

I-405, Tukwila to Renton Improvement Project (I-5 to SR 169 – Phase 2)



Corridor Program

Congestion Relief & Bus Rapid Transit Projects

CUMULATIVE EFFECTS ANALYSIS TECHNICAL MEMORANDUM

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SUMMARY

OBJECTIVE OF THIS ANALYSIS

This technical memorandum analyzes the potential contribution to cumulative effects on selected environmental resource areas resulting from the construction and operation of the I-405, Tukwila to Renton Improvement Project (I-5 to SR 169 – Phase 2) (referred to as the Tukwila to Renton Project). The potential effects of other major projects within one mile of the Tukwila to Renton Project are also included in this cumulative effects analysis (CEA).

CUMULATIVE EFFECTS AND WHY WE STUDY THEM

The Council on Environmental Quality's (CEQ) regulations implements the procedural provisions of the National Environmental Policy Act (NEPA). The CEQ/NEPA regulations define cumulative effects as:

“The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.”¹

Cumulative effects are important to consider during the construction and operation of a project. While project effects may be minor when viewed in the individual context of direct and indirect effects, they can add to the effects of other actions and eventually lead to a measurable environmental change. Because cumulative effects can be separated from a proposed project in time and location, their measurement can be more difficult to quantify and assess. The CEQ recommends that a CEA accomplish the following:

- Focus on the effects and resources within the context of the proposed action.
- Present a concise list of issues that have relevance to the anticipated effects of the proposed action or eventual decision.
- Reach conclusions based on the best available data at the time of the analysis.
- Rely on information from other agencies and organizations on reasonably foreseeable projects or activities that are beyond the scope of the analyzing agency's purview.
- Relate to the geographic scope of the proposed project.
- Relate to the time period of the proposed project.

It is possible that some environmental resources can be negatively, and others positively, affected by the same proposed project. Cumulative effects can also be positive as well as negative depending on the environmental resource being evaluated.

¹ 40 CFR 1508.7 Protection of Environment, Council on Environmental Quality, Cumulative Impact.

RELATIONSHIP TO THE I-405 CORRIDOR PROGRAM CUMULATIVE EFFECTS ANALYSIS

This CEA for the Tukwila to Renton Project used the analysis in the *I-405 Corridor Program NEPA/SEPA Final Environmental Impact Statement (WSDOT 2002)* as a starting point. The I-405 Corridor Program CEA focused on air quality, energy, farmlands, aquatic resources, surface water, and wetlands. Neither energy nor farmlands were included in the CEA for the Tukwila to Renton Project. Farmlands would not be affected by the project. Energy was not analyzed because the difference in energy consumption at the regional level, with or without the project, was predicted to be inconsequential. The project-level analysis is based on the results of scoping, agency consultations, and the anticipated direct and indirect effects on air quality, surface water, wetlands, and aquatic resources due to the Tukwila to Renton Project as well as the other projects considered in this CEA.

GEOGRAPHIC BOUNDARIES AND TIME PERIOD

When evaluating cumulative effects, the analyst must consider expanding the geographic study area beyond that of the proposed project, as well as expanding the time limits to consider past, present, and future actions that may affect the environmental resources of concern.

The geographic scope of analysis is defined by the physical limits or boundaries of the Tukwila to Renton Project's effect on an environmental resource, as well as the boundaries of other activities that also may contribute to effects on that environmental resource. The time period is determined by identifying time limits that are both relevant to the project and reasonable. The time period and geographic boundaries can be different for each environmental resource evaluated. The geographic boundaries and time period established for the Tukwila to Renton Project CEA were based on the I-405 Corridor Program Final EIS, scoping, agency consultations, and the area directly affected by the project itself.

Geographic Boundaries

The geographic boundary for the project-level air quality analysis was set at 0.5 mile from the centerline of the project right-of-way. This boundary provided for consideration of the effects on air quality of other nearby projects. Effects on air quality for the overall Central Puget Sound Region were addressed previously in the *I-405 Corridor Program Final EIS*.

The geographic boundaries for the wetlands, surface waters, and aquatic resources analyses were set at one mile from the centerline of the project right-of-way. Expanding the geographic area beyond that of the direct effect area of the Tukwila to Renton Project allowed a more comprehensive analysis of the cumulative effects on the environmental resources.

Time Period

For the four environmental resources that were analyzed (air quality, surface waters, wetlands, and aquatic resources), a time period from 1960 through 2030 was set. Using 1960 as the starting point for the analyses allowed an assessment of the changes that have occurred since the original construction of I-405. The year 2030 is the future year used in regional transportation planning documents.

MAJOR PROJECTS INCLUDED IN THIS CUMULATIVE EFFECTS ANALYSIS

For the effects of other major projects to be considered, the projects must be located within or near the geographic boundaries used for this CEA. The projects must also be reasonably foreseeable, which typically means they are planned, approved, and funded. Specific projects considered in the CEA are:

- Link Light Rail Phase 1 – South 154th Street to Seattle-Tacoma International Boulevard (Sound Transit)
- Link Light Rail Station – Tukwila International Boulevard/Southcenter Boulevard (Sound Transit)
- SR 518 Corridor Improvements (WSDOT)
- Westfield Shoppingtown Mall Access Improvement: Klickitat Drive/Southcenter Parkway (City of Tukwila)
- I-5 Pavement Replacement (WSDOT)
- Strander Boulevard/SW 27th Street (City of Renton)
- I-405, Renton Nickel Improvement Project (WSDOT)
- Black River Pump Station Improvements (King County)
- Springbrook Creek Wetland and Habitat Mitigation Bank (WSDOT/City of Renton)
- SR 167 Corridor Improvements (WSDOT)
- SR 515 Corridor Improvements (WSDOT)
- Benson Road Sidewalk Improvements (City of Renton)
- South Grady Way Improvements (City of Renton)
- Rainier Avenue Improvement Project (City of Renton)
- Boeing Renton Plant Site Redevelopment (The Boeing Company/City of Renton)
- SR 169 Improvements (City of Renton)
- I-405, SR 169 to I-90, Renton to Bellevue Project (WSDOT)

HOW SUBSTANTIAL ADVERSE CUMULATIVE EFFECTS WILL BE MITIGATED

For the Tukwila to Renton Project to be consistent with regulatory guidance, reasonable measures to minimize adverse effects have been incorporated into the project design. The measures combine avoidance, minimization, and mitigation activities, some of which include minimizing effects to wetlands, treating stormwater, and using traffic management plans.

POTENTIAL CUMULATIVE EFFECTS DURING CONSTRUCTION

The following summarizes the Tukwila to Renton Project's anticipated contribution to cumulative effects to air quality, surface waters, wetlands, and aquatic resources during its construction.

Air Quality – localized, temporary, minor effects.

Surface Waters – localized, temporary effects of low magnitude, if they occur.

Wetlands – 7.5 acres of wetlands and 8.1 acres of wetland buffers permanently filled; 1.1 acres of wetlands and 0.5 acre of wetland buffers temporarily disturbed.

Aquatic Resources – some losses or degradation of aquatic habitat and temporary, short-term decreases in water quality due to encroachment below the ordinary high water mark in some streams.

The construction-related cumulative effects resulting from the combination of project's contribution to cumulative effects and the effects associated with the other projects included in this CEA are discussed in the Potential Effects section.

POTENTIAL CUMULATIVE EFFECTS DURING OPERATION

The following summarizes the Tukwila to Renton Project's anticipated contribution to cumulative effects to air quality, surface waters, wetlands, and aquatic resources during its operation.

Air Quality – maintenance or decrease in carbon monoxide (CO) levels from existing levels – no violation of air quality standards.

Surface Waters – improved water quality due to enhanced water quality treatment of approximately 154 acres of currently untreated and new impervious surfaces.

Wetlands – a positive effect is likely because of improved water quality in discharges to wetlands in some areas. Also, compensatory mitigation at the Springbrook Creek Wetland and Habitat Mitigation Bank will provide safe, high-quality wildlife habitats away from roadside dangers.

Aquatic Resources – potential for positive effect from improved water quality and compensatory measures via the Panther Creek Watershed Rehabilitation Plan and other stream mitigation opportunities, re-establishment and maintenance of native riparian vegetation, and possible opening up of previously inaccessible habitat.

The operation-related cumulative effects resulting from the combination of project's contribution to cumulative effects and the effects associated with the other projects included in this CEA are discussed in the Potential Effects section.

POTENTIAL CUMULATIVE EFFECTS ASSOCIATED WITH THE NO BUILD ALTERNATIVE

Construction-related and operational effects on air quality, surface waters, wetlands, and aquatic resources resulting from the Tukwila to Renton Project would not occur with the No Build Alternative.

Improvements and enhancements associated with the Tukwila to Renton Project would not occur with the No Build Alternative. Without the Tukwila to Renton Project, there would be no relief to traffic congestion. There would be no improvements to existing water quality treatment facilities that do not meet current standards. There would be no improvements to fish habitat or the possible elimination of impassable fish barriers.

MEASURES TO AVOID OR MINIMIZE ADVERSE CUMULATIVE EFFECTS

No measures, beyond those incorporated in the project design or listed in the air quality, water resources, and ecosystems discipline reports, will be necessary.

UNAVOIDABLE ADVERSE CUMULATIVE EFFECTS

No unavoidable substantial adverse cumulative effects are anticipated due to construction and operation of the Tukwila to Renton Project.

PROJECT DESCRIPTION

WSDOT is proposing to construct the I-405, Tukwila to Renton Improvement Project (I-5 to SR 169 – Phase 2), referred to as the Tukwila to Renton Project, to relieve congestion. Relieving congestion will benefit the public by:

- Lowering the number of accidents, thus improving safety.
- Increasing overall speeds through this section of freeway.
- Improving response times for emergency service vehicles using I-405.
- Improving access to and from I-405 and local circulation.

The Tukwila to Renton Project extends approximately four and one-half miles along I-405, from I-5 to SR 169, and approximately two miles along SR 167, from I-405 to SW 43rd Street. The project adds capacity to both I-405 and SR 167; improves the SR 181 and SR 169 interchanges; reconstructs the SR 167 interchange consisting of general-purpose direct-connector ramp from southbound I-405 to southbound SR 167, HOV direct-connector ramps from northbound SR 167 to northbound I-405 and from southbound I-405 to southbound SR 167, and a split-diamond interchange at Lind Avenue and Talbot Road with connecting frontage roads. These improvements represent the second phase of the I-405 Corridor Program for this portion of I-405. The first phase consists of improvements in the Renton Nickel Improvement Project, which is considered as the baseline condition for the Tukwila to Renton Project.

The analysis in this technical memorandum describes the baseline conditions, how the project may affect those conditions, and what measures will be taken to mitigate effects. To understand what improvements are being proposed as part of this project, the following presents the main features of the Build Alternative followed by a brief explanation of the No Build Alternative.

BUILD ALTERNATIVE

The Tukwila to Renton Project improvements from west to east (northbound) along the study area are as follows:

I-405 from I-5 to SR 181 Interchange

- Remove the existing northbound I-405 Tukwila Parkway on-ramp.
- Realign I-405 mainline slightly to the south beginning just west of the existing northbound I-405 Tukwila Parkway on-ramp to the SR 181 interchange.
- Improve the SR 181 interchange:
 - Remove the existing SR 181 on-ramp to northbound I-405.
 - Extend Tukwila Parkway from the intersection with 66th Avenue east over the Green River to SR 181.
 - Construct new northbound I-405 on-ramp from Tukwila Parkway just east of the new crossing over the Green River (replaces the two existing on-ramps).

- Reconstruct the 66th Avenue S bridge over I-405 on a new alignment to the west and reconstruct the intersections with Southcenter Boulevard and Tukwila Parkway.
- Reconstruct the off-ramp from northbound I-405 to SR 181.
- Improve local arterials within the interchange area such as Southcenter Boulevard and Interurban Avenue.
- Reconstruct five bridges and build one new bridge over the Green River.
- Lower the Duwamish-Green River Trail.
- Reconstruct the I-405 structures over SR 181.
- Realign the Interurban Trail.

I-405 from East of SR 181 to SR 167 Interchange

- Realign I-405 to provide a smooth transition onto the new Springbrook Creek/Oakesdale Avenue bridge that was constructed under the Renton Nickel Improvement Project.
- Construct one additional general-purpose lane in each direction on I-405 from SR 181 through SR 167.
- Stripe lanes to provide a buffer between HOV and general-purpose lanes along I-405.
- Reconstruct the I-405 structures over the Burlington Northern Santa Fe (BNSF) and Union Pacific railroads.
- Stripe the bridges over Springbrook Creek/Oakesdale Avenue for five lanes in both directions.

SR 167 from I-405 to SW 43rd Street On-ramp

- Construct an auxiliary lane on northbound SR 167 from SW 43rd Street to I-405.
- Stripe lanes to provide a buffer between HOV and general-purpose lanes along SR 167.
- Reconstruct SR 167 between SW 27th Street and I-405 to accommodate the reconstructed SR 167 interchange.
- Reconstruct East Valley Road to the west of its current alignment between SW 23rd Street and SW 16th Street to accommodate the reconstructed SR 167 interchange.

I-405 Interchange with SR 167

The interchange improvements affect both freeway to freeway access and local access.

Freeway to Freeway Access

- Construct a general-purpose direct-connector ramp from southbound I-405 to southbound SR 167, replacing the existing loop ramp.
- Reconstruct exterior ramps from northbound I-405 to southbound SR 167 and from northbound SR 167 to northbound I-405, replacing the existing ramps. This project will also add a general-purpose lane to both ramps.

- Construct HOV direct-connector ramps from southbound I-405 to southbound SR 167 and from northbound SR 167 to northbound I-405.
- Maintain existing loop ramp from northbound SR 167 to southbound I-405.

Local Access

Shift local access between I-405 and Renton from SR 167 to the Lind Avenue/Talbot Road split diamond interchange. WSDOT will:

- Construct a new half-diamond interchange at Lind Avenue.
- Construct a new half-diamond interchange at SR 515 (Talbot Road).
- Construct southbound and northbound frontage roads connecting Lind Avenue to Talbot Road.
- Remove exterior ramps to/from SR 167 north of I-405 and loop ramps south of I-405.
- Reconstruct the Lind Avenue bridge over I-405.
- Reconstruct I-405 structures over Talbot Road.
- Improve local street intersections.
- Provide new connection to Grady Way from S Renton Village Place.

I-405 from East of SR 167 Interchange to North of SR 169

- Construct two additional general-purpose lanes in each direction on I-405 from SR 167 through SR 169.
- Stripe lanes to provide a buffer between HOV and general-purpose lanes along I-405.
- Reconstruct S 14th Street south of its existing location.
- Cantilever the I-405 structures over Main Avenue.
- Reconstruct three bridges over the Cedar River: southbound and northbound I-405 and a pedestrian bridge.
- Relocate the BNSF railroad bridge over the Cedar River west of its current alignment.
- Close off Houser Way as a cul-de-sac just south of the Cedar River and remove the bridge over the river. Northbound traffic will be rerouted via Bronson Way, which will be striped to accommodate the new traffic pattern. Two options are being considered for northbound traffic between Houser Way and Bronson Way. The first option stripes Mill Avenue as a one-way street to provide two lanes northbound from the intersection of Houser Way and Mill Avenue to Bronson Way. Emergency vehicles will still be allowed to travel southbound on Mill Avenue from 2nd Street to Houser Way. The second option leaves Mill Avenue as a two-way street up to the intersection with 2nd Street where it will be striped for one-way traffic northbound and reconfigures Main Avenue, a one-way street southbound, for two-way traffic. Main Avenue would be widened and striped for two-way traffic to provide access from the south to Bronson Way.

- Reconstruct the two local street accesses to Renton Hill. Two local access points will be maintained by reconstructing the Renton Avenue bridge over I-405 and reconstructing Mill Avenue as a stacked structure that also provides access to Renton Hill. The existing Cedar Avenue bridge will be removed.
- Construct a pedestrian pathway from Renton Hill to City parks and trails.

NO BUILD ALTERNATIVE

The No Build Alternative assumes that the improvements associated with the Renton Nickel Improvement Project are constructed as does the baseline condition. Only routine activities such as road maintenance, repair, and safety improvements would be expected to take place between 2014 and 2030. This alternative does not include improvements that would increase roadway capacity or reduce congestion beyond baseline conditions. For these reasons, it does not satisfy the project's purpose to reduce congestion on I-405 between I-5 in Tukwila and SR 169 in Renton. The No Build Alternative has been evaluated in this technical memorandum as a comparison for the effects associated with the Build Alternative.

BACKGROUND

METROPOLITAN TRANSPORTATION PLAN AND OTHER REGIONAL ACTIONS

The following subsections briefly describe greater Seattle area transportation planning documents and projects that have a bearing on the I-405 Corridor Program. Transportation investments identified in these plans are discussed here because they are reasonably foreseeable and they relate to the CEA time period and geographic boundaries for the Tukwila to Renton Project.

Metropolitan Transportation Plan

The *Metropolitan Transportation Plan* (MTP) was first adopted in 1995 and includes specific provisions that relate to the I-405 corridor. The Puget Sound Regional Council (PSRC) developed Destination 2030,² a 2001 update of the 1995 MTP that emphasizes an integrated multi-modal transportation system, describes the major regional components of the system, and acknowledges that capacity enhancements are needed to improve mobility on regional roadways. Destination 2030 also identifies, analyzes, and develops solutions to regional transportation problems. According to Destination 2030, vehicle miles traveled (VMT) would increase by 45 percent and the population by 50 percent by 2030. To address these increases, the MTP calls for aggressive transportation investments and indicates that, with those investments, net effects on system performance should be relatively minor. Destination 2030 takes into account different growth patterns in the region and calls for focused growth in urban centers. In 2002, the PSRC revised Destination 2030 to incorporate the transportation improvements proposed in the I-405 Corridor Program selected alternative.

Sound Transit Future Investments

Since 1996, Sound Transit has implemented *Sound Move*, the first phase of a 10-year regional transit long-range vision. *Sound Move* includes regional bus service, high-occupancy vehicle (HOV) access improvements, park-and-ride lots, and commuter rail and light rail. All *Sound Move* commitments are included in Destination 2030 and the I-405 Corridor Program alternatives. A variety of these regional high-capacity transportation (HCT) investments are being/have been implemented along the I-405 corridor. Two projects near the Tukwila to Renton Project are Renton HOV Access/North 8th (environmental review completed in 2006) in north Renton and the Link Light Rail Station (under construction with opening in 2009) in Tukwila at the intersection of Tukwila International Boulevard and Southcenter Boulevard.

Sound Transit began Phase II planning in mid-2001. A Phase II public vote was required to build the new set of proposed regional HCT improvements beyond 2006. On November 6, 2007, voters in the Central Puget Sound region considered and voted against Proposition 1, the Roads & Transit measure, which included Sound Transit 2, the plan for future regional transit.

² PSRC 2001.

LAND USE, POPULATION GROWTH, AND HIGHWAYS IN THE REGION, THE I-405 CORRIDOR, AND THE PROJECT AREA

The following subsections provide a brief discussion of land use and population growth-oriented policies, documents, and trends that apply to the region, the I-405 corridor, and the Tukwila to Renton Project.

Washington State Growth Management Act

During the late 1980s and early 1990s, policies, statutes, and regulations enacted at the state, regional, and local levels defined growth boundaries and population density for local jurisdictions over a 20-year period. Central to these efforts was Washington State's Growth Management Act³ (GMA).

The GMA, a state law passed by the Legislature in 1990 and amended in 1991, addressed the negative consequences of unprecedented population growth and suburban sprawl. The law directed all the state's cities and counties to plan for growth, with more extensive requirements imposed on those cities and counties experiencing the largest amount of growth. The GMA defined urban growth areas, designated urban centers, established density targets in those urban centers, and identified minimum levels of services for statewide infrastructure. The GMA requirements also provide for consistency among transportation, capital facilities, and land use plans.

VISION 2020 and Destination 2030

VISION 2020 describes regional land use patterns consistent with GMA policies. Comprehensive plans for cities in the study area were developed within the framework of *VISION 2020*. *Destination 2030* describes the regional transportation system required to support planned growth. The I-405 Corridor Program action alternatives are consistent with the GMA in that they support implementing the envisioned regional land use patterns. *VISION 2020* focuses growth into the urban growth areas defined by each county, establishes a multi-center approach to development that promotes a jobs/housing balance, and plans for needed transportation improvements. It specifies that improvements should occur at the same time as employment growth to implement the infrastructure concurrency requirements of the GMA.

County-Wide Planning Policies

King, Pierce, and Snohomish Counties worked with local cities and took the lead in developing and adopting County-Wide Planning Policies (CWPP). The CWPP integrates land use planning with transportation planning policies. Cities, including the Eastside cities (cities east of Lake Washington) within the study area, adopted the CWPP to help implement the GMA and *VISION 2020*. The CWPP supports the urban center concept. Some urban centers are within the I-405 corridor. All the local jurisdictions in the study area adopted comprehensive plans in accordance with the requirements of the GMA, CWPP, and PSRC multi-county planning

³ RCW 36.70A Growth Management – Planning by Selected Counties and Cities.

policies. The comprehensive plans include transportation elements that are certified by PSRC to conform to the transportation planning elements of the GMA, *VISION 2020*, and the MTP. The concurrency requirements of the transportation elements require key infrastructure be built or planned for within 6 years of any proposed development. The I-405 Corridor Program alternatives generally support the applicable local transportation plans.

Historical Land Use Changes and Trends

The Puget Sound Region has experienced substantial population growth since 1960. The 2000 population of more than 3 million is expected to increase to nearly 5 million by 2030. Eastside communities that were largely rural in nature in the early 1960s were gradually transformed to rural/suburban and then to suburban/urban. This land use change was made easier by major transportation improvements such as the first Lake Washington floating bridge (now I-90) connecting Seattle to the Eastside via Mercer Island, the second Lake Washington floating bridge (now SR 520), and I-405 construction. Establishing Microsoft and other “high-tech”-oriented businesses in the mid-1980s and 1990s along the I-405 corridor also played a key role in land use change. Identifiable urban centers (for example, Bellevue, Kirkland, and Redmond) emerged, increasing pressure to improve movement of goods and people along the I-405 corridor.

Land Use Plans and Policies in the Project Study Area

The State of Washington Local Project Review Act⁴ and associated state-implementing rules⁵ provide ways for local governments to determine whether projects are consistent with the GMA-required comprehensive plans. The GMA contains a goal for each of the following topics:

- Urban Growth
- Transportation
- Economic Development
- Permits
- Open Space and Recreation
- Citizen Participation and Coordination
- Historic Preservation
- Reduction of Sprawl
- Housing
- Property Rights

⁴ RCW 36.70B Local Project Review.

⁵ WAC 365-197 Washington State Department of Community, Trade, and Economic Development – Project Consistency.

- Natural Resource Industries
- Environment
- Public Facilities and Services
- Shorelines

The transportation-related goal is to "...encourage efficient multi-modal transportation systems that are based on regional priorities and coordinated with county and city comprehensive plans."

In addition, the GMA identifies several planning requirements that apply to roads and highways:

- Adoption of concurrency regulations, ensuring that transportation strategies or improvements are in place at the time of development or within 6 years to meet local level of service (LOS) requirements. Local LOS requirements do not apply to "highways of statewide significance," such as I-405 and SR 167. For highways of statewide significance, local jurisdictions are to evaluate the effects of land use on the state facility and the differences between local standards and the state LOS standard for urban facilities.
- Highways of statewide significance are considered to be one type of "essential public facility." Essential public facilities are typically difficult to site. Local comprehensive plans are required to address such facilities and may not prohibit their siting.
- Local governments are encouraged to coordinate or consolidate their processes for reviewing permitting and environmental planning requirements for major transportation projects.

An additional primary consideration is consistency with local zoning and shoreline master programs.

The Tukwila to Renton Project is located within the jurisdictions of the Cities of Tukwila and Renton. Local land use plans and policies address cooperation among jurisdictions; transit and multimodal systems; compatibility and policies that influence design; and essential public facilities. According to the conclusions presented in the *Land Use Discipline Report*,⁶ the Tukwila to Renton Project is consistent with local jurisdictions' plans and policies, and the local jurisdictions' plans and policies are generally supportive of the project improvements. There are some exceptions, however. For example, although arterial improvements to accommodate the Tukwila to Renton Project are anticipated in Renton's Arterial Plan, a change to the functional classifications of Houser Way and Mill Avenue may be needed to account for changes in roadway structures and traffic patterns.

⁶ WSDOT 2007a.

REGULATORY CONSIDERATIONS

The following subsections discuss air quality, water quality, wetland, and aquatic resource statutes and regulations that affect transportation projects.

Air Quality

Air quality in the project area is regulated by the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PS Clean Air). Under the Clean Air Act (CAA), the EPA has established the National Ambient Air Quality Standards (NAAQS), which specify maximum concentrations for carbon monoxide (CO), particulate matter (PM) less than 2.5 micrometers in size (PM_{2.5}) and 10 micrometers in size (PM₁₀), ozone (O₃), sulfur dioxide (SO₂), lead, and nitrogen dioxide (NO₂).

Transportation conformity ensures that transportation activities (for example, plans, programs, and projects) are reviewed and evaluated for their effects on air quality prior to funding or approval. Such plans, programs, and projects may not cause or contribute to new air quality violations, worsen existing violations, or interfere with the timely attainment of air quality standards or the required interim emissions reductions toward attainment.⁷

Transportation plans must provide for the timely implementation of Transportation Control Measures (TCMs) from an applicable maintenance plan. TCMs are projects, programs, and actions that would help reduce or eliminate the severity or number of NAAQS violations and that would help attain and maintain NAAQS standards. TCMs can be strategies to increase the efficiency of existing transportation facilities, reduce travel demand, or lower the amount of emissions in vehicles, leading to measurable vehicle emissions reductions.⁸

A State Implementation Plan (SIP) is required under the CAA and provides a blueprint for how maintenance and non-attainment areas will meet NAAQS. Positive findings of conformity are required under the CAA, the Transportation Equity Act (TEA) for the 21st Century (TEA-21), and the Clean Air Washington Act (CAWA), and will allow the central Puget Sound Region to proceed with implementation of transportation projects in a timely manner.⁹

The I-405 project corridor lies within a CO maintenance area. Air quality emissions in the Puget Sound Region are currently managed under the provisions of an Air Quality Maintenance Plan (AQMP) for CO. The current plan was developed by PS Clean Air and Ecology and was approved by the EPA in 2004. Any regionally significant transportation project in the Puget Sound air quality maintenance areas must conform to the AQMP. As noted previously, conformity is demonstrated by showing that the project will not cause or contribute to any new

⁷ PSRC 2004.

⁸ PSRC 2004.

⁹ PSRC 2004.

violation of any NAAQS, not increase the frequency or severity of any existing violation of any NAAQS, and not delay timely attainment of the NAAQS.¹⁰

Water Quality

The federal Water Pollution Control Act, better known as the Clean Water Act (CWA), regulates discharges of pollutants to surface waters of the United States. The CWA is codified in 33 USC 1251 et seq. which states that the goal of the CWA is “to restore and protect the chemical, physical, and biological integrity of the nation’s waters.” The EPA has delegated to Ecology the authority to administer provisions of the CWA in Washington State (RCW 90.48.260). In turn, Ecology establishes water quality standards (WQS) under its delegated CWA authority. Ecology uses those standards to protect and maintain beneficial uses of waterbodies when issuing discharge permits, and in reviewing proposed projects to ensure that the quality of surface waters is protected.

The primary method used to ensure that waterbodies meet WQS is the National Pollutant Discharge Elimination System (NPDES) permit program, established under CWA Section 402 (33 USC 1342). Under the NPDES program, any person responsible for the discharge of a pollutant or pollutants above a certain threshold directly into surface waters of the United States from any point source must apply for and obtain a permit. CWA Section 402 requires the EPA to review and grant permits for any point-source discharge of designated pollutants, which include 126 priority toxic pollutants as well as various “conventional” pollutants.

Any activity that requires a federal license or permit and that might result in the discharge of a pollutant into waters of the United States is required to obtain a Water Quality Certification under Section 401 of the CWA. Section 401 certification is administered by the state in which the discharge originates. Certification ensures that the discharge complies with applicable standards of the CWA. Ecology administers this program in Washington State (RCW 90.48.260).

Wetlands

Numerous federal, state, and local laws, regulations, ordinances, and orders govern activities in or near wetlands. That was not the case in 1960. NEPA’s passage in 1969 required agencies to evaluate the effects of their projects on the environment, including wetlands. Federal Executive Order 11990, issued in 1978, required all federal agencies to provide for wetland protection in their policies. The U.S. Department of Transportation (USDOT) complies¹¹ with that mandate during the planning, construction, and operational phases of transportation facilities and projects. Activities in wetlands are also regulated by CWA Section 404 permitting requirements administered by the U.S. Army Corps of Engineers. Additionally, legislation at the state level, such as SEPA and GMA, as well as county and municipality ordinances, now regulate

¹⁰ WSDOT 2007b.

¹¹ DOT Order 5660.1A.

wetlands. The local ordinances governing wetlands and other sensitive/critical areas continue to evolve. The required mitigation and compensatory measures have become more stringent.

Aquatic Resources

Prior to 1966, authority for wildlife protection rested primarily with the states, except where the wildlife was highly migratory or where wildlife taken in violation of state or federal law was transported across state boundaries. In response to a concern that various species had become or were in danger of becoming extinct, the federal government began to enact legislation protecting endangered and threatened fish, wildlife, and plants. Congress' efforts culminated with the passage of the Endangered Species Act (ESA) of 1973 (Public Law 93-205, 16 USC 1531 et seq.). Under the ESA, the Secretary of the U.S. Department of Interior, through the U.S. Fish and Wildlife Service (USFWS) has responsibility for plants, wildlife, and inland fishes. The Secretary of Commerce through the National Marine Fisheries Service (NMFS) is responsible for implementing the ESA with respect to ocean-going fish and marine animals. The USFWS and the NMFS are collectively referred to as the "Services."

The 1996 Sustainable Fisheries Act amended federal fisheries management regulations to require identification and conservation of habitat that is "essential" to federally-managed fish species. Essential habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Pacific Fishery Management Council (PFMC) is the body responsible for reviewing relevant habitat issues in the Pacific Northwest. The PFMC has designated Essential Fish Habitat (EFH) for the Pacific salmon fishery, federally-managed groundfish, and coastal pelagic fisheries. Federal agencies must consult with NMFS on all activities, or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect EFH. The Pacific salmon management unit includes chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and pink (*O. gorbuscha*) salmon. The designation is not limited to ESA-listed species. The EFH designation for the Pacific salmon fishery includes all those streams, lakes, ponds, wetlands, and other waterbodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except above the impassible barriers identified by the PFMC.¹²

On March 29, 1999, NMFS listed the Puget Sound Chinook salmon as a threatened species.¹³

On November 1, 1999, the USFWS listed the Coastal-Puget Sound distinct population segment (DPS) of bull trout (*Salvelinus confluentus*) as a threatened species.

On February 22, 2001, the EPA and the Services published a final notice of a Memorandum of Agreement (MOA)¹⁴ between the three agencies that addresses coordination under the CWA and the ESA. The MOA prescribes regional coordination review teams to ensure interagency coordination. The MOA sets up a process for elevating issues that cannot be resolved at the

¹² WSDOT 2002.

¹³ <http://www.nwr.noaa.gov/ESA-Salmon-Listings/upload/snapshot0607.pdf>

¹⁴ *Federal Register*, Volume 66, Number 36.

regional level. The MOA encourages the agencies to integrate more effectively national level activities such as water quality standards (WQS) rulemakings. The MOA provides for communication and consultation between EPA and the Services regarding both state and tribal WQS. Finally, the MOA establishes a structure for the EPA and the Services to coordinate on actions related to the issuance of NPDES permits.

On September 2, 2005, the NMFS published (50 CFR 226) the rules (effective January 2, 2006) designating critical habitat for Pacific salmon and steelhead in Washington, Oregon, Idaho, and California. This designation included the Puget Sound evolutionary significant unit (ESU) of chinook salmon. Critical habitat is designated for areas containing the physical and biological habitat features, or primary constituent elements (PCEs), essential for conservation of the species or which require special management considerations. PCEs include sites that are essential to support one or more life stages of the ESU and which contain physical or biological features essential to conserve the ESU. Chinook salmon critical habitat within the study area includes the Green River, Springbrook Creek, and the Cedar River.

On September 26, 2005, the USFWS published (70 Federal Register 56212) the final rule (effective October 26, 2005) designating critical habitat for the Coastal-Puget Sound population of bull trout. For an area to be included as critical habitat, it must provide one or more of the following functions for bull trout: spawning, rearing, foraging, or over-wintering habitat to support essential existing bull trout local populations; movement corridors necessary for maintaining essential migratory life history forms; or suitable habitat that is considered essential for recovering existing local populations that have declined or that need to be re-established to achieve recovery. The critical habitat includes Lake Washington and associated tributaries of the lake, the Cedar River from Boulder Creek upstream to Chester Morse Lake, the Sammamish River, Lake Union, and the Ship Canal.

On June 11, 2007, NMFS listed the Puget Sound steelhead as a threatened species.¹⁵

Additionally, local regulations, ordinances, and policies provide for the protection of aquatic resources through shoreline management and sensitive/critical areas requirements.

¹⁵ <http://www.nwr.noaa.gov/ESA-Salmon-Listings/upload/snapshot0607.pdf>

BASELINE CONDITIONS

Baseline conditions describe a future point before the Tukwila to Renton Project is built, but after construction of the previously cleared and funded Renton Nickel Improvement Project is complete. The study areas described and referenced in the following subsections for air quality, surface waters, wetlands, and aquatic resources are those utilized by the respective discipline report authors in evaluating the effects of the Tukwila to Renton Project. The geographic boundaries for the CEA are described in Appendix A, Methodology.

AIR QUALITY

The *Air Quality Discipline Report*¹⁶ evaluated the localized effects on air quality that could occur within the project limits during construction and operation of the Tukwila to Renton Project.

Air Quality in Central Puget Sound Region since 1960

Air quality in the central Puget Sound Region has varied since 1960. In 1978, air quality had degraded to the point that the central Puget Sound Region was classified by the EPA as a “non-attainment area” for CO and O₃. The degradation was largely a result of the rise in vehicle travel associated with increasing population and urbanization.

Air quality improved over the next two decades due to technological improvements in emissions control equipment and more stringent regulations. This improvement enabled the EPA to designate the region as a “maintenance area” for CO and O₃ in 1996. As described in the *I-405 Corridor Program Final EIS*, during that same two-decade period, freeway lane miles increased by approximately 50 percent, while the region-wide vehicle travel grew by approximately 200 percent. The O₃ maintenance area designation was dropped on June 15, 2005, because the region was in attainment for the new 8-hour O₃ standard and the 1-hour standard was revoked.

Because travel demand has exceeded the capacity of the roadway and transit network, congestion continues to worsen on all highways, including I-405. While motor vehicle emissions are expected to decline in the future due to new regulations and technologies, growth in vehicle travel will eventually result in an overall increase in emissions.¹⁷

Existing Air Quality in the Project Study Area

Existing CO concentrations, and those predicted for baseline conditions, in the Tukwila to Renton Project study area do not and will not exceed NAAQS.

¹⁶ WSDOT 2007b.

¹⁷ PSRC 2004.

SURFACE WATERS

The study area utilized in the *Water Resources Discipline Report*¹⁸ is the area that will be affected by improvements to I-405 and SR 167 in addition to those areas affected by other project elements (e.g., stormwater treatment facilities, surface street improvements, and staging areas for construction equipment). The study area includes existing and proposed new rights-of-way between I-5 and SR 169 and along SR 167 between I-405 and SW 43rd Street. Along streams and rivers, the study area extends upstream 300 feet and downstream 1,320 feet (one-quarter mile).

Watersheds and Streams in the Project Study Area

The Tukwila to Renton Project passes through the portion of the Green River watershed (water resource inventory area (WRIA 8)) that encompasses the Green River and its tributaries including Gilliam Creek, Cottage Creek, Springbrook Creek, Panther Creek, Rolling Hills Creek, and Thunder Hills Creek. The northern end of the study area also passes through a portion of the Cedar River watershed (WRIA 9). Exhibits 1 and 2 show the watersheds and the waterbodies located in the study area, respectively.

The Green River begins in the Cascade Mountains about 30 miles northeast of Mount Rainier and flows over 90 miles to Puget Sound at Elliott Bay in Seattle. Historically, the White, Green, and Cedar (via the Black) Rivers flowed into the Duwamish River, draining more than 1,600 square miles. Because the White River was diverted in 1911 and the Cedar River in 1916, the Green/Duwamish drainage area has been reduced to 556 square miles.

The Cedar River crosses I-405 at the north end of the project at river mile (RM) 1.6. The flows from the Cedar River drain its 166-square-mile watershed and provide half of the total flow into Lake Washington. The reach of the river in the project study area is referred to as the Renton Reach. The Renton Reach is constrained between levees and revetments.

Quality of Surface Waters in the Project Study Area

In 1982, an NPDES permit was issued to move the outfall of the Renton Wastewater Treatment Plant from the Green River to Puget Sound. This project was completed in early 1987. Prior to the project, the treatment plant was a major source of pollution in the Green River, causing increased temperature, low dissolved oxygen, and ammonia toxicity.

In 1992, the EPA approved a total maximum daily load (TMDL) issued by Ecology. The Green River TMDL does not allow the discharge of ammonia-nitrogen into the river.

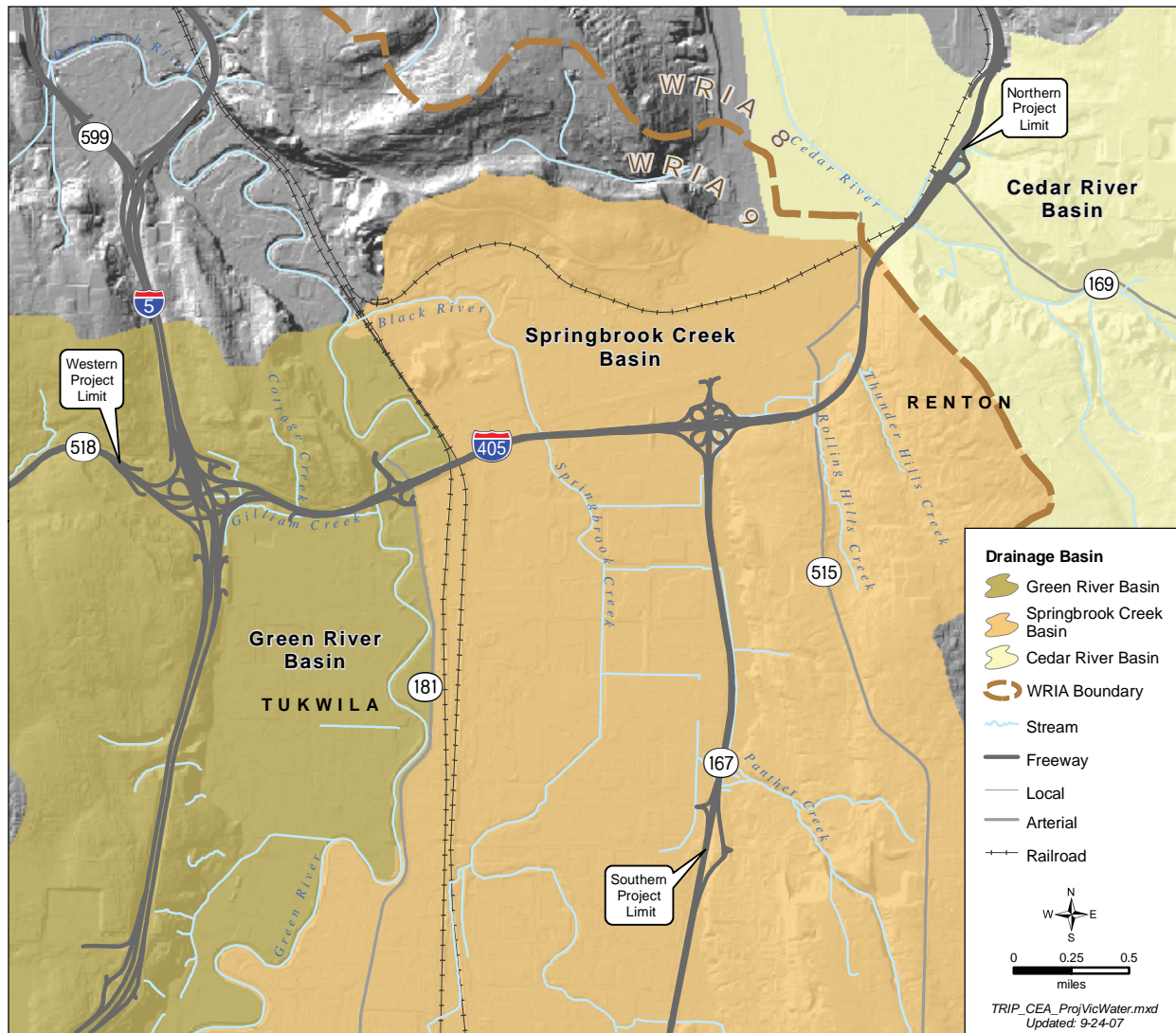
No other TMDLs have been developed for the waterbodies in the study area. King County is currently conducting the Green-Duwamish Watershed Water Quality Assessment with the goal of developing tools to analyze current and future water quality issues, to assist with salmon

¹⁸ WSDOT 2007c.

recovery planning, to guide stormwater management decisions, and to provide guidance for Ecology’s TMDL program.¹⁹

According to the 303(d) list Ecology published in 2004, three waterbodies in the study area do not meet the state water quality standards: Green River, Springbrook Creek, and Cedar River. In the study area, the Green River is 303(d)-listed for fecal coliform bacteria, dissolved oxygen, and temperature. Springbrook Creek is 303(d)-listed for not complying with standards for dissolved oxygen and fecal coliform bacteria. The Cedar River is 303(d)-listed for fecal coliform bacteria and temperature downstream of the project study area.²⁰

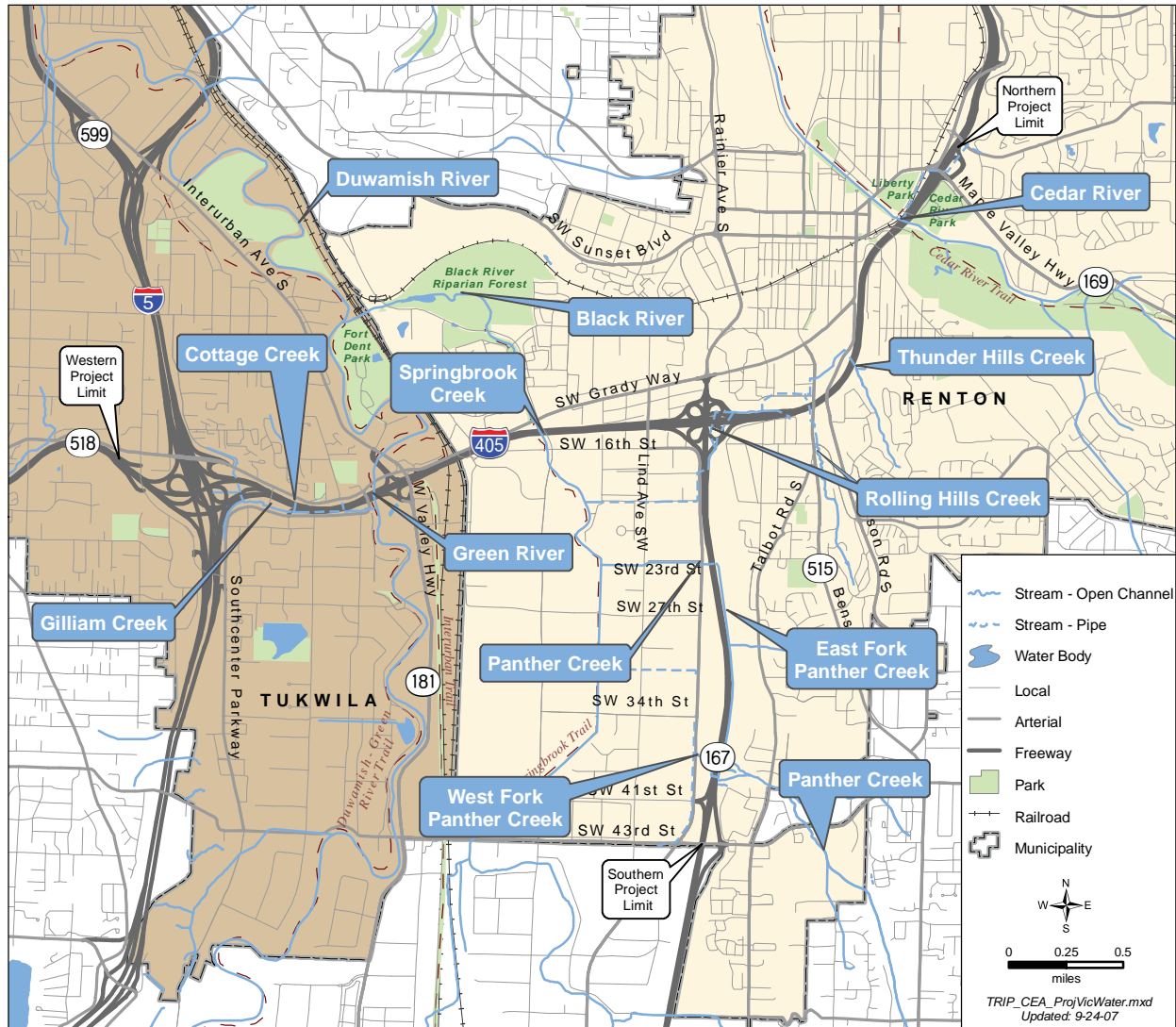
Exhibit 1: Watersheds in the Project Study Area



¹⁹ WSDOT 2007c.

²⁰ <http://apps.ecy.wa.gov/wqawa/viewer.htm>

Exhibit 2: Waterbodies in the Project Study Area



Effect of Development on Surface Water Quality

When natural landscapes are developed, the natural drainage processes can be radically altered. In a natural forested landscape, vegetation and the upper soil layers capture rain and slowly release the rainwater to groundwater, or release it as stream base flow. When impervious surfaces such as roofs, driveways, sidewalks, and streets replace the soils and vegetation, much less water soaks into the ground, decreasing groundwater recharge and stream base flows. Also, the increased impervious surface generates more stormwater, which runs off much more quickly and results in more erosion, sedimentation, and flooding.

Stormwater runoff in urban areas also carries more pollutants, including: sediment from erosion; oil and grease from roads and parking lots; metals from tires, brakes, and roofs; and pesticides, herbicides, and fertilizers from lawns and landscaping. Some of these pollutants dissolve in stormwater, but most become attached to small particles and thereby increase the cloudiness (turbidity) of the water. Vehicle traffic generates several types of pollutants. These include metals such as copper and zinc, oil and grease, turbidity from wearing tires and brakes, and dirt that is washed off vehicles.

All of these changes decrease the habitat value of streams due to the hydrologic effects and the reduced water quality. Nutrients in surface water, such as those from fertilizers, can lower the amount of dissolved oxygen available to aquatic life. Turbidity, copper, and zinc can harm fish and aquatic insects. Removing the particles that cause turbidity is the primary strategy of many stormwater treatment systems.²¹

Stormwater Management

By the 1970s, local municipalities recognized that stormwater management was needed for new developments. Local municipalities established stormwater utilities and implemented best management practices (BMPs) for controlling stormwater runoff. The Puget Sound Action Team published the *Puget Sound Water Quality Management Plan* in the late 1980s. In the early 1990s, King County issued the *Surface Water Design Manual*, WSDOT issued the *Highway Runoff Manual*, and Ecology issued the *Stormwater Management Manual for the Puget Sound Basin*. Stormwater detention and water quality treatment became mandatory for all projects. Statutes (for example, the CWA, GMA, and the Shoreline Management Act) and their associated regulations provided additional guidance. Stormwater management requirements continue to evolve and are becoming more stringent.

Stormwater Management in the Project Study Area

Stormwater along the Tukwila to Renton Project corridor is currently managed and treated using a variety of facilities. These facilities include stormwater ponds, biofiltration swales, ecology embankments, filter strips, and constructed wetlands. Portions of the highway drain without detention or water quality treatment. Some of the systems have been in place for a long

²¹ WSDOT 2007c.

time and may not function as originally intended. Additional details can be found in the *Water Resources Discipline Report*.²²

WETLANDS

The study area utilized in the *Ecosystems Discipline Report*²³ is the portion of the I-405 corridor within the project limits and includes areas that could experience either temporary or permanent effects.

Wetland Resource Trends

Wetland resources in the watersheds have declined over time because of the construction of homes, retail centers, industrial facilities, public infrastructure, and the loss of natural landscapes associated with population increases. While environmental awareness has increased through the passage of legislation, the number, size, and function of wetlands have declined. However, the rate of decline has decreased and that trend is likely to continue. The goal of *No Net Loss* (at least as many acres of wetlands created as lost/filled) and improved avoidance, mitigation, and compensation measures are helping to restore wetland areas. Advanced scientific studies, refined regulatory requirements and programs, and use of adaptive management procedures will further enhance the restoration trend.

Wetlands in the Project Study Area

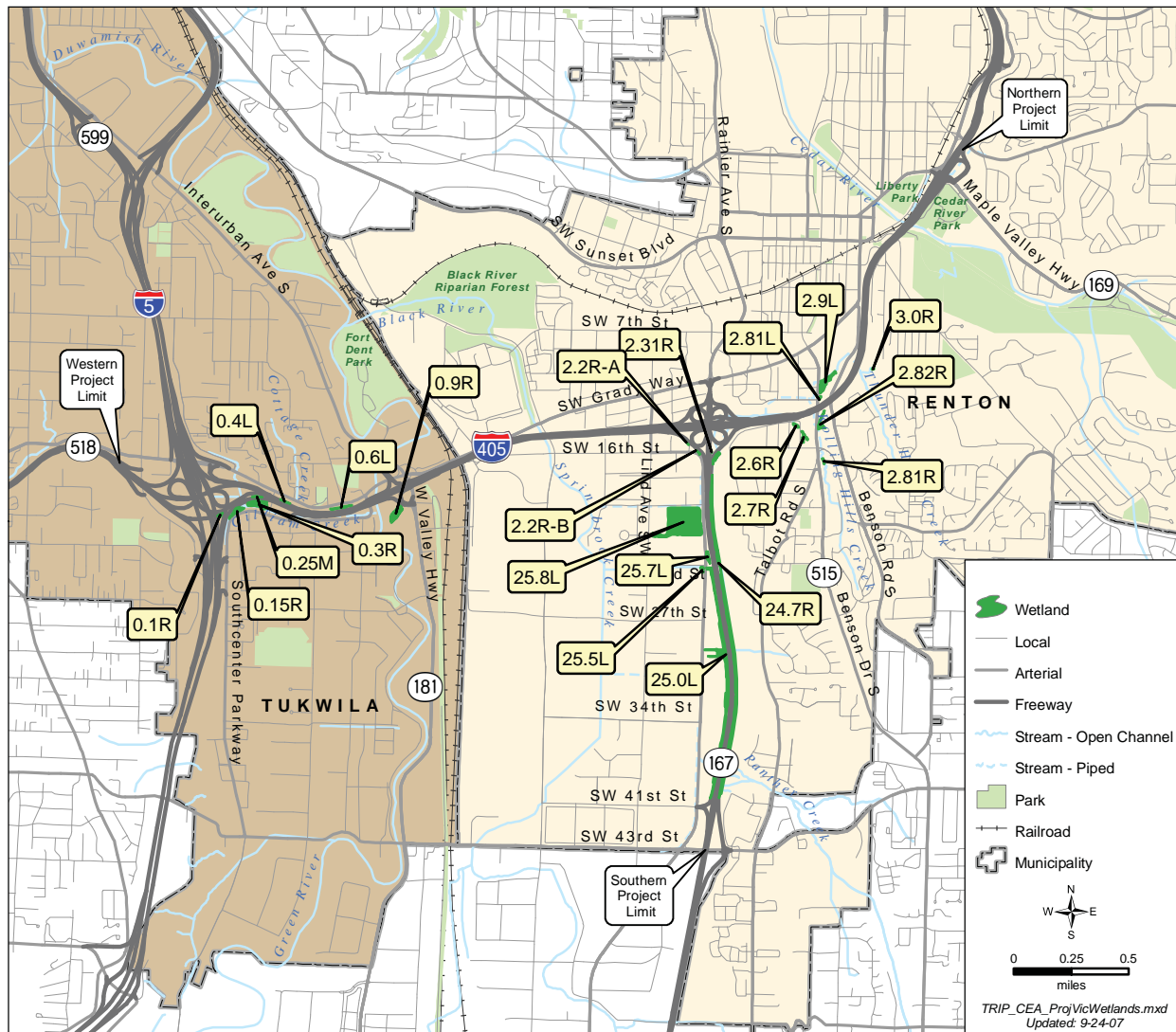
Location

Twenty-two wetlands, totaling approximately 94 acres, were delineated within the project study area as shown in Exhibit 3. The Green River watershed contains seven of the wetlands totaling approximately three acres.

²² WSDOT 2007c.

²³ WSDOT 2007d.

Exhibit 3: Wetlands in the Project Study Area



The majority of the seven wetlands are roadside ditches dominated by bentgrass (*Agrostis stolonifera*), common cattail (*Typha latifolia*), and soft rush (*Juncus effuses*). These wetlands receive road runoff and typically discharge to a catch basin or culvert. Two of the seven wetlands are associated with Gilliam Creek itself.

The Springbrook Creek subbasin encompasses approximately two-thirds of the study area and contains the remaining 15 wetlands covering about 91 acres. These wetlands receive water from Springbrook Creek and its tributaries, surface water, and a high groundwater table. Two-thirds of the wetlands are less than 1 acre in size and are primarily dominated by reed canarygrass. The remaining wetlands typically contain a greater variety of wetland tree and shrub species associated with forested and scrub-shrub wetland classification types, respectively. The buffer areas associated with these wetlands include fill associated with roads and shrub, grass, and herbaceous habitat typically found in highway medians and right-of-way. The majority of

SR 167 within the study area has wetlands on both sides that are associated with Panther Creek, another tributary to Springbrook Creek.²⁴

No wetlands occur within the portion of the Cedar River watershed that lies within the study area.

Classification

Using Ecology's rating system, 9 of the 22 total wetlands that occur in the study area were classified as Category IV (lowest-value class of wetlands), 11 as Category III, and 2 as Category II. No Category I wetlands occur within the study area.

The Cities of Tukwila and Renton have their own critical areas ordinances that include wetland classification systems.

According to the Tukwila Environmentally Sensitive Areas code, four of seven wetlands located in the Tukwila portion of the study area are Type 3 or are not regulated by the City. The remaining three wetlands are Type 2 because they are connected to a watercourse that contains salmonids or are larger than one acre. There are no Type 1 wetlands in the study area within Tukwila.

Of the 15 wetlands located in the Renton portion of the study area, nine are Category 3 according to the Renton Environmental Regulations. These wetlands have undergone human-related hydrologic alterations such as ditching or channelization. Only one wetland, Panther Creek wetland, is considered Category 1.²⁵ All others are exempt from regulation by the City because these wetlands are all smaller than 2,200 square feet and are classified by Ecology as either a Category II or Category IV wetland.

Function and Values

Larger wetlands in the study area are typically located in flat, low-lying areas. Smaller wetlands are most often located in small, closed topographic depressions, or are hydrologically connected to hillside seeps or roadside drainage ditches. Because of their size and topography, larger wetlands are more likely to provide a higher number and higher value of beneficial functions than smaller wetlands.

The entire study area is located within the urban growth area, with most of the study area comprised of existing road rights-of-way. All the wetlands within the study area have been disturbed to some extent by development, including construction of I-405 and development in the surrounding area. This has affected the wetlands' ability to provide beneficial functions.

All of the wetlands in the study area have, to varying degrees, the potential to provide valuable stormwater management functions, including flood flow alteration, sediment removal, nutrient

Ecology bases its categories on function as follows:

- I – Provide a high level of functions.
- II – Provide high levels of some functions.
- III – Provide a moderate level of functions.
- IV – Provide low level of functions.

²⁴ WSDOT 2007d.

²⁵ WSDOT 2007d.

and toxicant removal, and erosion control. Approximately one-half of the total number of wetlands has a moderate potential to provide value related to general habitat, habitat for amphibians, wetland-associated mammals and/or wetland-associated birds, or native plant richness. Ten wetlands have a low potential to provide habitat for many species. Only one wetland (24.7R) had a high (numerous types of vegetation, water levels that vary, and an irregularly shaped edge) functional score.²⁶

AQUATIC RESOURCES

The study area utilized in the *Ecosystems Discipline Report*²⁷ is the portion of the I-405 corridor within the project limits and includes areas that could experience either temporary or permanent effects.

Aquatic Resource Trends

Although fish populations fluctuate naturally, in general, their numbers have markedly declined and the extent and quality of their habitat has decreased over the past century. As the human population and the extent of development have increased over time, aquatic habitat has been eliminated and/or degraded. Aquatic habitat alteration has taken the form of removal of forest cover and stream-side vegetation, channel modification, bank armoring, dredging, removal of woody debris from streams, routing of streams through culverts, and alteration of natural stream flow regimes.

The Washington State Salmonid Stock Inventory identifies five salmonid stocks within the I-405 Corridor Program area as “depressed”: Cedar River sockeye (*O. nerka*), Lake Washington beach sockeye, Lake Washington/Sammamish tributary sockeye, Lake Washington/Sammamish tributary coho, and Lake Washington winter steelhead (*O. mykiss*). A depressed stock is defined as “one whose production is below expected levels, based on available habitat and natural variation in survival rates, but above where permanent damage is likely.” Escapement (number of fish that survive natural and human-caused mortality to spawn) for each of these stocks has been on a declining trend. Any cumulative adverse effect from the I-405 Corridor Program project could contribute to the continuance of such a declining trend.²⁸

As noted previously declining populations have led to the listing of Puget Sound Chinook salmon, Puget Sound steelhead, and bull trout as “threatened” under the ESA.

Characteristics of the Aquatic Habitat in the Project Study Area

Fish habitat includes the physical, chemical, and biological components of the environment that support fish throughout their life cycle. These components include water quality, stream flows, physical features, and ecosystem interactions related to the habitat.

²⁶ WSDOT 2007d.

²⁷ WSDOT 2007d.

²⁸ WSDOT 2002.

Over time, the rivers and streams in the project study area have been highly altered from their natural states to accommodate residential, commercial, and industrial land uses. This alteration has included bank hardening, such as installing riprap and placing streams in pipes and concrete channels; reducing or removing streamside vegetation; straightening stream channels; and removing in-stream habitat. These alterations have resulted in the loss of historic floodplains associated with most of the waterbodies. Substantial changes have also occurred in the vegetation surrounding the waterbodies; what was once predominantly mature native vegetation has been replaced by a mix of immature native vegetation and non-native invasive plant species.

The Lower Green River subbasin has dramatically changed over the last 130 years, but still performs a vital role for the salmon in the watershed. The Lower Green River is a vital migration corridor for fish moving between the Middle Green and the Duwamish estuary. It also provides limited rearing habitat for fish produced upstream.²⁹

The Renton Reach of the Cedar River is entirely artificial. It is completely constrained between levees and revetments, and was regularly dredged to prevent flooding (from its completion in 1912 until the mid-1970s). Portions of this reach were again dredged in 1999 for the first time since the mid-1970s. This reach is essentially one long riffle with little habitat complexity. It is affected by urban and industrial uses along the river that contribute to local water quality problems and eliminate the potential for connection with a natural floodplain. These uses also prevent riparian corridors from becoming established, which can provide large woody debris (LWD) in the channel. Much of the river's sediment is deposited in this reach.³⁰

Fish Species in the Project Study Area

Many fish and other aquatic species inhabit the rivers, streams, and wetlands in the project study area. Fish species found in the area include both anadromous and resident salmonids and a variety of other resident fish. Other aquatic species found in the area include macroinvertebrates, lampreys, crayfish, amphibians, and freshwater mussels and clams.

Anadromous salmonids found in the study area include chinook, coho, chum (*O. keta*), pink, sockeye, steelhead trout, and searun cutthroat (*O. clarki clarki*). In addition, bull trout, Dolly Varden, and resident cutthroat trout (*O. clarki*) are known to use the waterbodies in the study area. Anadromous salmonid species primarily use the rivers and streams in the study area for upstream and downstream migration and rearing. The study area also contains limited spawning habitat for chinook, coho, pink, sockeye, chum, and steelhead. Resident cutthroat trout use the study area for all life stages.

Other fish species likely to be found in the study area include three-spine stickleback (*Gasterosteus aculeatus*), longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculus*), longfin smelt (*Spirinchus thaleichthys*), prickly sculpin (*Cottus asper*), riffle sculpin (*C. gulosus*), reticulate

²⁹ KCDNR 2004.

³⁰ Kerwin and Nelson 2000.

sculpin (*C. perplexus*), shorthead sculpin (*C. confusus*), torrent sculpin (*C. rhotheus*), largescale sucker (*Catostomus macrocheilus*), peamouth chub (*Mylocheilus caurinus*), and redbside shiner (*Richardsonius balteatus*).

Other native species found in the study area include Pacific lamprey (*Lampetra tridentate*); river lamprey (*L. ayresi*); Western brook lamprey (*L. richardsoni*); several species of crayfish, frogs, and salamanders; and freshwater clams and mussels.³¹

Additional details regarding the presence of fish in the project study area can be found in the *Ecosystems Discipline Report*.³²

Listed Species and Species of Concern in the Project Study Area

The rivers and several of the streams in the study area contain various life stages of chinook salmon, steelhead, and bull trout, all of which are currently listed as threatened under the ESA. In addition, coho salmon, a species of concern, are also found in the streams and rivers in the study area.

Waterbodies in the study area known to be used by Chinook salmon include the Green River, Springbrook Creek, and the Cedar River, though it is likely that some smaller waterbodies in the study area also support certain chinook life stages. Chinook use the study area primarily for upstream and downstream migration and rearing. However, there is also some limited spawning habitat. The Chinook salmon found in these waterbodies are a part of the Puget Sound ESU of chinook salmon.³³

Historically, bull trout were reported to use the Duwamish River and Lower Green River in “vast” numbers.³⁴ However, bull trout are infrequently observed in this system today.³⁵ Waterbodies that are bull trout critical habitat within the study area include the Green River and the Cedar River.

Several life stages of coho salmon are found throughout the study area. Coho use the study area primarily for upstream and downstream migration and rearing. However, there is also some limited spawning habitat. Coho salmon typically spend one year in freshwater habitat before migrating to sea. It is likely that the wetlands located in the study area, which have direct connections to flowing waterbodies and off-channel areas, are used by coho for rearing.

Priority fisheries and aquatic species include all state endangered, threatened, sensitive, or candidate species, and species of recreational, commercial, or tribal importance that are considered vulnerable. All fish species with state candidate status that occur in the study area

³¹ Wydoski and Whitney 2003.

³² WSDOT 2007d.

³³ NMFS 1998, 1999.

³⁴ Suckley and Cooper 1860.

³⁵ USFWS 2004.

also hold a federal designation and have been discussed. No other state sensitive, threatened, or endangered fish species occur within the study area. Other fish species designated as priority species³⁶ that may occur within the study area include chum and sockeye salmon, steelhead and coastal cutthroat trout, and river lamprey.

³⁶ WDFW 2004.

POTENTIAL EFFECTS

AIR QUALITY

Construction

Direct

The Tukwila to Renton Project is expected to produce temporary effects on air quality that are characteristic of the construction of large roadway projects. These effects could include: (a) increases in particulate emissions depending on the level and type of activity, soil characteristics, weather, and equipment employed; (b) CO and oxides of nitrogen in the exhaust of construction equipment powered by gasoline and diesel engines; (c) increases in the levels of CO and oxides of nitrogen emitted from vehicles that are delayed while transiting through the work areas; and (d) odors associated with the use of asphalt. These effects are expected to be localized and minor.

Indirect

No indirect effects associated with air quality changes are anticipated due to construction of the Tukwila to Renton Project because of the low level and short duration of the temporary direct effects.

Cumulative

Construction-related cumulative effects on air quality due to the Tukwila to Renton Project and the other projects included in this CEA should be localized, temporary, and of low magnitude with mitigation measures in place. This is due to the distance between the projects and their respective schedules, duration, characteristics, and size.

Operation

Direct

The Tukwila to Renton Project will not cause any NAAQS exceedences for CO, which indicates that it will meet EPA project-level and, once it is included in the Transportation Improvement Plan, regional conformity requirements.³⁷

Indirect

No indirect effects associated with air quality are anticipated due to operation of the Tukwila to Renton Project.

³⁷ WSDOT 2007b.

Cumulative

The Tukwila to Renton Project will add capacity to I-405 and, as a result, decrease congestion and improve traffic flow. The project will not cause or contribute to violation of CO standards. These benefits should be realized through 2030.³⁸ The other HOV and transit projects included in the CEA may also help reduce automobile use, improve the transportation system's efficiency, and decrease existing CO levels in parts of the air quality study area. The operational phase of the I-5 Pavement Replacement, Link Light Rail Station – Tukwila International Boulevard/Southcenter Boulevard, Benson Road Sidewalk Improvements, Springbrook Creek Wetland and Habitat Mitigation Bank, and Black River Pump Station Improvement projects will not affect air quality.

No Build Alternative

Improvements and enhancements associated with the Tukwila to Renton Project would not occur with the No Build Alternative. The Tukwila to Renton Project would not produce any construction-related effects on air quality.

The No Build Alternative would not provide any relief to traffic congestion in the Tukwila to Renton Project study area and, as a result, may contribute to an increased rate of air quality degradation.

Assuming the other projects considered in this CEA are constructed and placed in operation, the cumulative effects on air quality due to those projects would be beneficial as noted under the construction and operation cumulative effects discussions above.

SURFACE WATERS

Construction

Direct

The Tukwila to Renton Project will be constructed in accordance with federal and state technical guidance, permit conditions, and WSDOT project specifications that will require the use of BMPs to control the rate of runoff and, where practical, retain runoff on the site. As a result, any direct effects, should they occur, on surface waters will be localized, temporary, and of low magnitude.

Indirect

Because the direct effects, if they occur, on surface waters are anticipated to be localized, temporary, and of low magnitude, there should be no indirect effects.

³⁸ WSDOT 2007e.

Cumulative

WSDOT will implement BMPs to minimize the Tukwila to Renton Project's contribution to the cumulative effects on surface waters, and will comply with all regulatory requirements and permit conditions (for example, the NPDES Construction Stormwater Permit conditions). Assuming that similar mitigation measures will be followed for the other projects considered in this CEA, construction-related cumulative effects on surface waters should be temporary and of low magnitude.

Operation

Direct

The project will add approximately 58 acres of new impervious highway surface. WSDOT will treat highway runoff by applying quality and flow control BMPs in accordance with the *WSDOT Highway Runoff Manual* so that stormwater discharges from the highway will meet the water quality and peak discharge criteria required by state and local authorities. WSDOT also plans to retrofit 68 acres of currently untreated impervious surfaces. After construction is complete, the project will provide enhanced water quality treatment for approximately 154 acres. As a result, water quality conditions in the study area are expected to improve.³⁹

Indirect

Groundwater hydrology could be altered due to the increased impervious surface area. However, the increase in impervious surfaces should not substantially affect the total amount of recharge to the shallow aquifers in the vicinity of the project because the majority of recharge to these aquifers is from upgradient drainage areas. Thus, no effects are anticipated to the City of Renton's wells in the Cedar Valley Aquifer.⁴⁰

Cumulative

The Tukwila to Renton Project is not anticipated to produce adverse effects on surface waters during operation. In fact, as noted above, it should improve the water quality in the study area because it will provide enhanced water quality treatment for approximately 154 acres. Similarly, the Renton to Bellevue Project will improve water quality as a result of retrofitting 171 acres of existing impervious surface area with new water quality treatment facilities. The Westfield Shoppingtown Mall Access Project will also result in improved water quality discharges to the Gilliam Creek complex. The other projects included in this CEA will, at a minimum, be required to comply with surface water management requirements. If those projects also provide enhanced and/or retrofitted treatment, surface water quality in the study area should be further improved.

³⁹ WSDOT 2007c.

⁴⁰ WSDOT 2007c.

No Build Alternative

The Tukwila to Renton Project would not produce any construction-related effects on surface water and water quality under the No Build Alternative. Improvements and enhancements associated with the Tukwila to Renton Project would not occur with the No Build Alternative.

Currently, some surface waters within the study area receive untreated runoff. To the degree that those surface waters are adversely affected by the existing water quality, those effects would likely continue.

Assuming the other projects considered in this CEA are constructed and placed in operation, the cumulative effects on surface waters due to those projects would be as noted under the construction and operation cumulative effects discussions above.

WETLANDS

Construction

Direct

Construction will require work in and adjacent to wetlands. Varying portions of 12 of the 22 wetlands identified within the project study area will be permanently filled. Specifically, the project will fill approximately 7.5 acres (five Category IV (0.27 acre), six Category III (1.81 acres), one Category II (5.42 acres)) of wetlands and 8.1 acres of wetland buffers. Additionally, approximately 1.1 acres of wetlands and 0.5 acre of wetland buffers will be disturbed during construction, resulting in a temporary reduction or loss of wetland functions.

Wetlands and wetland buffers temporarily affected during construction will be restored. Restoration will include replanting with appropriate vegetation.

Indirect

Loss or reduction in a wetland's function and/or value can be an indirect effect of partially filling the wetland. Six of the 12 directly affected wetlands will be completely filled, resulting in the complete loss of functions and values. The remaining six wetlands will be partially filled. This will include approximately 5.42 acres of wetland 24.7R (61 acres in size), a Category II wetland.

Eleven of the 12 wetlands that will be permanently affected are dominated by invasive species and are surrounded by urban land uses including roads and buildings.⁴¹ In those cases, the loss or reduction in functions and values should not be substantial.

However, because it is a Category II wetland, partially filling wetland 24.7R can reduce its capacity to store stormwater, filter pollutants, protect stream banks from erosion, and provide wildlife habitat, thus potentially reducing its function and value.

⁴¹ WSDOT 2007d.

Cumulative

The Tukwila to Renton Project will have a positive cumulative effect on wetlands. To compensate for the loss of approximately 7.5 acres of wetlands, more and higher quality wetland areas will be created and enhanced. WSDOT plans to compensate for permanently affected wetlands at the nearby Springbrook Creek Wetland and Habitat Mitigation Bank. The bank will provide safe, high-quality wildlife habitats away from the dangers of a roadside location.

Wetlands will also be affected by the Renton Nickel Improvement, Renton to Bellevue, SR 167 Corridor Improvements, and SR 518 Corridor Improvement Projects. These projects will also create or enhance more acres of wetlands than are filled or permanently impacted. The Renton Nickel Improvement and SR 518 Corridor Improvement Projects are utilizing mitigation credits associated with the Springbrook Creek Wetland and Habitat Mitigation Bank.

The Strander Boulevard/SW 27th Street Project has the potential to affect wetlands depending on the exact location and final design and construction details.

Wetlands should not be affected by the other projects considered in this CEA.

Operation

Direct

Some wetlands that exist within the right-of-way are currently affected by maintenance activities. It is likely that wetland areas remaining within the right-of-way after construction of the project will continue to be affected by maintenance activities. Stormwater management measures provided by the project will reduce adverse water quality-related effects on wetlands within the right-of-way or those receiving stormwater discharges from the new impervious surfaces.

Indirect

No indirect effects are anticipated due to operation of the Tukwila to Renton Project because the direct effects will be minor.

Cumulative

The Springbrook Creek Wetland and Habitat Mitigation Bank will provide safe, high-quality wildlife habitat away from roadside dangers. Other projects considered in this CEA that mitigate appropriately could also positively affect wetlands. Failure to implement appropriate mitigation would reduce their potential positive contributions to effects on wetlands.

Operation of the Tukwila to Renton and Renton to Bellevue Projects may result in a positive cumulative effect to wetlands receiving runoff as a result of the projects retrofitting currently untreated impervious surfaces, as well as providing enhanced treatment of discharges from the new impervious surfaces for a total of 154 and 171 acres, respectively.

Electrical transmission line maintenance activities in wetlands within the study area but outside the WSDOT right-of-way will likely continue.

No Build Alternative

No construction would occur for the No Build Alternative; therefore, no wetlands or their buffers would be affected by the Tukwila to Renton Project. Some wetlands in the project study area currently receive untreated runoff. If those wetlands are adversely affected by the existing water quality, those effects would likely continue.

Improvements and enhancements associated with the Tukwila to Renton Project would not occur with the No Build Alternative.

Assuming the other projects considered in this CEA are constructed and placed in operation, the cumulative effects on wetlands due to those projects would be as noted under the construction and operation cumulative effects discussions above.

AQUATIC RESOURCES

Construction

Direct

Some aquatic habitat areas will experience temporary and permanent direct effects as a result of project construction. There will be some loss of existing stream habitat in some streams. Some streams will also experience changes to over-water cover. Because most of the existing riparian vegetation in the study area is moderately to severely degraded, effects on the riparian vegetation are not expected to be substantial.⁴²

The specific project elements that could affect aquatic resources are:

- Construction of one new bridge, reconstruction of five other bridges over the Green River to accommodate roadway widening, including piers below the OHWM.
- Encroachment below the OHWM of Gilliam Creek to allow expansion of I-405.
- Encroachment below the OHWM of Rolling Hills Creek and an unnamed tributary to Rolling Hills Creek to accommodate I-405, SR 167, and local roadway improvements.
- Encroachment below the OHWM of Thunder Hills Creek to accommodate I-405 roadway improvements including construction of a retaining wall.
- Removal of the Houser Way Bridge over the Cedar River to accommodate widening of I-405.
- Reconstruction of three bridges over the Cedar River and relocation of the Burlington Northern Santa Fe railroad bridge.
- Encroachment below the OHWM of Panther Creek between SR 167 and the East Valley Highway to expand SR 167 to the west.

⁴² WSDOT 2007d.

- Encroachment into the riparian buffers of Gilliam Creek, an unnamed tributary to Gilliam Creek, Cottage Creek, Green River, Springbrook Creek, Panther Creek, Rolling Hills Creek, an unnamed tributary of Rolling Hills Creek, Cedar River, Thunder Hills Creek, and an unnamed tributary to Thunder Hills Creek to accommodate various elements of project construction.

Indirect

Indirect effects, resulting from direct construction effects on fish and changes to aquatic habitat, are not anticipated. This is primarily due to the degraded condition of the existing environment and the use of avoidance measures and BMPs to minimize direct effects during construction.

Cumulative

Some losses and degradation of aquatic habitat and temporary short-term decreases in water quality could occur due to construction of the Tukwila to Renton and the Renton Nickel Improvement Projects and the lane addition portions of the SR 167 Corridor Improvement Project. The Renton to Bellevue Project will similarly directly affect aquatic resources and may also involve in-water work for bridging across May Creek and Coal Creek. These construction effects (for example, loss of riparian vegetation, temporary increased sedimentation, changes in the stream flows, and stream course modifications) will be minimized through the use of BMPs, compliance with permit conditions and in-water work windows set by the fish and wildlife agencies, and by including avoidance measures in the project design. Construction of the other projects considered in this CEA is not expected to affect aquatic resources with the exception of the Springbrook Creek Wetland and Habitat Mitigation Bank, which will result in improved aquatic habitat.

Operation

Direct

Proper maintenance and operation of the project's water treatment facilities will help prevent a decline in water quality and its potential negative effects (sedimentation, toxicity due to metal contaminants, etc.) on fish and the aquatic habitat. Re-establishment and maintenance of native riparian vegetation will also be a beneficial effect. WSDOT will address fish passage at the culverts per the Memorandum of Agreement between WSDOT and WDFW.

Indirect

Improved general ecosystem health is a potential indirect effect associated with the direct effects on aquatic resources resulting from operation of the project. This change would be the result of maintained or enhanced water quality, and improved riparian vegetation and fish passage.

Cumulative

Proper maintenance and continued operation of the Tukwila to Renton Project's water treatment facilities, culverts, and fish passage facilities, when combined with those associated

with the Renton Nickel Improvement, Renton to Bellevue, SR 167 Improvements, Westfield Shoppingtown Mall Access, and SR 518 Corridor Improvement Projects, should result in a positive cumulative effect on aquatic resources. Additionally, proper maintenance of the improvements provided by the Springbrook Creek Wetland and Habitat Mitigation Bank will maintain their positive cumulative effects on aquatic resources as well.

No Build Alternative

For the No Build Alternative, no construction would occur and, thus, no fish or aquatic habitat would be affected by construction activities associated with the Tukwila to Renton Project. At the present time, some surface waters in the study area receive untreated runoff. To the degree that those surface waters are adversely affected by the existing water quality, those effects would likely continue and could translate to negative effects on aquatic resources. Improvements to riparian vegetation would not occur.

Improvements and enhancements associated with the Tukwila to Renton Project would not occur with the No Build Alternative.

Assuming the other projects considered in this CEA are constructed and placed in operation, the cumulative effects on aquatic resources due to those projects would be as noted under the construction and operation cumulative effects discussions above.

MEASURES TO AVOID OR MINIMIZE ADVERSE CUMULATIVE EFFECTS

No measures, beyond those incorporated in the project design or listed in the air quality, water resources, and ecosystems discipline reports, would be necessary during construction and operation of the Tukwila to Renton Project to avoid or minimize adverse cumulative effects.

UNAVOIDABLE ADVERSE CUMULATIVE EFFECTS

No unavoidable adverse cumulative effects are anticipated due to the construction and operation of the Tukwila to Renton Project.

ACRONYMS AND ABBREVIATIONS

Term	Meaning
AQMP	air quality maintenance plan
BA	biological assessment
BMP	best management practice
BRPS	Black River Pump Station
CAA	Clean Air Act
CAWA	Clean Air Washington Act
CE	categorical exclusion
CEA	cumulative effects analysis
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
CWPP	County-wide Planning Policies
DO	dissolved oxygen
DPS	distinct population segment
Eastside	east side of Lake Washington
Ecology	Washington State Department of Ecology
EFH	essential fish habitat
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FHWA	Federal Highway Administration
GMA	Washington State Growth Management Act
HCT	high-capacity transportation
HOT	high-occupancy toll
HOV	high-occupancy vehicle
I	Interstate
LOS	level of service
LWD	large woody debris
MOA	memorandum of agreement
MP	mile post

Term	Meaning
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO ₂	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
O ₃	ozone
OHWM	ordinary high water mark
PCE	primary constituent element
PFMC	Pacific Fishery Management Council
PM	particulate matter
PM _{2.5}	particulate matter less than 2.5 micrometers in size
PM ₁₀	particulate matter less than 10 micrometers in size
PS Clean Air	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
RM	river mile
SEPA	Washington State Environmental Policy Act
Services	National Marine Fisheries Service and U.S. Fish and Wildlife Service
SIP	State Implementation Plan
SO ₂	sulfur dioxide
Sound Transit	Central Puget Sound Regional Transit Authority
SR	state route
TCM	transportation control measure
TEA	Transportation Equity Act
TEA-21	Transportation Equity Act for the 21st Century
TIP	Transportation Improvement Plan
TMDL	total maximum daily load
UGA	urban growth area
USC	U.S. Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VMT	vehicle miles traveled

Term	Meaning
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WQS	water quality standard
WRIA	water resource inventory area
WSDOT	Washington State Department of Transportation

GLOSSARY

Term	Meaning
access	The ability to enter a freeway or roadway via an on-ramp or other entry point.
adaptive management	An approach that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing actions as opportunities for learning. Projects are designed and implemented to provide useful information for future actions. Monitoring and evaluation are emphasized so that the interactions of different elements of the system are better understood. Actions are then adjusted, if needed, to achieve the desired results.
air pollutant	Any substance in air that could, in high enough concentration, harm people, animals, vegetation, or materials. They may be in the form of solid particles, liquid droplets, gases, or a combination thereof. Generally, they fall into two main groups: (1) those emitted directly from identifiable sources and (2) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric elements.
air quality standards	The level of pollutants prescribed by regulations that may not be exceeded during a given time in a defined area.
amphibians	A group of vertebrate animals that spend part of their time on land and part in the water. Amphibians must return to the water to breed and they have distinct larval and adult forms.
anadromous fish	A fish species that spends a part of its life cycle in the sea and returns to freshwater streams to reproduce (for example, salmon, steelhead, and trout).
aquifer	A geological stratum of saturated materials with the capability to yield useable quantities of groundwater on a long-term, sustainable basis.
arterial	A major street that primarily serves through-traffic, but also provides access to abutting properties. Arterials are often divided into principal and minor classifications depending on the number of lanes, connections made, volume of traffic, nature of traffic, speeds, interruptions (access functions), and length.
attainment area	An area considered to have air quality as good as or better than the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants designated in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Term	Meaning
bank	The slope of land adjoining a body of water, such as a river, lake, wetland or drainage channel. With respect to flowing waters, banks are either right or left as viewed facing in the direction of the flow.
basin	An area of land that drains to a specific waterbody.
best management practice (BMP)	Innovative and improved environmental protection tools, practices, and methods that have been determined to be the most effective, practical means of avoiding or reducing environmental impacts.
biofiltration swale	Long, broad, shallow grassy channels that are designed so that stormwater flows slowly through the facility. This allows the vegetation and soil matrix to filter and absorb pollutants from the stormwater runoff.
buffer (aquatic resource)	A designated area along and adjacent to a stream or wetland that may be regulated to control the negative effects of adjacent development on the aquatic resource.
capacity	The maximum sustained traffic flow of a transportation facility under prevailing traffic and roadway conditions in a specified direction.
carbon monoxide (CO)	A colorless, odorless, toxic gas produced by incomplete combustion.
categorical exclusion (CE)	A category of actions that do not individually or cumulatively have a significant effect on the environment and for which neither an environmental assessment nor environmental impact statement is required under the National Environmental Policy Act.
channelization (streams)	Structural alteration made to straighten, widen, deepen, or otherwise modify a natural stream channel.
Code of Federal Regulations (CFR)	The arrangement of the general and permanent rules published by the executive departments and agencies of the Federal government. It is divided into 50 titles that represent broad areas subject to federal regulation. Each volume of the CFR is updated once each calendar year.
comprehensive plan	A municipal plan that provides policy and guidance on physical development and redevelopment. It addresses a range of issues: land use; economic development; housing; environmental protection; transportation; public facilities; urban design; and historic preservation. It also guides zoning laws, which in turn affect the types of uses allowed in specific areas, the amount of parking that must be provided, and other development requirements or restrictions.

Term	Meaning
concurrency	A provision of the Growth Management Act requiring that if a development will cause the level of service on a locally owned transportation facility to decline below the adopted standards, then the necessary transportation improvements must be provided at the time development occurs or a financial commitment must be in place to complete the improvements or strategies within six years. Otherwise, the local government is required to deny the permit application.
confluence	The convergence of two streams of comparable size into a single channel, or the junction where two rivers, streams, etc. flow together.
congestion	The condition when unstable traffic flows constrain travel speeds to less than the posted limit. Recurring congestion is caused by constant excess traffic volume compared with the highway's capacity. Nonrecurring congestion is caused by unusual or unpredictable events such as traffic accidents.
conservation	As defined by the Endangered Species Act (ESA), the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary.
construction footprint	The physical area affected by project construction activities.
Council on Environmental Quality (CEQ)	The federal agency charged with implementing the National Environmental Policy Act.
criteria pollutants	The six pollutants for which the Environmental Protection Agency has identified and set standards to protect human health under the Clean Air Act: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide.
critical areas	These include aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologic hazard areas, and wetlands. Critical area functions and values are protected by ordinances that require development to avoid or compensate for adverse effects on critical areas.

Term	Meaning
critical habitat	Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally-listed species on which are found physical or biological features essential to conserving the species, and that may require special protection or management considerations; and (2) specific areas outside the geographic area occupied by a federally-listed species when it is determined that such areas are essential for the conservation of the species.
cumulative effect	The effect on the environment that results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively noticeable actions taking place over a period of time.
delay	The increased travel time experienced because of circumstances that impede the desirable movement of traffic.
demand	The desire for travel by potential users of the transportation system.
detention	The temporary storage of stormwater runoff in a stormwater facility to control the discharge rates.
detention pond	A surface catchment designed to reduce effects on stormwater runoff quality and/or quantity impacts by storing the increased runoff volume that results from development, then slowly releasing it at controlled runoff rates. Detention tanks and vaults are underground structures used to reduce peak stormwater flows.
direct effect	An effect caused by an action or alternative and occurring at the same time and location. Effects may be ecological, aesthetic, historic, cultural, economic, social, or health-related.
downstream	Referring to the direction of the flow of a stream or river.
drainage ditch	An open channel designed and constructed to convey water. This may include modifications of natural drainages or manmade historic channels incorporated in a system design.
ecology embankment	A stormwater treatment facility constructed in the pervious shoulder area of a highway to provide water quality treatment for highway runoff. It consists of a trench that is dug along side the highway shoulder, lain with perforated pipe, and backfilled with a filtration media. Water from the road flows off the roadway, is filtered by the media, and carried off site by the pipe.

Term	Meaning
ecosystem	A community of organisms interacting with each other, and the environment in which they live.
effect	Something brought about by a cause or agent; a result. This may include ecological, aesthetic, historic, cultural, economic, social, health, or other effects, whether direct, indirect, or cumulative. Effects may include those resulting from actions that may have both beneficial and detrimental effects.
emission	Pollution discharged into the atmosphere from smokestacks, other vents, surface, vehicles, and other sources.
emission standard	The maximum amount of air polluting discharge legally allowed from a single source, e.g., the amount of CO that may be released by an automobile per mile of travel.
encroachment	Any action, including the placement of fill and the construction of piers and bridge abutments, that will occur within the limits of the regulatory floodplain; intrusion by roads or development into habitat areas that reduces the area available to wildlife or reduces the functions of the habitat area.
endangered species	Any species that is in danger of extinction throughout all or a substantial portion of its range.
Endangered Species Act (ESA)	Federal legislation adopted to prevent the extinction of plants and animals.
environmental impact statement (EIS)	A document prepared under the National Environmental Policy Act and/or the State Environmental Policy Act that identifies and analyzes, in detail, environmental effects of a proposed action. As a tool for decision-making, the EIS describes positive and negative effects and examines reasonable alternatives for an undertaking.
escapement	The number of adult fish that enter a fresh water system to spawn.
evolutionarily significant unit (ESU)	The term used by the National Marine Fisheries Service for a fish species population protected by a listing under the Endangered Species Act.
Federal Highway Administration (FHWA)	One of several agencies in the U.S. Department of Transportation, the FHWA provides federal financial assistance to the states through the Federal Aid Highway Program, the purpose of which is to construct and improve the National Highway System, urban and rural roads, and bridges.

Term	Meaning
federally-listed species	Any species of fish, wildlife, or plant that has been determined by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to be endangered or threatened under Section 4 of the Endangered Species Act.
filter strip	Grassy slopes that filter and diffuse stormwater running off highway shoulders.
floodplain	Any land area susceptible to being inundated by flood waters from any source. This is typically the flat or nearly flat land on the bottom of a stream valley or tidal area that is covered by water during floods, including the flood fringe and floodway.
floodway	The channel of the river or stream, and those portions of the adjoining floodplains that have been designated as reasonably required to carry and discharge the base flood flow without resulting in a backwater that exceeds flood hazard regulations.
general-purpose lane	A freeway or arterial lane available for use by all traffic.
gradient	A measure of how steep a slope is. A slope with a gradient of ten percent rises (or declines) one foot for every ten feet of horizontal length.
groundwater	That portion of the water below the ground surface that is free flowing within the soil particles. Groundwater typically moves slowly, generally at a downward angle because of gravity, and eventually enters into streams, lakes, and oceans.
groundwater recharge	The process where natural sources (infiltrating rain, snowmelt or surface water) or pumped water enters and replenishes the groundwater supply.
Growth Management Act (GMA)	Washington State legislation adopted in 1990, and subsequently amended that requires all cities and counties in the state to do some long-range comprehensive planning. GMA has more extensive requirements for the largest and fastest-growing counties and cities in the state. Such comprehensive plans must address several required topics, including but not limited to land use, transportation, capital facilities, utilities, housing, etc. The GMA requirements also include guaranteeing the consistency of transportation and capital facilities plans with land use plans.
habitat	The environment or specific surroundings where a plant or animal grows or lives.

Term	Meaning
high-capacity transportation (HCT)	A system of public transportation services and facilities that provides a substantially higher level of passenger capacity, speed, and service frequency than traditional public transportation systems operating principally on general-purpose roadways. Examples include express buses on HOV lanes, passenger ferry service, light and heavy rail systems, and bus rapid transit.
high-occupancy toll (HOT) lanes	Limited-access freeway lanes that are actively managed through a variable toll system in order to regulate their use and thereby maintain express travel speeds and reliability. Toll prices rise or fall in real time as the lane approaches capacity or becomes less used. This ensures that traffic in the HOT lane remains flowing at express travel speeds of 45 to 60 miles per hour, even if the general-purpose lanes become congested. Toll prices may differ for carpools, transit, motorcycles, and single-occupant vehicles. Tolls are collected electronically using overhead scanners that read a transponder inside the vehicle and automatically debit the operator's account.
high-occupancy vehicle (HOV)	High-occupancy vehicle is a special designation for a bus, carpool, or vanpool provided as an encouragement to increase ride-sharing. Specially designated HOV lanes and parking are among the incentives for persons to pool trips, use fewer vehicles, and make the transportation system more efficient. HOV lanes are generally inside (left-side) lanes, and are identified by signs and a diamond on the pavement. Currently, two or more (2+) occupants are required to use the I-405 HOV lanes. Motorcycles are allowed to use freeway HOV lanes as well.
Highways of Statewide Significance	Highways of statewide significance include, at a minimum, interstate highways and other principal arterials that are needed to connect major communities in the state.
hydrocarbons (HC)	Organic chemicals that contain hydrogen and carbon.
hydrology	Within the context of a wetland, permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil.
impervious surface	Pavement, roofs, and other compacted or hardened areas that do not allow the passage of rainfall or runoff into the ground.
indirect effect	An effect that occurs later in time or is removed in distance from the proposed action, but is still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems.

Term	Meaning
invasive species	Non-native species that disrupt and displace native species.
jurisdiction	A municipal government agency, such as a city or county, and as appropriate, federal and state agencies and federally recognized tribes. The term also can mean “to have authority over.”
land use	The type of activity (i.e., residential, commercial, or industrial) that occurs on property.
large woody debris (LWD)	Logs, limbs, or root wads that are waterward of the ordinary high water line. To qualify as large woody debris, it must be of sufficient size to be resistant to erosion, provide bank stability, or help maintain or create habitat features important to fish life.
level of service (LOS)	A measure of how well a freeway or local signalized intersection operates. For freeways, LOS is a measure of traffic congestion typically based on volume-to-capacity ratios. For local intersections, LOS is based on how long it takes a typical vehicle to clear the intersection. Other criteria also may be used to gauge the operating performance of transit, non-motorized, and other transportation modes.
listed species	Any species of fish, wildlife, or plant that has been determined to be endangered or threatened. See also: “federally-listed species” and “State-listed species”.
macroinvertebrate	Small animals that are visible with the naked eye, yet which have no backbone (insects, worms, larvae, etc.).
maintenance area	Area that has met the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants designated in the Clean Air Act and is being managed to continue to meet the NAAQS.
Metropolitan Transportation Plan (MTP)	The detailed long-range plan for future investments in the central Puget Sound Region’s regional transportation system. For planning purposes, the MTP also is recognized as the central Puget Sound Region’s Regional Transportation Plan.

Term	Meaning
mitigation	An effort to: (1) avoid the impact altogether by not taking a certain action or parts of an action; (2) minimize the impact by limiting the magnitude of the action and its implementation, by using technology or by taking affirmative steps; (3) rectify the impact by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate the impact over time by preservation and maintenance operations; (5) compensate for the impact by replacing, enhancing or providing substitute resources or environments; and/or (6) monitor the impact and taking appropriate corrective measures.
mitigation bank	A mitigation project constructed in advance of planned development to mitigate for unavoidable effects on wetlands and their associated habitat. Banks are generally sized to provide sufficient mitigation for several development projects in one location. As a result, the bank typically provides higher functioning wetlands and more useable habitat than may be possible on an individual project scale.
National Ambient Air Quality Standards (NAAQS)	Standards established by the Environmental Protection Agency under the Clean Air Act for pollutant concentrations in outside air throughout the country. See also: "criteria pollutants".
National Environmental Policy Act (NEPA)	Federal legislation adopted in 1969 that established a national environmental policy intentionally focused on federal activities and the desire for a sustainable environment balanced with other essential needs of present and future generations. NEPA also established federal agency responsibility and created the basic framework for integrating environmental considerations into federal decision-making. The fundamentals of the NEPA decision-making process include: an interdisciplinary approach in planning and decision-making for actions that affect the human environment, interagency coordination, consideration of alternatives, examination of potential environmental consequences and mitigation, documentation of the analysis, and making the information available to the public for comment prior to implementation.
National Pollutant Discharge Elimination System (NPDES)	The federal program under Section 402 of the Clean Water Act for issuing, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements for discharges of pollutants from point sources to tidal waters, lakes, wetlands, rivers, streams, or other water courses.

Term	Meaning
nitrogen oxides (NO _x)	A product of combustion from transportation and stationary sources resulting from nitric oxide combining with oxygen in the atmosphere; a contributor to the formation of ozone, which is a major component of photochemical smog. This includes NO and NO ₂ .
non-attainment area	An area that does not meet one or more of the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants designated in the Clean Air Act.
nutrients	Essential chemicals needed by plants or animals for growth, such as phosphorus.
ordinary high water mark (OHWM)	The elevation marking the highest water level that is so common and maintained for a sufficient time in all ordinary years that it leaves evidence upon the landscape, such as a clear and natural line impressed on the bank, changes in soil character, destruction of or change in vegetation, or the presence of litter and debris. Generally, it is the point where the natural vegetation changes from predominately aquatic to upland species. Where the ordinary high water mark cannot be found, it is the line of mean annual flood—the highest the water gets in an average year—but not the highest it gets during extreme flooding.
outfall	The point of discharge for stormwater runoff; also the outlet or mouth of a drain pipe or culvert that discharges stormwater runoff.
ozone (O ₃)	Ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation. It also is a chemical oxidant and major component of photochemical smog. Ozone can seriously impair the respiratory system and is one of the most widespread of all the criteria pollutants regulated under the Clean Air Act. Ozone in the troposphere is produced through complex chemical reactions of nitrogen oxides, which are among the primary pollutants emitted by combustion sources; hydrocarbons, released into the atmosphere through the combustion, handling and processing of petroleum products; and sunlight.
particulate	A very small solid suspended in air or water. Sources of particulate matter include sea salt, pollen, smoke from forest fires and wood stoves, road dust, industrial emissions, and agricultural dust. Some particles may be small enough to be drawn deep into the respiratory system where they can contribute to infection and reduced resistance to disease.
pervious	Having pores or openings that permit liquids or gases to pass through.

Term	Meaning
pervious surface	A surface that allows the penetration of liquids, such as grassy areas.
PM _{2.5}	Particulate matter less than 2.5 micrometers in diameter.
PM ₁₀	A standard for measuring the amount of solid or liquid matter suspended in the atmosphere, specifically, particulate matter less than 10 micrometers in diameter. Smaller PM ₁₀ particles can penetrate to the deeper portions of the lung, affecting sensitive population groups such as individuals with respiratory ailments and children.
pollutant	Any substance introduced into the environment that contaminates or otherwise adversely affects the usefulness of a resource.
Puget Sound Regional Council (PSRC)	The Metropolitan Planning Organization (MPO) and Regional Transportation Planning Organization (RTPO) for the central Puget Sound Region, which is comprised of Snohomish, King, Pierce, and Kitsap counties. The MPO and RTPO is the legally-mandated forum for cooperative decision-making about regional growth policies and transportation issues in the metropolitan planning area.
pump station	A mechanical facility that controls flows from one body of water to another.
recharge	Water, whether precipitation, surface water, or groundwater, that enters and adds to an aquifer.
recharge area	Land area important for retaining precipitation as part of the groundwater hydrology of the region.
resident fish	Fish that do not migrate out to the ocean, but remain in fresh water.
restoration	To improve a disturbed or altered wetland by returning wetland parameters that may be missing.
retention/detention pond	A drainage facility designed to reduce stormwater runoff quantity and quality effects either by holding the increased runoff volume that results from development for a considerable amount of time, allowing the suspended particles to settle out, and then slowly releasing it through natural means on site; or by holding the runoff for a short period of time and then releasing it to the stormwater management system for treatment and discharge.
riffle	A shallow area of a stream or river in which water flows rapidly over a rocky or gravelly stream bed.

Term	Meaning
right-of-way	Land purchased prior to the construction of transportation improvements along with land for sound walls, retaining walls, stormwater facilities, and other project features. This also includes permanent or temporary easements for construction and maintenance. Vacant land may also be set aside for future highway expansion under certain circumstances.
riparian	Pertaining to anything connected with or immediately adjacent to the banks of a stream, river, or other waterbody.
riparian area	The land and habitat adjacent to streams, lakes, estuaries, or other waterways, comprising the transition area between the aquatic ecosystem and the nearby upland terrestrial ecosystem. Riparian corridors, or zones, identified by soil characteristics or plant communities, include the wet areas in and near streams, ponds, lakes, springs, and other surface waters.
river mile (RM)	The distance of a point on a river measured in miles from the river's mouth along the low-water channel.
runoff	Rainwater or snowmelt that leaves an area as a surface drainage.
salmonid	Any member of the family Salmonidae, which includes all species of salmon, trout, and char (including bull trout).
scrub-shrub wetland	Wetland dominated by woody vegetation less than 20 feet tall. The vegetation may include shrubs, young trees, and trees or shrubs that may be stunted because of environmental conditions. Scrub-shrub wetlands are flooded for extended periods during the growing season.
sediment	Material that originates from weathering and erosion of rocks, dirt, or unconsolidated deposits and organic material. Sediment is carried and deposited by wind, ice or water. It is often transported by stormwater runoff and may be suspended within the water.
sensitive species	Any native wildlife species that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range without cooperative management or removal of threats.

Term	Meaning
Shoreline Management Act (SMA)	Washington State legislation adopted in 1971 that requires local jurisdictions to create and implement a Shoreline Master Program (SMP). The purpose of the SMP is to regulate land use and new development within sensitive shoreline areas. Shorelines, according to the SMA, include all areas typically within 200 feet inland from principal bodies of water (rivers and streams with flows of at least 20 cubic feet per second, lakes over 20 acres, and tidal areas) and associated wetlands. The local SMP identifies standards of protection for shoreline areas, and typically contains shoreline policies, shoreline use environments or zones, and specific shoreline regulations. The final SMP is subject to approval by the State Department of Ecology.
Sound Move	The Central Puget Sound Regional Transit Authority (Sound Transit) ten-year (1996 to 2006) regional transit system plan for implementing commuter rail, light rail, and regional express bus service and HOV facilities in parts of King, Pierce, and Snohomish counties.
species of concern	Species whose conservation standing is of concern to the U.S. Fish and Wildlife Service, but for which status information is still needed for consideration to list the species under the Endangered Species Act.
State Environmental Policy Act (SEPA)	Washington State legislation adopted in 1974, that establishes an environmental review process for all development proposals and major planning studies prior to taking any action. SEPA includes early coordination to identify and mitigate any substantial issues or significant effects that may result from a project or study.
State Implementation Plan (SIP)	Plan developed by state government to attain and maintain compliance with the National Ambient Air Quality Standards.
state-listed species	Species of wildlife that are considered to be at-risk and are protected by Washington State laws.
stormwater	The portion of precipitation that does not naturally percolate into the ground or evaporate, but flows overland, in channels, or in pipes into a defined surface water channel or a constructed stormwater facility.
stormwater detention	The process of storing stormwater in manmade facilities such as ponds or vaults and releasing the stormwater at a controlled rate. This helps control the volume and rate at which stormwater enters streams and rivers. Controlling the flow of stormwater helps maintain or improve conditions in the streams and minimizes erosion of stream banks.

Term	Meaning
study area	The area specifically evaluated for environmental effects.
subbasin	A smaller portion, or subarea, of a watershed or catchment area.
threatened species	Any species that is likely to become endangered within the foreseeable future throughout all or a substantial portion of its range.
total suspended solids	Soil and other particles that are carried in water. High levels of soil particles can make a waterbody appear muddy or cloudy and affect fish by clogging gills and reducing their ability to see and forage for food.
transportation facility	Roadways, access ramps, noise walls, retaining walls, traffic barriers, transit stations, park-and-ride structures, non-motorized facilities, signage, lighting, stormwater treatment and conveyance, and landscaping within the project area.
Transportation Improvement Plan (TIP)	Regional plan prepared by the metropolitan planning organization outlining what projects are funded and planned for construction. In the Puget Sound Region, the TIP is prepared by the Puget Sound Regional Council (PSRC) using a six-year planning horizon.
tributary	A stream or other body of water that contributes its water to another stream or body of water.
turbidity	A condition caused by suspended sediments or floating material that clouds the water and makes it appear dark and muddy.
urban growth boundary	For jurisdictions planning under the Washington State Growth Management Act, the boundary that divides areas that are planned to support urban-type development and densities (typically having a minimum density of four residential units per acre) from those areas that are expected to remain rural in character and level of development (typically having fewer than four residential units per acre).
vehicle	Any car, truck, van, motorcycle, or bus designed to carry passengers or goods. Bicycles and other pedestrian-oriented vehicles are not included in this definition.
vehicle miles traveled (VMT)	The number of miles traveled by all vehicles, usually reported for a given area or population.

Term	Meaning
Water Resource Inventory Area (WRIA)	An administrative and planning area designated by the Washington State Department of Ecology for addressing water and aquatic resource management issues. Sixty-two WRIsAs have been designated, corresponding to the state's major watershed basins. The terms WRIA and watershed are frequently used interchangeably, although a WRIA may include more than one watershed.
watershed	The region of land that drains into a specific body of water, such as a river, lake, sea, or ocean. Rain that falls anywhere within a given body of water's watershed will eventually drain into that body of water.
wetland	Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

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Exhibit 2

Data from base data referenced below.

Exhibit 3

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Exhibit A-1, A-2

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Exhibit A-3

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Appendix A: METHODOLOGY

GUIDANCE FOR CONDUCTING A CUMULATIVE EFFECTS ANALYSIS

Guidance from the Council on Environmental Quality (CEQ), Federal Highway Administration (FHWA), and the Washington State Department of Transportation (WSDOT) was followed for analyzing and assessing cumulative effects due to the I-405, Tukwila to Renton Improvement Project (I-5 to SR 169-Phase 2). Brief discussions of the CEQ, FHWA, and WSDOT guidance follow.

Council on Environmental Quality

CEQ regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA) define cumulative effects as:

“...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.”⁴³

The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even indirect effects, but they can add to other disturbances and eventually lead to a measurable environmental change. Cumulative effects should be considered along with the direct and indirect effects of each alternative. The range of alternatives considered includes the No Build Alternative as a baseline against which to evaluate cumulative effects. The range of actions to be considered includes not only the proposed project but all connected and reasonably foreseeable similar actions that could contribute to cumulative effects. Related actions should be addressed in the same analysis. The CEQ recommends that an agency’s analysis accomplish the following:

- Focus on the effects and resources within the context of the proposed action.
- Present a concise list of issues that have relevance to the anticipated effects of the proposed action or eventual decision.
- Reach conclusions based on the best available data at the time of the analysis.
- Rely on information from other agencies and organizations on reasonably foreseeable projects or activities that are beyond the scope of the analyzing agencies’ purview.
- Relate to the geographic scope of the proposed project.
- Relate to the time period of the proposed project.

⁴³ 40 CFR 1508.7 Protection of Environment, Council on Environmental Quality, Cumulative Impact.

A cumulative effects analysis (CEA) involves assumptions and uncertainties, with choices supported by the best analysis based on the best available data. Monitoring programs and/or research can be identified to improve the available information and, thus, the analyses in the future. Where uncertainties exist, adaptive management provisions can be incorporated into whichever alternative is eventually selected.

Cumulative effects can be positive as well as negative, depending on the resource element (e.g., air quality, fish, etc.) being evaluated. It is possible that some resource elements can be negatively and others positively affected by the same proposed project. Most cumulative effects analyses will identify varying levels of beneficial and adverse effects depending on the resource elements and the specific actions. Because of this potential mixture of effects, it is sometimes difficult to determine which alternative is best. The CEQ handbook, *Considering Cumulative Effects Under the National Environmental Protection Act*, has been used as a valuable reference tool in this analysis.

Federal Highway Administration

The FHWA implements NEPA and the CEQ guidelines through its environmental regulations (23 CFR 771).⁴⁴ FHWA regulations do not explicitly address cumulative effects, with the exception of the definition for categorical exclusions (CE), which addresses potential significant effects from cumulative CE actions. FHWA policy is also provided in a position paper⁴⁵ and a memorandum⁴⁶ dated January 31, 2003. The January 31, 2003, memorandum states

“An appropriately thorough review of the probable direct and indirect effects of FHWA actions and documentation of other cumulative effects on specific resources is essential to a reasoned and informed project decision and will assist in attaining FHWA’s environmental streamlining and stewardship goals.”

Per FHWA guidance, the potential relationship of a transportation proposal to indirect effects must be established on a case-by-case basis early in the NEPA project development process. A CEA is resource area-specific and generally performed for the resource areas directly affected by the action under study (such as a transportation project). However, not all of the resource areas directly affected by a project will require a CEA. The environmental resource areas subject to a CEA should be determined on a case-by-case basis early in the NEPA process, generally as part of early coordination or scoping.

⁴⁴ Federal Highway Administration, Department of Transportation, Environmental Impact and Related Procedures.

⁴⁵ Federal Highway Administration, *Position Paper on Secondary and Cumulative Impact Assessment in the Highway Development Process*, published August 20, 1992.

⁴⁶ Federal Highway Administration, *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process*, published January 31, 2003.

Washington State Department of Transportation

Although WSDOT does not currently provide specific guidance for cumulative effects analyses, the *WSDOT Environmental Procedures Manual* refers to the CEQ and FHWA materials. Further, the *Washington State Environmental Policy Act Rules*⁴⁷ require cumulative effects to be analyzed.

SCOPE OF THE CUMULATIVE EFFECTS ANALYSIS

Critical Resources

The CEA for the Tukwila to Renton Project used the CEA in the *I-405 Corridor Program Final EIS* as a starting point. The I-405 Corridor Program CEA focused on air quality, energy, farmlands, aquatic resources, surface water, and wetlands. However, for the Tukwila to Renton Project, neither energy nor farmlands were included in the CEA. Farmlands were determined not to be affected at all by the project. Energy was not analyzed because the difference in energy consumption at the regional level, with or without the project, was predicted to be inconsequential. The project-level analysis was then conducted, based on the results of scoping, agency consultations, and the anticipated direct and indirect effects on air quality, surface waters, wetlands, and aquatic resources due to the Tukwila to Renton Project.

Geographic Boundaries and Time Period

When evaluating cumulative effects, the analyst must consider expanding the geographic study area beyond that of the proposed project, as well as expanding the time limits to consider past, present, and future actions that may affect the environmental resources of concern.

The geographic scope of analysis is defined by the physical limits or boundaries of the Tukwila to Renton Project's effect on an environmental resource, as well as the boundaries of other activities that also may contribute to the effects on that environmental resource. The time period is determined by identifying time limits that are both relevant to the project and reasonable. The geographic boundaries and time period can be different for each environmental resource evaluated.

The geographic boundaries and time period established for the CEA for the Tukwila to Renton Project were based on those used in the *I-405 Corridor Program Final EIS*, scoping, agency consultations, and the area directly affected by the project itself.

Geographic Boundaries

The geographic boundary for the project-level air quality CEA was set at 0.5 mile from the centerline of the project right-of-way (Exhibit A-1). This boundary provided for consideration of the effects on air quality of other nearby projects. Effects on air quality for the overall Central Puget Sound Region were addressed previously in the *I-405 Corridor Program Final EIS*.

⁴⁷ WAC 197-11-792 Washington State Environmental Policy Act Rules, Scope.

The geographic boundaries for the surface waters, wetlands, and aquatic resources CEAs were set at one mile from the centerline of the project right-of-way (Exhibit A-2). Expanding the geographic area beyond that of the direct effect area of the Tukwila to Renton Project allowed a more comprehensive analysis of the cumulative effects on the environmental resources.

Exhibit A-1: CEA Boundary for Air Quality

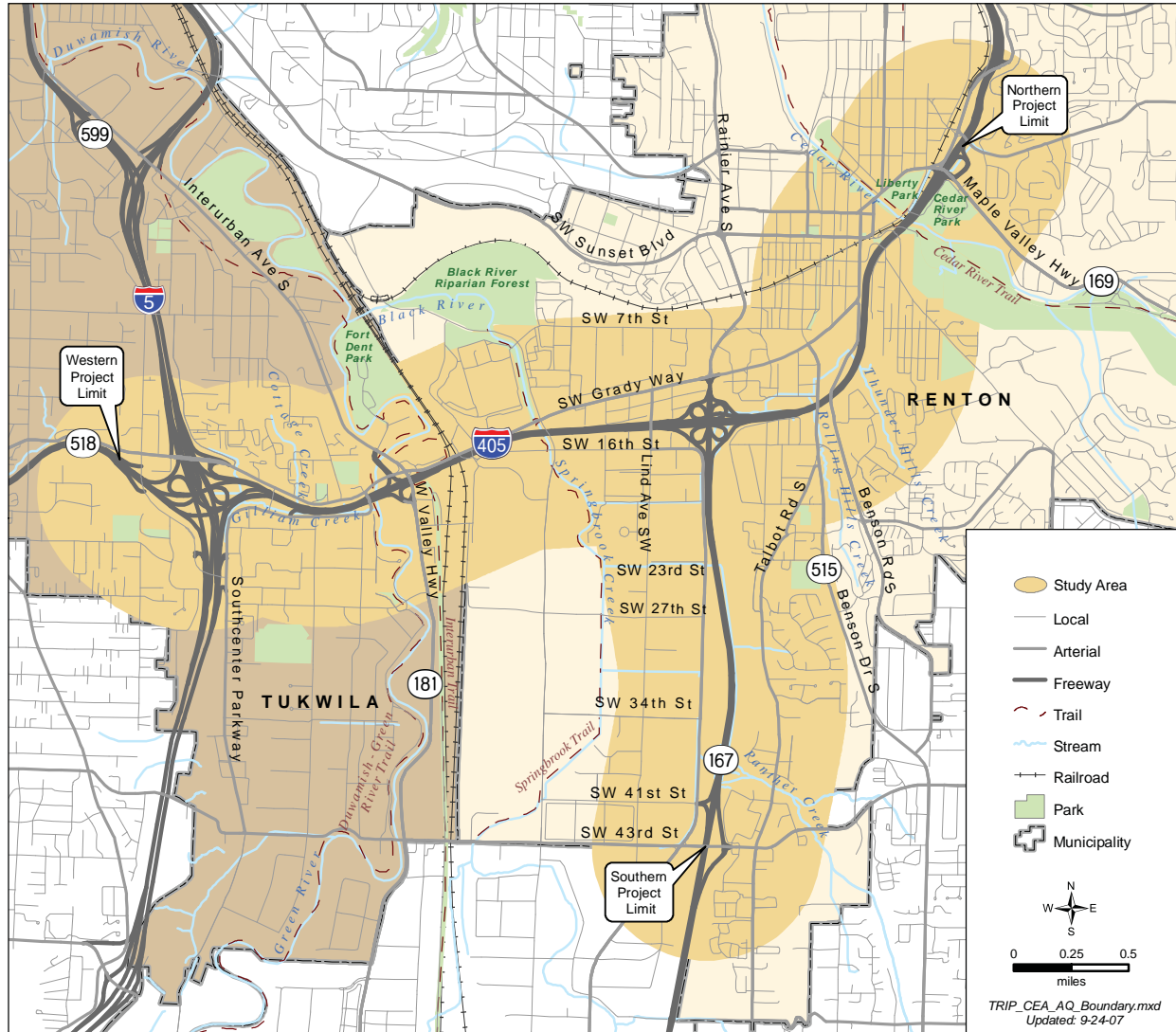
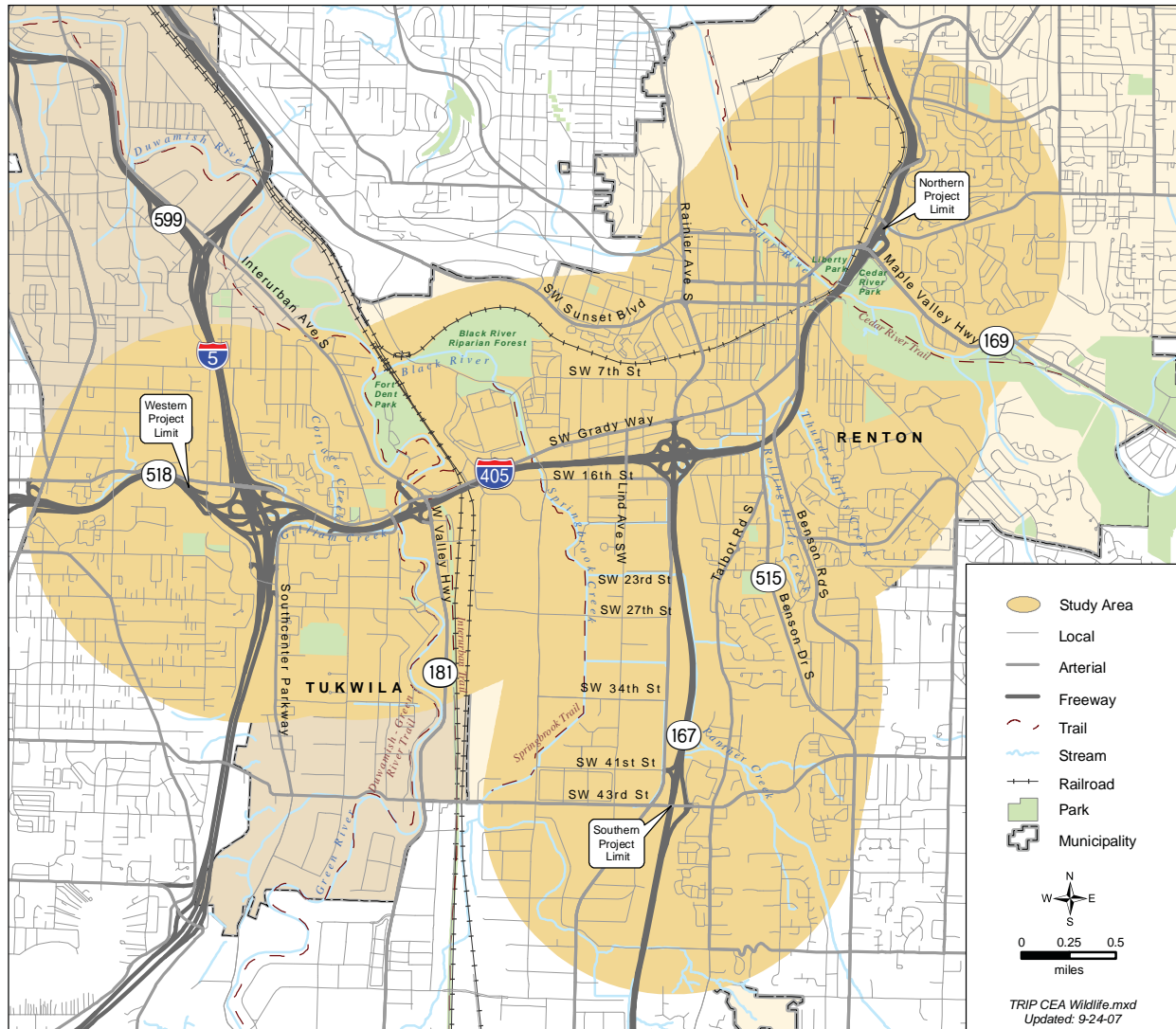


Exhibit A-2: CEA Boundaries for Surface Waters, Wetlands, and Aquatic Resources



Time Period

For the four environmental resources that were analyzed (air quality, surface water, wetlands, and aquatic resources), a time period of 1960 through 2030 was set. Using 1960 as the starting point for the analysis allowed an assessment of the changes that have occurred since the original construction of I-405. The year 2030 is the “future year” used in regional transportation planning documents.

Framework for the Cumulative Effects Analysis

The environmental effects of improvements to I-405 and all other proposed transportation investments in the region were reviewed in the Final EIS for Destination 2030⁴⁸ (Destination 2030). The potential cumulative effects of the I-405 Corridor Program, and other Metropolitan Transportation Plan improvements, were re-evaluated in the *I-405 Corridor Program Final EIS*. That Final EIS expanded on Destination 2030 by analyzing slightly different combinations of plans and other transportation improvements. The *I-405 Corridor Program Final EIS* utilized the Puget Sound Regional Council (PSRC) land use forecasting model (DRAM/EMPAL) to provide a partial basis for evaluating the geographic distribution of potential cumulative effects on critical resources, ecosystems, and human communities. Although the *I-405 Corridor Program Final EIS* served as a starting point for this CEA, the forecasting model was not applied at the project-specific level because mobility improvements contained in the Tukwila to Renton Project would be more noticeable at the local level, and would result in few measurable changes in mobility at the regional level.

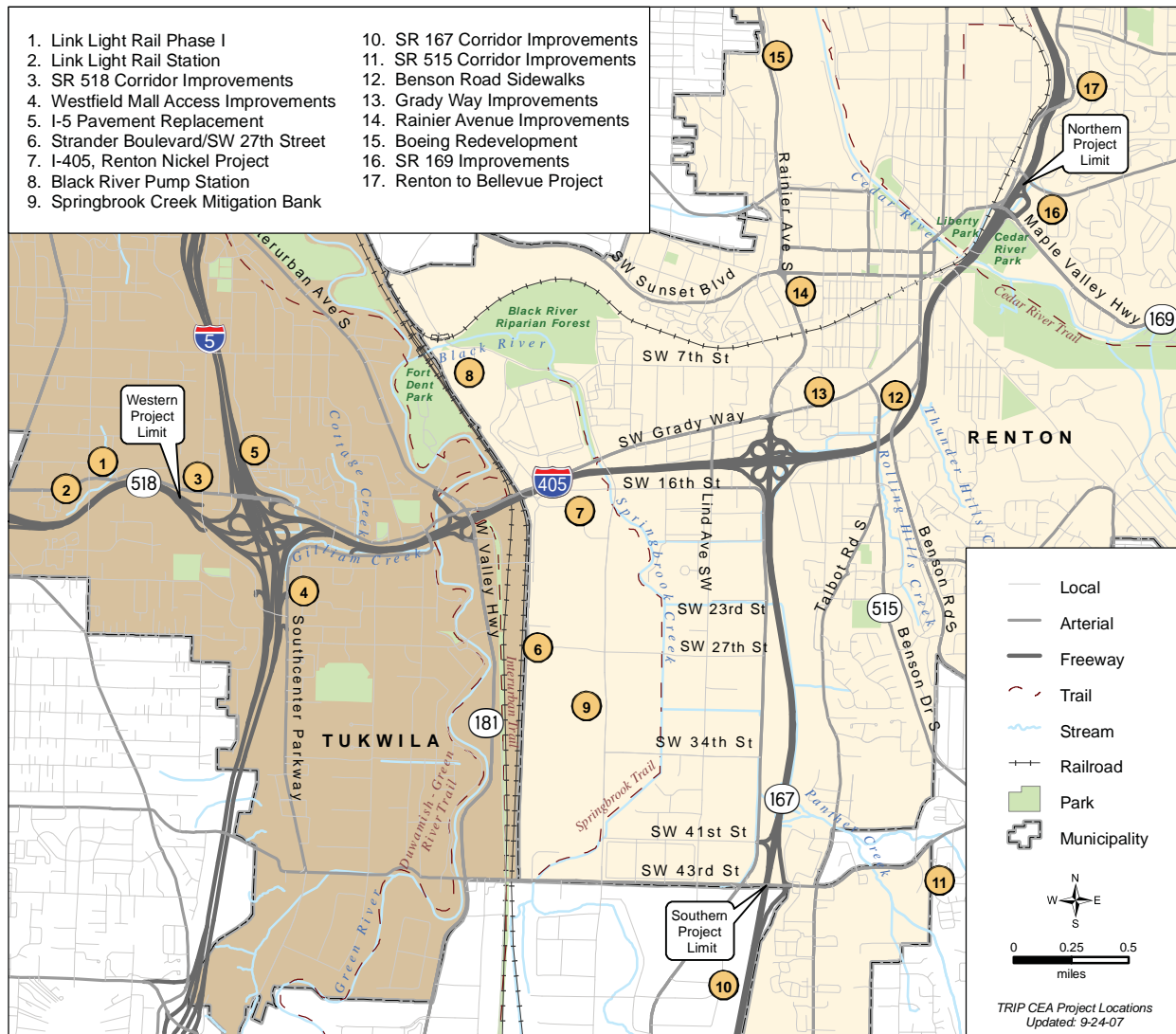
The direct effects on the critical resources (air quality, surface waters, wetlands, and aquatic resources) caused by the Tukwila to Renton Project were determined first. The indirect effects resulting from the direct effects on the critical resources were then estimated. Similar information, to the extent it was available, was assembled for each of the other projects considered in the CEA. Finally, the direct and indirect effects were re-examined to estimate the contribution to cumulative effects on each critical resource resulting from the Tukwila to Renton Project alone as well as when combined with the other projects included in this CEA.

OTHER MAJOR PROJECTS INCLUDED IN THE CUMULATIVE EFFECTS ANALYSIS

Other nearby major future projects were included in the CEA if: (a) they were planned, approved, and funded or likely to receive funding in a relatively short period (five years or less) of time; (b) all or a portion of the projects would be located within or close to the CEA geographic boundaries; and (c) the projects would be initiated before 2030. The effects from these projects were evaluated because they could result in cumulative effects on the critical resources. Exhibit A-3 shows where these other projects are, or will be, located.

⁴⁸ *Final EIS for Destination 2030, The Metropolitan Transportation Plan for the Central Puget Sound Region* (PSRC 2001).

Exhibit A-3: Other Projects Considered in this CEA



Projects considered in this CEA were:

1. Link Light Rail Phase 1 - South 154th Street to Seattle-Tacoma International Airport

Sound Transit is extending the Central Light Link rail line approximately 1.7 miles from South 154th Street to Seattle-Tacoma International Airport. Construction is underway and will be completed in 2009.⁴⁹

⁴⁹ <http://www.soundtransit.org/projects/svc/link/south/default.asp>.

2. Link Light Rail Station – Tukwila International Boulevard/Southcenter Boulevard

Sound Transit is constructing an elevated station at the intersection of Tukwila International Boulevard and Southcenter Boulevard/South 154th Street. The station will connect passengers to downtown Seattle and Seattle-Tacoma International Airport. This station is slated to begin operating in 2009.⁵⁰

3. SR 518 Corridor Improvements

WSDOT plans to add one eastbound lane to SR 518 between Seattle-Tacoma International Airport and the I-5/I-405 interchange and improve the SR 509/SR 518 interchange. Construction of the SR 509/SR 518 interchange improvements is slated to begin in early 2008 with completion in late 2009. The SR 518 improvements are in progress and will be completed in mid to late 2008. The environmental analyses have been completed for this project.⁵¹

4. Westfield Shoppingtown Mall Access Improvement: Klickitat Drive/Southcenter Parkway

The City of Tukwila plans to improve Southcenter Parkway/Klickitat Drive to reduce traffic congestion adjacent to Westfield Shoppingtown Mall. The proposed improvements include widening Southcenter Parkway at Klickitat Drive, constructing a grade separation of Southcenter Parkway southbound via an underpass and bridge structure, adjusting utilities, and constructing detention and stormwater structures. The project is expected to include some vegetation removal, excavation, and fill of soils; construction of a retaining wall; and restriping of traffic lanes. Construction will begin in 2008 and will be completed in 2009.

5. I-5 Pavement Replacement

WSDOT plans to remove and replace concrete on 14 miles of I-5 extending from Tukwila to Northgate. The overall project will be constructed as a series of smaller projects through this 14-mile section. Construction is scheduled to start in 2009 with completion of the first projects in 2013.⁵²

6. Strander Boulevard/SW 27th Street

The City of Renton, in partnership with the City of Tukwila, is in the process of evaluating potential transportation improvements to upgrade and link the existing Strander Boulevard and SW 27th Street corridors. The primary goal of this project is to improve east-west mobility across the Green River Valley. As a means of achieving this goal, general-purpose, heavy vehicle/truck traffic, railroad, and high-occupancy vehicle (HOV) improvements will be

⁵⁰<http://www.soundtransit.org/x1647.xml>.

⁵¹ <http://www.wsdot.wa.gov/projects/sr518>.

⁵² <http://www.wsdot.wa.gov/projects/i5/rehab>.

considered for implementation along three segments of the Strander Boulevard/SW 27th Street corridor.

Segment 1 will extend Strander Boulevard to the east of West Valley Highway (SR 181) to connect between West Valley Highway and Oakesdale Avenue SW. This segment will include grade separated crossings of the Union Pacific and Burlington Northern Santa Fe railroads. Completion of this segment will involve construction of a new public roadway across the existing Boeing Longacres Office Park site, and will provide accesses to the Boeing Longacres Office Park site and the proposed Sound Transit Sounder Station and Park-and-Ride site.

Segment 2 will provide general-purpose vehicle, HOV, and/or truck traffic improvements on SW 27th Street between Oakesdale Avenue SW and East Valley Road. The existing roadway may also be widened in this segment.

Segment 3 will provide a direct access between SW 27th Street and SR 167 for general-purpose vehicle, HOV, and/or truck traffic to and from SW 27th Street.⁵³

7. I-405, Renton Nickel Improvement Project

The Renton Nickel Improvement Project is a highway expansion project that will improve mobility and safety through Tukwila and Renton by adding lanes to I-405 and SR 167. On I-405, the project begins just east of the I-5/I-405 interchange in Tukwila and extends north past the Cedar River to the SR 169 (Maple Valley Highway) interchange. The project will build both an additional lane northbound and southbound between I-5 and SR 167 and between SR 167 and SR 169. On SR 167, the project will construct a southbound auxiliary lane from I-405 to the SW 41st Street and extend the southbound HOV lane north, closer to I-405. Construction is underway and be completed in 2011.⁵⁴

8. Black River Pump Station Improvements

The Black River Pump Station (BRPS) is located in Renton, approximately 1,700 feet upstream of the Black River and Green River confluence. The BRPS was built in 1972 by the U.S. Soil Conservation Service and is currently operated and maintained by the King County Department of Natural Resources and Parks, Water and Land Resources Division, Flood Hazard Reduction Service, Green River Flood Control Zone District. The BRPS completely spans the stream channel, creating a dam that effectively establishes the discharge point of Springbrook Creek before it enters the channel of the Black River. Although the BRPS includes fish passage facilities, it is considered to be a downstream and upstream barrier to certain life stages of salmonids. As a result, improvements to the fish passage facilities are currently being evaluated by King County.

⁵³ <http://www.ci.renton.wa.us/>.

⁵⁴ <http://www.wsdot.wa.gov/NR/rdonlyres/88B2B767-D787-482E-BEDC-4CC7A5939841/0/RentonNickelFactsheet.pdf>

9. Springbrook Creek Wetland and Habitat Mitigation Bank

As part of the I-405 Corridor Program, WSDOT and the City of Renton are establishing a mitigation bank that enhances, rehabilitates, and re-establishes wetlands and wetland buffers. The mitigation bank site is approximately 130 acres of existing wetlands and uplands in the southwest portion of the City of Renton. Springbrook Creek parallels much of the site. Construction of this mitigation project is underway.

10. SR 167 Corridor Improvements

WSDOT, King and Pierce Counties, and cities along SR 167 are in the process of identifying projects to help reduce congestion and improve safety on SR 167 from SW 43rd Street in Renton to SR 161 in Puyallup.

WSDOT is planning to convert the HOV lane(s) to high-occupancy toll (HOT) lane(s) on SR 167. The HOT lane(s) on SR 167 will start at I-405 in Renton and extend to 15th Street NW (southbound lane)/15th Street SW (northbound lane) in Auburn. WSDOT plans to have the HOT lanes open in spring of 2008.⁵⁵

WSDOT is also planning to construct a carpool lane on northbound SR 167 from 15th Street SW to 15th Street NW in Auburn. WSDOT will add and upgrade ramp meters and bypass lanes for carpools, vanpools, and buses to northbound and southbound on-ramps between Auburn and Renton at five interchanges (15th Street NW, South 277th Street, Willis Street (SR 516), South 212th Street, and SW 43rd Street). Construction is scheduled to be completed in 2007.⁵⁶

11. SR 515 Corridor Improvements

WSDOT will construct improvements to the SR 515 corridor through several projects. The first project will include paving the roadway and restoring safety features in the Renton vicinity from SE 192nd Street to Benson Road (108th Avenue SE).

The second project includes upgrades to access management along SR 515 from SE 182nd Street to SE 176th Street. A raised traffic island will be installed to replace the existing two-way left-turn lane and a left-turn pocket will be built at the entrance to the Fred Meyer parking lot. The project also includes building U-turn pockets at SE 180th Street and SE 176th Street and widening SR 515 to accommodate the U-turns. The existing traffic signals will be relocated and signal timing will be adjusted to allow a phase for the U-turn movement. Both projects are scheduled to begin construction in early 2008.

12. Benson Road Sidewalk Improvements

The City of Renton is improving the network of sidewalks through its Citywide Walkway Program. The Benson Road Sidewalk Project involves constructing a new sidewalk on Benson Road South extending from City Hall to South 26th Street. The project will complete the

⁵⁵<http://www.wsdot.wa.gov/projects/sr167/hotlanes>.

⁵⁶http://www.wsdot.wa.gov/Projects/SR167/HOV15thSW_15thNW/.

sidewalk system on Benson Road South between Nelson Middle School and downtown Renton.⁵⁷

13. South Grady Way Improvements

The City of Renton plans to add a third eastbound lane to South Grady Way between Rainier Avenue South and Talbot Road South by removing the traffic signal islands.

14. Rainier Avenue Improvement Project

The City of Renton plans to improve Rainier Avenue South and Hardie Avenue SW from the northern city limits to the I-405/SR 167 interchange near SW 34th Street. In 2005, the City completed a corridor-wide study to identify ways to improve Rainier Avenue South. First phase improvements will include upgrading sidewalks, pedestrian crossings, and existing transit support facilities; adding business access transit lanes; and replacing the Hardie Avenue SW railroad bridge.⁵⁸

15. Boeing Renton Plant Site Redevelopment

Boeing's Renton Plant site currently occupies approximately 290 acres. Consolidation efforts will shift operations to the north and west of the existing site, resulting in a surplus of up to 75 acres. To provide for a broad range of uses on this property, Boeing requested amendments to the City of Renton's Comprehensive Plan, including: amendments to the Comprehensive Plan map and text to divide the existing "Urban Center" designation into two parts: "Urban Center-Downtown" and "Urban Center-North;" Comprehensive Plan text amendments to establish new policies for the Urban Center-North area; Comprehensive Plan map amendments to re-designate properties in the site area from Employment Area-Industrial, Employment Area-Office, and Employment Area-Transition to Urban Center-North; creation of new mixed-use zoning provisions corresponding to the "Urban Center-North" designation; rezones of the site area properties to the new zoning designations; Development Agreement between the City of Renton and the Boeing Company; and other applicable modifications to City of Renton Comprehensive Plan and Development Regulations.

16. SR 169 Improvements

Phase 1 of this City of Renton project closed the existing entrance into Cedar River Park, provides a new signalized intersection 900 feet further east along SR 169, and constructs a new access road to serve both the park property and Stoneway property to the east. Phase 2 will widen and improve SR 169 from I-405 to approximately 2,000 feet east. Phase 2 includes an additional eastbound auxiliary lane for traffic coming off the northbound I-405 off-ramp to merge into eastbound SR 169, widens westbound SR 169 to include a right-turn lane onto northbound I-405, and installs a transit queue bypass lane. Construction also includes

⁵⁷ <http://www.ci.renton.wa.us/pw/transport/walkway/walkway.htm>.

⁵⁸ <http://www.ci.renton.wa.us/>.

sidewalks, a landscape island, new lighting, signing, signals, drainage facilities, retaining wall, channelization, and a portion of the new parking lot for the Cedar River Park.

17. I-405, SR 169 to I-90, Renton to Bellevue Project

This WSDOT project extends approximately 8 miles from SR 169 to the northern ramps of the I-90 interchange. The principal features include the following: (a) two new general-purpose lanes on I-405 in each direction from SR 169 through the I-90 interchange; (b) realignment of I-405; (c) construction of a new in-line transit station in the vicinity of 112th Avenue SE; (d) construction of an HOV direct access ramp at North 8th Street in coordination with Sound Transit; (e) reconstruction, realignment, and reconfiguration of eight interchanges (SR 169, North 3rd Street, Park Avenue, NE 30th Street, NE 44th Street, 112th Avenue SE, Coal Creek Parkway, and I-90); (f) changes to local roadways related to interchange improvements and I-405 widening; and (g) stormwater management to provide water quality treatment and discharge. Construction is currently not scheduled.