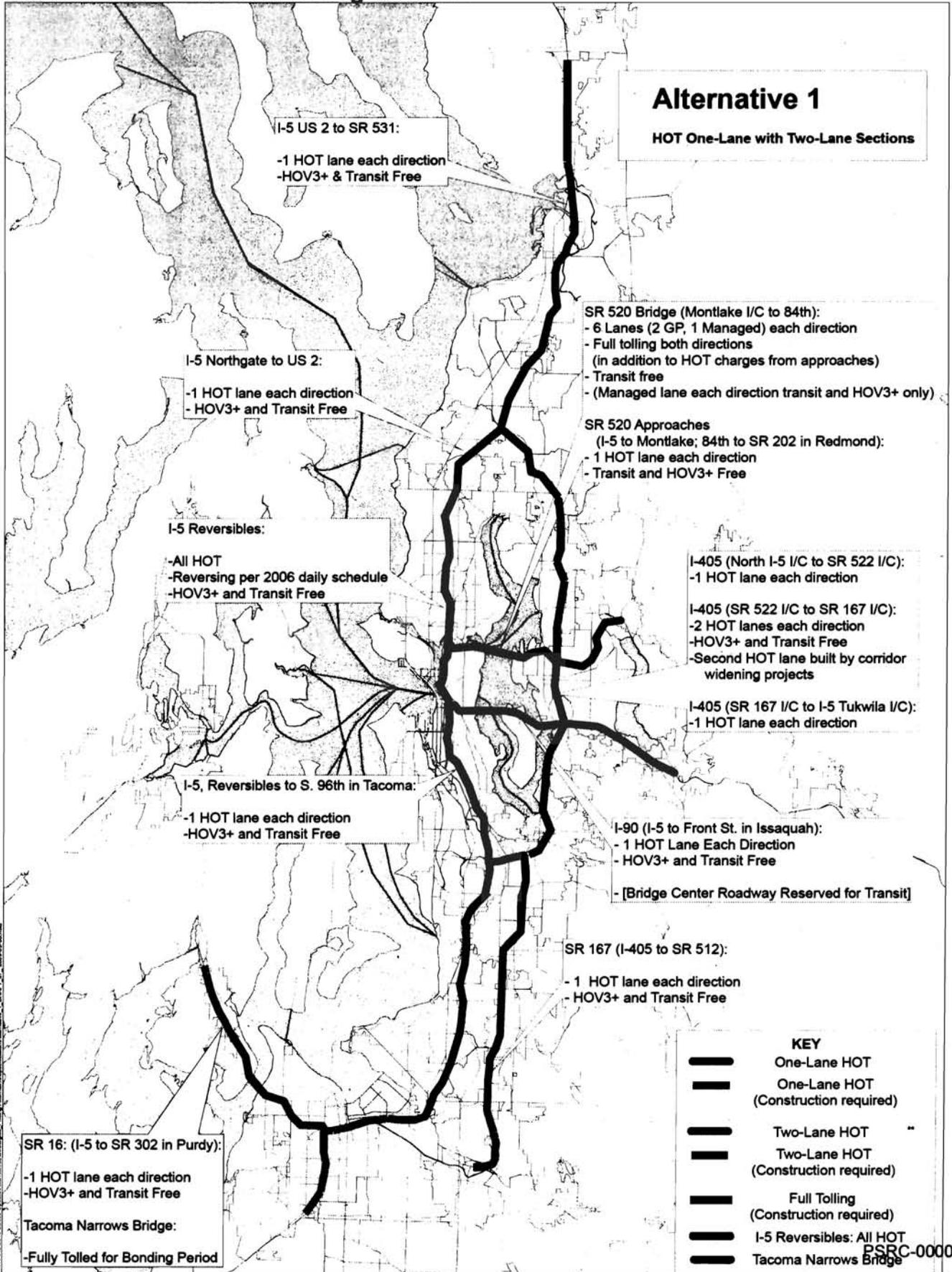
The programs and projects included in Alternative 1 are described below and are shown in Exhibits 3-6 and 3-7.

Exhibit 3-6. Alternative 1: Emphasize the Efficiency of the Existing System



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Exhibit 3-7. Alternative 1: Tolling Scenario



Alternative 1 System Efficiency**Alternative 1 Demand Management**

To increase the efficiency of the system, Alternative 1 places more emphasis on the use of employer demand management programs (incentive and volunteer) that promote options to driving alone. Options include expanding established programs such as Commute Trip Reduction (CTR), better use of vanpools, guaranteed ride home, and more opportunities to telecommute. GTEC programs would extend to more locations and could include options for trips that are not part of the work commute. These programs will accomplish several objectives: fewer vehicle trips, improved air quality, and other quality-of-life improvements. More cities would address parking regulations and implement parking rate surcharges or increases for both private and public facilities.

Alternative 1 System Management

Alternative 1 makes use of a variety of ITS techniques to monitor the system and to improve freight mobility on freeways and arterials. These ITS techniques range from center-to-center communications to in-vehicle traveler information devices. Alternative 1 also expands system management techniques and programs (e.g., signal coordination, incident management), extending them across jurisdictional boundaries regionwide. Doing so would reduce travel times and delay and would improve travel reliability.

Alternative 1 Strategic Expansion**Alternative 1 Roadways**

Alternative 1 includes improvements to HOV lanes on I-5 and SR 16. This alternative relies on the limited use of tolling by implementing the one-lane HOT lane network on core freeways and is designed to improve roadway operations (HOT lanes allow single-occupant vehicles to use the HOV lane for a fee). Toll rates would be set to maximize system efficiency, and most revenues would be spent to operate the HOT network, with the remainder spent on investments in the tolled corridors. (The HOT network includes lanes on I-5, I-90, I-405, SR 167, and SR 16, with full tolls in both directions on the SR 520 floating bridge.)

Alternative 1 Transit

Alternative 1 makes the most of low-cost transit investments to improve core service throughout the day and more community connector service during peak hours. Sound Transit ST2 will extend Link light rail service north to Lynnwood, east to Redmond/Overlake, and south to Redondo/Federal Way. Increases in transit service hours would keep pace with the region's population growth. Improvements that connect regional growth centers to transit centers, rail stations, and ferry terminals will also result in a more efficient system.

Alternative 1 Bicycle and Pedestrian

An extended and safer network of connecting sidewalks, trails, and paths will facilitate bicycle and pedestrian choices.

Alternative 1 Funding

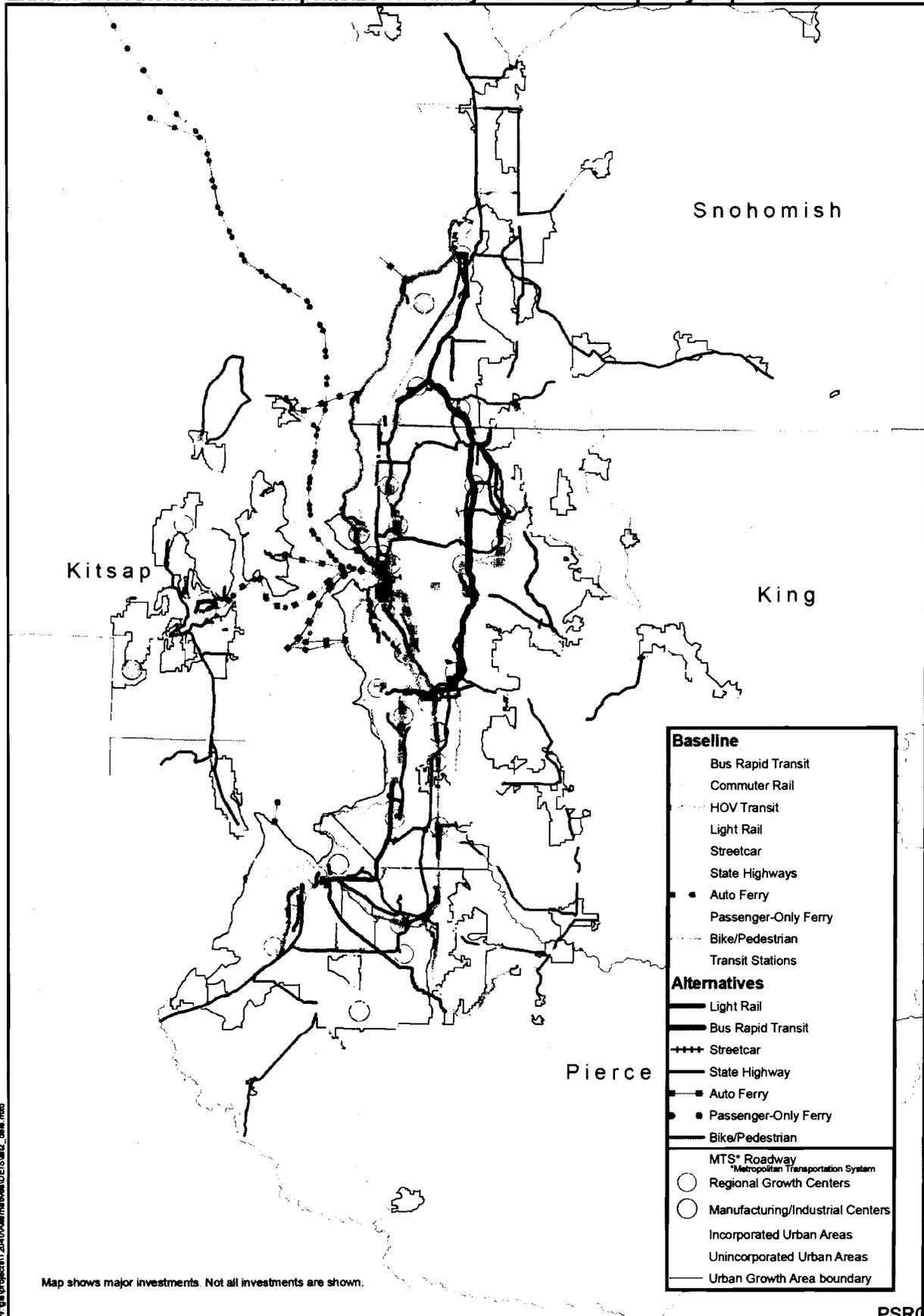
Alternative 1 would rely on limited increases in traditional funding (gas tax, etc.), revenue from a one-lane HOT lane system on core freeways, and additional parking revenues for local jurisdictions.

7 Which programs and projects are included in Alternative 2: Emphasize Roadway and Transit Capacity Expansion?

This alternative most resembles the current plan, Destination 2030. Alternative 2 adds the most roadway capacity through lane additions to existing highways, the creation of several new highways (SR 167 Extension, SR 509 Extension, and the Cross-Base Highway), and added lanes on the regional arterial network. It adds considerable new light rail capacity beyond ST2 and a new auto ferry route across Puget Sound. It adds pedestrian and bicycle infrastructure in key locations. Its demand management, bus service, and system management investments are similar to the Baseline Alternative. Its most significant management strategy is the establishment of a two-lane HOT system on much of the regional freeway network (with some one-lane HOT) to manage congestion and provide revenue to supplement traditional funding sources. Traditional funding sources would provide the majority of the financing.

The programs and projects included in Alternative 2 are described below and are shown in Exhibits 3-8 and 3-9.

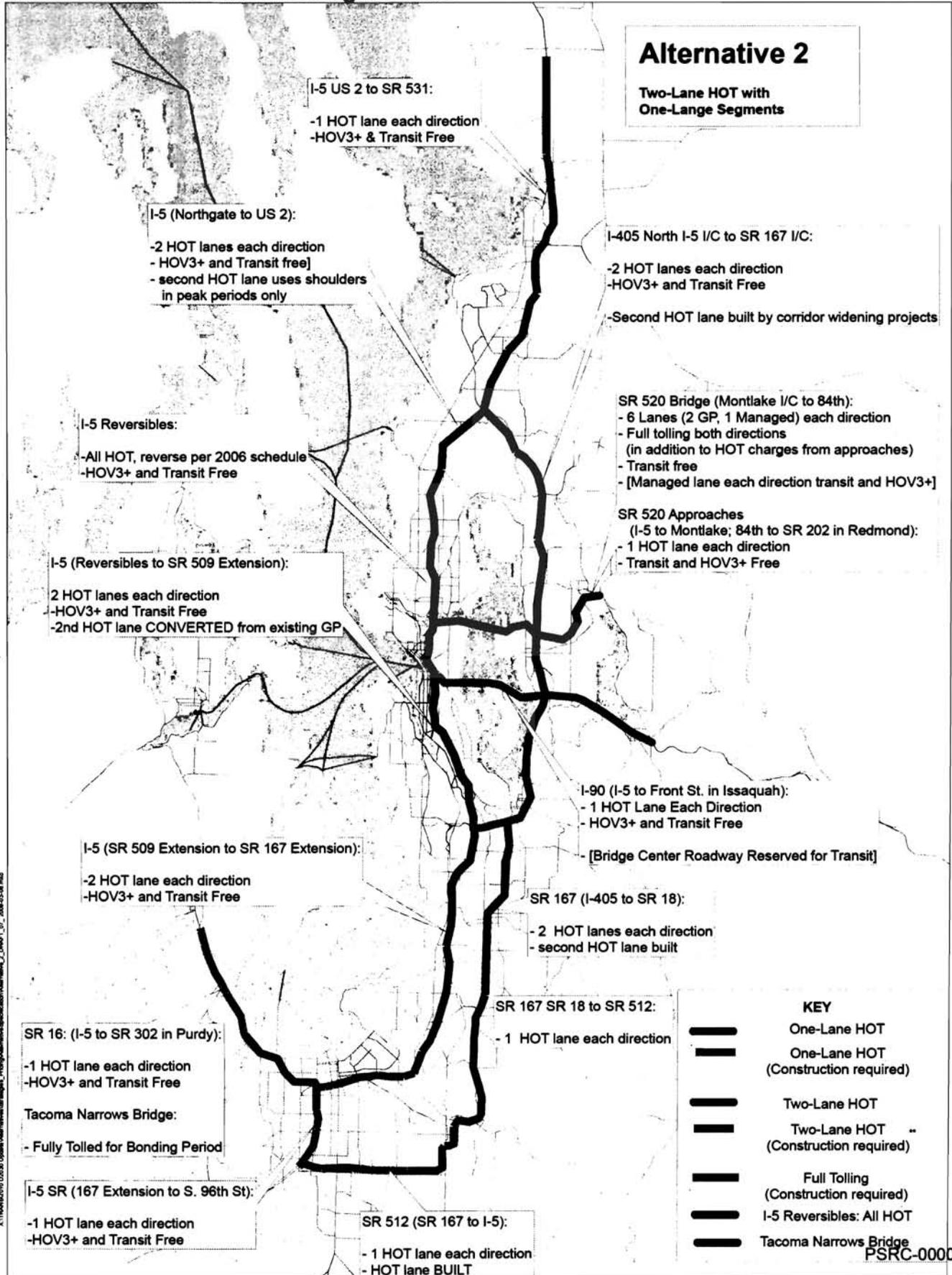
Exhibit 3-8. Alternative 2: Emphasize Roadway and Transit Capacity Expansion



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Exhibit 3-9. Alternative 2 Tolling Scenario



PSRC-00001286

Alternative 2 System Efficiency**Alternative 2 Demand Management**

Given its emphasis on roadway and transit expansion, Alternative 2 relies less on increased participation in employer demand management programs such as commute trip reduction (CTR), vanpools, and “telework” for system efficiency. Rather than expecting all cities with regional growth centers to participate in GTECs and “complete streets” programs, Alternative 2 places emphasis on the five metropolitan cities (Seattle, Bellevue, Bremerton, Everett, and Tacoma) as proposed locations for such programs. Pricing strategies and a reservation system would help manage auto ferry demand and improve system efficiency.

Alternative 2 System Management

There would be only modest investments in overall system management programs and ITS. Efforts would concentrate on coordinating signals across jurisdictional boundaries and transit signal priority improvements.

Alternative 2 Strategic Expansion**Alternative 2 Roadways**

Alternative 2 assumes both arterial and freeway expansions (on I-405, SR 167, SR 18, SR 522, SR 509, and US 2 among others). This alternative proposes to convert existing HOV lanes to HOT lanes and to add new HOT lanes, resulting in a two-lane HOT system on a large portion of the region’s freeways. This will result in increased efficiency by maximizing use of the roadway capacity to improve travel times, reduce delay, and improve reliability for all users.

Alternative 2 Transit

In Alternative 2, rail and ferry services would extend farther. Sound Transit’s Link light rail service would extend to Everett, Tacoma, and downtown Redmond. Passenger-only ferry service would augment the WSF auto ferry system, with improved transit connections to ferry terminals.

Alternative 2 Bicycle and Pedestrian

Alternative 2 includes investments to complete a continuous network of sidewalks, paths, and trails to connect bicyclists and pedestrians to transit centers, rail stations, and ferry terminals.

This network would also connect to park-and-ride lots in manufacturing/industrial centers and in regional growth centers. Combining bicycle and pedestrian options with the expanded transit systems and more efficient roadways would provide significant improvements in access to housing and jobs.

Alternative 2 Funding

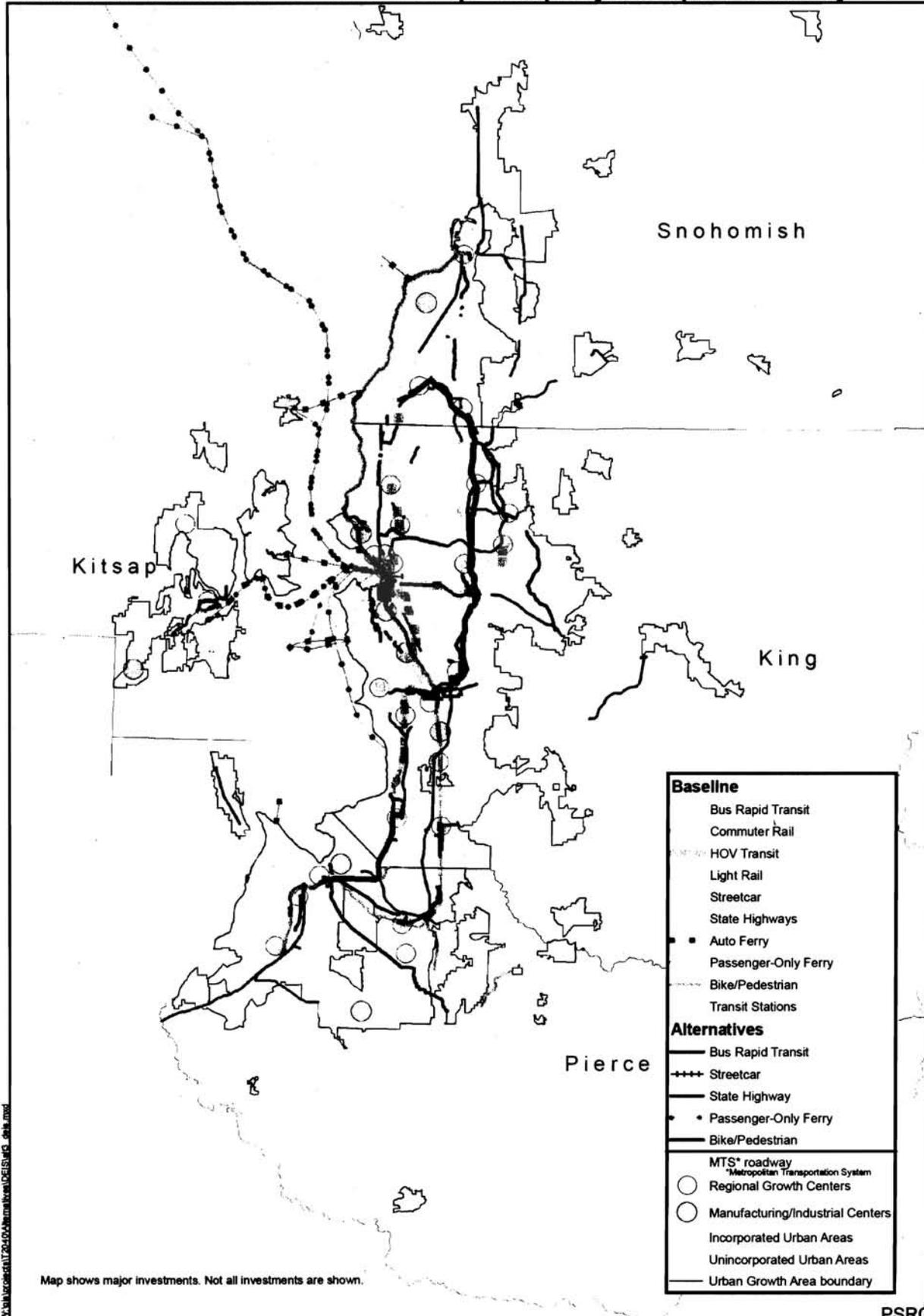
Alternative 2 would rely on significantly more traditional funding (gas tax, etc.), as well as new revenues from implementing a two-lane HOT lane network on major highways. Given the amount of new capacity investments, this alternative would likely have the highest need for generating new revenue.

8 Which program and projects are included in Alternative 3: Toll Revenues Expand Capacity and Improve Efficiency?

Alternative 3 would expand capacity and improve efficiency primarily in the central portion of the Puget Sound region. This alternative proposes a significant shift in the way our region collects and allocates transportation funds. Major freeways where improvements are planned would be tolled, and toll revenues would be spent on highway improvements in the tolled corridors. These revenues would be sufficient to fund significant portions of highway projects, including lane additions on the central regional freeways; reconfiguration of ramps and interchanges for efficiency, such as those on I-5; and new facilities such as the SR 167 Extension, SR 509 Extension, and the Cross-Base Highway. Traditional revenues would fund other efficiency and management programs, including substantial bus service investments, strategic arterial roadway expansion, and new off-road trail infrastructure in the corridors connecting the regional centers to form a nonmotorized network. Alternative 3 includes the same light rail program (Sound Transit's Phase 2 [ST2]) as the Baseline Alternative to form the regional transit system. The highway tolling rates would be set to also serve a demand management function and minimize impacts on adjacent arterials.

The programs and projects included in Alternative 3 are described below and are shown in Exhibits 3-10 and 3-11.

Exhibit 3-10. Alternative 3: Toll Revenues Expand Capacity and Improve Efficiency



PSRC-00001289

Alternative 3 System Efficiency

Alternative 3 Demand Management

Alternative 3 relies more on greater participation in employer demand management programs such as CTR, vanpools, and “telework.” GTECs would locate in all cities with regional growth centers and would collect additional parking charges to manage parking supply. This alternative includes incentives for mixed-use development near transit centers and rail stations. In response to a greater demand for parking, a user fee would be charged at park-and-ride lots. Regional growth centers may provide incentives to supply parking for carpools and vanpools. Pricing strategies and a reservation system would help manage auto ferry demand and improve system efficiency.

Alternative 3 System Management

The approach to arterial management in Alternative 3 concentrates on signal coordination in major corridors that connect centers, and places a strong emphasis on ITS and a wide range of other technology tools (from center-to-center communications to in-vehicle devices) that allow operators—including freight movers and transit drivers—to use the system more efficiently.

Alternative 3 Strategic Expansion

Alternative 3 Roadways

By collecting tolls on the region’s core freeways, Alternative 3 would generate sufficient revenue to complete major highway projects, including the SR 509 and SR 167 extension projects, as well as improvements to SR 9, SR 18, and US 2. It is important to note that Alternative 3 proposes to adhere to a traditional tolling philosophy that targets the use of toll revenue to the facility where it is collected. The collected toll funds would not be spent on transit or other projects, programs, or system improvements.

Alternative 3 Transit

Alternative 3 implements specific management measures to retain transit speed and reliability on the arterial system. Transit service hours would increase from higher transit speeds on the tolled freeways. These additional service hours would be reallocated to key arterial routes. This alternative would also

focus arterial system management investments on transit-supportive strategies. Passenger-only ferry service would augment the Washington State Ferries (WSF) auto ferry system, and transit service to ferry terminals would be improved.

Alternative 3 Bicycle and Pedestrian

Alternative 3 would increase bicycle access to transit on arterials and proposes to complete sidewalk networks on all arterials in urban areas. Bicyclists would benefit from a completed network along the corridors that connect regional growth centers. Bicycle and car share programs would offer more travel choices.

Alternative 3 Funding

Alternative 3 would rely on toll revenues to finance highway improvements and would use limited traditional funding sources (sales taxes) to fund transit improvements. In this alternative, tolls would be placed on the core freeway system: I-5, I-405, I-90, the SR 520 floating bridge, SR 167, SR 509, and the northern segment of SR 18 near Snoqualmie that would be widened.

9 Which programs and projects are included in Alternative 4: Combine Traditional Revenues and Tolls to Maximize Efficiency?

This alternative combines traditional revenue sources and highway tolling to create funding for a broad array of investments. In this alternative, nearly the entire highway network would be tolled, and toll rates would be set to maximize efficiency rather than to generate revenue. It includes strategic roadway expansion to alleviate congestion at bottlenecks and chokepoints, integrated system management and operational coordination across multiple modes, a light rail network beyond ST2, significant bus service increases, and strategic arterial roadway expansion. It would add new bicycle and pedestrian infrastructure in the regional centers and their connecting corridors.

The programs and projects included in Alternative 4 are described below and are shown in Exhibits 3-12 and 3-13.

Exhibit 3-12. Alternative 4: Combine Traditional Revenues and Tolls to Maximize Efficiency

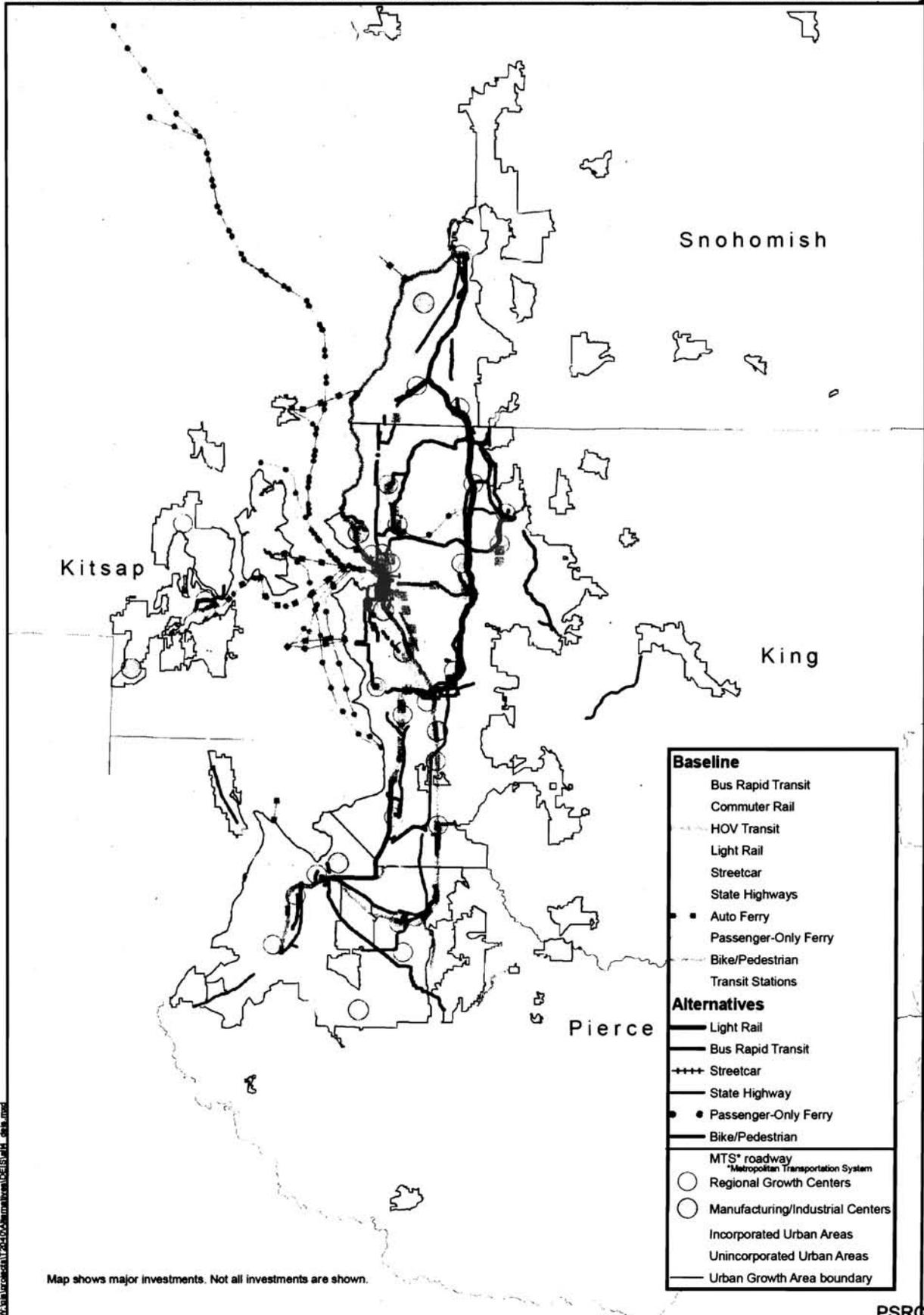
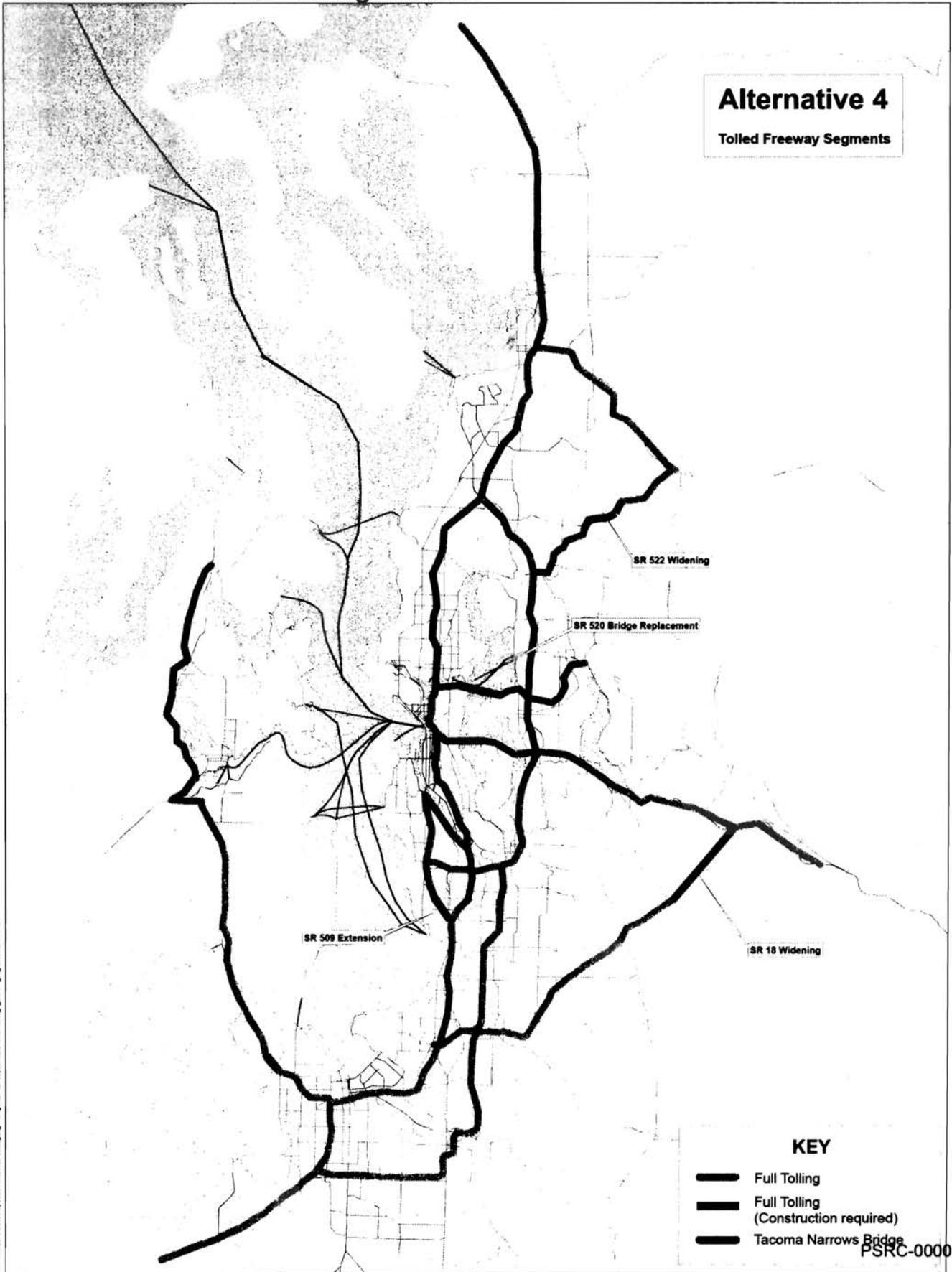


Exhibit 3-13. Alternative 4 Tolling Scenario



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Alternative 4 System Efficiency

Alternative 4 Demand Management

In Alternative 4, more funds would be available to invest in employer demand management programs such as CTR to support transit users and vanpools. These programs, plus other incentives that encourage travel choices other than driving alone, would increase opportunities to reduce freeway congestion. Pricing strategies and a reservation system would help manage auto ferry demand and improve system efficiency.

Alternative 4 System Management

Alternative 4 makes strategic use of a variety of ITS techniques to manage traffic flow. Techniques range from traveler information systems both in and out of vehicles that can expedite freight traffic and assist transit operators on the freeways and arterials. Added ITS technology will provide better traveler information.

Alternative 4 Strategic Expansion

Alternative 4 Roadways

Roadway expansions in Alternative 4 would be limited to projects that relieve congestion at bottlenecks and chokepoints by using some of the revenue generated by tolls.

Alternative 4 Transit

New revenue (including some toll revenue) would be invested in transit service. Alternative 4 would implement ST2 plus extend light rail to Everett, Tacoma, and downtown Redmond. These expansions, and the better use of shared rights of way for BRT, would combine to make the entire transit system more convenient for users and better integrated with roadway systems. Alternative 4 proposes to increase transit services on tolled corridors, including core and specialized service on routes where the use of tolling improves transit travel times. Passenger-only ferry service would augment the WSF auto ferry system, and transit service to ferry terminals would be improved.

Alternative 4 Bicycle and Pedestrian

Toll revenues would be spent to complete bicycle and pedestrian connections to transit centers, rail stations, and ferry

terminals. These investments would provide better access to arterial transit service, complete sidewalk systems and bicycle networks along corridors that connect regional growth centers, and provide more safety features at crosswalks. Cities with regional growth centers would work to provide better “end-of-trip” facilities such as locker rooms, storage, and secure bicycle racks.

Alternative 4 Funding

Funding for Alternative 4 would include limited traditional revenue sources and a significant increase in toll revenues derived from tolling most of the regional freeway system. Toll revenues would be used for both highway system improvements and for systemwide transit improvements.

10 Which programs and projects are included in Alternative 5: Reduce Emissions with Limited Highway Investment and a Focus on Regional Tolling?

Alternative 5 would include limited highway investments and focus on transit and nonmotorized programs. This alternative proposes a shift from dependence on fuel-based revenues to creating a system with greatly enhanced travel choices. In Alternative 5 all freeway and arterial roadways would be subject to tolls (or similar user fees) designed to maximize system efficiency. Toll revenue would replace some traditional funding sources and would fund a wide variety of investments, including elimination of bottlenecks and chokepoints on freeway and arterial roadways, expansion of arterials and highways in strategic locations, and creation of sophisticated roadway and transit management systems. Other than the Preferred Alternative, Alternative 5 contains the largest expansion of light rail or other high-capacity transit, the largest increase in bus service, and the largest expansion of dedicated nonmotorized infrastructure. Altogether, these programs and investments are designed to also reduce carbon dioxide emissions.

The programs and projects included in Alternative 5 are described below and are shown in Exhibits 3-14 and 3-15.

Exhibit 3-14. Reduce Emissions with Limited Highway Investment and a Focus on Regional Tolling

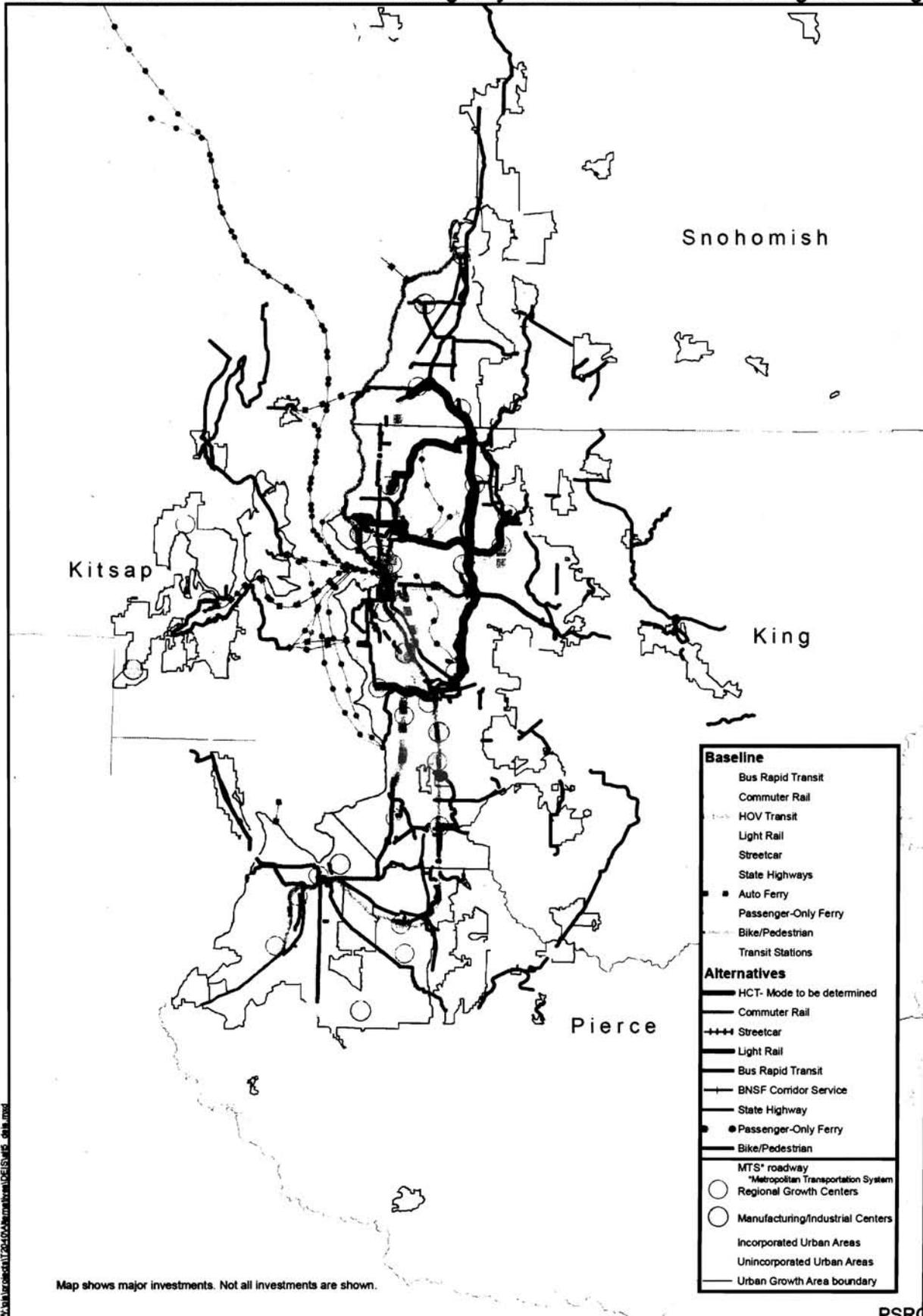


Exhibit 3-15. Alternative 5 Tolling Scenario



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Alternative 5 System Efficiency

Alternative 5 Demand Management

Alternative 5 includes incentive programs that encourage travel options for employers in small towns and rural areas. All cities with regional growth centers will offer GTEC programs. In addition, more effort will be made to engage small businesses and residential areas in car share and vanpool programs. Pricing strategies and a reservation system would help manage auto ferry demand and improve system efficiency.

Alternative 5 System Management

Alternative 5 relies on extensive system management and regionwide ITS programs to regulate traffic flow and improve travel time.

Alternative 5 Strategic Expansion

Alternative 5 Roadways

Alternative 5 would include limited investment in roadways. Improvements would primarily include completion of HOV lanes on I-5 and SR 16 and regionwide chokepoint and bottleneck improvements.

Alternative 5 Transit

Alternative 5 promotes an interconnected transit system that reaches beyond ST2 by building out the Sound Transit Long-Range Plan. It would extend express bus and rail (both light and commuter) service and increase core, connector, and specialized bus services throughout the region. Light rail or other high-capacity transit would connect Everett and Tacoma, extend to downtown Redmond, and serve Ballard and West Seattle. In addition, commuter rail would connect Renton and Snohomish via the Burlington Northern Santa Fe (BNSF) rail corridor. Alternative 5 would invest in new passenger-only ferry service to serve demand rather than expanding the auto ferry system, and transit service to ferry terminals would be improved. Investments in the transit system would stimulate mixed-use development near transit centers and rail stations. Cities would have funds for “complete street” projects to support safe, walkable, communities.

Alternative 5 Bicycle and Pedestrian

Dedicating more space in the right of way would provide a continuous network of bicycle lanes, sidewalks, paths, and trails connected to transit centers, rail stations, ferry terminals, and park-and-ride lots. Combined with parking management techniques and wide use of employer-based demand management programs, the system would offer commuters safer and more efficient travel alternatives.

Alternative 5 Funding

Alternative 5 would replace existing traditional funding sources (gas tax, etc.) with user-based fees and place tolls on all highways and arterials. This complete network tolling approach would generate sufficient revenues to finance roadways, transit, bicycle and pedestrian options, and other investments.

11 Which programs and projects are included in the Preferred Alternative?

The Preferred Alternative includes elements of the other five action alternatives, as well as the projects and programs included in the Baseline Alternative and core investments, and some programs and projects that were not included in previous alternatives. As described below, the Preferred Alternative is designed to improve the region's transportation system through a combination of investments in system efficiency, strategic expansion, transit, ferry, bike and pedestrian improvements, as well as investments to preserve the existing transportation system. The Preferred Alternative financial strategy is based on a phased approach of transitioning away from current gas taxes toward the implementation of new user fees.

The Preferred Alternative includes:

- more transit service than all other alternatives;
- more miles of biking and walking facilities focused on access to transit stations and centers and completing regional trail links than all other alternatives;
- current levels of vehicle ferry service, and additional passenger ferries;

- replacement of several vulnerable roadways including the Alaskan Way Viaduct and SR 520 Floating Bridge;
- completion of missing links in the highway network such as SR 509, SR 167, and the Cross Base Highway; and
- expansion of local arterials and state highways in limited but strategic ways to service growth in urban growth centers.

The programs and projects included in the Preferred Alternative are described below and are shown in Exhibits 3-16 and 3-17.

Preferred Alternative Project and Program Categories

The Preferred Alternative includes two categories of programs and projects: (1) Constrained, and (2) Unprogrammed. These categories recognize the federally approved structure for regional plans and the range of uncertainty that is inherent in long-range transportation planning programs.

Financially Constrained: This category is a federally required component of the plan where project and program costs must be accounted for and balanced with reasonably expected revenues over the life of the plan.

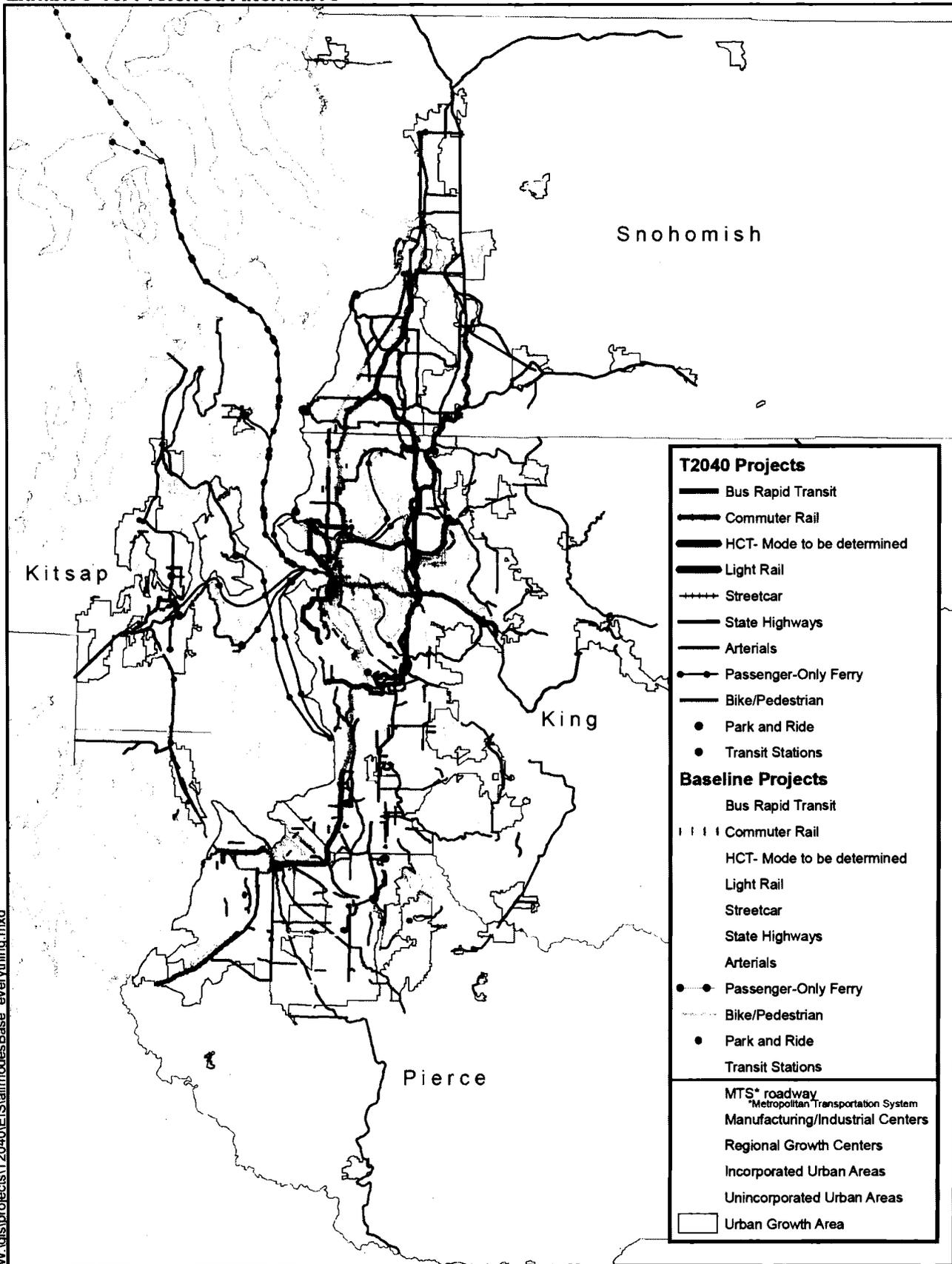
Unprogrammed: This category represents projects and programs that are included in the Preferred Alternative but are not subject to the requirement of having a corresponding funding strategy and may be more illustrative or aspirational in nature.

The Preferred Alternative contains both the financially constrained and the unprogrammed programs and projects.

How does this FEIS analyze the constrained portion of the Preferred Alternative?

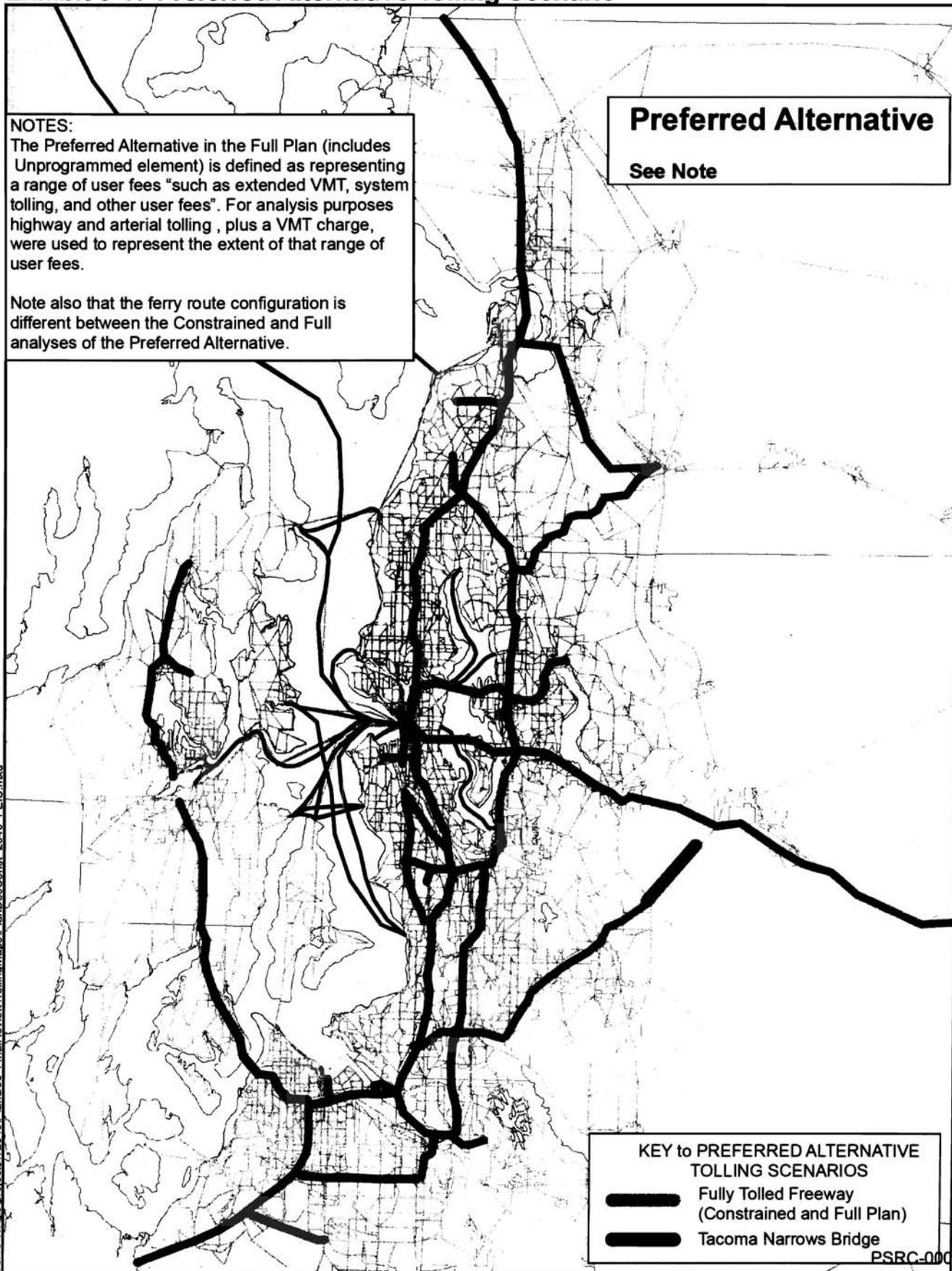
The Preferred Alternative in this FEIS contains both the financially constrained and the unprogrammed programs and projects (sometimes referred to as the full Preferred Alternative). Accordingly, most of the environmental disciplines analyze the potential effects of the Preferred Alternative. However, for instances when the constrained portion of the Preferred Alternative would result in greater effects upon the environment, such as in certain analyses in Chapter 4: Transportation and Chapter 6: Air Quality and Climate Change, the effects of the constrained portion of the Preferred Alternative are analyzed.

Exhibit 3-16. Preferred Alternative



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Exhibit 3-17 Preferred Alternative Tolling Scenario



NOTES:
 The Preferred Alternative in the Full Plan (includes Unprogrammed element) is defined as representing a range of user fees "such as extended VMT, system tolling, and other user fees". For analysis purposes highway and arterial tolling, plus a VMT charge, were used to represent the extent of that range of user fees.

Note also that the ferry route configuration is different between the Constrained and Full analyses of the Preferred Alternative.

Preferred Alternative
 See Note

KEY to PREFERRED ALTERNATIVE TOLLING SCENARIOS

-  Fully Tolled Freeway (Constrained and Full Plan)
-  Tacoma Narrows Bridge

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Preferred Alternative Preservation

Consistent with the other alternatives, preservation, operation and maintenance is prioritized and represents approximately 60% of the Preferred Alternative costs.

Preferred Alternative System Efficiency

The Preferred Alternative emphasizes greatly expanded employer and residential programs to reduce unnecessary travel and increase use of transit, vanpools, bicycling, and walking. The Preferred Alternative includes an aggressive program of advanced technology on arterials and freeways, including better signal coordination, active traffic management, new and expanded traveler information services, and transit-specific technologies to ensure on-time performance and provide customers with more complete, up-to-date travel information. Consistent with the other alternatives, the Preferred Alternative supports the state's Target Zero program (refer to Chapter 4: Transportation for more information) and continues progress on regional security programs.

Preferred Alternative Strategic Expansion

The Preferred Alternative includes investments in integrated strategies that support all forms of travel. The Preferred Alternative completes or replaces the network of roadway projects necessary to support development of the centers identified in VISION 2040 and keep freight moving to support a strong economy, such as SR 167, SR 509, SR 520 floating bridge, US 2 and SR 3. The Preferred Alternative contains approximately 950 new roadway lane miles, which represents the second highest level of roadway investment (Alternative 2 contains approximately 1200 new roadway lane miles) and a 7% increase over 2006 levels.

Users of the new highway capacity would directly pay for improvements through tolling, which would also reduce congestion and emissions. Local roadways would be expanded to support transit and improve the efficiency of people and freight movement, especially to provide access to and within centers.

Preferred Alternative Transit

The Preferred Alternative would implement a comprehensive transit strategy, including completion of ST2 projects and additional Link light rail extensions to Everett, Tacoma, and Redmond. The Preferred Alternative includes more light rail miles than any other alternative, and the largest expansion of commuter rail of any alternative, equal to Alternative 5. The Preferred Alternative includes more local transit investment than any other alternative: over 100% more service than 2006 in peak periods and over 80% more service off-peak. All-day service with high frequencies (generally every 15 minutes) would be emphasized.

Preferred Alternative Ferry

The Preferred Alternative includes three new passenger ferry routes on Lake Washington and six new passenger ferry routes on Puget Sound. The Preferred Alternative includes the most new passenger ferry service, one route more than Alternative 5.

Preferred Alternative Bicycle and Pedestrian

The Preferred Alternative would prioritize pedestrian and bicycle facilities within regional growth centers and within $\frac{3}{4}$ mile of transit passenger facilities. Missing links in regional trails would be completed. The Preferred Alternative includes 553 miles of new off-road trails, more than any other alternative.

Preferred Alternative Financial Strategy

The Preferred Alternative financial strategy is based on a phased approach of transitioning away from current gas taxes toward the implementation of new user fees, which could include tolls, VMT charges, and other pricing approaches to fund and manage the transportation system. There should be a relationship between the tax, fee, or toll and the use of the revenues. However, it is anticipated that the region would continue to rely on traditional funding sources and financial instruments as it makes a transition to a more sustainable financial strategy.

12 How did PSRC develop the alternatives?

The development of a Preferred Alternative was a three-year effort involving ongoing public involvement, agency consultation, and environmental analysis. The major elements of this effort included:

Background and Tool Development: The program started with the development of background information on transportation issues, such as growth, the economy, congestion, funding, environment, and health. Tools were developed to better inform the public and decision makers on specific areas that benefit or are affected by transportation programs, including land use, travel times, reliability, and safety. The tools included the development of a new benefit-cost model.

Scoping: Through scoping a list of issues, strategies, programs and projects were developed. A set of three critical issues were identified: Congestion and Mobility, Environment, and Transportation Funding.

Alternatives Development: Based on the issues and programs identified in scoping, alternatives were constructed to represent different transportation policy choices. The levels and type of investment, management, and funding strategies varied among the alternatives.

Criteria: Criteria were developed to evaluate key issues, particularly mobility, environment, economy, and equity. When possible, criteria were based on monetary values to provide quantitative information for the benefit-cost analysis.

Alternative Evaluation: The alternatives included three types of evaluation:

- **Policy Review:** All of the projects and programs in the alternatives were evaluated and found compliant with the VISION 2040 policies.
- **Environmental Impact Statement (EIS):** A Draft Environmental Impact Statement (DEIS) was used to evaluate the impact of the alternatives on the environment.

Public Scoping Process

For more information on the public scoping process, please refer to Appendix F.

Transportation 2040 Alternatives Development

Please refer to Appendix A for more details on developing the Transportation 2040 alternatives.

This FEIS responds to comments on the DEIS and also includes an analysis of the Preferred Alternative.

- **Criteria:** Criteria evaluation and reporting for each of the alternatives includes both qualitative and quantitative analysis.

Public Involvement and Consultation: The process included continuous public involvement and consultation with member agencies, including over 450 meetings, public notices, ongoing information posted on the Internet, and other materials. PSRC conducted a focused effort to provide outreach to seek input from low-income and minority populations and people with special transportation needs. Over 2000 comments on the DEIS were received and have been reviewed.

Recommendation: The Preferred Alternative includes the programs and projects contained in the Draft Transportation 2040 Plan, which was designed through lengthy consultation with many stakeholders (refer to the Public Involvement and Consultation Appendix in the Transportation 2040 Plan). Those consulted included all of PSRC’s standing committees and boards, technical committees formed for the plan update process, and numerous nonprofit or private entities. The stakeholders considered many aspects of the proposals in the course of recommending inclusion in the plan, including proposal maturity, proposal support for regional policies and objectives as set forth in VISION 2040, and the analysis results from the DEIS. Ultimately, the Transportation Policy Board recommended the investments included in the draft plan to the Executive Board, which endorsed the draft plan as the basis for the Preferred Alternative evaluated in this FEIS.

13 How was the public involved in the development of the alternatives?

On November 15, 2007, PSRC released a Scoping Notice and Determination of Significance for the Destination 2030 regional transportation plan update.

The Determination of Significance marked the beginning of an extended public outreach and scoping process that extended to February 2008. Public outreach included a variety of methods,

How were resource agencies involved in the development of alternatives?

Refer to Appendix J: Agency Consultation for more information about the involvement of resource agencies in the development of the plan alternatives.

Major Issues Identified through Scoping

Comments received during the scoping process were related to the following 10 broad issues:

- Land Use
 - Economy
 - Congestion and Mobility
 - Equity and Special Needs Transportation
 - Safety and Health
 - Security
 - Energy and the Environment
 - Preservation of the System
 - Transportation Funding
 - Project Prioritization
-

including a public opinion survey, workshops, open houses, presentations to a diverse set of stakeholders, and more.

One of the key purposes of the scoping process was to focus the plan update and environmental review on the most compelling transportation issues facing the region. PSRC received hundreds of comments, and about two-thirds of all comments suggested that the plan (1) focus on congestion and mobility, and (2) address concerns about energy and the environment (including climate change). In addition, over 300 comments called for the plan to address the following concerns: support for VISION 2040, tolling and congestion pricing programs, investments in transit, system and demand management measures, transportation funding, and ways to prioritize investments.

Emphasis on these issues was included in the DEIS Scope of Work and directly influenced the structure of the alternatives discussed earlier in this chapter.

PSRC received more than 1,200 comment letters, and more than 3,700 individual comments during the DEIS comment period, all of which have been considered and responded to in Volume 2. Shortly after the close of the public comment period, a summary of the comments was provided to key boards and committees at PSRC. The committees were also given the opportunity to review and discuss the comments as the Preferred Alternative was developed.

14 How were the alternatives evaluated?

The alternatives were evaluated by a process that involved the following steps:

- A technical analysis using the PSRC integrated land use and travel models, as well as other technical tools to measure air quality impacts and user benefits impacts
- An assessment using measures in the Transportation 2040 evaluation criteria as described below
- A comprehensive policy analysis of each alternative's ability to support VISION 2040

VISION 2040

For more information about VISION 2040 and its relationship to Transportation 2040, refer to Chapter 2: Introduction and Background.

Evaluation Policies and Criteria

For more information about the evaluation of plan alternatives, please refer to Appendix D: Policy Analysis and Evaluation Criteria Report.

- The analysis of environmental impacts under the formal SEPA review process contained in this document

Integrated Transportation and Land Use Modeling

The transportation modeling effort produced forecasts of the future distribution of jobs and population across the region and the future performance of the region's transportation system. The transportation system inputs used in the forecasts were derived directly from the investments specified for each alternative as documented in the Alternatives Technical Report (refer to Appendix A). The model inputs vary for each alternative. The outputs of the forecast tools are presented in detail in the Policy Analysis and Evaluation Criteria Report (refer to Appendix D).

To test how transportation can affect land use patterns, the travel modeling for Transportation 2040 employed a new land use model, UrbanSim (www.urbansim.org).

Using an internal representation of the region's collective future year land use plans as a starting point, each alternative, including the Baseline Alternative, was modeled to assess whether the alternatives resulted in land uses consistent with VISION 2040 policies. The results of this modeling are described in detail in the Policy Analysis and Evaluation Criteria Report (refer to Appendix D) and in Chapter 5: Land Use, Population, Employment, and Housing.

Transportation 2040 Evaluation Criteria

VISION 2040 is the organizing framework for evaluating the alternatives. The Regional Growth Strategy and the goals, objectives, and policies in VISION 2040 guided the development of the evaluation criteria and the organization of the policy analysis. The evaluation criteria provide the methodology to measure progress toward achieving VISION 2040. The evaluation criteria were developed to address the overarching goals of the transportation planning process. Individual metrics were developed to quantify different aspects of the evaluation criteria. The criteria measures are grouped into seven categories: mobility, finance, growth management,

Modeling methods and details

Refer to Appendix E: Technical Description of the Modeling Framework for a more detailed technical description of the modeling framework.

economic prosperity, environmental stewardship, quality of life, and equity.

Some of the metrics represent a different means to measure transportation benefits (or impacts) than has been commonly used in the past. For example, VMT is a commonly used proxy for measuring congestion or air quality impacts. In these metrics, congestion was directly measured as a function of travel time savings, and the cost of emissions as a function of vehicle speeds and distance was also measured directly; as a result, there was no direct need to use VMT as a proxy measure for these other metrics. In fact, reporting VMT would produce a duplicative effect of measuring both the proxy metric and the actual metric, based on the same underlying data.

Many of the criteria measures are estimated in monetary values so they can be included in a benefit-cost result. These measures are reported as annual benefits (positive values) and costs (negative values) for the plan horizon year 2040 in millions of year 2008 dollars. All monetary values are additive except for the economic prosperity benefits, which are a subset of the regional benefits already reported in the other measures. Other criteria measures are reported in the following summary table with directional measures as follows: “⊗” indicates no significant change, “-” indicates negative or undesirable change, and “+” indicates positive or desirable change.

The advantages of the benefit-cost approach are that both benefits and costs can be combined to assess the potential economic consequences of a particular transportation alternative. The disadvantage is that those measures not having a monetary value, such as growth management or economic prosperity, cannot be directly included. The full set of evaluation criteria recognizes the advantages of the benefit-cost method but combines this with other quantitative and qualitative measures to provide a more comprehensive assessment of each alternative in Appendix D. The results of the evaluation process are shown in Exhibit 3-18.

Exhibit 3-18²
Evaluation Criteria

Evaluation Criteria	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	PA-C	PA
Mobility							
M1. Travel Time Savings	\$1,850	\$2,510	\$3,440	\$2,890	\$3,560	\$5,020	\$6,390
M2. Improved Reliability Benefits	\$290	\$410	\$1,000	\$1,140	\$1,290	\$1,070	\$1,180
M3. Vehicle Operating and Ownership Benefits	-\$93	-\$189	-\$125	\$200	\$13	\$73	\$213
M4. Other User Benefits	\$17	\$38	\$77	-\$15	-\$457	\$89	\$34
Finance							
F1. Facility Operating Cost	-\$360	-\$160	-\$300	-\$510	-\$1,030	-\$1,570	-\$2,600
F2. Capital Cost	-\$640	-\$2,310	-\$1,670	-\$1,650	-\$1,700	-\$1,560	-\$2,770
F3. Operating Revenues	\$180	\$257	\$2,940	\$3,660	\$7,100	\$3,500	\$5,360
F4. Influence of Finance on the Economy	-\$134	-\$363	-\$46	\$44	\$138	\$224	\$103
Growth Management							
GM1. Population	⊗	⊗	⊗	⊗	⊗	⊗	⊗
GM2. Employment	⊗	⊗	⊗	⊗	⊗	⊗	⊗
GM3. Jobs to Housing Balance	⊗	⊗	⊗	⊗	⊗	⊗	⊗
GM4. Population and Jobs in Centers	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Economic Prosperity							
EP1. Benefits Low and High-wage Employment	\$382	\$441	\$555	\$431	\$370	\$1,060	\$1,380
EP2. Benefits to Cluster Employment	\$56	\$116	\$179	\$142	\$49	\$297	\$373
EP3. Benefits to Freight-Related Employment	\$55	\$86	\$97	\$81	\$52	\$171	\$226
Environmental Stewardship							
ES1. Vehicle and Stationary Emission Benefits	-\$14	-\$35	\$19	\$31	\$94	\$38	\$72
ES2. Impervious Surfaces	⊗	-	-	⊗	⊗	-	-
ES3. Agriculture and Natural Resource Lands	⊗	-	⊗	⊗	⊗	⊗	⊗
ES4. Energy Usage from Vehicle and Building Use	⊗	⊗	+	+	+	+	+
Quality of Life							
QL1. Accident Cost Savings	-\$94	-\$177	-\$52	\$1	\$168	-\$26	\$32
QL2. Non-motorized Travel	⊗	-	⊗	+	+	+	+
QL3. Redundancy (Roads and Transit)	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Equity							
E1. Geographic Distribution of Benefits	+	⊗	+	-	⊗	⊗	⊗
E2. Income Distribution of Benefits	⊗	⊗	⊗	-	-	⊗	⊗
E3. Benefits to Personal and Commercial Users	⊗	⊗	⊗	-	-	⊗	⊗
E4. Benefits to Environmental Justice Populations	+	+	+	+	+	+	+

All comparisons to the 2040 Baseline Alternative:

\$\$ in millions in the year 2040; positive values are benefits, negative values are costs; all monetary values are additive except for the Economic Prosperity benefits which are benefits to a subset of the region

PA-C is Preferred Alternative (Constrained), PA is Preferred Alternative, ⊗ is no significant change, - is negative change, + is positive change

² This exhibit has changed since the DEIS.

Policy Analysis

The adoption of the VISION 2040 Regional Growth Strategy in April 2008 set forward a series of growth policies. The Transportation 2040 alternatives are evaluated against these goals and policies. Excerpts from the Policy Analysis are included below.

Environment

A core principle of VISION 2040 is maintaining and improving both the natural and built environments. Land use, transportation, air quality, and human health are interconnected and therefore require integrated planning, regulations, and implementation actions.

Current conditions of habitat loss/fragmentation, impervious surface, pollution, and alterations of processes will be similar for all alternatives. Much of the region's transportation system is already in place, and the most common type of improvements for all alternatives involve the replacement or expansion of existing facilities within the urban area.

Development Patterns

The Development Patterns section of VISION 2040 reflects key elements of the Regional Growth Strategy, with a focus on the continued growth of designated regional centers and sub-regional centers. It also re-emphasizes preserving rural lands and not allowing development to diminish rural character and scale.

While all of the alternatives were highly supportive of population growth in regional growth centers, Alternatives 3, 4, and the Preferred Alternative were most successful.

Alternatives 1 and 5 were most consistent for employment growth in regional growth centers and manufacturing industrial centers. Forecasted growth in designated rural areas throughout the region was fairly low in each of the alternatives, including the Preferred Alternative. An analysis of development on rural parcels adjacent to designated natural resource lands did not indicate a disproportionately large change in activity compared to the Baseline Alternative. It does not appear that any of the

Evaluation Policies and Criteria

For more information about the evaluation of plan alternatives, please refer to Appendix D: Policy Analysis and Evaluation Criteria Report.

alternatives place undue conversion pressure on rural areas or natural resource lands.

Economy

The economic policies focus on creating a prosperous and sustainable regional economy. They incorporate new focus areas based on the Regional Economic Strategy. The policies are organized around the topics of business, people, and places. This new structure maintains many of the existing policies, but streamlines them while addressing many new topics.

The Preferred Alternative would likely do the most to improve workforce mobility and job access to existing and planned population and employment concentrations because of the following factors: conducting maintenance and minor improvements to existing highway infrastructure, providing extensive transportation options regionwide, and establishing extensive transportation demand management, transportation system management, and roadway pricing policies.

Transportation

The region's long-range transportation strategy is to establish a coordinated multimodal transportation system that is integrated with and supportive of regionwide growth management planning objectives. To support the regional vision for focusing growth within the designated urban growth area, especially in identified centers, transportation facilities and programs should contribute to establishing a balanced transportation system that provides enhanced travel options. The transportation policies focus on creating a cleaner, more efficient transportation system, and reducing congestion.

When evaluating improvements to VMT reduction, trip times, trip lengths, speeds, and delay, the Preferred Alternative appears to best improve regional mobility and accessibility.

15 What are the benefits and disadvantages of delaying implementation to a future time?

If implementation of the Transportation 2040 plan is delayed, transportation projects or programs identified in the plan could also be delayed. The primary benefit of this delayed

implementation would be to delay any adverse construction and operating impacts of the projects included in the final Transportation 2040 plan.

The primary disadvantages of delayed implementation could include:

- Failure to implement a key component of VISION 2040, the region's long-range vision for managing growth
- Delays in implementing transit, nonmotorized, and other project types that have environmental benefits
- Impacts on achieving economic development goals including affordable and convenient housing opportunities
- Deferred decisions by other parties on related transportation or development projects
- Increased cost or pressure to develop rights of way needed for some of the projects
- Risk in delaying or receiving a reduced amount of federal funding
- Higher construction costs due to inflation

16 What are the next steps?

After the release of the FEIS, PSRC will take the following steps:

- PSRC will continue to collect and review comments on the Draft Transportation 2040 Plan and will present these comments for consideration at the meeting of the General Assembly in spring 2010 (currently scheduled for May 2010).
- Based on a recommendation from PSRC's Transportation Policy Board and the Executive Board, the General Assembly will adopt Transportation 2040.
- Following the adoption of Transportation 2040, a project and program prioritization process will be developed (approximately 2 years, starting in summer 2010).

APPENDIX D

Chapter 6 Air Quality and Climate Change

1 What affects air quality in the central Puget Sound region?

Air pollution comes from many different sources, including industry, transportation, and agriculture. It affects both human health and the environment, including plants, animals, and visibility, as well as the built environment.

Air quality in the central Puget Sound region is affected by several factors, including geography, climate, and the urban environment. The region is located between the Cascade and Olympic mountain ranges and is bisected by Puget Sound. Largely surrounded by mountains and water, the region's land is further restricted by steep hills and environmentally sensitive areas. Most of the urban development in the region has occurred near sea level, adjacent to Puget Sound. Most of the air pollution in the region comes from the urban areas and transportation corridors that follow the north/south trending geography of the Puget Sound.

The central Puget Sound region has a modified marine climate. Temperatures are generally moderate with few extremely cold or hot days throughout the year. On most days, clean ocean air combined with wind disperses air pollutants in the region. When the onshore airflow is interrupted, the combined effects of urban development, geography, and weather can result in stagnating air and an increase in air pollution. In particular, the mountains on both the east and the west side of the region create a bowl, trapping pollution in the urban basin.

Which elements of Washington Administrative Code (WAC) 197-11-444 are addressed in this chapter?

This chapter addresses:

- Section (1)(b)(i) Air quality
- Section (1)(b)(iii) Climate
- Section (1)(b)(ii) Odor is not discussed separately because odor impacts from vehicle emissions would be similar to those discussed in the response to question 6 in this section.

Air Quality Information Sources

Air quality monitoring and other relevant information in this chapter was obtained from the Puget Sound Clean Air Agency (PSCAA), the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the University of Washington.

2 What are the pollutants of concern in the central Puget Sound region?

The pollutants of concern in the central Puget Sound region include the following:

- Particulate matter
- Carbon monoxide
- Ozone
- Hazardous air pollutants/air toxics
- Greenhouse gases

Particulate Matter

Particulate matter is the term for small particles of dust, soot, and organic matter suspended in the atmosphere. In this document, coarse particulate matter is referred to as PM_{10} and fine particulate matter is referred to as $PM_{2.5}$. Sources of particulate matter include motor vehicles, industrial boilers, wood stoves, open burning, and dust from roads, quarries, and construction activities. Relating to transportation sources, road and construction dust is often in the larger PM_{10} range, while vehicle exhaust emissions are generally in the smaller $PM_{2.5}$ range. In particular, diesel exhaust is a significant source of fine particles.

Health effects of particulate matter include respiratory illnesses, such as aggravated asthma, chronic bronchitis, and decreased lung function. Fine particulates can pose more serious health risks because they are easily inhaled and have the ability to penetrate deeper into lung tissue. As with many pollutants, sensitive populations such as children and the elderly are more susceptible to these health risks. Particulate emissions from diesel exhaust are of particular concern due to their toxicity. The U.S. Environmental Protection Agency (EPA) has concluded that diesel exhaust is a probable human carcinogen, and diesel particulate matter is the most likely portion of the exhaust to pose a risk (EPA, 2002).

Particulate matter can also cause environmental damage. Particles can be carried by the wind for long distances before

What is PM_{10} and $PM_{2.5}$?

PM_{10} is particulate matter that has a diameter of 10 micrometers or less.

$PM_{2.5}$ is fine particulate matter that has a diameter of 2.5 micrometers or less.

being deposited on the ground or in the water. Water bodies may become acidic, changes may occur to the nutrient balance in both water and in the soil, forests and crops may be damaged, and the diversity of ecosystems may be affected. Particulate matter is also the primary cause of reduced visibility, or haze, affecting specific national park and wilderness areas. In addition, particulates can cause aesthetic damage to buildings and stone, such as staining and accelerated decay.

Carbon Monoxide

Motor vehicles are the primary source of carbon monoxide (CO), but other sources include industry, outdoor burning, and non-road mobile sources such as off-road vehicles and lawnmowers. Areas of high CO concentrations are usually localized, occurring near congested roadways and intersections. These localized areas of elevated CO levels are referred to as CO hot spots. High levels generally occur in autumn and winter months during conditions of light winds and stable weather, which prevent dispersion of the emissions.

CO reduces the blood's oxygen-carrying capability. Acute health effects include headaches, slowed reflexes, weakened judgment, and impaired perception. Chronic effects include aggravation of pre-existing cardiovascular disease and increased heart disease risk in healthy individuals. At very high levels, CO is poisonous and can be fatal.

Ozone

Ozone in the upper atmosphere provides protection from harmful ultraviolet radiation from the sun; ozone in the lower atmosphere, referred to as ground-level ozone (also known as smog), poses numerous health and environmental risks. The term ozone in this chapter refers to ground-level ozone.

Ozone is formed when its precursors, nitrogen oxides (NO_x) and volatile organic compounds (VOCs), chemically react in the presence of sunlight. Peak ozone levels occur during the warmer summer months. Ozone is a regional concern because it, along with its precursors, can be carried hundreds of miles from its origins. Maximum ozone levels generally occur at

What is carbon monoxide?

Carbon monoxide (CO) is a colorless, odorless, poisonous gas produced when carbon-containing fuel is not burned completely.

How is ozone formed?

Ozone is formed when emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOCs) chemically react in the presence of sunlight.

locations several miles downwind from the sources. Sources of the precursor pollutants to ozone—NO_x and VOCs—include mobile sources, industry, commercial solvents, wood burning, and natural (biogenic) sources such as forests.

Ozone is an eye and respiratory tract irritant and increases the risk of respiratory and heart diseases. Ozone can cause breathing difficulty for susceptible populations (e.g., asthmatics and the elderly), and may lead to impaired lung function and premature death. Ozone can also affect the environment, causing damage to crops and other plant life, waterways, and ecosystems.

Hazardous Air Pollutants or Air Toxics

Hazardous air pollutants, also referred to as air toxics, are chemicals emitted into the atmosphere that cause or are suspected to cause cancer or other severe health effects, such as birth defects or reproductive problems. At the state and regional level, Washington State Department of Ecology (Ecology) and Puget Sound Clean Air Agency (PSCAA) list 400 pollutants as air toxics. This list includes the 188 national hazardous air pollutants set by EPA as well as additional pollutants believed to be harmful. Hazardous air pollutants are a subset of air toxics, but the terms are often used interchangeably. Examples of air toxics include benzene, perchlorethylene, methylene chloride, formaldehyde, and asbestos, as well as diesel particulate matter and wood smoke.

Air toxics are emitted by a variety of sources, including industry, small facilities such as dry cleaners, motor vehicles, non-road mobile sources (such as trains, boats, lawnmowers, etc.), and outdoor and indoor wood and debris burning. In the Puget Sound region, particulate matter from diesel exhaust represents more than 70 percent of the potential cancer risk from air toxics (PSCAA).

Air toxics are pollutants known or suspected to cause cancer and other serious health effects. These health effects include respiratory illnesses such as asthma and reduced lung function, damage to the immune system, neurological problems, and reproductive problems such as reduced fertility. Once deposited into the soil and waterways, air toxics can build up in the food

What are hazardous air pollutants or air toxics?

Hazardous air pollutants, also referred to as air toxics, are chemicals emitted into the atmosphere that cause or are suspected to cause cancer or other severe health effects, such as birth defects or reproductive problems. Asbestos and wood smoke are two examples of hazardous air pollutants.

chain, resulting in human consumption of contaminated plants, fish, and other animals.

Greenhouse Gases and Climate Change

Some greenhouse gases occur naturally in the atmosphere, trapping solar energy and warming the earth's surface. These gases include carbon dioxide (CO₂), nitrous oxide, and methane. If not for this greenhouse effect, the earth would be about 60 degrees cooler. However, more greenhouse gases are being added into the atmosphere, causing more heat to be trapped and the earth's surface to warm even further. The earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades; the decade between 1998 and 2007 has been the warmest on record for the last 100 years (National Academy of Sciences, 2006; IPCC, 2007).

Levels of CO₂ are higher now than at any time in the past 650,000 years, and according to EPA and the Intergovernmental Panel on Climate Change (IPCC), most of the warming in recent decades is very likely the result of human activities. There is 90 percent certainty that the burning of fossil fuels and other human activities are driving climate change (IPCC, 2007). Climate change refers to a significant change in long-term weather patterns around the world, as measured by temperature, rainfall, wind patterns, etc. Global warming refers to an average global increase in the earth's temperature.

The primary source of greenhouse gases is the burning of fossil fuels to generate electricity and power engines. Other sources include industry, agriculture, and landfills. In the Puget Sound region, 50 percent of the emissions are attributable to transportation sources, including motor vehicles, aircraft, construction equipment, and boats (PSCAA, 2005).

Expected consequences from climate change include an increase in global temperatures, resulting in a rising of the sea level. Other effects include a change in precipitation and impacts to local climates, which could alter forests, crop yields, and water supplies. Climate change may also affect human

What are greenhouse gases?

Greenhouse gases come in several forms. These gases include carbon dioxide (CO₂), nitrous oxide, and methane. CO₂ makes up the bulk of the greenhouse gas emissions from the transportation sector. Any process that burns fossil fuel releases CO₂ into the air. Vehicles are a significant source of greenhouse gas emissions and contribute to global warming primarily through the burning of gasoline and diesel fuels.

health, animals, and many types of ecosystems. For example, deserts may expand into existing rangelands, and features of some national parks may be permanently altered. The Puget Sound region may experience warmer summers and longer, wetter winters. Such effects could reduce forests in the Cascade Mountains and decrease snow packs. Reduced snow packs are likely to drastically change water availability in the region, which in turn will require a change in the way current water demands for agriculture, salmon populations, and energy uses are managed. Climate change is also likely to result in more winter floods and higher water temperatures that would further stress salmon populations, and potentially increase heat-related pollution such as ozone (UW Climate Impacts Group, 2007). Policy considerations related to the impacts of climate change specific to transportation infrastructure are included in the Transportation 2040 plan.

3 What regulations apply to air quality?

Numerous federal, state, and local regulations relate to air quality in the central Puget Sound region, including those under the federal Clean Air Act and the Washington Clean Air Act. For example, there are controls on industrial emissions, indoor and outdoor burning, and vehicle engines and fuels. This section focuses on those regulations pertinent to the scope of Transportation 2040 and the alternatives being considered, relative to the pollutants discussed in the previous section.

National Ambient Air Quality Standards

Under the federal Clean Air Act, EPA established National Ambient Air Quality Standards (NAAQS) for six principal, or criteria, pollutants considered harmful to public health and the environment. Primary standards set limits to protect public health; secondary standards set limits to protect the environment, including protection against decreased visibility and damage to wildlife, plants, and buildings. The six criteria pollutants are CO, lead, nitrogen dioxide, particulate matter (PM₁₀ and PM_{2.5}), ozone (NO_x and VOCs), and sulfur oxides. Air quality is monitored and areas are designated according to whether or not they meet the NAAQS for each pollutant. Geographic regions that meet the NAAQS are referred to as attainment areas; areas that do not meet the NAAQS are

What is the Clean Air Act?

The United States Clean Air Act describes legislation enacted by Congress to control air pollution on a national level. The first Clean Air Act was the Air Pollution Control Act of 1955, followed by the Clean Air Act of 1963, the Air Quality Act of 1967, the Clean Air Act Extension of 1970, and Clean Air Act Amendments in 1977 and 1990. Numerous state and local governments have enacted similar legislation, either implementing federal programs or filling in locally important gaps in federal programs.

designated nonattainment to that standard. Once designated nonattainment, the Clean Air Act requires the preparation of an attainment plan to demonstrate how an area will thereafter meet and maintain the NAAQS. Once a nonattainment area has subsequently met the NAAQS for a period of time, the area may be redesignated as a maintenance area. A maintenance plan is required for these areas to demonstrate that the NAAQS will continue to be met in the future. Maintenance and attainment plans for individual regions comprise the State Implementation Plan (SIP) for Air Quality for a given state. The terms maintenance plan, attainment plan, and SIP are often used interchangeably.

Maintenance plans will often contain control strategies to ensure attainment of the standards related to the pollutant sources. Depending on the pollutant, these sources can include transportation, industry, and wood smoke. An emissions inventory will be prepared, estimating the emissions from each of these sources. This inventory will be used to identify the appropriate level of emissions from each source that will ensure the region will maintain the standards. As an example, a motor vehicle emissions “budget” may be prepared for certain pollutants, which is a ceiling of total emissions from on-road mobile sources in the region that cannot be exceeded.

In 1978, the central Puget Sound region was classified as a nonattainment area for CO and ozone. In 1987, the industrial areas of the Seattle Duwamish River, Kent Valley, and Tacoma Tideflats were classified as nonattainment areas for PM₁₀. The Seattle and Tacoma industrial areas include the ports of both those cities. In 1996, having met the federal standards for several years, the region was redesignated by EPA as a maintenance area for CO and ozone; the three PM₁₀ nonattainment areas were redesignated as maintenance areas in 2001. As required, each of these areas has approved maintenance plans in place. Approval of both the CO and ozone maintenance plans occurred in 1996, with subsequent updates to both plans approved in 2004; approval of the PM₁₀

maintenance plan occurred in 2000, with the plan becoming effective in 2001.

In June 2004 EPA officially designated areas to a new ozone standard, and in April 2005, to a new particulate matter standard. The original ozone standard for which the Puget Sound region was in maintenance was based on a 1-hour concentration. The new standard is based on an 8-hour average concentration and replaced the 1-hour standard as of June 15, 2005. The new particulate matter standard is for PM_{2.5}, and is in addition to the existing PM₁₀ standard, which remains in place. EPA further strengthened the standard for PM_{2.5} in 2006, and strengthened the ozone standard in 2008.

Both the new PM_{2.5} and ozone standards have recently been violated in the Puget Sound region. The South Tacoma (Wapato Hills/Puyallup River Valley) area was designated by EPA as nonattainment to the new PM_{2.5} standard in December 2008. This designation became effective with the October 2009 Federal Register notice published by EPA.¹

Ecology, in coordination with PSCAA, must develop an attainment plan within 3 years of this designation to demonstrate how the area will come back into compliance with the standard. The primary source of PM_{2.5} emissions in this newly designated area is wood-burning activities, but mobile sources represent approximately 27 percent of the emissions².

The region has also experienced exceedances of the new ozone standard, with a final exceedance in summer 2008 leading to a violation of the standard. In January 2010, EPA proposed a revision to the 2008 ozone standard, and put all area

¹ The December 2008 notice did not become effective until the October 2009 Federal Register notice.

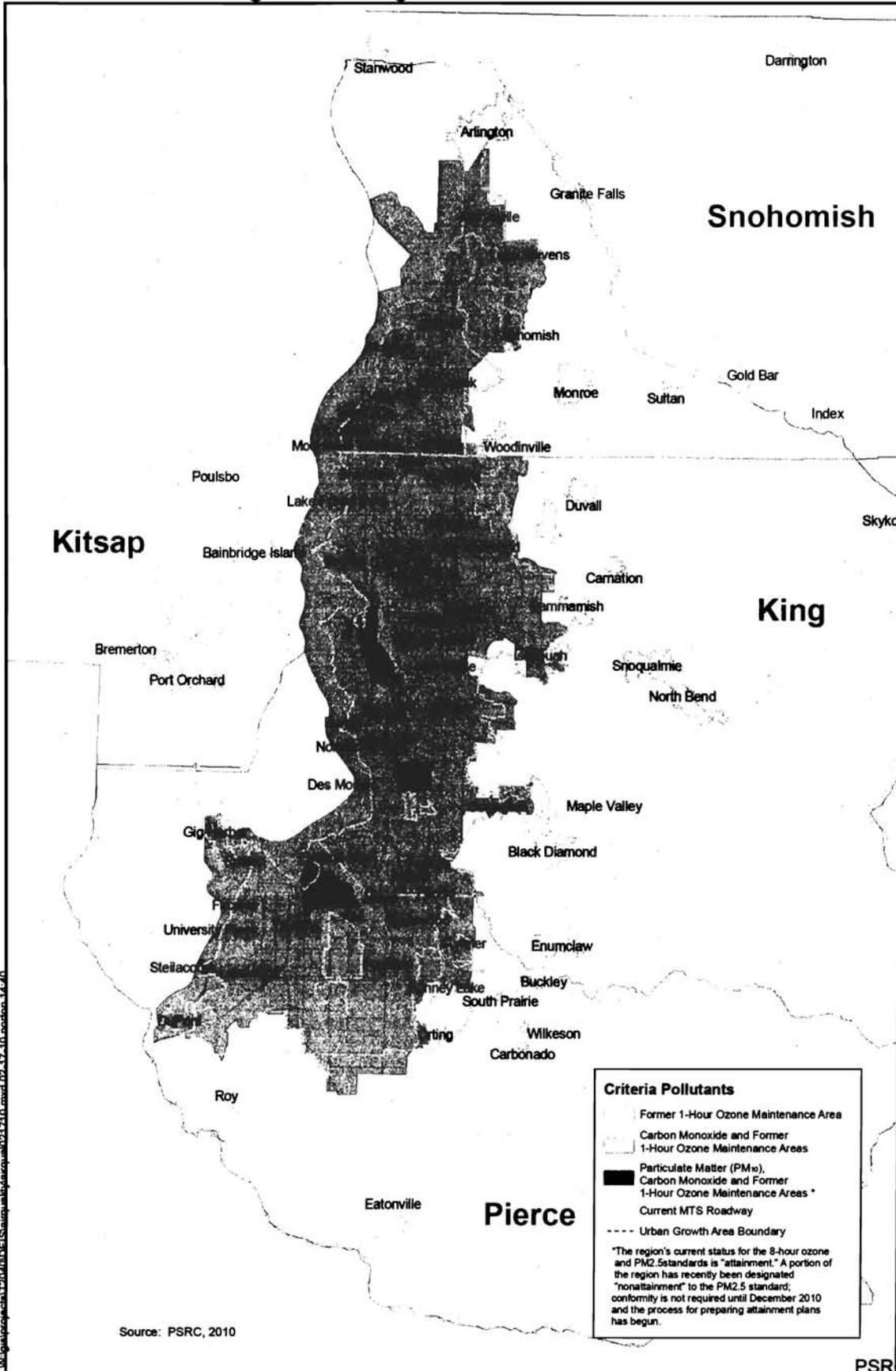
² The final source apportionments will be completed as part of the attainment plan process.

designations to the 2008 standard on hold. The revised standard is expected to be finalized by August 2010.

Exhibit 6-1 illustrates the region's current maintenance area boundaries. The PM_{2.5} and ozone redesignations are not reflected on this map, because they are still ongoing processes.

Exhibit 6-2 identifies the current NAAQS for each of the criteria pollutants.

Exhibit 6-1. Central Puget Sound Region Maintenance Areas



**Exhibit 6-2
National Ambient Air Quality Standards**

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon monoxide	9 ppm (10 mg/m ³)	8-hour ⁽¹⁾	none	
	35 ppm (40 mg/m ³)	1-hour ⁽¹⁾		
Lead	0.15 µg/m ³ ⁽²⁾	rolling 3-month average	same as primary	
	1.5 µg/m ³	quarterly average	same as primary	
Nitrogen dioxide	0.053 ppm (100 µg/m ³)	annual (arithmetic mean)	same as primary	
Particulate matter (PM ₁₀)	150 µg/m ³	24-hour ⁽³⁾	same as primary	
Particulate matter (PM _{2.5})	15.0 µg/m ³	annual ⁽⁴⁾ (arithmetic mean)	same as primary	
	35 µg/m ³	24-hour ⁽⁵⁾	same as primary	
Ozone	0.075 ppm (2008 standard)	8-hour ⁽⁶⁾	same as primary	
	0.08 ppm (1997 standard)	8-hour ⁽⁷⁾	same as primary	
	0.12 ppm	1-hour ⁽⁸⁾ (applies only in limited areas)	same as primary	
Sulfur dioxide	0.03 ppm	annual (arithmetic mean)	0.5 ppm (1,300 µg/m ³)	3-hour ⁽¹⁾
	0.14 ppm	24-hour ⁽¹⁾		

Notes: ppm = parts per million mg/m³ = milligrams per cubic meter µg/m³ = micrograms per cubic meter

- Not to be exceeded more than once per year.
- Final rule signed October 15, 2008.
- Not to be exceeded more than once per year on average over 3 years
- To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.
- To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).
- To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
- (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
- (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.
(b) As of June 15, 2005, EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

Source: EPA, 2009.

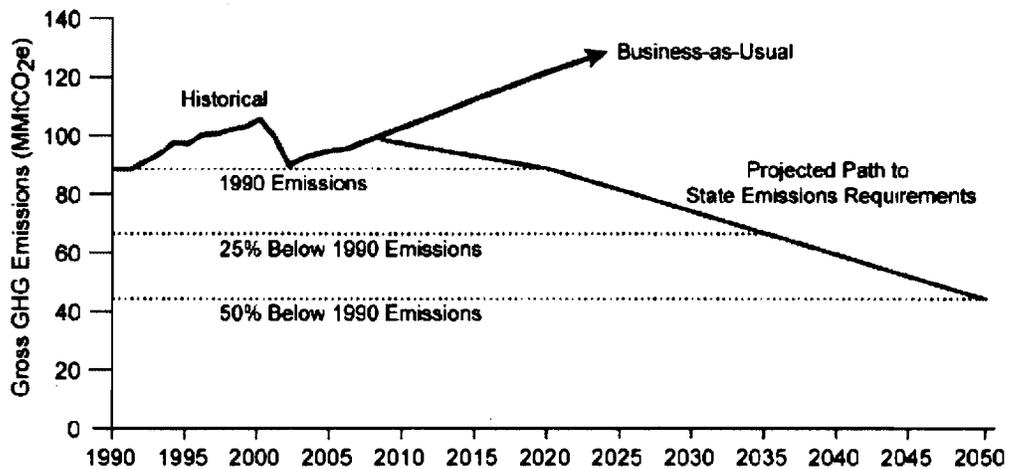
March 2010

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Greenhouse Gases

At this time, there are no federal standards related to greenhouse gases. The state of Washington has passed several pieces of legislation related to the reduction of greenhouse gases, including setting statewide goals to reduce emissions to 1990 levels by 2020, 25 percent below 1990 levels by 2035, and 50 percent below 1990 levels by 2050 (Exhibit 6-3). In addition, the state has set benchmarks for reducing annual statewide per capita vehicle miles traveled (VMT). These benchmarks are to decrease annual statewide VMT per capita by 18 percent by 2020, 30 percent by 2035, and 50 percent by 2050. These reductions are from a forecasted statewide VMT baseline of 75 billion in 2020; trucks over 10,000 pounds gross vehicle weight are exempted. Currently, no emission reduction goals have been established for individual sectors (e.g., transportation, industry) or specific emission goals or VMT benchmarks established for specific regions.

**Exhibit 6-3
Greenhouse Gas Reduction Goals**



Source: CTED, 2008

There may be future federal and state legislation that sets requirements for reducing greenhouse gas emissions and/or VMT, pertinent to the transportation and growth management planning activities conducted by PSRC. In the absence of such requirements, PSRC has taken an active stance to address the

state's climate change goals in the VISION 2040 policies and in the development of Transportation 2040. Each alternative has been evaluated for greenhouse gas emissions as well as total and per capita VMT (refer to Question 5 later in this chapter). The data produced from this analysis will help to inform the region and state on the potential benefits from alternative combinations of transportation and land use strategies in reducing emissions and VMT. In addition to the information contained in the Potential Mitigation Measures section of this chapter, the Transportation 2040 plan discusses the potential benefits from improvements in technology (vehicles and fuels), as well as policy considerations such as market penetration and cost issues.

Transportation Conformity

Transportation conformity is a mechanism to ensure that transportation-related activities—plans, programs, and projects—are reviewed and evaluated for their impacts on air quality prior to funding or approval. 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. Specifically, regional transportation plans, improvement programs, and projects may not cause or contribute to new violations, worsen existing violations, or interfere with the timely attainment of air quality standards or the required interim emission reductions towards attainment. Positive findings of conformity are required by the federal Clean Air Act, the Clean Air Washington Act, and the federal transportation act (the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users—SAFETEA-LU) to allow regions to proceed with transportation project implementation in a timely manner.

A regional transportation conformity analysis must show that the total regional emissions produced by projects in the long-range transportation plan and the short-range transportation improvement program, plus activity on the existing transportation system, do not exceed the motor vehicle emissions budget identified in the maintenance plan for each criteria pollutant (refer to the previous section). In the Puget

What is SAFETEA-LU?

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) is a bill that governs United States federal surface transportation spending. It was signed into law by President George W. Bush on August 10, 2005 and expired on September 30, 2009. Congress is working on a replacement bill for the next six-year period.

Sound region, based on the pollutants for which the region is in maintenance to the standard, conformity is demonstrated for CO and PM₁₀. Because the 1-hour ozone standard has been revoked and the region is currently in attainment of the 8-hour ozone standard, demonstrations of conformity are no longer required for this pollutant. Conformity to PM_{2.5}, based on the newly designated nonattainment area in Pierce County, is required to be demonstrated by December 14, 2010. PSRC is working with the region's air quality consultation partners on the procedures and parameters for conducting this analysis, which will be concluded after Transportation 2040 is adopted.

4 What are the current conditions and trends for air quality?

National Pollutant Trends

Nationally, emissions of the six criteria pollutants have declined by 41 percent since 1990, even while population, VMT, and energy use have increased. This decline is a result of regulatory and voluntary control programs in a variety of sectors, including mobile sources and industry. However, many parts of the country are in violation of one or more of the NAAQS, and ozone and fine particulates present particular challenges. Emissions of air toxics are also on the decline, with a decrease in emissions of certain pollutants such as benzene of 5 percent or more per year between 2000 and 2005.

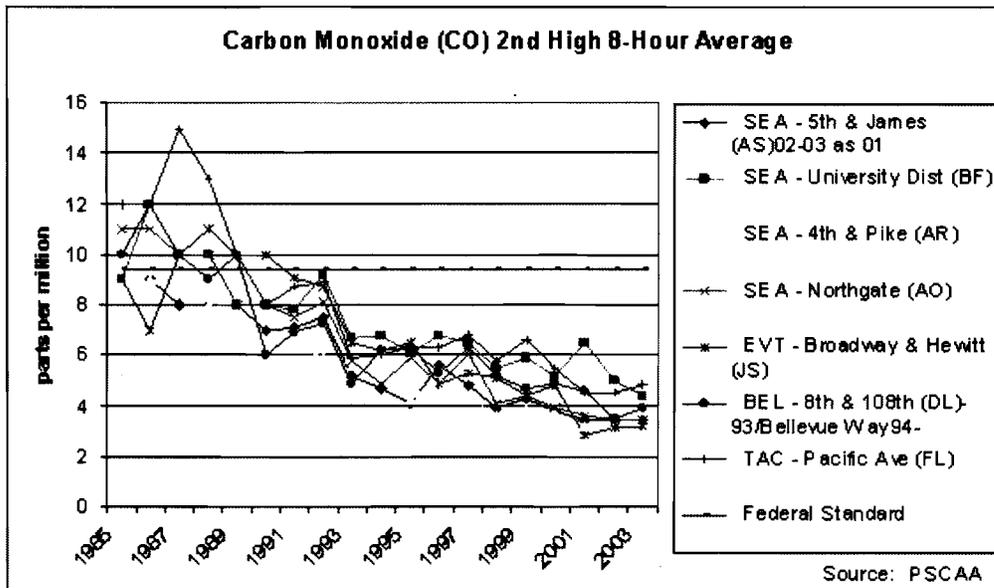
Alternatively, total emissions of greenhouse gases have increased 15 percent since 1990. This is primarily due to CO₂ emissions from the combustion of fossil fuels (EPA, 2007).

Regional Pollutant Trends

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. Levels of CO in particular have decreased substantially in the region (Exhibit 6-4). On-road gasoline vehicles represent over 70 percent of CO emissions in the region (PSCAA, 2006b). Decreases in CO concentrations have resulted in large part from federal emission standards for new vehicles and the gradual replacement of older, more polluting vehicles. Local oxygenated fuels programs, inspection and

maintenance programs, and traffic control measures have also played a role in the declining CO emission trend.

**Exhibit 6-4
Carbon Monoxide Trends in the Central Puget Sound Region**



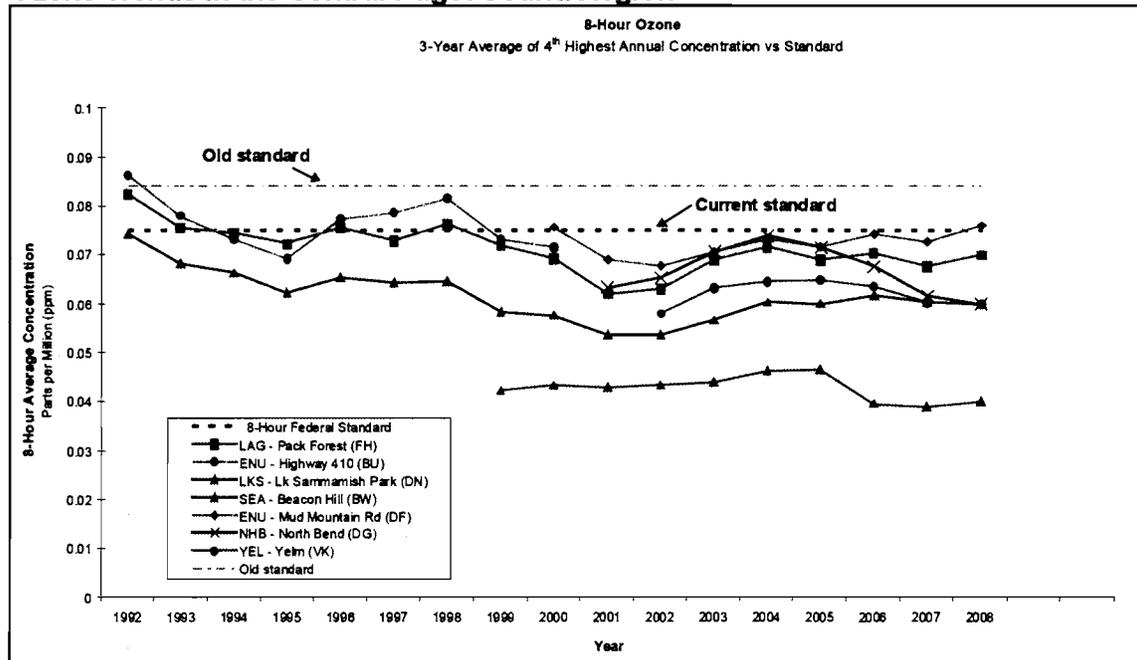
Source: PSCAA, 2006b

Emissions of sulfur oxides, NO_x, and lead are below levels of concern in the Puget Sound region and have been for many years. Levels of sulfur oxides in the region have shown significant decreases in the last 20 years, and PSCAA ceased monitoring for this pollutant in 1999. Lead in the ambient air is no longer considered a public health concern, and it has not been monitored in the region since 1999. Although NO_x is a concern in the region due to its role in the formation of ozone (along with VOCs in the presence of sunlight), emissions of this pollutant have been dramatically reduced in the region.

Emissions of ozone and fine particulates, however, have been of concern in recent years. In fact, as stated in the previous section, the region has recently violated the more stringent standards set by EPA and is soon to be designated as nonattainment of both standards.

Exhibit 6-5 illustrates the ozone trend in the region since 1992. The dashed black line represents the current federal standard; the high ozone concentrations that occurred last summer, plus several previous years' exceedances, have resulted in a violation of the standard. While the emissions are originating primarily in urban areas, the highest concentrations of ozone are measured in communities 10 to 30 miles downwind from the source, in areas such as North Bend and Enumclaw. Because of the complex chemical reactions occurring in the formation of ozone, the reduction of the precursor pollutants (VOCs and NO_x) does not produce proportional reductions in ozone. In the Puget Sound region, it has been determined that at a certain level, reducing emissions of NO_x may actually increase ozone concentrations. Therefore, reducing VOCs will be the most effective way to reduce ozone.

**Exhibit 6-5
Ozone Trends in the Central Puget Sound Region**

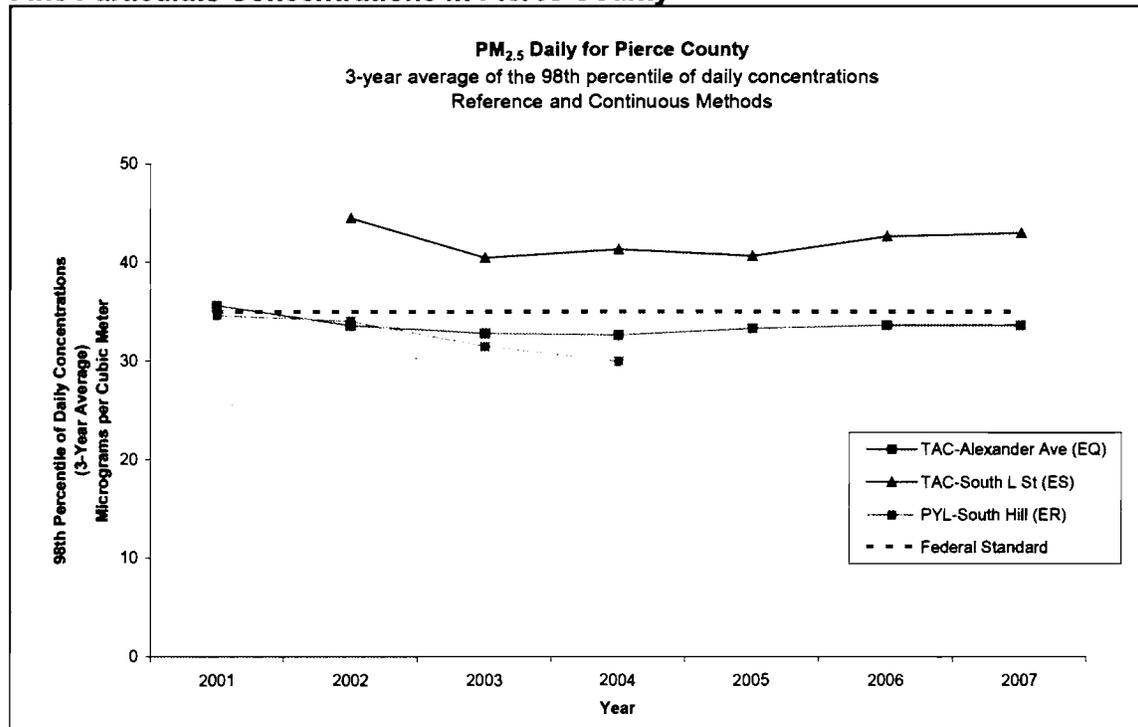


Source: PSCAA, 2009

Exhibit 6-6 shows the PM_{2.5} concentrations in Pierce County since 2001; the graph illustrates that the Tacoma area has now violated the new standard. Other monitors throughout the

region are close but have not yet violated the fine particulate standard. As stated previously, the primary source of PM_{2.5} emissions in the Tacoma area is wood burning activities, with mobile sources representing approximately 27 percent of the emissions. A similar composition of sources can be found in other parts of the region for this pollutant, although the percentage share between mobile sources and wood burning has seasonal differences. Emissions of coarse particulates, or PM₁₀, in the region have remained below the federal standard since the early 1990s.

**Exhibit 6-6
Fine Particulate Concentrations in Pierce County**

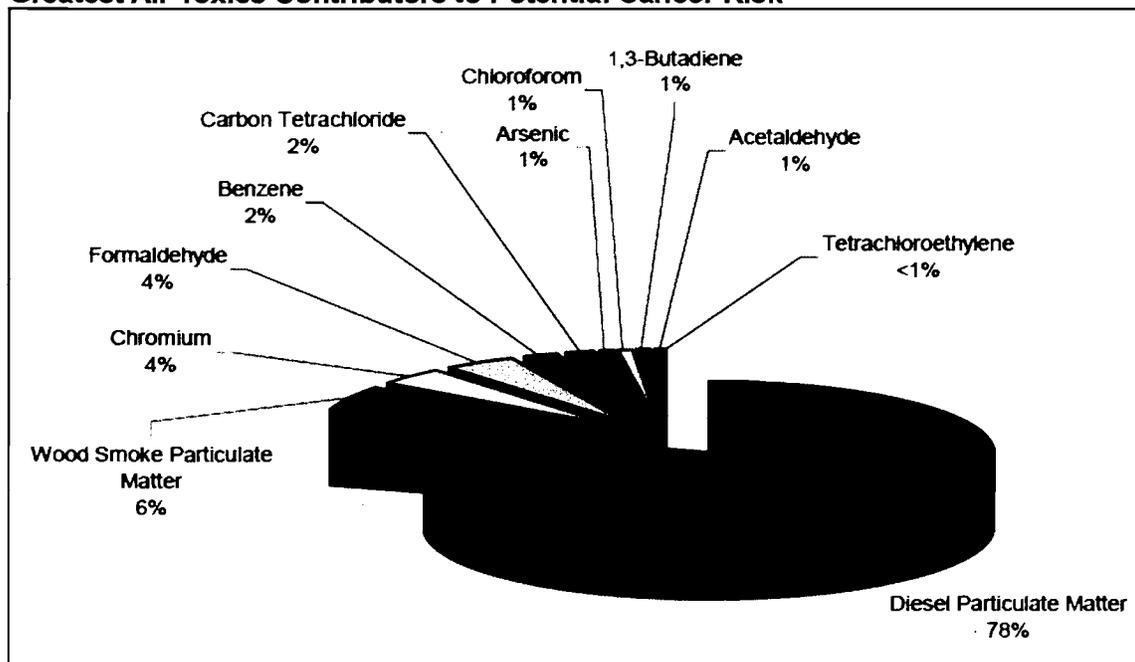


Note: All South Hill data are Federal Reference Method (FRM) from 2000 to 2007. Alexander Avenue data are FRM from 1999 to 2002 and nephelometer data from 2003 to 2007. South Hill data are FRM from 1999 to 2002 and nephelometer data from 2003-2004; incomplete nephelometer data were collected from South Hill in 2005.

Air toxics are present in the region at levels posing a health risk, and EPA has placed the region in the top 5 percent of the country for potential cancer risk from air toxics (PSCAA, 2006a). As shown in Exhibit 6-7, diesel particulate matter from diesel-fueled vehicles and equipment accounts for approximately 78 percent of the potential cancer risk from all

air toxics in the central Puget Sound region. At 6 percent, particulate matter from wood smoke represents the second-highest potential cancer risk in the region (PSCAA, 2003). Monitoring in the region for 17 air toxics has occurred since 2000. While 2000 to 2005 is a relatively short span of time on which to draw conclusions for regional trends, concentrations decreased in that time for all but one air toxic (PSCAA, 2006a).

**Exhibit 6-7
Greatest Air Toxics Contributors to Potential Cancer Risk**



Source: PSCAA, 2006a

Finally, while transportation sources account for 50 percent of the greenhouse gas emissions in the Puget Sound region, emissions are expected to grow fastest in the buildings and facilities sector and electricity supply (PSCAA, 2004). This is due in large part to the region's increasing reliance on natural gas and coal-based electricity sources, because the region's hydropower resources have largely met their maximum potential. The 2 years for which there are regional inventories—2000 and 2005—indicate an overall increase of

approximately 0.8 million metric tons of CO₂ equivalent during this 5-year time period, or 1.7 percent; the percentage by source has stayed roughly the same.

5 How were the alternatives analyzed?

NO_x, VOCs, ozone, CO, PM₁₀, and PM_{2.5} emissions for on-road mobile sources for the alternatives were estimated using PSRC's travel demand model and EPA's MOBILE6.2 vehicle emissions modeling software. EPA's draft Motor Vehicle Emission Simulator (MOVES) software was used to estimate greenhouse gas emissions represented as CO₂ equivalents (and hereafter referred to as CO₂). Emissions were calculated on an individual link basis, based on the VMT and speed of each link. This calculation was performed separately for five time periods (a.m. peak, midday, p.m. peak, evening, and night). The calculated emissions of individual links were then summed for each of the five time periods, which in turn were summed for the total daily emissions. No modeling was performed for air toxics, but emissions are expected to vary among the alternatives similarly to the other pollutants. Refer to Appendix E for further details on the air quality modeling parameters.

CO and PM₁₀ emissions were modeled within their respective maintenance areas as well as for the entire region. This approach allows modeled emissions under each alternative to be compared to the motor vehicle emission budget for each maintenance area. Emissions of all other pollutants were modeled for the entire region, because there are no currently designated maintenance or nonattainment areas in the Puget Sound region for these pollutants. The method for performing conformity analyses is slightly different than that used to analyze the entire region and reported in Exhibit 6-8; refer to Appendix E for further details.

6 What effects on air quality are common to all alternatives?

Exhibit 6-8 presents the results of each alternative for all pollutants analyzed (for the entire region). Exhibit 6-9 shows

Where can I learn more about EPA MOBILE6.2 and MOVES?

For more information about the vehicle emissions modeling software used by the EPA, refer to <http://www.epa.gov/otaq/models.htm>.

the percent change of emissions from each of the action alternatives (Alternatives 1 through 5 and the Preferred Alternative) compared to the Baseline Alternative. Exhibit 6-10 compares the CO and PM₁₀ emissions for each alternative against the motor vehicle emission budget for those two pollutants within their respective maintenance areas (as illustrated in Exhibit 6-1).

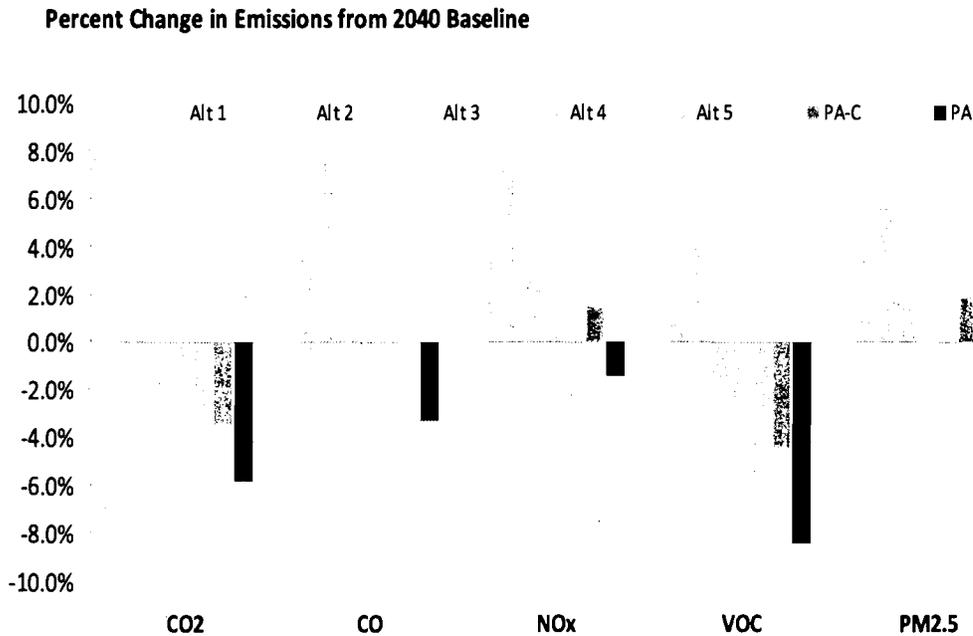
In addition to on-road mobile sources, emissions from the energy consumption of buildings were estimated for each of the alternatives. The energy consumption from these facilities is described in Chapter 11: Energy; the corresponding CO₂ emissions related to this energy consumption are included in Exhibit 6-8 and 6-9 (refer to Appendix E for additional information on the methods used).

As demonstrated in Exhibit 6-10, all of the Transportation 2040 alternatives remain below the motor vehicle emission budgets for the two pollutants for which the region is in maintenance status. As shown in Exhibits 6-8 and 6-9, emission trends compared to the base year show a decrease for the criteria pollutants but an increase for CO₂. As described in the previous section, regulatory and technological improvements such as the Tier II emission standards, which will reach full implementation by 2009, have played a significant role in the declining trend in these emissions. Because CO₂ emissions from mobile sources are more directly related to the amount of carbon in the fuel and the amount of fuel burned, the trend for these emissions is different than that of the other pollutants. The criteria pollutants are more affected by vehicle emission control technologies and improvements in fuel combustion because carbon is the main component of petroleum fuels. CO₂ emissions are less affected by these technologies and more by improvements to the fuel economy of vehicles and lowering the carbon content of fuels.

Exhibit 6-8³
Emissions (annual tons)

	2006	2040 Baseline Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	PA-C	PA
CO2 Mobile	17,158,000	23,648,000	23,708,000	24,020,000	22,789,000	22,568,000	21,257,000	22,308,000	21,526,000
CO2 buildings	8,893,000	13,176,000	13,154,000	13,086,000	13,105,000	13,136,000	13,169,000	13,245,000	13,141,000
Total CO2	26,051,000	36,824,000	36,862,000	37,106,000	35,894,000	35,704,000	34,426,000	35,553,000	34,667,000
CO	497,400	387,000	402,200	418,200	394,600	386,300	354,600	387,600	374,900
NOx	57,900	13,700	14,200	14,700	14,100	13,900	13,000	13,900	13,500
VOC	34,500	17,800	18,100	18,600	17,500	17,300	15,900	17,000	16,300
PM2.5	1,770	520	540	550	530	520	490	530	510

Exhibit 6-9⁴
Percent Change from 2040 Baseline Alternative



³ This exhibit has changed since the DEIS

⁴ This exhibit has changed since the DEIS.

Exhibit 6-10⁵

Transportation Conformity Analysis

	Motor Vehicle Emission Budget*	2040 Baseline Alt	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Preferred Alternative (Constrained)
CO (daily tons)	2,512	1,164	1224	1278	1208	1187	1084	1188
PM ₁₀ (daily pounds)								
Kent	232	83	88	91	87	88	85	84
Duwamish	844	299	296	291	299	296	275	288
Tacoma	461	236	247	252	250	254	231	240

Source: From the Central Puget Sound Region Maintenance Plan for each pollutant. Note: Conformity is applied only to the financially constrained portion of the Transportation 2040 plan; for the full conformity determination, including analysis of interim years, refer to Appendix E of the Transportation 2040 plan.

7 What effects on air quality are specific to individual alternatives?

As illustrated in Exhibits 6-8 and 6-9, Alternative 2 has the largest increase in emissions compared to the Baseline Alternative for all pollutants. Alternative 1 has an emissions increase for all pollutants compared to the Baseline Alternative, and Alternatives 3 and 4 show a mix of increases and decreases, depending on the pollutant. Alternative 5 shows the largest decrease in emissions for all pollutants. The full Preferred Alternative reduces emissions of all pollutants compared to the Baseline Alternative. The full Preferred Alternative has lower emissions of all pollutants than Alternatives 1 through 4, while emissions are higher than in Alternative 5. The results from the full Preferred Alternative are closest to the results of Alternative 5 than any of the other alternatives. The financially constrained portion of the Preferred Alternative has higher emissions than the full Preferred Alternative, and demonstrates a mix of increases and decreases compared to the other alternatives, depending on the pollutant.

As shown in Exhibits 6-11 and 6-12, Alternative 5 has the lowest percentage of single-occupant vehicle (SOV) trips, and the highest percentage of transit and bike/walk trips. Alternative 2, on the other hand, has the highest percentage of SOV trips and the lowest percentage of bike/walk trips; the share of transit trips in Alternative 2 is lower than in Alternative 1 and Alternatives 3 through 5, but is equivalent to

⁵ This exhibit has changed since the DEIS.

the transit share of trips in the Baseline Alternative. These mode share differences correlate with the emission results in Exhibits 6-8 and 6-9. The Preferred Alternative has a lower percentage of SOV trips, and a higher percentage of transit and bike/walk trips than the Baseline Alternative. The mode shares in the Preferred Alternative are similar to those in Alternatives 4 and 5.

Exhibit 6-11⁶
2040 Mode Shares (percent)

	Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative (Constrained)	Preferred Alternative
SOV	44	43	45	43	43	42	43	42
Shared Ride	40	40	42	40	40	40	40	40
Transit	4	5	2	4	5	5	5	5
Bike/Walk	12	12	1	12	12	13	12	12
Total	100%	100%	100%	100%	100%	100%	100%	100%

Note: Numbers may not add to 100% due to rounding.

Exhibit 6-12⁷
Total Vehicle Miles Traveled (VMT)

	Baseline	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative (Constrained)	Preferred Alternative
Total VMT	102,519,000	106,647,000	110,481,000	104,059,000	101,643,000	94,063,000	102,539,000	99,511,000

In terms of total VMT, Alternative 5 has the lowest VMT and Alternative 2 the highest among the alternatives. Chapter 4: Transportation discusses more fully the differences among the alternatives in terms of average daily speed and other indicators, including differences among facility types. Because individual pollutants react differently to changes in speed, these nuances may help to explain why Alternatives 3 and 4 display decreases in emissions of certain pollutants but increases in others. The full Preferred Alternative has lower VMT than the Baseline Alternative and all other alternatives except Alternative 5. The financially constrained portion of the Preferred Alternative is very similar in total VMT to the

⁶ This exhibit has changed since the DEIS.

⁷ This exhibit has changed since the DEIS.

Baseline Alternative; total VMT is less than shown in Alternatives 1 through 3, but higher than Alternatives 4 and 5.

Daily VMT per Capita Reductions

HB 2815 sets benchmarks for reducing statewide annual per capita VMT. The benchmark is based on a statewide forecast of 75 billion VMT by 2020; trucks over 10,000 pounds gross vehicle weight are exempted. The methodology for estimating the daily VMT per capita resulting from each Transportation 2040 alternative is different than the annual statewide benchmarks as described in the legislation. To make a reasonable and valid comparison, assumptions were made regarding the forecasted statewide 2020 annual VMT, the percentage of VMT attributed to trucks over 10,000 pounds, the forecasted 2020 statewide population, and the appropriate conversion factor from annual VMT per capita to daily VMT per capita. These assumptions are further discussed in Appendix E.

Based on these assumptions, average statewide daily VMT per capita in 2020 for passenger vehicles and light trucks is estimated to be approximately 27 miles. The statewide benchmarks would then be 22.1 miles by 2020, 18.9 miles by 2035, and 13.5 miles by 2050. In contrast, the PSRC regional forecast of 2020 daily VMT per capita is approximately 20.1 miles per day for passenger vehicles and light trucks, which is 26 percent lower than the state's forecast of VMT per capita in 2020. Exhibit 6-13 shows the daily VMT per capita results for each of the Transportation 2040 alternatives, for passenger vehicles and light trucks.

Exhibit 6-13⁹

Daily VMT per Capita for Passenger Vehicles and Light Trucks

	2020 Regional Baseline	Baseline Alternative	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Preferred Alternative (Constrained)	Preferred Alternative
Daily per Capita VMT	20.1	18.6	19.4	20.1	18.8	18.3	16.8	18.5	17.9
Percent Reduction from 2020		-8%	-4%	0%	-6%	-9%	-16%	-8%	-11%

⁹ This exhibit has changed since the DEIS.

The mobile source emission analyses do not include emissions from transit vehicles. At this time, PSRC's travel demand models do not represent all transit vehicle miles on the transportation network. As such, the impact from transit vehicles on emissions is not represented in the quantified analyses, although the subsequent transit ridership and distribution of trips among modes is captured. Each of the Transportation 2040 alternatives contains different levels of transit investment for light rail, commuter rail, and bus service. Each vehicle type has different emission characteristics; therefore, total ridership and the number of miles traveled by the vehicles will affect the total resulting emissions.

Greenhouse Gas Emissions and Technology

In addition to the pricing, transit, efficiency, and other strategies included in each of the Transportation 2040 alternatives (refer to Chapter 3: Plan Alternatives for more complete alternative descriptions), the PSRC Transportation Policy Board also directed staff to consider the potential effects from improved vehicle and fuel technologies on each alternative with respect to reducing greenhouse gas emissions. These technologies are discussed in greater detail in Question 9 and in the Transportation 2040 plan. However, as an example of the ultimate potential such technologies might provide, a scenario to replace the current fleet of passenger vehicles and light trucks with all electric vehicles was evaluated. With the caveat that achieving a full fleet replacement by 2040 would most likely require a shift from current policy and market mechanisms, the potential CO₂ emission reductions for such a scenario within the Transportation 2040 alternatives is in the range of 60 percent. This represents the approximate share of CO₂ emissions from passenger vehicles and light trucks for each alternative; replacing the existing fleet with electric vehicles that produce zero CO₂ emissions from the tailpipe (these calculations do not take into account upstream emissions that may result from the generation of electricity) would therefore remove the same proportionate share of total emissions for each alternative. For each of the alternatives, this scenario would reduce emissions in the range of approximately 50 percent from base year 2006 levels. Based on the analysis



Greater electric vehicle use would reduce greenhouse gas emissions

Source: Wikimedia Commons, 2008

March 2010

PSRC-00001469

results, the Transportation 2040 plan includes a Four-Part Greenhouse Gas Strategy to address the reduction of greenhouse gas emissions. This strategy includes land use, transportation choices, user fees, and technology. The Transportation 2040 plan also contains more information on the potential benefits of these strategies.

8 What cumulative effects on air quality could occur if the Transportation 2040 actions coincide with other planned actions?

Beyond the transportation-related impacts described previously, all of the alternatives would result in development and construction activity in various areas throughout the region. Construction would likely generate localized dust and exhaust emissions from vehicles and other equipment. In addition, these construction activities would likely contribute to localized traffic congestion, which may temporarily worsen localized emissions. The potential quantities of generated dust and exhaust emissions would depend on the amount of construction activity associated with each alternative. Specific impacts would be analyzed and addressed during project-level analysis of individual projects.

The surface transportation-based forecasts used for the air quality analysis do not attempt to predict other changes in regional and external pollution that could affect regional air quality. Growth outside of the region could also increase vehicle emissions in nearby metropolitan areas.

9 How can the effects to air quality be mitigated?

Individual projects may require mitigation, which would be identified during future project-level planning and environmental review. Each of the alternatives is estimated to result in emissions well below the motor vehicle emission budget for the pollutants for which the region is in maintenance (CO and PM₁₀); therefore, mitigation to reduce these emissions would not be required. However, given that certain pollutants are still a concern in the region (e.g., ozone and PM_{2.5}),

What are cumulative effects?

Cumulative effects address the impact on the environment that results from the incremental impact of the action being considered 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.

existing programs and measures to ensure the region's continued attainment and maintenance status should continue.

There have been many improvements in vehicle and fuel technologies over the past several decades, resulting in dramatic reductions in mobile source emissions. However, with population and VMT continuing to grow, emissions from mobile sources are still a concern, particularly with issues related to climate change taking prominence in our world today. Some of the current innovations occurring in our region include a conversion of transit buses to diesel/electric hybrid engines and the use of ultra-low-sulfur diesel or biodiesel fuel.

Washington State Ferries is currently researching the use of biodiesel fuel for use on the ferry system. The ferry system has already converted their entire fleet to run on ultra-low-sulfur diesel fuel. Much work has also been done to reduce emissions from port-related activities, such as using cleaner fuels, electric shore power, and other activities. The Diesel Solutions program run by PSCAA, in partnership with Ecology and EPA, has been working since 2001 to retrofit diesel engines in public and private fleets. The goal of Diesel Solutions is to retrofit or replace 100 percent of these fleets by 2040, resulting in a 90 percent reduction in particulate matter emissions.

The use of ultra-low-sulfur diesel fuel in highway engines has the potential to reduce emissions of particulate matter and NO_x by more than 90 percent when the current heavy-duty vehicle fleet has been completely replaced by 2030 (AFDC, 2009). The use of biodiesel, depending on the percentage blended with conventional diesel, can reduce emissions of CO, particulate matter, sulfates, hydrocarbons, and air toxics. Biodiesel also has the potential to reduce greenhouse gas emissions by 10 to 50 percent, depending on the blend. There are larger issues with the use of biodiesel, however, related to the upstream energy impacts from production (dependent on the agricultural source, for example).

Another fuel improvement currently being researched is to reduce the carbon content of fuel. The state of California established a Low-Carbon Fuel Standard in 2007, with a goal



Washington State Ferries (WSF) is developing strategies that would lower ferry emissions.

Source: WSDOT, 2009



Using low-carbon fuels in transit reduces greenhouse gas emissions.

Source: King County Metro Transit, 2003

of reducing the carbon intensity of fuels 10 percent by 2020. The 2008 Climate Action Team in the state of Washington has also recommended a low-carbon fuel standard as one of several “most promising” strategies to reduce greenhouse gas emissions in the transportation sector.

There are also many innovations in vehicle technologies that are either currently in the market or are being researched for future implementation. These include hybrid electric vehicles, plug-in hybrid or full electric vehicles, and hydrogen fuel cells. The potential tailpipe emission reduction from each of these technologies depends, in part, on the market penetration of the vehicles. The length of time it takes for these vehicles to enter the market, including at what percentage, is significant when discussing the impacts on climate change. “Traditional” hybrid electric vehicles have the potential to reduce greenhouse gas emissions in the range of 30 percent, and plug-in hybrid electric vehicles have the potential of reducing greenhouse gas emissions in the range of 30 to 60 percent (EPA, 2007). Many other factors, such as the source of electricity, play a role in the potential for upstream emission reductions from these technologies. Fuel cell vehicles may present the most promising technology in terms of tailpipe emission reduction, but they also present the most challenges (including costs, transport and storage of hydrogen, safety, and distribution systems).

An expanded analysis of the potential benefits from improvements in vehicle and fuel technology, as well as policy considerations such as market penetration and cost issues, are included as part of the Transportation 2040 plan. As with travel-related strategies, it will take a mix of strategies to result in the most effective emission reductions possible from vehicle and fuel technologies. However, the literature and research to date suggests that to achieve the maximum emission reduction from the transportation sector, a mix of all strategies must be undertaken—travel reduction, efficiency improvements, and vehicle and fuel technology improvements. It is also important to note that these quantified analyses do not capture all of the possible benefits from the investments assumed for each of the

Greenhouse Gas Strategy

For more information about PSRC’s Greenhouse Gas Strategy, refer to Appendix L: Greenhouse Gas 4-part Strategy.

Transportation 2040 alternatives, due to the limitations of the analytical models. Additional emission reductions may be possible from components such as additional sidewalk infrastructure, travel demand management programs, and Intelligent Transportation System (ITS) investments.

10 Are there any significant unavoidable adverse impacts to air quality?

Future project-level environmental review would determine if applicable air quality standards would be exceeded at specific locations. Where this occurs, potential mitigation for such impacts would be evaluated and implemented as appropriate to address the impact. If all mitigation measures required as part of subsequent project-level actions are implemented, no significant unavoidable adverse air quality impacts are expected under any of the alternatives.

APPENDIX E

Appendix L Greenhouse Gas 4-part Strategy

Supplementary information regarding options for further reducing greenhouse gas emissions in the Puget Sound region

State and Federal Greenhouse Gas Emissions Reduction Directions

Greenhouse Gas Reduction Goals: The State of Washington has adopted greenhouse gas (GHG) emission reduction goals for the state to reduce emissions to 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050. These goals are overall statewide reduction goals, across all sectors and sources of emissions. While these goals are enacted in state law, the state has not yet assigned targets for the regions of the state, nor for individual sectors (transportation, energy, housing, etc.). The federal government has also not yet set national GHG reduction goals, and current federal legislation being considered by Congress would require specific state goals and targets at least 2 years beyond the enactment of federal legislation.

In the absence of specific requirements and guidance, the Puget Sound Regional Council (PSRC) Transportation Policy Board has taken a proactive stance to address the state's climate change goals in the Transportation 2040 Update process. Each alternative analyzed according to State Environmental Policy Act (SEPA) rules was evaluated for GHG emissions as well as total and per capita vehicle miles traveled (VMT). The data produced from this evaluation process helped to inform the region and state on the potential benefits of a combination of transportation strategies in reducing emissions and VMT.

Based on PSRC's analyses and research, as well as data and research conducted at the national level, Transportation 2040 includes a Four-Part Greenhouse Gas Strategy. Recognizing that it will require a variety of strategies and tools to effectively reduce emissions from the transportation sector, the four-part strategy contains the following elements:

- **Land Use:** build upon the VISION 2040 Regional Growth Strategy to further the goal of balancing jobs and housing, and pursue additional refinements through strategies such as transit-oriented development.
- **User Fees:** recognizing its critical role in reducing VMT and emissions, transition the region over time to a user fee/roadway pricing system.
- **Choices:** continue to provide travelers options to the single-occupant vehicle, and continue research into the costs and benefits of various strategies.
- **Technology:** recognizing that improvements to vehicles and fuels will play a crucial role in reducing emissions, PSRC has undertaken research with the Washington State Department of Ecology (Ecology) on the potential technological advances that may be likely in our region by the year 2040.

Transportation 2040 includes programs and investments that encompass all four of these strategies; these investments are described in more detail later in this document.

State Vehicle Miles Traveled Reduction Benchmarks: The state of Washington has also enacted VMT reduction benchmarks. These benchmarks are not requirements, but were enacted to encourage measurement of VMT as part of an overall greenhouse gas reduction strategy. In early 2009, Governor Gregoire issued an Executive Order, which requires a collaborative process to review the VMT reduction benchmarks and report on whether they should be changed, especially related to alternative fuel vehicles, and the economic and other impacts of VMT reduction benchmarks. The report is due by the end of 2010. The analysis conducted for Transportation 2040 has demonstrated that VMT per capita in the region is already meeting the State's 2020 benchmark, and additional reductions for all alternatives are estimated by 2040 (Refer to Chapter 6 for more information). Given this state directive, PSRC is reporting progress on VMT reduction and has incorporated specific actions within the four-part greenhouse gas strategy to support VMT reduction.

PSRC continues to work with the Washington State Department of Transportation (WSDOT), other metropolitan planning and regional transportation planning organizations around the state, and additional stakeholders on the requirements of Governor Gregoire's executive order.

Transportation 2040

The Transportation 2040 alternatives contain elements of the Four-Part Greenhouse Gas Strategy, including land use actions, roadway pricing, providing more transportation choices, and vehicle and fuel technology. Each of these strategies are discussed below:

Land Use: The region will achieve the adopted growth strategy, VISION 2040. Analysis conducted for the development of VISION 2040 indicates that the increased shift to a more centered growth pattern, and a better jobs/housing balance within the four counties embodied within VISION 2040, will reduce GHG emissions by about 6% from the trend¹.

Pricing and Choices: The Transportation 2040 alternatives use four pricing strategies that would have the effect of reducing vehicle travel, and therefore, GHG emissions.

1. Tolling individual freeway segments: The first strategy is tolling of individual roadway segments, first converting most high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes, and then tolling individual freeways where capacity will be added. The tolling is assumed to be variable by time of day to reduce peak period travel and congestion, and the overall effect of tolling is to reduce unnecessary travel and overall vehicle travel. Assumed toll rates were set at levels that would optimize use of the system (while minimizing negative arterial diversion) and maximize benefits to system users.

2. Substituting a VMT fee for the gas tax: A gas tax substitute, such as a VMT fee, could be implemented. The VMT fee has a more direct link to amount of travel compared with the gas tax, providing drivers with more direct information on how much they travel. This approach has been demonstrated to reduce the amount of travel.

3. Freeway System Tolls: All regional freeways could be tolled to raise money for transportation investments and to manage the limited capacity of the system. It is assumed that the freeway system toll will be variable, with higher toll rates during the peak commute times, and a minimal or no toll at night and other non-congested times. Toll rates were set to optimize use of the system and to maximize benefits to the system users. This translates to an average toll of about 18 cents per mile.

4. Parking Surcharges: Additional parking surcharges could be implemented in major regional employment centers.

The above pricing approaches, supported by a 120% increase in local transit service and the extension of regional light rail to Everett, Tacoma, and Redmond, plus investments in walking and biking facilities within and accessing centers and transit stations, together result in a 9% reduction in regional GHG emissions from the trend.

Technology: Assumptions about the market penetration of electric and other alternative fuel vehicles, less carbon-intensive fuels, and improved fuel efficiency of the overall passenger and freight fleets could further reduce GHG emissions. In collaboration with Ecology, PSRC developed two technology scenarios: a "likely" scenario, which is probable given current trends and conservative assumptions about fuel prices and other incentives to change technology, and an "aggressive" scenario, which assumes a higher degree of concerted effort to transition the vehicle fleet to a more energy-efficient approach. These scenarios, based on extensive national research and prepared in consultation with the U.S. Environmental Protection Agency (U.S. EPA), WSDOT, and the Puget Sound Clean Air Agency, are

¹ The value referenced here is obtained from the analyses conducted for the VISION 2040 Environmental Impact Statement. The alternatives analysis for VISION 2040 evaluated various growth patterns compared to the historic trend, using the investments contained in the existing long-range transportation plan, *Destination 2030*.

identified in the chart below. The “likely” scenario could result in an additional 25% reduction of GHG emissions, and the “aggressive” scenario could result in an additional 43% reduction in emissions.

Potential Vehicle and Fuel Technological Improvements in the Central Puget Sound Region by 2040

	LIKELY SCENARIO	AGGRESSIVE SCENARIO
Percent of Electric Vehicles in Fleet	20%	45%
Improvements to Fuel Economy	40 mpg	50 mpg
Reduction of Carbon Intensity of Fuel	10%	25%
Improvements to Heavy Duty Vehicles	5%	10%

Four-Part Greenhouse Gas Strategy: Next Steps

PSRC has taken a proactive stance at addressing the reduction of GHG emissions, beginning with the multicounty planning policies and the Regional Growth Strategy contained in VISION 2040 and continuing with the analysis work and investment strategies contained in Transportation 2040. This is an emerging area, with research and legislation continuing to evolve at both the state and national levels. PSRC’s Boards have directed that Transportation 2040 should be flexible and adaptable in order to respond to new guidance and directions on a variety of issues, including climate change.

The Transportation 2040 alternatives contain elements of each of the four components of the Four-Part Greenhouse Gas Strategy. Additional research and analysis could be conducted in each of these areas, such as the following:

Land Use: VISION 2040 resulted in a 6% reduction in GHG emissions from the trend. From the VISION 2040 Environmental Impact Statement (EIS), further focusing growth in metropolitan and larger cities could result in up to a 9% reduction in GHG emissions.

User Fees and Choices: The transportation investments in the Preferred Alternative result in a 9% reduction in GHG emissions from the 2040 Baseline. Higher assumptions of vehicle operating costs would result in additional reductions, for example:

- The toll rates in Alternative 5 were higher (25¢ per mile) and resulted in a 10% reduction in GHG emissions from the Baseline.
- Other sensitivity tests of higher vehicle operating costs (an additional 19¢ per mile, equal to approximately an additional \$4.00 a gallon) indicated the potential for further reductions of GHG emissions in the range of 7% to 10%.
- A sensitivity test that involved increasing urban bus services in coordination with the road tolls analyzed in the Draft EIS alternatives indicated the potential for further modest reductions in GHG emissions, in the range of 0.2%.
- The report Moving Cooler² analyzed fees equivalent to an *additional* \$5.00 a gallon, which resulted in a 28% reduction in GHG emissions from their study baseline by 2050.

The alternatives analysis conducted for Transportation 2040 included significant investments in alternatives to single-occupant vehicle travel, consistent with the 2008 Washington State Climate Action Team’s recommendations³. Additional research could be conducted regarding the impact of the region’s “short trips,” as well as the benefits of localized bicycle and pedestrian investments, active traffic management, transportation demand management (TDM) programs, etc.

² Moving Cooler, an Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions, Cambridge Systematics, Inc. 2009.

³ As published in Leading the Way: Implementing Practical Solutions to Climate Change, November 2008.

Technology: The application of likely and aggressive technology improvements to the Preferred Alternative results in a total GHG emissions reduction between 5% and 28% below 2006 levels. To ensure that these potential emissions reduction benefits are achieved, the region and the state should consider opportunities to influence the direction of vehicle and fuel improvements over the next 30 years, for example, through legislation or incentives.

SUMMARY

The results from the strategies and investments contained in the Transportation 2040 Preferred Alternative are consistent with state and national research related to the reduction of GHG emissions from the transportation sector. The 2008 Washington State Climate Action Team report, Leading the Way: Implementing Practical Solutions to the Climate Change Challenge, makes the following statements:

- “Two objectives are key to achieving the state’s goals for GHG emission reductions: 1) a binding GHG emissions limit, and 2) alignment of market incentives to support achieving that limit.”
- “In order to meet the 2020 targets and achieve the longer-term GHG emission reduction targets, a “centerpiece” market-based policy must be aligned with these limits to deliver cost-effective solutions and drive the broad structural changes needed to achieve a flourishing low-carbon economy. The sector-specific “most promising” policies recommended here can complement, but cannot supplant, this centerpiece policy; but they alone cannot (and are not intended to) achieve the longer-term goals in the absence of this market signal.”

Further, of the 14 “most promising strategies” recommended in the 2008 Climate Action Team report for all sectors, 10 were quantitatively analyzed for their emissions reduction potential. These 10 strategies were estimated to be able to reduce GHG emissions by 10% below forecasted 2020 levels.⁴

In addition, it is nationally recognized that all possible strategies are required to effectively reduce emissions from the transportation sector:

- “Meeting long-term climate protection goals will require significant progress on all three legs of the stool.” Center for Clean Air Policy
- “Independently, each approach appears to have the potential to significantly reduce GHG emissions from the transportation sector, but not enough to flatten emissions. When the approaches are combined however, there are even greater opportunities and added flexibility to reduce emissions.” U.S. EPA
- “For the U.S. transportation sector, system approaches that combined advanced vehicle technology, lower GHG fuels, and TDM yield the largest potential and flexibility for lowering both GHG emissions and petroleum use.” U.S. EPA

As mentioned previously, this is an emerging issue with numerous state and federal activities in process, including potential future federal legislation. PSRC will continue to move forward on its Four-Part Greenhouse Gas Strategy and will continue to collaborate with other agencies and monitor this important issue.

⁴ Page 49, Leading the Way: Implementing Practical Solutions to Climate Change, November 2008.

APPENDIX F

Chapter 3: A Sustainable Environment

The geographic features that uniquely define central Puget Sound, located between the Cascade and Olympic mountain ranges and bisected by its namesake saltwater estuary, create an outstanding natural setting and support a richly diverse ecology. The region's forests, wetlands, maritime waterways and fisheries are not only natural economic resources but also attractions for people whose daily lives are closely linked to vistas and access to mountains, beaches, rivers and lakes. The region's environment serves as a key foundation for growing clusters of the regional economy, making nurturing and sustaining the environment an economic priority vital to sustaining a high quality of life.

The region's topography also limits lands suitable for development and imposes complex and often expensive infrastructure requirements. Cities and towns are reshaping aging infrastructure to transform urban environments into more livable places, and are building new centers for additional job and employment growth.

This complex and rich environment shapes Transportation 2040. The plan is designed to keep the region's air and water healthy, sustain the region's overall ecology, assist in coordinated efforts of the Puget Sound Partnership to protect and restore the health of the region's watersheds, and lead in the development of emerging federal and state initiatives to reduce overall greenhouse gas emissions to address global climate change.

Transportation 2040 commits to supporting a heightened awareness of the relationship between transportation and the environment, consistent with the regional environmental sustainability framework established by VISION 2040. The plan has been designed with a central focus of reducing the potential environmental impacts associated with both transportation infrastructure and operation. See *Appendix C, MPP-En-2 and 3, MPP-En-8 through 15, MPP-En-17 through MPP-En-19, MPP-En-23, MPP-DP-27, and MPP-T-28.*

Alternative approaches to developing a regional transportation system were evaluated in the *Environmental Impact Statement for Transportation 2040 (EIS)*. Preparation of the EIS included extensive agency coordination and public comment over many months, and has been guided by PSRC's Transportation Policy Board and Growth Management Policy Board. The Transportation 2040 Environmental Impact Statement contained information that allowed regional decision makers to craft a transportation plan that addresses critical regional policy objectives, including improved air quality, reduced greenhouse gases, improved water quality, public health and mobility, and support for the VISION 2040 Regional Growth Strategy. The EIS identifies specific potential measures to mitigate impacts associated with the implementation of Transportation 2040. For full documentation of the environmental analysis supporting Transportation 2040, see www.psrc.org

Maintain and Improve Air Quality

The region has made great strides in improving air quality over the past several decades, even with growth in both population and vehicle miles traveled. However, emissions of certain pollutants have been on the rise in recent years, and there are new and continuing challenges ahead.

To protect human health and the environment, the Environmental Protection Agency has set National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants under the Clean Air Act. These pollutants are ground-level ozone, carbon monoxide, particle pollution (or particulate matter), sulfur oxides, nitrogen oxides, and lead. Levels of many of these pollutants have been

declining in our region, but emissions of fine particulates and elements that form ground-level ozone are still a concern. While emissions of these pollutants come from a variety of sources, motor vehicles account for a significant share in the central Puget Sound region.

Transportation Conformity

Air quality is monitored and areas are designated according to whether or not they meet the air quality standards for each pollutant. Geographic regions that meet the standards are referred to as attainment areas; areas that do not meet the standards are designated nonattainment to that standard. Once designated nonattainment, the Clean Air Act requires the preparation of an attainment plan to demonstrate how an area will thereafter meet and maintain established standards. Once a nonattainment area has subsequently met the standards for a period of time, the area may be redesignated as a maintenance area. To demonstrate that the standards will continue to be met in the future, a maintenance plan is required for these areas.

Parts of the region are designated as maintenance areas for particulate matter less than 10 microns in diameter (PM10) and carbon monoxide (CO). Under federal and state air quality statutes and regulations, there are special requirements in maintenance areas to ensure that proposed transportation activities — plans, programs and projects — do not cause new, or contribute to existing, air quality problems. Compliance with these statutes and regulations (referred to as conformity) requires analyses that demonstrate compliance with existing air quality control plans and programs. A positive finding of conformity is required by the federal Clean Air Act and its amendments, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and the Clean Air Washington Act. Positive conformity findings allow the region to proceed with implementation of transportation projects in a timely manner. In the absence of a positive conformity finding, only those projects which are exempt (such as safety or transit projects) will be allowed to proceed using federal transportation funds.

As shown in Figure 17, the projects and programs in Transportation 2040 are well within the established limits for the two pollutants for which conformity currently applies in the region, CO and PM₁₀. The formal conformity analysis and finding for Transportation 2040 is included as Appendix E.

Figure 17. Transportation Conformity Analysis Summary

	Motor Vehicle Emissions Budget*	Transportation 2040
CO (daily tons)	2,512.0	1,188.5
PM10 (daily pounds)		
Kent	231.5	84.4
Duwamish	844.4	287.8
Tacoma	460.8	240.1

* from the Central Puget Sound Region Maintenance Plans for each pollutant

While the region is currently designated as being in attainment with the federal standards for the other criteria pollutants, the South Tacoma (Wapato Hills/Puyallup River Valley) area has violated the fine particulate matter standard (PM 2.5) and was designated nonattainment in December 2009. The Washington State Department of Ecology, in cooperation with the Puget Sound Clean Air Agency, is developing an attainment plan to demonstrate how the area will come back into compliance with the standard. The primary source of fine particulate matter emissions in this area is wintertime wood burning activities, but mobile sources also represent a portion of the emissions. The region is also facing a potential re-designation to the newly proposed ground-

level ozone standard. In recent years the region had exceeded the existing standard, but had not yet officially violated the standard. On December 21, 2009, EPA released a proposed new ground-level ozone standard, which is more stringent than the existing standard. The new standard is expected to be finalized by August 2010, with area designations made by August 2011. Given the monitoring data in recent years, the region may be at risk of being designated nonattainment to the new standard.

The region is committed to maintaining the air quality standards in our region by continuing to reduce emissions of air pollutants through the use of cleaner fuels and vehicles, increasing alternatives to driving alone, and land use strategies. The region continues to monitor these air quality issues, and Transportation 2040 has been crafted to maintain compliance with all air quality and transportation conformity regulations.

Reduce Greenhouse Gas Emissions

Climate change has become a significant issue at the national, state, regional and local level. Washington state has taken numerous steps to begin addressing climate change, including the passage of legislation, which established goals for the reduction of greenhouse gases, and which sets benchmarks for the reduction of vehicle miles traveled (VMT) per capita (RCW 70.235.020, RCW 47.01.440).

Because the consequences of climate change are serious, the central Puget Sound region has committed to take aggressive action to reduce its transportation-related emissions. Throughout the process of creating Transportation 2040, climate change has been identified as one of the key issues needing to be addressed in the plan.

VISION 2040 calls for the region to reduce its overall production of harmful elements that contribute to climate change, and commits the region to comply with state directives. An evaluation of greenhouse gas emissions and vehicle miles traveled per capita was conducted in the process to develop Transportation 2040. The results of this analysis and additional research have produced a four-part greenhouse gas strategy that is a central part of Transportation 2040.

Climate change is defined as a significant change in the earth's long-term weather patterns. Increased levels of greenhouse gases in the atmosphere trap heat, causing the earth's surface to warm to a greater extent than usual; as temperatures rise, the climate changes. The burning of fossil fuels is a significant contributor to greenhouse gases.

In the United States, the transportation sector contributes 28 percent of all greenhouse gas emissions. In Washington state, transportation is responsible for 45 percent of greenhouse gas emissions, and in the Puget Sound region, the figure increases to approximately 50 percent. This difference among sectors can be explained in part due to our heavy use of hydropower for electricity, as opposed to coal and other fossil fuels in the rest of the country.

Within the transportation sector, passenger vehicles are responsible for roughly half of all emissions. While motor gasoline is the largest contributor to emissions among fuel types, the shares from diesel and jet fuel have grown over the last several decades. Reducing emissions from the transportation sector involves three components: (1) the type of fuel used, (2) travel behavior (especially as it relates to vehicle miles traveled), and (3) energy efficiency. However, analyses show that the growth in vehicle miles traveled due to population growth over the next four decades will outpace the improvements from the recently adopted fuel economy standards (a 35.5 mile per gallon fleet average by 2016). Even with more aggressive fuel economy improvements, the established greenhouse emission reduction goals will not be reached without some reduction in overall travel.

Washington State Legislation. RCW 70.235.020 established the following greenhouse gas emission reduction goals:

- To 1990 levels by 2020
- To 25 percent below 1990 levels by 2035
- To 50 percent below 1990 levels by 2050

In Addition, two key pieces of legislation were subsequently passed:

- RCW 47.01.440 establishes statewide annual per capita reduction benchmarks for vehicle miles traveled. The legislation established the forecast baseline of statewide vehicle miles traveled of 75 billion by the year 2020, exempting trucks over 10,000 pounds.
 - By 2020, decrease by 18 percent
 - By 2035, decrease by 30 percent
 - By 2050, decrease by 50 percent
- RCW 36.70A.580 and 5801 aim to address the impacts of climate change through the Growth Management Act, and direct the Department of Commerce to work with the Department of Transportation to reduce vehicle miles traveled.

In 2009, the Governor signed Executive Order 09-05, which directs the state to continue work on a variety of important climate change activities, including working with the federal government on a climate program, reducing greenhouse gas emissions from stationary sources, reducing greenhouse gas emissions from transportation (including recommendations on vehicle miles traveled benchmarks and working with organizations such as PSRC), and adapting and preparing for unavoidable impacts.

Regional Policies. VISION 2040 established a wide variety of specific regional greenhouse gas reduction goals, policies, and actions committing the Puget Sound region to meet all state and federal targets for greenhouse gas emissions reductions. See *Appendix C, MPP-En-3, MPP-En-16 through MPP-En-25, MPP-DP-45, MPP-Ec-15, MPP-T-5, MPP-T-6, MPP-T-22, MPP-T-23, MPP-T-25, MPP-PS-1, MPP-PS-12 and MPP-PS-13.* See also *En-Action-6, DP-Action-9 and T-Action-14.*

Four-Part Greenhouse Gas Reduction Strategy

The analysis for Transportation 2040 included research into the potential impacts to emissions from various levels of pricing, system management and demand management strategies, as well as strategic expansion of all modes including roadways, transit, and bicycle and pedestrian facilities.

The realization that it will require a variety of strategies and tools to effectively reduce emissions from the transportation sector led to the development of a four-part greenhouse gas strategy:

- **Land Use:** Build upon the VISION 2040 Regional Growth Strategy to further the goal of providing an improved jobs-housing balance, and pursue additional refinements through strategies such as transit oriented development.
- **User Fees:** Recognize the critical role of price in reducing vehicle miles traveled and emissions, transition the region over time to a user fee/roadway pricing system.
- **Choices:** Provide travelers options to single occupant vehicles, and continue to research the costs and benefits of various strategies.
- **Technology:** Recognize that improvements to vehicles and fuels will play a crucial role in reducing emissions. PSRC has undertaken research with the Department of Ecology on the potential technological advances that may be likely in our region by the year 2040.

Transportation 2040 includes programs and investments that encompass all four of these strategies, including land use actions, roadway pricing, providing more transportation choices, and vehicle and fuel technology. Transportation 2040 supports the following specific actions:

Land Use: In order to achieve the greenhouse gas reduction benefit from land use, the region must achieve a growth pattern similar to the one adopted in the VISION 2040 Regional Growth Strategy. Analysis conducted for the development of VISION 2040 indicated that the increased shift to a more compact and concentrated growth pattern, and a better jobs/housing balance within the region's four counties, will reduce greenhouse gas emissions by about 6 percent from the trend.³ A compact development pattern is a foundation of the region's greenhouse gas reduction strategy.

Pricing and Choices: Transportation 2040 embraces pricing strategies that would be phased in over the life of the plan, with the effect of reducing vehicle travel and associated greenhouse gas emissions. These pricing approaches, supported by the full plan's peak period 132 percent increase in local transit service (108 percent increase off-peak), the extension of regional light rail, and investments in walking and biking facilities, together result in a 9 percent reduction in regional greenhouse gas emissions from the trend.

Technology: Transportation 2040 makes assumptions about the market penetration of electric and other alternative fuel vehicles, less carbon-intensive fuels, and improved fuel efficiency of the overall passenger and freight fleets. In collaboration with the Washington State Department of Ecology, PSRC developed two technology scenarios: a "likely" scenario, which is probable given current trends and conservative assumptions about fuel prices and other incentives to change technology, and an "aggressive" scenario, which assumes a higher degree of concerted effort to transition the vehicle fleet to a more energy efficient approach. These scenarios, based on extensive national research and consultation with the Environmental Protection Agency, the Washington State Department of Transportation and the Puget Sound Clean Air Agency, are identified in Figure 17 below. The "likely" scenario results in an additional 25 percent reduction of greenhouse gas emissions, and the "aggressive" scenario results in an additional 43 percent reduction in emissions. Appendix L provides additional details on the technology assumptions contained in the Four-Part Greenhouse Gas Strategy.

Outcomes

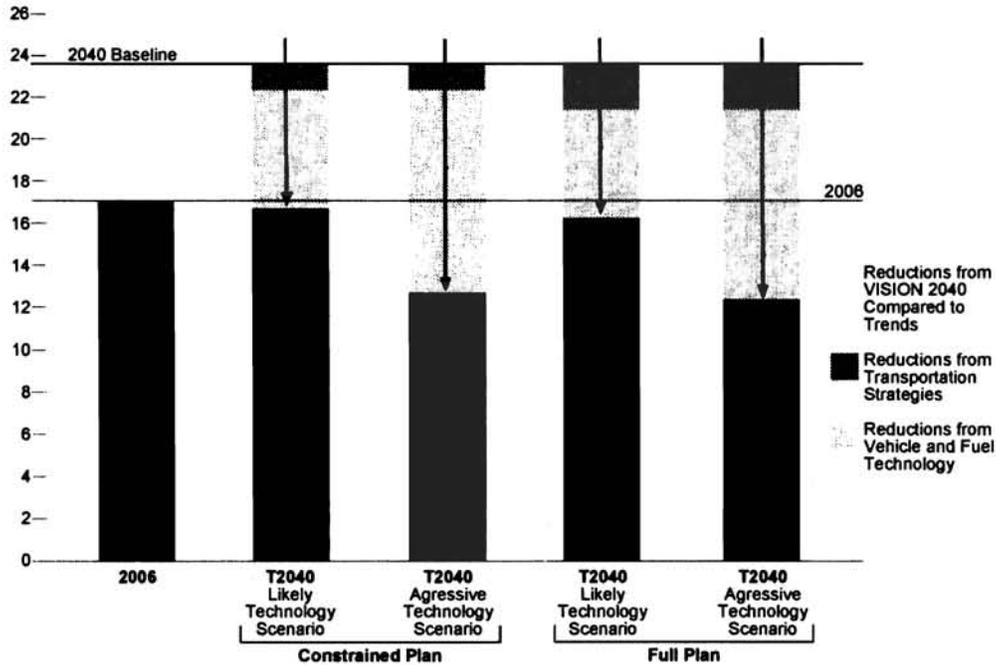
The results of the investments and strategies contained in Transportation 2040 are illustrated in Figure 18. The combination of the four-part strategy results in a range of emissions reductions (between 5 percent likely technology scenario and 28 percent aggressive technology scenario) below 2006 modeled emissions.⁴ As compared to the 2040 Baseline trend, the preferred alternative results in emissions reductions between 31 percent and 48 percent.

PSRC's 2010 Action Strategy will include a strategy to work with WSDOT and local and regional jurisdictions by December 2011 to improve analysis methodologies and identify additional strategies to reduce greenhouse gas emissions, when WSDOT is required to report to the Governor on the status of regional transportation plans. When state targets are set for the transportation sector and regions, PSRC should revisit its greenhouse gas reduction strategy.

³ Value obtained from the analyses conducted for the VISION 2040 Environmental Impact Statement. The alternatives analysis for VISION 2040 evaluated various growth patterns compared to the historic trend, using the investments contained in the existing long-range transportation plan, Destination 2030.

⁴ The Washington State greenhouse gas emissions reduction goals are set to a baseline 1990 level; PSRC does not at this time have a 1990 model year, so 2006 is used as a surrogate for comparison. The approximate increase in emissions from 1990 to 2006 are incorporated into findings.

Figure 18. Greenhouse Gas Emissions (CO₂ Emissions in Millions of Tons)



Adaptation

In addition to reducing the impacts from the transportation sector on climate change, it is also important for the region to address the impacts from climate change. This concept is referred to as “adaptation to climate change.” Beyond transportation, a wide variety of impacts from long term climate change may be expected in Washington state and the Puget Sound region. These include rising sea levels, increased flooding, and an increase in the frequency and severity of storms and other weather events, droughts, wildfires, impacts to water availability and quality, and impacts to crops. Specific to transportation, impacts could include the accelerated deterioration of roadways, issues related to flooding and increased stormwater, bridge damage, rail buckling, and reduced water levels in some water bodies that could affect the passage of ships and barges.

This is an emerging area of study, but the state and region are being proactive in planning for potential impacts on transportation. These activities include the state’s work called for in Executive Order 09-05 and RCW 43.21M, which direct the departments of Ecology, Health, Agriculture, Commerce, Fish and Wildlife, Natural Resources and Transportation to work with scientific experts and stakeholders to develop an integrated climate change strategy by December 2011. King County, in collaboration with the University of Washington and the International Council for Local Environmental Initiatives (ICLEI)-Local Governments for Sustainability released “Preparing for Climate Change: A Guidebook for Local, Regional and State Governments.” The King County Wastewater Division has also conducted an analysis of vulnerability of wastewater facilities to sea level rise.

PSRC has evaluated these potential impacts to transportation infrastructure in the Puget Sound region, including the port areas which would be most affected by rising sea levels. Appendix L contains a white paper on adaptation to climate change for transportation planning in the Puget Sound region.

Improve Water Quality

Maintaining and improving water quality is a regional priority. See *Appendix C, MPP-En-13 and 14*. The transportation system is a significant source of pollutants that affect water quality. The Puget Sound Partnership Action Agenda identified several sources of water pollution from the transportation system, including land-based vehicles, planes, and recreational and commercial ships. Roads and rail systems contribute pollutants from impervious road surfaces, brake pads, oil leaks, vehicle emissions, and maintenance of rights of way. Aviation contributes emissions, de-icing compounds, and oil/fuel leaks, and ships contribute anti-fouling compounds, oil/fuel leaks, personal care products, pathogens, sewage, and ballast water. Vehicles – including buses, trains, and ferries – are a source of greenhouse gas emissions and particulates. Although these initially enter the air, they can also settle in and contaminate surface waters.

In developing Transportation 2040, the potential impacts of different transportation systems to water quality were evaluated. A key finding was that as the region implements the system envisioned in Transportation 2040, it must do so in a way that avoids and mitigates harm to the region's precious water resources.

Transportation 2040 recommends that mitigation of transportation-related impacts to water quality can be accomplished in a number of ways:

- Reducing vehicle miles traveled decreases the amount of pollutants generated by vehicles. The use of innovative technologies can also help control potential water pollution at the source, as could programs that promote cleaner fuels and vehicles. A combination of incentives and disincentives could be used to promote clean vehicles, such as higher taxes on dirty fuels or tax credits for clean fuels and vehicles. Transportation programs that are designed to address issues such as congestion, emissions, fuel use, or waste management can indirectly benefit water quality through reduction of pollutants entering the environment.
- The treatment and detention of stormwater runoff from operating the transportation system will be particularly important, due to increased new impervious surfaces associated with preservation of existing facilities and new capacity. Potential stormwater impacts should be mitigated by designs that minimize the amount of impervious surface and use low-impact materials such as pervious pavers to manage runoff volumes. Collection, treatment and reuse of stormwater and other runoff is recommended to maximize the use of scarce water resources. Other approaches include use of natural systems such as wetlands to manage water flow, and measures to restore buffers and natural channels for streams alongside transportation facilities.
- Many existing facilities lack modern systems for water quantity or quality management. As projects replace, improve, or extend existing facilities, an opportunity exists to improve their environmental performance compared to today. For example, culverts and other drainage facilities associated with transportation infrastructure can be designed and operated to facilitate fish passage. Transportation 2040 supports the opportunity for the region to create innovative, low-impact, environmentally friendly transportation infrastructure, and to address and correct the harm we have already done.

Improve and Promote Health

Health and well-being factor prominently in VISION 2040. Multicounty planning policies call for improving opportunities for walking and biking, as well as for addressing health in regional and local planning and decision-making processes (MPP-DP-43 and MPP-DP-44). The region's transportation system is to be developed in a manner that minimizes impacts to human health (MPP-T-7). Transportation 2040 addresses public health from several perspectives, the most common of which are impacts to air and water quality and promotion of physical activity. As described above, Transportation 2040 has been designed to minimize impacts to air and water quality, which will yield positive health benefits.

Public health concerns have traditionally focused on preventing the spread of disease, protecting people from unsafe water, polluted air, hazardous waste, and to help people live healthy lives. In recent years, however, public health agencies, local land use planners, and transportation staff have begun to focus increased attention on the health implications of the built environment and the way people travel. Research findings from the Centers for Disease Control (CDC) link the country's obesity epidemic in part to both community design and travel choices. Physical inactivity is a growing health problem in the United States, contributing not only to obesity, but also to chronic disease, osteoporosis, depression, and premature death. Several CDC studies indicate that communities that feature a mix of land uses, are connected by pedestrian and bicycle infrastructure and transit, and rely less on driving are more conducive to physical activity.

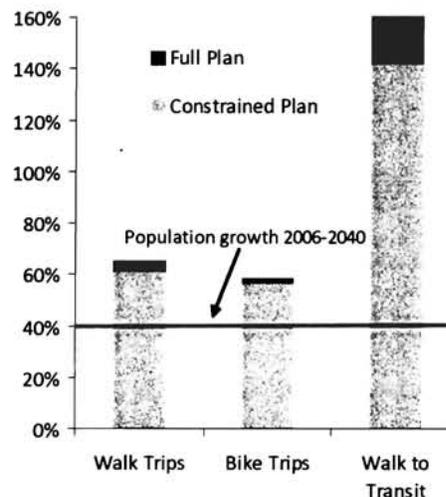
Transportation 2040 promotes programs and investments that provide alternatives to driving, especially to improve the walkability and bikability of the region's communities. These alternatives can result in mobility choices that are healthier and safer. The region's built environment, including the design of communities, the completeness of sidewalk networks, and the provision of open space, affects not only physical well-being, but also mental well-being. Transportation 2040 holds that the region should take a "complete streets" approach to operating transportation rights-of-way. This involves making attractive, safe space for all system users, especially in dense urban areas. See Appendix C, MPP-T-14 and MPP-T-15.

Outcomes

Transportation 2040 supports the reintegration of public health into planning and implementation of transportation projects as a way to ensure the region's communities are more sustainable and truly provide opportunities for improved quality of life.

Projects and programs were selected to reduce emissions, minimize impacts to water bodies, emphasize investment in trails and walkways, complete local street networks, and minimize trip distances and congestion. As illustrated in Figure 19, modeling of Transportation 2040 showed increases in walk and bike trips at rates significantly higher than population growth, providing conditions that encourage physical activity.

Figure 19. Increase in Bike and Walk Activity



APPENDIX G

Puget Sound Regional Council

ADOPTED JULY 2010

Transportation 2040

Appendix L: Climate Change Background

Toward a Sustainable Transportation System

PSRC-00004255

Appendix L: Climate Change Background

Attached are two white papers containing 1) the details on the vehicle and fuel technology research that was conducted as part of preparing PSRC's Four-Part Greenhouse Gas Strategy, and 2) data and information describing adaptation to climate change, specific to the central Puget Sound region's transportation system.

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L-1: VEHICLE AND FUEL TECHNOLOGY ASSUMPTIONS
Assumptions and Methodology for Potential Improvements to the 2040 Puget Sound Vehicle Fleet and Fuel Mix

INTRODUCTION

As part of the Four-Part Greenhouse Gas Strategy, Transportation 2040 makes some assumptions about the market penetration of electric and other alternative fuel vehicles, less carbon-intensive fuels, and improved fuel efficiency of the overall passenger and freight fleets. In collaboration with the Washington State Department of Ecology, PSRC developed two technology scenarios: a “likely” scenario, which is probable given current trends and conservative assumptions about fuel prices and other incentives to change technology, and an “aggressive” scenario, which assumes a higher degree of concerted effort to transition the vehicle fleet to a more energy efficient approach. These scenarios, based on extensive national research and in consultation with the Environmental Protection Agency, the Washington State Department of Transportation and the Puget Sound Clean Air Agency, are identified in the chart below. The “likely” scenario results in an additional 25% reduction of greenhouse gas emissions, and the “aggressive” scenario results in an additional 43% reduction in emissions, beyond the reductions achievable from the transportation and land use strategies contained in Transportation 2040. The application of likely and aggressive technology improvements in the region, in addition to the investments in Transportation 2040, results in a total greenhouse gas emissions reduction between 5% and 28% below 2006 levels¹. In order to ensure these potential emissions reduction benefits are achieved, the region and the state should consider opportunities to influence the direction of vehicle and fuel improvements over the next 30 years, for example through legislation, incentives, etc.

The two scenarios are described in the chart below. Each component of the technology assumptions are further described in the following sections of this white paper. This discussion will also describe how the assumptions were applied to the modeling output of the investments and strategies contained in Transportation 2040.

Potential Vehicle and Fuel Technological Improvements in the Central Puget Sound Region by 2040

	LIKELY SCENARIO	AGGRESSIVE SCENARIO
Percent of Electric Vehicles in Fleet	20%	45%
Improvements to Fuel Economy	40 mpg	50 mpg
Reduction of Carbon Intensity of Fuel	10%	25%
Improvements to Heavy Duty Vehicles	5%	10%

SECTION 1: BACKGROUND

The following discussion details the research conducted by PSRC and Ecology, and describes how the assumptions related to the vehicle and fuel technological improvements laid out in the table above were reached.

1A. Percent of Electric Vehicles in the Central Puget Sound Vehicle Fleet

The first supposition regarding the potential for improvements to the vehicle fleet in the Puget Sound region is what portion of the fleet might be converted to electric or hybrid-electric vehicles by 2040. Research conducted on this topic included studies and analyses conducted by the following agencies or institutions (a full bibliography of sources is included at the end of this white paper):

- University of California at Berkeley
- Argonne National Laboratory
- U.S. Environmental Protection Agency (EPA)
- U.S. Department of Energy

¹ PSRC does not have a 1990 base year within the current modeling framework, which is the year on which the state’s greenhouse gas goals are based. At this point in time we are using our 2006 modeled base year as a surrogate for 1990.

- R.L. Polk & Company
- U.S. Government Accountability Office (GAO)
- University of Michigan
- Electric Power Research Institute
- Better Place
- JD Power and Associates
- California Air Resources Board

There are scenarios within these studies and analyses suggesting the percentage of electric or hybrid-electric vehicles in the national fleet could be anywhere from 9% to 50%. For example, the University of Michigan's "PHEV marketplace penetration: An agent based simulation" study indicates a fleet penetration by 2030 of 16%, while the UC Berkeley's "Electric Vehicles in the United States, a New Model with Forecasts to 2030" study reports a possible fleet penetration of 24%. EPA's "A Wedge Analysis of the U.S. Transportation Sector" study, on the other hand, suggests that vehicle technology combined with alternative fuels can represent a 30% market share by 2050. On the lower end, a 2006 presentation by EPA on "Plug-In Hybrids: Background and Scenario Analysis" cited a modeling scenario resulting in a 9% fleet penetration by 2030.

Most of the studies and analyses researched are forecasting to either the year 2020 or 2030 and reporting on national fleet penetration rates, whereas Transportation 2040 is looking at potential vehicle and fuel improvements in the Puget Sound region by the year 2040. One point of consideration in creating our assumptions was that by 2040 the Puget Sound fleet should be as close as possible to a full fleet turnover. Further, Washington State and the Puget Sound region are already looking forward on this issue, with several pieces of state legislation and numerous local actions underway with regards to electric vehicle infrastructure. Some examples of this are identified below:

- House Bill 1481 requires the installation of charging outlets for electric vehicles, new tax incentives for electric vehicle infrastructure, and the development of an alternative fuels corridor pilot project; as part of this bill, PSRC is called upon to assist local jurisdictions in preparing model ordinances and development regulations allowing for electric vehicle infrastructure
- House Bill 1303 set targets for the use of alternative fuels in state vehicle fleets; many local jurisdictions are also pursuing "green fleets," including the City of Seattle
- King County has been participating in electrification pilot projects, including the implementation of vehicle recharging stations at park and ride lots
- In 2006 and earlier, the state also adopted clean car and renewable fuel requirements

Several of the reference documents also point out that it is most likely that the penetration into the fleet of electric vehicles will occur first in the West Coast, since this area has the highest percentage of hybrid vehicle registrations and has the highest demand for these vehicles. In addition, these sources cite the current planning efforts to deploy electric vehicle infrastructure. For example, an analysis conducted by R.L. Polk & Company indicates that registrations nationwide for new hybrid vehicles rose 38% between 2006 and 2007, and that Washington ranked 5th in total hybrid registrations. Growth in Washington State hybrid purchases between 2006 and 2007 was 52% according to this study.

Based on the research summarized above, the movement in Washington State and the region regarding electric vehicle infrastructure, and the timeframe of 2040, we categorized the potential fleet penetration of electric vehicles into the Puget Sound fleet by 2040 into the following two scenarios:

- **Likely Scenario: 20%**

This scenario is comprised of a fairly conservative assumption that by 2040, 20% of the Puget Sound fleet would be electric, plug-in hybrid electric or other zero to low emission vehicles². Washington State had approximately 4% of the national share of new hybrid vehicle registrations in 2007; given current issues with reporting at the local level, it is unclear what percentage of the Puget Sound fleet are hybrids or other alternative vehicles, but the Seattle metropolitan region is reported to be second in the nation in per capita hybrid vehicles registrations. It is likely that the share of alternative vehicles in our region will continue to increase over the next 30 years. Given the growth rate of hybrid vehicle sales nationally over the past several

² The phrase "zero emission vehicles" refers only to the tailpipe emissions; for a discussion of possible "upstream" emissions from these types of vehicles, refer to Section 2.

years, and the interest nationally and regionally in more efficient vehicle technology, we feel that 20% is a conservative assumption for the region's 2040 fleet.

▪ **Aggressive Scenario: 45%**

This scenario is comprised of a more aggressive assumption that by 2040, should the region, the state and the federal government more actively pursue the transition to alternative vehicles, 45% of the Puget Sound fleet could be electric, plug-in hybrid electric or other zero to low emission vehicles. Many of the studies and analyses researched indicate the possibility of a greater penetration into the national fleet of alternative vehicles than our conservative scenario. The conservative, or likely, scenario is based on the current conditions in our region and the expected growth in the market. Given all the other factors mentioned – the impetus in Washington State and the Puget Sound region, the expected full fleet turnover by 2040, and the expected national agenda on clean technology – a more aggressive fleet penetration of 45% seems reasonable should a more focused pursuit of this transition occur at all levels.

1B. Improvements to Vehicle Fuel Economy

The second supposition regarding the potential for improvements to the vehicle fleet in the Puget Sound region is what additional improvements in fuel economy might be possible by 2040. Research conducted on this topic included studies and analyses conducted by the following agencies or institutions (a full bibliography of sources is included at the end of this white paper):

- National Highway Traffic Safety Administration (NHTSA)
- Cambridge Systematics
- U.S. EPA
- California Air Resources Board
- Energy Information Administration (EIA)
- Congressional Budget Office
- U.S. Department of Energy

In September 2009, NHTSA and EPA released a joint proposed rule to update the current Corporate Average Fuel Economy (CAFE) standards for the light-duty passenger vehicle fleet. Previously, the CAFE standards were 27.5 miles per gallon (mpg) for passenger vehicles and 20.7 mpg for light trucks; the light truck standards were updated in 2006 to 23.5 mpg by model year 2010. In March 2009, as a precursor to the subsequent rulemaking, NHTSA set a new standard for model year 2011 vehicles of 30.2 mpg for passenger cars and 24.1 mpg for light trucks, for a combined fleet average of 27.5 mpg. The new CAFE standards once finalized will apply to both passenger cars and light trucks manufactured in model years 2012 through 2016; the joint rulemaking with EPA's proposed greenhouse gas emissions standards for light duty vehicles will achieve a combined average of 35.5 mpg by model year 2016.

Given the movement nationally to improve the fuel economy of the future vehicle fleet, activity in California related to fuel economy improvements, as well as legislation in Washington State related to clean vehicles and alternative fuels, we categorized the potential for future fuel economy improvements to the Puget Sound vehicle fleet by 2040 into the following two scenarios:

▪ **Likely Scenario: 40 mpg**

This scenario is comprised of a fairly conservative assumption that by 2040, further strengthening of the CAFE standards for the passenger vehicle fleet is likely. This scenario assumes that the average fuel economy of the Puget Sound passenger vehicle fleet in 2040 will be 40 mpg, compared to the proposed new standards which would achieve a fleet average nationally of 35.5 mpg by model year 2016.

▪ **Aggressive Scenario: 50 mpg**

This scenario is comprised of a more aggressive assumption that by 2040, there is the potential that even greater improvements to vehicle fuel economy can be achieved. This scenario assumes a continued interest at the national level in pursuing cleaner and more efficient vehicles, from a 34.1 mpg national fleet average in 2016 to a 50 mpg fleet average in the Puget Sound region by 2040.

It is important to note here that the categories of technology improvements outlined in this report are not mutually exclusive. For example, one way to improve the average fuel economy of the fleet is to include electric vehicles

and/or reduce the carbon content of fuels. As such, while the assumptions for each category are fully described separately in Section 1, the methodology used to apply each assumption takes into account the overlapping nature of the improvements and modifies accordingly so as to avoid double counting of benefits. This is more fully described in Section 2.

1C. Reduction of Carbon Intensity of Fuels (i.e., Alternative Fuels)

The third supposition regarding the potential for improvements to the vehicle fleet in the Puget Sound region was what opportunities to reduce the carbon content of fuel might be possible by 2040. Research conducted on this topic included studies and analyses conducted by the following agencies or institutions (a full bibliography of sources is included at the end of this white paper):

- Washington State Department of Ecology
- California Air Resources Board
- University of California at Berkeley
- University of California at Davis
- U.S. EPA
- Western States Petroleum Association
- U.S. Department of Energy
- Pew Center on Global Climate Change

Several states around the country are researching the benefits and costs of implementing a low carbon fuel standard, and many states have also adopted legislation related to alternative and renewable fuels. Most notably, the three West Coast states of California, Oregon and Washington are each pursuing these strategies to varying degrees. California, for example, is in the process of establishing a low carbon fuel standard that would reduce the carbon intensity of passenger vehicle fuels by at least 10% by 2020. As mentioned previously, Washington State has passed legislation requiring the use of alternative fuels in state fleets, as well as legislation related to renewable fuel standards. Washington State is also currently in the process of researching a low carbon fuel standard, assessing options and their applicability for Washington State.

Perhaps more so than with any of the other categories of technological improvements, the potential to reduce the carbon intensity of fuel relies on many other strategies that are already captured within the other categories, particularly those of improved vehicle fuel economy and an influx of electric or hybrid vehicles into the fleet. However, our research suggests that there are additional benefits that could be achieved through further pursuit of alternative fuels such as ethanol, biodiesel, hydrogen fuel cells, etc. For example, EPA just recently finalized a renewable fuels standard that will increase the required volumes of renewable fuel to 36 billion gallons by 2022.

Given the national, regional and state interest in pursuing alternative and renewable fuels, we categorized the potential for advances in reducing the carbon intensity of fuel in the Puget Sound region by 2040 into the two scenarios below. It is important to note that the scenarios are based on the total assumed reduction of carbon intensity in the fuel supply, inclusive of all possible strategies for achieving these targets. Issues related to overlapping strategies are addressed in Section 2, which modifies the application of these estimates accordingly so as to avoid double counting of benefits.

- **Likely Scenario: 10%**

This scenario is comprised of a fairly conservative assumption that by 2040, a 10% reduction in the carbon intensity of fuel can be achieved in the Puget Sound region. Given the actions already taken by Washington State related to fuels, and the recent passage of a national program on renewable fuels, it is likely that a 10% additional reduction over the next 30 years will be possible.

- **Aggressive Scenario: 25%**

This scenario is comprised of a more aggressive assumption that by 2040, a 25% reduction in the carbon intensity of fuel can be achieved in the Puget Sound region. This scenario assumes that an even more aggressive pursuit of alternative and renewable fuels, including the possibility of new technologies such as hydrogen fuel cells, is possible over the next 30 years. As an example, EPA's "A Wedge Analysis of the U.S. Transportation Sector" study looked at varying levels of both corn and cellulosic ethanol in the market by 2050, up to 90 billion gallons compared to 9 billion gallons produced in 2008. The U.S. Department of Energy is also pursuing research into hydrogen fuel cells. Their Fuel Cell Technologies Program coordinates

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research with national laboratories, universities and industry partners to overcome technical barriers to the reliability, cost and performance of fuel cell systems. Fuel cells are currently being developed for passenger vehicles, buildings and small applications such as computers.

1D. Improvements to Heavy Duty Vehicles

The fourth supposition regarding the potential for improvements to the vehicle fleet in the Puget Sound region is what improvements in the fuel economy of heavy duty vehicles might be possible by 2040. This area is less robust in terms of the research and data available, but also has perhaps the most potential in significant improvements due to the relatively large share of carbon emissions per vehicle and the overall increase in freight truck emissions in the last 20 years. Research conducted on this topic included studies and analyses conducted by the following agencies or institutions (a full bibliography of sources is included at the end of this white paper):

- U.S. EPA
- Federal Highway Administration
- Air and Waste Management Association
- David Suzuki Foundation
- Levelton Consultants, Ltd.
- U.S. Department of Energy
- Washington State Department of Ecology
- California Air Resources Board

There are a variety of factors in play when discussing heavy duty, or freight, truck emissions. These include not just the efficiency of the vehicles, but also details with the movement of freight such as the number of small shipments, an increase in the number of "empty" miles, increased idling due to traffic congestion, etc. This analysis focuses only on the technological improvements possible to heavy duty vehicles and engines.

There are numerous regulatory and voluntary mechanisms currently being pursued to reduce emissions from heavy duty trucks. For example, EPA has established rules related to both diesel fuel and heavy duty engines, as has the California Air Resources Board. The Washington State Department of Ecology is pursuing several strategies to reduce diesel emissions, including retrofitting older diesel vehicles and an idle reduction campaign. Thus far, these programs and regulations have focused primarily on the reduction of particulate matter and nitrogen oxide emissions from heavy duty vehicles, although it is expected there will be corollary reductions in greenhouse gas emissions.

While there is not a lot of research currently available on the potential to reduce greenhouse gas emissions from technological improvements to heavy duty vehicles, what research is available suggests reductions in the range of 25-50%. These improvements include hybrid vehicle systems, aerodynamic and rolling resistance improvements, and engine and fuel improvements, among other strategies.

While we do expect this area to yield significant benefits in the future, our current assumptions of these benefits will remain conservative until further research supports a larger reduction potential, and are categorized into the following two scenarios:

- **Likely Scenario: 5%**

This scenario is comprised of a fairly conservative assumption that an additional 5% reduction in greenhouse gas emissions from technological improvements to heavy duty vehicles can be achieved in the Puget Sound region by 2040. Given the aggressive strategies currently being pursued in Washington State and the Puget Sound region related to diesel emissions, as well as activities being undertaken at the national level to reduce emissions from heavy duty vehicles and diesel fuel, it is likely that a 5% additional reduction over the next 30 years will be possible.

- **Aggressive Scenario: 10%**

This scenario is comprised of a more aggressive assumption that an additional 10% reduction in greenhouse gas emissions from technological improvements to heavy duty vehicles can be achieved in the Puget Sound region by 2040. Given all the reasons identified above we feel that 10% is an achievable target, but with the

lack of available research on the benefits of existing strategies to reduce greenhouse gas emissions, we remain conservative on the range of emissions reductions assumed.

SECTION 2: METHODOLOGY

This section describes how the assumptions for the two technology scenarios – likely and aggressive – were applied to the output of the Transportation 2040 alternatives analysis. EPA's draft MOVES Demo model was utilized to estimate greenhouse gas emissions for Transportation 2040. However, this version of the draft model did not have the capability to adjust for advanced vehicles or fuel scenarios, so our approach involved post-processing each assumption to the emissions results produced by the integration of PSRC's modeling framework. Each assumption under both scenarios was carefully applied to only the appropriate output, and the adjustments described above were made so as to avoid double counting of benefits.

2A. Percent of Electric Vehicles in the Central Puget Sound Vehicle Fleet

- **Likely Scenario: 20%**
- **Aggressive Scenario: 45%**

The assumptions for the percentage of electric, plug-in hybrid electric or other zero to low emission vehicles in the fleet were applied only to the emissions output from passenger cars and light-duty trucks³. For the purposes of this analysis as applied to Transportation 2040, these vehicles were assumed to have zero tailpipe emissions (see below for a discussion of other emissions implications from these vehicles).

- **Likely Scenario (20%):** a 20% reduction was applied to the greenhouse gas emissions results from Transportation 2040 for passenger cars and light trucks.
- **Aggressive Scenario (45%):** a 45% reduction was applied to the greenhouse gas emissions results from Transportation 2040 for passenger cars and light trucks.

Significant discussion was held regarding whether it was appropriate to describe these vehicles as having "zero emissions." There was some concern expressed that this description does not adequately convey that there are, in fact, "upstream" emissions that may be created from the generation of the electricity used for these vehicles. At this point in time, all emissions results analyzed at PSRC – whether for Transportation 2040, the Regional Transportation Improvement Program or other analyses – only report on on-road vehicle tailpipe emissions. It is this category for which PSRC has state and federal requirements through transportation conformity. The analysis of "upstream" or "lifecycle" emissions is an area for which there is no standard methodology or guidance currently available. We do not conduct such an analysis for any other component of our plan – for example, upstream emissions impacts from gasoline production, materials production for concrete/cement/steel for building infrastructure, emissions impacts from the construction and operation of buildings, vehicle production, etc.

We do, however, want to stress that the results as described in Transportation 2040's Four-Part Greenhouse Gas Strategy reflect only on-road vehicle emissions, and we recognize that the source of fuel used for any future vehicle fleet may have additional greenhouse gas emissions not reflected in our reporting. There has been some movement in Washington State and the Puget Sound region, however, to ensure that the electricity for vehicles will come from alternative sources and utilize the grid off-peak. These strategies, if adopted, will mitigate any "upstream" emissions from these vehicles.

2B. Improvements to Vehicle Fuel Economy

- **Likely Scenario: 40 mpg**
- **Aggressive Scenario: 50 mpg**

In order to avoid double counting of benefits, the assumptions for improved vehicle fuel economy were applied to the remainder of the passenger vehicle fleet, after the reductions under 2A were applied. For the purposes of

³ PSRC's modeling output can be segregated into passenger vehicles, light trucks, medium trucks and heavy trucks.

this analysis we assumed that any increases in the number of "traditional" hybrid electric vehicles (not plug-in hybrid electric vehicles) would be captured with the overall improvements to the average fuel economy of the fleet.

As mentioned above, we were not able to adjust for these improvements within the emissions model, and there is no methodology available to apply an adjustment to the emissions output or to individual emission factors. From the NHTSA Draft Environmental Impact Statement (DEIS) for the proposed CAFÉ standards, these standards are expected to reduce grams CO₂e per mile from 295 in the base year fleet to 250 grams CO₂e per mile, a 15.3% improvement. Data on the other alternatives analyzed in the NHTSA DEIS suggest that a combined fleet average of 38.7 mpg, which is the alternative closest to our Likely Scenario assumption, would result in an 18.3% reduction from the existing fleet. As a comparison, the alternative closest to the proposed CAFÉ standards of 35.5 mpg resulted in a reduction of 14.5%. Data was not readily available for a 50 mpg fleet average, which is our Aggressive Scenario. While *Growing Cooler* does report on a 50 mpg scenario, their calculations have built-in assumptions regarding national VMT growth, and are not easily transferrable for a post-processing application to Transportation 2040.

Based on the research conducted, we chose the following application of our Likely and Aggressive Scenarios:

- **Likely Scenario (40 mpg):** an 18% reduction was applied to the greenhouse gas emissions results from Transportation 2040 for the remainder of the passenger cars and light trucks. This is based on the analysis of the alternative in the NHTSA DEIS which is closest to this scenario, at a combined fleet average of 38.7 mpg.
- **Aggressive Scenario (50 mpg):** a 25% reduction was applied to the greenhouse gas emissions results from Transportation 2040 for the remainder of the passenger cars and light trucks. In the absence of specific data that can be applied to our results, we compared the varying reduction of emissions from the NHTSA DEIS alternatives and used this as a factor for our Aggressive Scenario assumptions. For example, the difference in greenhouse gas emissions between a combined fleet average of 35.5 mpg and a fleet average of 38.7 mpg standard in the NHTSA DEIS is approximately 4%. As such, to maintain consistency and reasonableness in the application of our assumptions, we forecasted an additional 8% reduction between a combined fleet average of 40 mpg and 50 mpg. We believe this is a fairly conservative application of our assumptions. For example, EPA's "A Wedge Analysis of the U.S. Transportation Sector" study indicates that hybrid electric vehicles achieve a 29% reduction in greenhouse gas emissions over traditional gasoline vehicles; as a comparison, we are applying only a 25% reduction factor for a combined fleet average of 50 mpg.

2C. Reduction of Carbon Intensity of Fuels (i.e., Alternative Fuels)

- **Likely Scenario: 10%**
- **Aggressive Scenario: 25%**

As discussed in Section 1, the scenarios for reducing the carbon intensity of the fuel supply have the most potential for overlap with the other components of the technology assumptions. As such, for the application of these scenarios to Transportation 2040, we wanted to ensure that we did not overestimate, or double count, the benefits from this strategy. Based on the research conducted, however, it does seem likely that at least some portion of the implementation strategy will be achieved through alternative fuels such as ethanol, biodiesel, etc., and therefore additional reductions may be achieved above and beyond the reductions assumed from improved fuel economy and electric vehicles.

To remain as conservative and reasonable as possible, therefore, the following adjustments were applied to the greenhouse gas emission results from Transportation 2040 for the remainder of the passenger vehicle fleet, after the reductions from 2A and 2B were applied:

- **Likely Scenario (10%):** a 5% reduction was applied to the greenhouse gas emission results from Transportation 2040 for the remainder of the passenger cars and light trucks. This is an adjustment of 50% from the scenario assumption of a 10% benefit from this strategy.

- **Aggressive Scenario (25%):** a 12% reduction was applied to the greenhouse gas emission results from Transportation 2040 for the remainder of the passenger cars and light trucks. This is an adjustment of 50% from the scenario assumption of a 25% benefit from this strategy.

2D. Improvements to Heavy Duty Vehicles

- **Likely Scenario: 5%**
- **Aggressive Scenario: 10%**

As discussed in Section 1, the potential for improvements to heavy duty vehicles providing reductions in greenhouse gas emissions is still an emerging area of research. Although quite a bit of work has been done towards reducing emissions of the heavy duty fleet, most of the results are expressed in terms of reducing emissions of particulate matter or nitrogen oxides. What research is available regarding the reduction of greenhouse gas emissions from these improvements indicates quite divergent results. As such, we will remain as conservative as possible in applying benefits to this portion of the Puget Sound vehicle fleet.

- **Likely Scenario (5%):** a 5% reduction was applied to the greenhouse gas emission results from Transportation 2040 for medium and heavy duty trucks. While our assumptions have been focused on heavy duty trucks, we believe it is likely that improvements to the medium truck category (e.g., commercial vans and trucks) will also be achieved by 2040.
- **Aggressive Scenario (10%):** a 10% reduction was applied to the greenhouse gas emission results from Transportation 2040 for medium and heavy duty trucks.

SUMMARY

Based on PSRC's analyses and research, as well as data and research conducted at the national level, Transportation 2040 includes a Four-Part Greenhouse Gas Strategy. Recognizing that it will require multiple strategies and tools to effectively reduce emissions from the transportation sector, the Strategy therefore contains the following elements:

- **Land Use:** building upon the VISION 2040 Regional Growth Strategy to further the goal of providing a jobs vs. housing balance, and to pursue additional refinements through strategies such as transit-oriented development facilities;
- **User Fees:** recognizing its critical role in reducing VMT and emissions, transition the region over time to a user fee/roadway pricing system;
- **Choices:** continue to provide travelers options to the single-occupant vehicle, and continue research into the costs and benefits of various strategies;
- **Technology:** recognizing that improvements to vehicles and fuels will play a crucial role in reducing emissions, PSRC has undertaken research with the Department of Ecology on the potential technological advances that may be likely in our region by the year 2040.

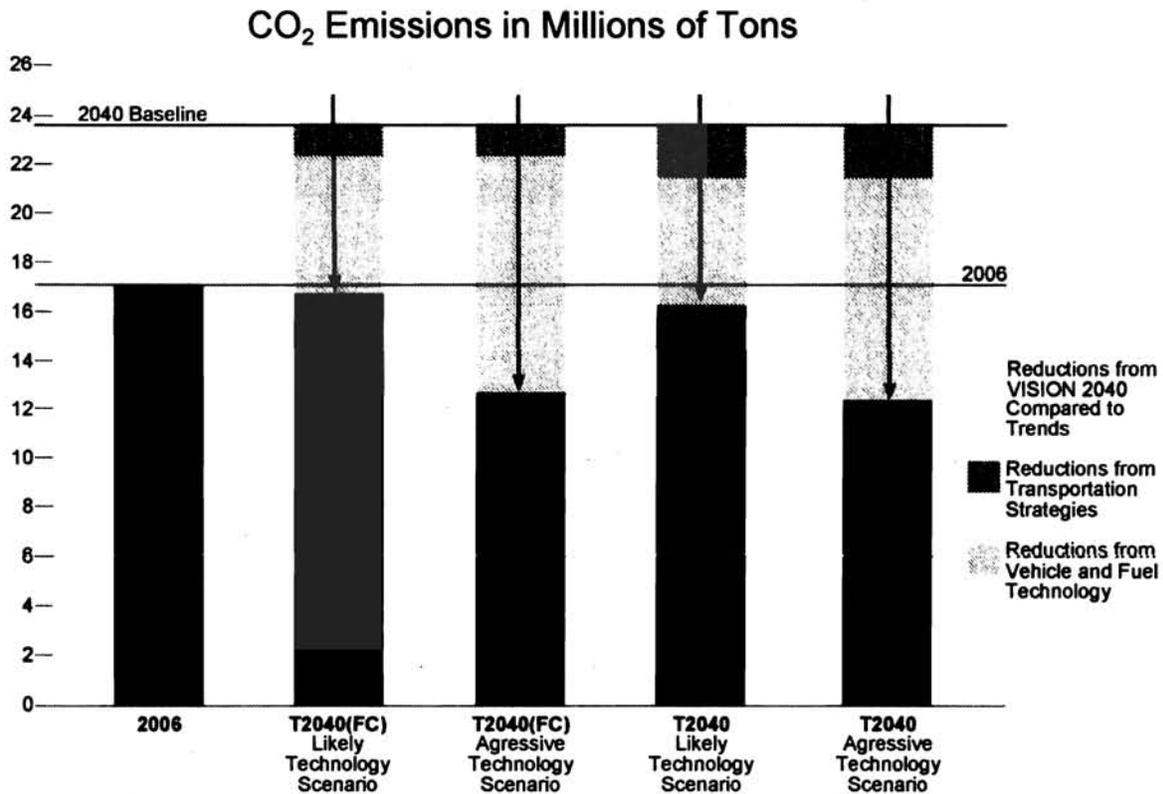
The Transportation 2040 emissions results produced from the land use and transportation investments adopted by the PSRC Boards were based on current fleet assumptions and disaggregated into vehicle types – passenger cars, light duty trucks, medium trucks and heavy trucks. Based on the vehicle and fuel technology assumptions and methodologies laid out in this report, the following adjustments to those disaggregated emissions results were made to reflect an alternative 2040 vehicle fleet, representing what might be likely and what might be achieved with more aggressive pursuit of improvements.

1. A portion of the passenger car/light duty truck fleet was assumed to be electric and have zero tailpipe emissions;⁴
2. After the above calculation was applied, an adjustment was applied to the remaining emissions from the passenger car/light duty truck fleet to reflect improvements in fuel economy for these vehicles;
3. After both of the above calculations were applied, an adjustment was then applied to the remaining emissions from the passenger car/light duty truck fleet to reflect additional benefits from alternative fuels;

⁴ As noted above, this refers only to zero tailpipe emissions and does not necessarily mean zero emissions; a discussion of potential upstream impacts from the energy production is referenced in Section 2.

- Finally, an adjustment was made to the emissions from heavy duty and medium duty trucks, to reflect conservative assumptions regarding future improvements to this portion of the fleet.

The results of Transportation 2040's Four-Part Greenhouse Gas Strategy are illustrated in the chart below⁵. Transportation 2040 has two components – the Financially Constrained portion of the plan, and projects and programs in the Unprogrammed portion of the plan, the combination of which comprise the full plan.



As illustrated in the chart, the Four-Part Greenhouse Gas Strategy results in a range of emissions reductions between 31% and 48% below the 2040 Baseline trend, and between 5% and 28% below 2006 modeled emissions in the year 2040. As a comparison, the state's greenhouse gas emission reduction goals are to achieve 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050.

These results appear to be consistent with the data provided in such reports as Washington State's 2008 Climate Advisory Team report, "Leading the Way: Implementing Practical Solutions to the Climate Change Challenge," which states that the sector-specific "most promising" strategies recommended in that report can "complement, but cannot supplant" the centerpiece market-based policy, and that they alone "cannot (and are not intended to) achieve the longer-term goals in the absence of this market signal." Further, the analyses contained in the report *Moving Cooler* indicate that even with the most aggressive strategies related to VMT reduction (land use, transit, pricing, etc.) emissions by 2050 are still above 1990 levels. Finally, this analysis is also consistent with the statement that technology alone does not "solve the problem." How we can effectively reduce GHG emissions from the transportation sector is an ongoing issue that we will continue to work on, in collaboration with the state and region.

⁵ Throughout the draft plan and EIS process, the Transportation 2040 results have been compared primarily to the 2040 Baseline alternative, and to some extent also to the 2006 base year (PSRC does not have data for the 1990 year that is consistent with our current modeling framework, therefore, for the purposes of greenhouse gas emissions comparisons the 2006 base year is provided as a surrogate).

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