

## 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 Bellevue to Lynnwood Improvement Project corridor is currently managed and treated using a variety of facilities. These facilities include stormwater ponds, biofiltration swales, media file drains<sup>28</sup>, 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 time and may not function as originally intended. Additional details can be found in the *Water Resources Discipline Report*.<sup>29</sup>

## Wetlands

The wetland study area used in the *Ecosystems Discipline Report*<sup>30</sup> includes the portion of the I-405 corridor within the project footprint with an emphasis on those sections where road widening is proposed.

## Wetland Resource Trends

Wetland resources in WRIA 8 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” of wetland area requires that at least as many acres of wetlands created or restored as are lost. In addition, 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.

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<sup>28</sup> *Previously known as ecology embankments.*

<sup>29</sup> *WSDOT 2011c.*

<sup>30</sup> *WSDOT 2011d.*

## Wetlands in the Project Study Area

### Location

Twenty-one wetlands, totaling about 13.6 acres, were delineated within the project study area. They are shown in Exhibit 6.<sup>31</sup> Of these 21 wetlands, 10 were previously delineated and mapped as part of the Kirkland Nickel Project in February, March, and June 2004.

### Classification

Using Washington State Department of Ecology's rating system wetlands in the study area were assigned a classification based on the Cowardin classification system.<sup>32</sup> Within the Cowardin system, each wetland is classified based on its physical characteristics. The wetlands within the project study area were classified as forested, emergent or scrub shrub.

Using the Ecology rating system, project biologists categorized 14 of the 21 total wetlands as Category IV wetlands, the lowest-value class of wetlands described using the Ecology rating system. Five of the wetlands were ranked as Category III wetlands. One wetland was classified as a Category II wetland, and one wetland was classified as a Category I wetland. We also used local jurisdiction guidelines to categorize the wetlands. Of the eight wetlands occurring in Kirkland, one is considered a Category 1 wetland, one is considered a Category 2 wetland, and six are considered Category 3 wetlands according to the Kirkland City Code<sup>33</sup>. Of the five wetlands occurring in unincorporated King County, two are considered Category 3 wetlands and three are considered Category 4 wetlands according to the King County Code.<sup>34</sup> According to the Bothell City Code, of the nine wetlands within Bothell, two wetlands are Type 3 wetlands and seven are Type 4 wetlands.<sup>35</sup> One of the wetlands, Wetland 22.8L, is located within Bothell and unincorporated King County; therefore, both local ratings apply. Wetland 22.8L is a Type 3 wetland under Bothell guidelines and a Category 3 wetland under King County guidelines. Rating systems for both King County and the City of Bothell are adopted from the Washington State rating system.

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 a low level of functions.

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<sup>31</sup> Wetland designations include the milepost of the location along the roadway followed by an L (west of the roadway) or an R (east of the roadway). M is used if the wetland is in the median. For example: wetland 20.4L is located at milepost 20.4 on the west side of the I-405.

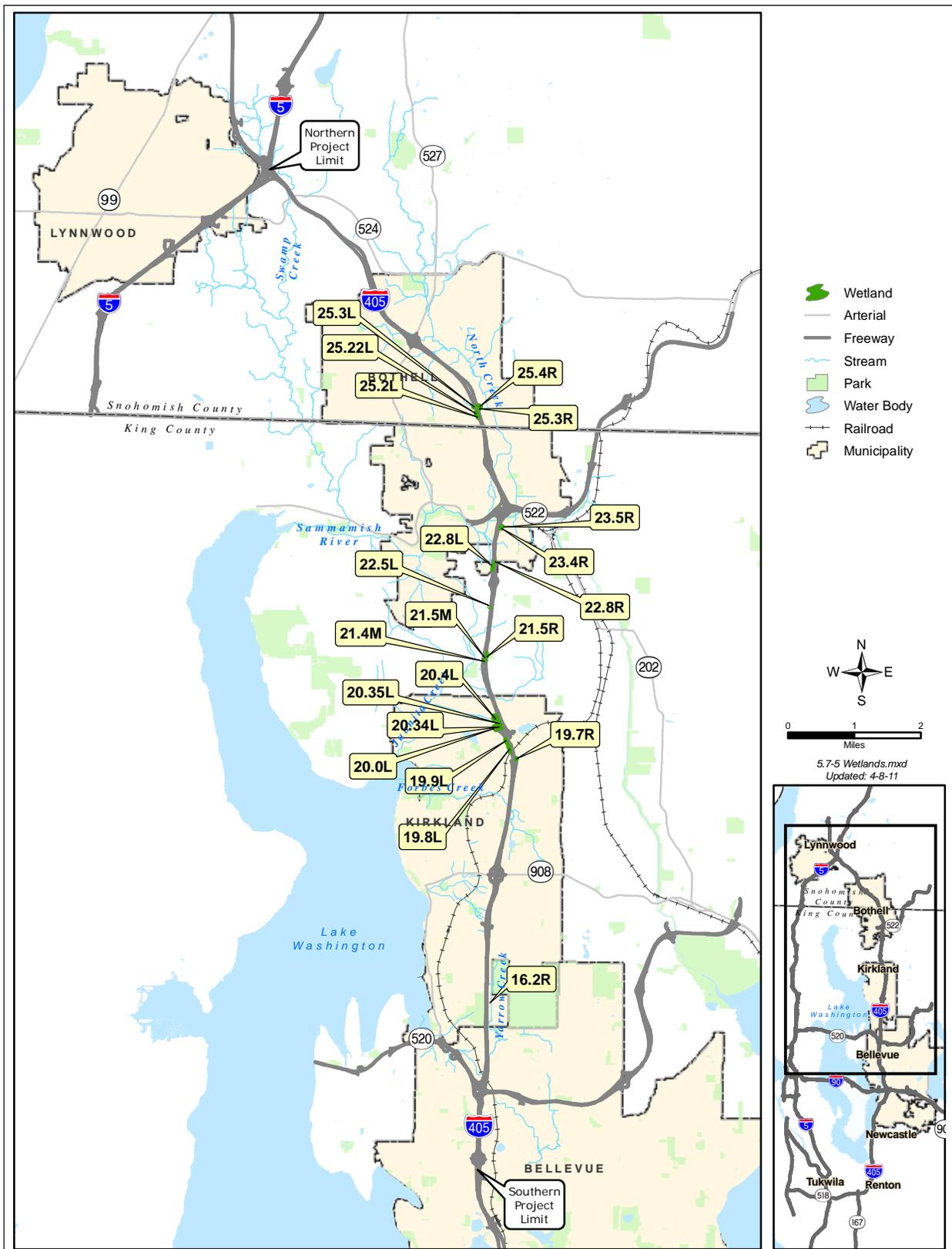
<sup>32</sup> Cowardin 1979.

<sup>33</sup> Kirkland 2010.

<sup>34</sup> King County 2010.

<sup>35</sup> Bothell (City of) 2010.

Exhibit 6: Wetlands in the project study area



### *Function and Values*

Seventeen of the 21 wetlands within the study area are relatively small (less than 0.5 acres) and of these 17 wetlands, six are less than 0.1 acres. These small wetlands are located in small, low-lying areas and they receive water from hillside seeps or roadside drainage ditches. The remaining four wetlands (16.2R, 20.4L, 22.5L, and 22.8L ) are larger than 1.0 acre. The study area includes only a portion of each of the larger wetlands, with the majority of their surface area lying outside the study area.

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' abilities 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 and toxicant removal, and erosion control. Three of the 21 wetlands have 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.

### *Aquatic Resources*

The aquatic resources study area used in the *Ecosystems Discipline Report*<sup>36</sup> is that portion of the I-405 corridor within the project footprint with an emphasis on those sections where road widening is proposed.

### **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 riparian 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

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<sup>36</sup> WSDOT 2011d.

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.<sup>37</sup>

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

### **Characteristics of Aquatic Habitat in the Project Study Area**

Aquatic 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.

Over time, the river 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 culverts and pipes; reducing or removing streamside vegetation; straightening stream channels; and removing in-stream habitat. These changes have resulted in the loss of historic floodplains associated with most of the water bodies. Substantial changes have also occurred in the vegetation surrounding the water bodies; what was once predominantly mature native vegetation has been replaced by a mix of immature native vegetation and non-native invasive plant species.

### **Fish Species in the Project Study Area**

Despite altered habitat conditions, streams in the study area still support various species and life history stages of fish. They also serve as important migration corridors for various resident and anadromous fish. The primary resident fish species using these systems are cutthroat trout, sculpin, three-spine stickleback, and longnose dace. The primary anadromous fish species migrating as well as rearing in these streams is coho salmon. Additional details regarding the presence of fish in the project study area can be found in the *Ecosystems Discipline Report*.<sup>38</sup>

### **Listed Species and Species of Concern in the Project Study Area**

Chinook salmon are listed as threatened under the ESA. In the study area, Chinook salmon are documented in the Sammamish River and the lower sections of Juanita Creek and Yarrow Creek. Chinook salmon present in these streams are part of the Puget Sound evolutionarily significant unit (ESU) of Chinook salmon.

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<sup>37</sup> WSDOT 2002.

<sup>38</sup> WSDOT 2011d.

Bull trout are listed as threatened under the ESA. Bull trout populations in the Puget Sound region are part of the Coastal-Puget Sound Distinct Population Segment (DPS). Bull trout and Dolly Varden (*Salvelinus malma*) (USFWS currently lists these species as co-listed where the range overlaps) may occur in the Sammamish River. Bull trout or Dolly Varden have rarely been observed in the Lake Washington system (excluding Chester Morse Lake) in the last 30 years.

Steelhead trout are listed as threatened under the ESA. In the study area, steelhead are documented in the Sammamish River. Steelhead that occur in the Sammamish River are part of the Puget Sound ESU.

Coho salmon are listed as a federal species of concern by NMFS.<sup>39</sup>

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<sup>39</sup> NMFS 2011.

## POTENTIAL EFFECTS

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### *Air Quality*

#### **Construction**

##### *Direct*

Particulate emissions will vary from day to day depending on the level of construction activity, specific operations, and weather conditions. Particulate emissions will depend on the soil's moisture and silt content, wind speed, and the amount and type of equipment operating. Larger dust particles will settle near the source, and fine particles will disperse over greater distances from the construction site.

The quantity of fugitive dust or particulate emissions will be proportional to the area of construction operations and level of activity. Based on field measurements of unmitigated dust emissions from roadway projects, an approximate emission factor for construction operations is 1.2 tons per acre of construction per month of activity.<sup>40</sup> Possible mitigation measures to control fugitive dust or particulate emissions are discussed in the Measures to Avoid or Minimize Construction Effects.

##### *Indirect*

No indirect effects associated with air quality changes are anticipated from construction of the Bellevue to Lynnwood Improvement Project because of the low level and short duration of the temporary direct effects.

##### *Cumulative*

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

#### **Operation**

##### *Direct*

The Bellevue to Lynnwood Improvement Project is included in the PSRC MTP and in the PSRC Transportation Improvement Program (TIP). The project meets all requirements of 40 CFR Part 93 and WAC 173-420 and demonstrates regional conformity.

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<sup>40</sup> *Ecology 1992.*

If either Build Alternative is implemented, the Bellevue to Lynnwood Improvement Project will not cause any NAAQS exceedances for CO, which indicates that it will meet EPA project-level conformity requirements.<sup>41</sup>

Mobile Source Air Toxic (MSAT) emissions in the study area are predicted to noticeably decrease in the future, even though VMT is predicted to increase by over 40 percent under both the No Build and Build Alternatives in 2040. Therefore, no mitigation would be required.

### Build Alternative 1

The maximum estimated one-hour CO concentrations from vehicle emissions are 5.7 parts per million (ppm) in 2014 and 6.6 ppm in 2040. The maximum estimated eight-hour CO concentrations are 4.9 ppm in 2014 and 5.5 ppm in 2040. The worst-case CO concentrations for existing conditions, year of opening, and design year would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations.

### Build Alternative 2

The maximum estimated one-hour CO concentrations from vehicle emissions are 5.3 ppm in 2014 and 6.4 ppm in 2040. The maximum estimated eight-hour CO concentration is 4.6 ppm in 2014 and 5.4 ppm in 2040. The worst-case CO concentrations for existing conditions, year of opening, and design year would not exceed the one-hour average NAAQS of 35 ppm for CO or the eight-hour NAAQS of 9 ppm at modeled locations. No mitigation would be required because no exceedances of NAAQS are predicted.

### No Build Alternative

The No Build Alternative has the same CO concentrations as Build Alternative 2.

### *Indirect*

No indirect effects associated with air quality changes are anticipated resulting from operation of the Bellevue to Lynnwood Improvement Project.

### *Cumulative*

### Build Alternatives

The project will add freeway capacity, improve reliability, increase travel speed, and benefit operations on I-405. The project will not cause or contribute to violation of CO standards. These benefits should be realized through 2040.<sup>42</sup> The other HOV and transit projects included in the CEA may also help reduce automobile use, improve the

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<sup>41</sup> WSDOT 2011b.

<sup>42</sup> WSDOT 2011b.

transportation system's efficiency, and decrease existing CO levels in parts of the air quality study area. The operational phase of the Brightwater Conveyance System, North Creek Portal and the North Creek Interceptor and Olympus Meadows Trunk Improvements Project will not affect air quality.

### No Build Alternative

Under the No Build Alternative, improvements and enhancements associated with the Bellevue to Lynnwood Improvement Project would not occur. The Bellevue to Lynnwood Improvement 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 Bellevue to Lynnwood Improvement Project air quality study area. However, the *Air Quality Technical Memorandum*<sup>43</sup> predicts the No Build Alternative to have lower CO concentrations than either of the Build Alternatives.

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

## ***Surface Waters***

### **Construction**

#### *Direct*

The Build Alternatives will be constructed in accordance with federal and state technical guidance, permit requirements, and Washington State Department of Transportation (WSDOT) project requirements, which mandate the use of best management practices (BMPs) to control construction runoff. However, the topography and limited space within the I-405 corridor make controlling increased runoff volumes and peak flows difficult for all but the smaller storms. Consequently, there could be increased amounts of runoff entering some local waterways during construction.

Yarrow Creek, Forbes Creek, Juanita Creek, North Creek, the Sammamish River, and other smaller receiving waters and drainage systems that convey water to Lake Washington, will each receive only a small percentage of their total flow from construction areas. Each receiving water is anticipated to have sufficient capacity to convey the flow to Lake Washington without increasing the existing flood risk. Sedimentation ponds and other BMPs provided during construction will help prevent downstream flooding, erosion, and sedimentation.

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<sup>43</sup> *WSDOT 2011b*

### *Indirect*

Temporary effects during project construction include sedimentation and disturbance to stream buffers from vegetation clearing and soil disturbance. Sediments can enter stream systems that are adjacent to construction activities. However, introduction of sediments and pollutants into stream buffers in the study area will be avoided and minimized. The effects are anticipated to be localized, temporary, and of low magnitude if they occur.

### *Cumulative*

WSDOT will implement BMPs to minimize the Bellevue to Lynnwood Improvement Project's contribution to adverse 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, adverse construction-related cumulative effects on surface waters should be temporary and of low magnitude.

## **Operation**

### *Direct*

Either Build Alternative will add approximately 18.2 acres of new impervious highway surface. WSDOT is designing the Bellevue to Lynnwood Improvement Project to the current WSDOT *Hydraulics Manual*<sup>44</sup>, and the current WSDOT *Highway Runoff Manual*<sup>45</sup>, so that stormwater discharges from the highway will meet the water quality and peak discharge criteria required by state and local authorities.<sup>46</sup> The Build Alternative will include detention facilities to prevent increases in peak flows and velocities or downstream flooding as a result of the additional impervious surface area.

The stormwater treatment systems proposed will treat all of the new impervious surface area as well as some of the existing impervious that is currently untreated. As a result, overall, water quality will be similar to, or better than, the No Build Alternative in the water bodies downstream of the study area.

The Build Alternatives will not substantially alter existing runoff patterns with the exception of new outfalls to the Sammamish River.

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<sup>44</sup> WSDOT 2010a.

<sup>45</sup> WSDOT 2010b.

<sup>46</sup> WSDOT 2011c.

### *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 drainage areas beyond the project footprint.<sup>47</sup> The increase in impervious area as a result of the project, and the resulting loss of infiltration, is very small compared with the size of the basins. The proposed stormwater facilities (media filter drain treatment facilities and an infiltration facility) will help to mitigate the relatively small loss of groundwater recharge and reduced stream flows downstream of the project.

### *Cumulative*

We do not anticipate any adverse cumulative effects. Similarly, the I-405, NE 8th Street to SR 520 Braided Ramps Project and the SR 520 Bridge Replacement and HOV Project will maintain or possibly improve water quality as a result of retrofitting some existing impervious surface areas with new water quality treatment facilities. The other projects included in this CEA will, at a minimum, be required to comply with surface water management requirements. To the extent those projects also provide enhanced and/or retrofitted treatment and/or reduced impervious area, improvements to surface water quality could result.

### **No Build Alternative**

The Bellevue to Lynnwood Improvement Project would not produce any construction-related effects on surface waters and water quality under the No Build Alternative.

Currently, some surface waters in the Bellevue to Lynnwood Improvement Project study area receive untreated runoff from stormwater facilities that do not meet current treatment level standards. 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 respective contributions to cumulative effects on surface waters due to those projects would be as noted under the construction and operation cumulative effects discussions above.

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<sup>47</sup> *WSDOT 2011c.*

## *Wetlands*

### **Construction**

#### *Direct*

Construction will require work in and adjacent to wetlands in the project's wetlands study area. The 21 wetlands in the study area have a total area of 13.62 acres. Either of the Build Alternatives will permanently affect 0.38 acre, completely fill three wetlands and partly fill five wetlands. Either alternative will permanently convert 1.21 acres of the 26 acres of wetland buffers into new roadway facilities.

Additionally, approximately 0.03 acre of wetlands and 0.3 acre of wetland buffers will be temporarily disturbed, resulting in a short-term reduction or loss of wetland and wetland buffer functions. For wetlands temporarily disturbed, WSDOT will restore the wetlands and wetland buffers after construction is completed. Restoration will include replanting with appropriate vegetation. A project-specific restoration plan will guide those activities.

#### *Indirect*

Loss or reduction in a wetland's function and/or value can be an indirect effect of partially filling the wetland. Of the eight wetlands that will be partially or completely filled, six are Category IV, and two are Category III. Three Category IV wetlands (less than 0.2 acre total) will be completely filled, resulting in the complete loss of functions and values. Filling a portion of a wetland or altering its vegetation can reduce the wetland's capacity to store stormwater, filter pollutants, protect stream banks from erosion, and provide wildlife habitat. Four of the eight wetlands that will be permanently affected are ditch-associated, dominated by invasive species, and surrounded by urban land uses including roads (two are in the I-405 median) and buildings.<sup>48</sup> Thus, in those cases, the loss or reduction in functions and values should not be substantial.

#### *Cumulative*

Based on the mitigation that will occur to compensate for the loss of 0.38 acre, a positive contribution to cumulative effects to wetlands may be realized as a result of the construction of the Bellevue to Lynnwood Improvement Project. WSDOT will mitigate for effects to wetlands from the constructed project at the Kelsey Creek wetland mitigation site located adjacent to Lake Hills Connector Road in Bellevue. Mitigation includes wetland creation, wetland enhancement, and wetland buffer enhancement. The enhancements include excavation of fill materials, planting of wetland vegetation, and planting of native upland vegetation to increase and enhance wetland buffers.

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<sup>48</sup> *WSDOT 2011d.*

Wetlands will also be affected by the SR 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project. The SR 520 Bridge Replacement and HOV Project has evaluated wetland effects for the I-5 to Medina segment, the Medina to SR 202 segment, and at the Aberdeen, Washington site for the replacement floating bridge pontoon construction. NEPA environmental documentation has been completed for all sites, except the SR 520 I-5 to Medina segment which will have a FEIS and Record of Decision issued in 2011. The SR 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project have identified about nine acres of permanent conversion and eight acres of temporary effects to wetlands. Most of the temporary effect is wetland shading by temporary construction bridges. All of the projects will create or enhance more acres of wetlands than are filled or permanently affected.

The North Creek Interceptor and Olympus Meadows Trunk Improvements Project will temporarily affect wetlands and only permanently fill approximately 12 square feet of wetland area.

No wetlands will be affected either temporarily or permanently by the Brightwater Conveyance System, North Creek Portal Project.

## **Operation**

### *Direct*

Some wetlands that exist within the right-of-way are currently affected by vegetation and stormwater conveyance system 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 such maintenance activities. Stormwater management measures provided by the project will help to minimize 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 Bellevue to Lynnwood Improvement Project because the direct effects to wetlands will be minor.

### *Cumulative*

The compensatory mitigation sites will provide high-quality wetlands and habitats. Other projects considered in this CEA that mitigate appropriately could also positively affect wetlands. Operation of the 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project may result in positive cumulative effects to wetlands that presently receive stormwater runoff as a result of the projects retrofitting water quality treatment for some existing impervious surface, as well as enhanced treatment of discharges from the new impervious surfaces.

## No Build Alternative

No construction would occur under the No Build Alternative; therefore, no wetlands or wetland buffers would be affected by the I-405, Bellevue to Lynnwood Improvement Project. Some wetlands in the wetland study area currently receive untreated runoff from stormwater facilities that do not meet current treatment levels. If those wetlands are adversely affected by the existing water quality, those effects would likely continue.

Improvements and enhancements associated with the Bellevue to Lynnwood Improvement Project would not occur.

Assuming the other projects considered in this CEA are constructed and placed in operation, the respective contributions to 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 habitats will experience temporary and others permanent direct effects as a result of project construction. Some project features will require construction below the ordinary high water mark (OHWM), within riparian zones, or within buffers for some streams. Stream channel habitat (totaling approximately 1,450 square feet of stream channel) in four of the 12 streams in the project study area will be permanently affected by road widening or culvert extensions. Approximately 36,800 square feet of stream buffer will be permanently lost. However, most of the existing riparian vegetation in the study area is already moderately to severely degraded.

The specific project elements that will produce these changes to aquatic resources are:

- Widening pavement northbound in the vicinity of Yarrow Creek will affect the stream buffer.
- Widening pavement northbound and southbound in the vicinity of Juanita Creek at NE 145th Street will affect the stream buffer.
- Widening the northbound lanes through the median and extending the C28 and C29 culverts will affect both the streams and buffers.
- Widening pavement in the vicinity of KL14 and Stream 42 and extending the culvert which conveys Stream 42 will affect the KL14 buffer and Stream 42 and its buffer.
- Installing stormwater outfalls below the OHWM of the Sammamish River will affect 450 square feet of the river, and 1,775 square feet of the buffer.

### *Indirect*

Indirect effects from construction, resulting from direct 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 Bellevue to Lynnwood Improvement Project. The 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project will similarly directly affect aquatic resources. The 520 Bridge Replacement and HOV Project, in particular, will involve substantial in-water work. These construction effects (for example, loss of riparian vegetation, temporary increased sedimentation, and water 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.

Although the North Creek Interceptor and Olympus Meadows Trunk Improvements Project will have multiple stream crossings, all but one will utilize trenchless crossing techniques. The one open-trench crossing will be conducted during an approved “fish window” as specified by the WDFW.

The Brightwater Conveyance System, North Creek Portal Project, will not directly affect aquatic resources. Stormwater discharges from the site will be in accordance with the NPDES permit for the project.

## **Operation**

### *Direct*

Proper maintenance and operation of the project’s stormwater treatment facilities will help prevent a decline in water quality and its potential negative effects (sedimentation, metal contaminants, etc.) on aquatic resources. Re-establishment and maintenance of native riparian vegetation will also be a beneficial effect.

### *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.

### *Cumulative*

Proper maintenance and continued operation of the Bellevue to Lynnwood Improvement Project’s water treatment facilities and culverts, when combined with

those associated with the 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project should result in a positive cumulative effect on aquatic resources. Additionally, proper maintenance of the improvements provided by compensatory mitigation (riparian plantings adjacent to the north side of Sammamish River near a proposed new stormwater outfall, and in-stream and riparian restoration at Stream C28) for the Bellevue to Lynnwood Improvement Project will maintain their positive cumulative effects on aquatic resources as well.

Improvements made to the riparian vegetation at the open-trench crossing location for the North Creek Interceptor and Olympus Meadows Trunk Improvements Project should also result in a positive cumulative effect to aquatic resources.

Operation of the Brightwater Conveyance System, North Creek Portal Project, will not affect aquatic resources.

### **No Build Alternative**

Under the No Build Alternative, no construction would occur and, thus, no aquatic resources would be affected by construction activities associated with the Bellevue to Lynnwood Improvement Project. At the present time, some surface waters in the project study area receive untreated runoff from stormwater facilities that do not meet current treatment level standards. 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 Bellevue to Lynnwood Improvement Project would not occur.

Assuming the other projects considered in this CEA are constructed and placed in operation, the respective contributions to 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**

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No measures, beyond those incorporated in the project design or listed in the *Air Quality Technical Memorandum*, the *Ecosystems Discipline Report* and the *Water Resource Discipline Reports*, will be necessary during construction and operation of the Bellevue to Lynnwood Improvement Project to avoid or minimize adverse cumulative effects.

## **UNAVOIDABLE ADVERSE CUMULATIVE EFFECTS**

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No unavoidable substantial adverse cumulative effects are anticipated due to the construction and operation of the Bellevue to Lynnwood Improvement Project.

## ACRONYMS AND ABBREVIATIONS

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<b>Term</b>	<b>Meaning</b>
AQMP	air quality maintenance plan
BMP	best management practice
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
DOT	U.S. Department of Transportation
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
HOV	high-occupancy vehicle
I	Interstate
LOS	level of service
MOA	memorandum of agreement
MP	mile post
MSL	mean sea level
MTP	Metropolitan Transportation Plan

<b>Term</b>	<b>Meaning</b>
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO <sub>2</sub>	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
O <sub>3</sub>	ozone
OHWM	ordinary high water mark
PCE	primary constituent element
PFMC	Pacific Fishery Management Council
PM	particulate matter
PM <sub>2.5</sub>	particulate matter less than 2.5 micrometers in size
PM <sub>10</sub>	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
SEPA	Washington State Environmental Policy Act
Services	National Marine Fisheries Service and U.S. Fish and Wildlife Service
SIP	State Implementation Plan
SMA	Washington State Shoreline Management Act
SO <sub>2</sub>	sulfur dioxide
Sound Transit	Central Puget Sound Regional Transit Authority
SOV	single-occupant vehicle
SR	state route
TCM	transportation control measure
TEA	Transportation Equity Act
TEA-21	Transportation Equity Act for the 21st Century
TMDL	total maximum daily load
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife

<b>Term</b>	<b>Meaning</b>
WDNR	Washington State Department of Natural Resources
WQS	water quality standard
WRIA	water resource inventory area
WSDOT	Washington State Department of Transportation

## GLOSSARY

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<b>Term</b>	<b>Meaning</b>
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 emissions	Pollutants emitted into the air, such as: carbon monoxide, nitrogen oxide, nitrogen dioxide, sulfur dioxide, and others.
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.

Term	Meaning
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.
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 water body.
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.

<b>Term</b>	<b>Meaning</b>
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.
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
express toll lane	A limited-access freeway lane that is actively managed through a variable toll system to regulate its 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. Transit and carpools do not pay a toll. See also: "managed lane."
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
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 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 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.
invasive species	Non-native species that disrupt and displace native species.

Term	Meaning
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
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.

<b>Term</b>	<b>Meaning</b>
nitrogen oxides (NO <sub>x</sub> )	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 <sub>2</sub> .
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 which is so common and maintained for a sufficient time in all ordinary years that it leaves evidence upon the landscape, such as a clear, 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 <sub>3</sub> )	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.

<b>Term</b>	<b>Meaning</b>
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.
pervious surface	A surface that allows the penetration of liquids, such as grassy areas.
PM <sub>2.5</sub>	Particulate matter less than 2.5 micrometers in diameter.
PM <sub>10</sub>	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 <sub>10</sub> 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.
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.
refugia habitat	An area of a stream that provides shelter or safety for aquatic species.
resident fish	Fish that do not migrate out to the ocean, but remain in fresh water.

<b>Term</b>	<b>Meaning</b>
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.
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 water body.
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.
runoff	Rainwater or snowmelt that leaves an area as a surface drainage.
salmonid	Any member of the family <i>Salmonidae</i> , which includes all species of salmon, trout, and char (including bull trout).

<b>Term</b>	<b>Meaning</b>
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.
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.

<b>Term</b>	<b>Meaning</b>
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.
study area	The area specifically evaluated for environmental effects.
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 water body 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.

<b>Term</b>	<b>Meaning</b>
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.
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.

**Term**

wetland

**Meaning**

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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### *GIS Data Sources*

#### **Exhibit 2**

King County, 2006, Topo Drainage for Catchments, Basins, Watersheds, and WRIAs.

King County Standard GIS Data Disk, extract June 2006:

Urban Growth Boundary.

Snohomish County, 2006; Rural-Urban.

#### **Exhibit 3**

WSDOT (Washington State Department of Transportation). 2006 - 2007. I-405 Staff; Wetlands.

#### **Exhibit A-1**

WSDOT (Washington State Department of Transportation). 2006 - 2007. I-405 Staff for HDR; Study Area.

#### **Exhibit A-2**

WSDOT (Washington State Department of Transportation). 2006 - 2007. I-405 Staff for HDR; Wetland and Aquatic Study Area, Wildlife Study Area.

### ***Base Data***

All GIS exhibits contain one or more of the following as base layers:

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## APPENDIX A METHODOLOGY

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### *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, Bellevue to Lynnwood Improvement Project. 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.”<sup>49</sup>*

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.

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<sup>49</sup> 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 Federal Highway Administration (FHWA) implements the NEPA and the CEQ guidelines through its environmental regulations (23 CFR 771).<sup>50</sup> 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 paper<sup>51</sup> and a memorandum<sup>52</sup> 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.

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<sup>50</sup> *Federal Highway Administration, Department of Transportation, Environmental Impact and Related Procedures.*

<sup>51</sup> *Federal Highway Administration, Position Paper on Secondary and Cumulative Impact Assessment in the Highway Development Process, published August 20, 1992.*

<sup>52</sup> *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

The WSDOT Environmental Procedures Manual<sup>53</sup> refers to the CEQ and FHWA materials, and cumulative impact analysis guidance developed jointly with FHWA and EPA Region X<sup>54</sup>. Further, the Washington State Environmental Policy Act Rules<sup>55</sup> require cumulative effects to be analyzed.

### *Scope of Cumulative Effects Analysis*

#### **Critical Resources**

The CEA for the Bellevue to Lynnwood Improvement 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 waters, and wetlands. For the Bellevue to Lynnwood Improvement 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 Bellevue to Lynnwood Improvement 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.

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<sup>53</sup> *WSDOT 2010c.*

<sup>54</sup> *WSDOT 2008.*

<sup>55</sup> *WAC 197-11-792 Washington State Environmental Policy Act Rules, Scope.*

The geographic scope of analysis is defined by the physical limits or boundaries of the Bellevue to Lynnwood Improvement 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 Bellevue to Lynnwood Improvement 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 one-half 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*.

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 Bellevue to Lynnwood Improvement Project allowed a more comprehensive analysis of the cumulative effects on the environmental resources.

Exhibit A-1: CEA boundary for air quality



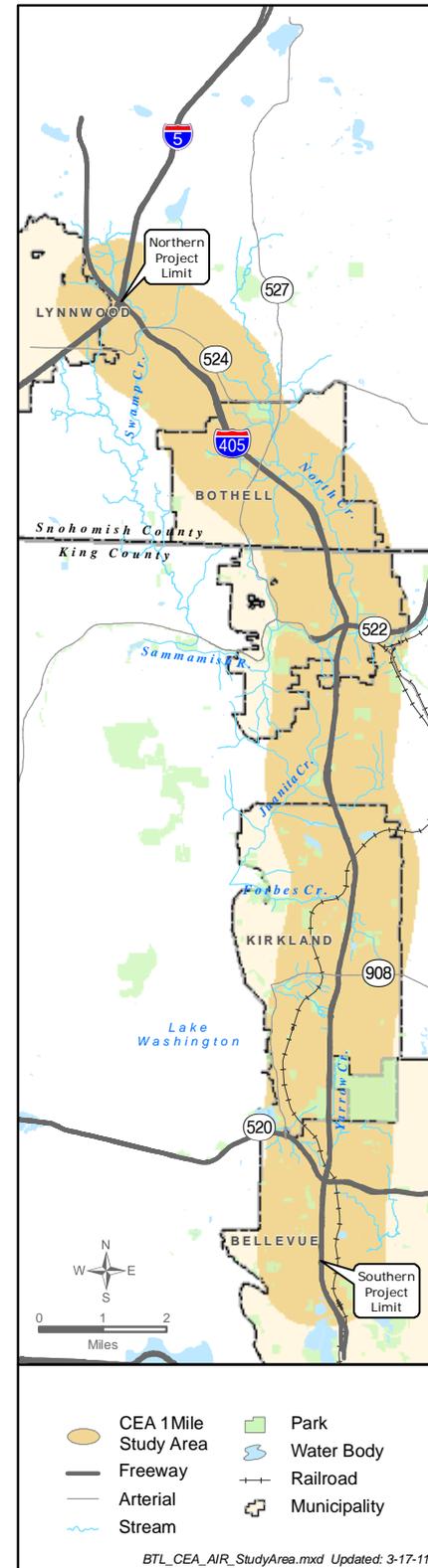
## Time Period

The time period from 1978 through 2030 was set for the four environmental resources that were analyzed (air quality, surface waters, wetlands, and aquatic resources). Using 1978 as the starting point for the analysis allowed an assessment of air quality changes since the the Central Puget Sound Region was classified by the EPA as a “non-attainment area” for CO and O3. The year 2030 is the “future year” that has been used in regional and I-405 corridor 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 2030<sup>56</sup> (*Destination 2030*) and Transportation 2040.<sup>57</sup> 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 Bellevue to Lynnwood Improvement Project will be more noticeable at the local level, and

Exhibit A-2: CEA boundaries for surface waters, wetlands, and aquatic resources



<sup>56</sup> *Final EIS for Destination 2030, The Metropolitan Transportation Plan for the Central Puget Sound Region (PSRC 2001).*

<sup>57</sup> *PSRC 2010.*

will 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 Bellevue to Lynnwood Improvement 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 this CEA. Finally, the direct and indirect effects were re-examined to estimate the contribution to cumulative effects on each critical resource resulting from the Bellevue to Lynnwood Improvement 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.

Projects considered in the CEA were:

#### **SR 520 Bridge Replacement and HOV Project (WSDOT)**

The SR 520 Bridge Replacement and HOV Project<sup>58</sup> proposes to replace SR 520's Portage Bay and Evergreen Point bridges and improve the existing

**Exhibit A-3: Other projects considered in this CEA**



<sup>58</sup> <http://www.wsdot.wa.gov/Projects/SR520Bridge/>

roadway between I-5 in Seattle and SR 202 in Redmond. The new bridges will have improved resistance to windstorms and earthquakes. The new roadway will also have wider shoulders to help reduce congestion and a new regional bicycle/pedestrian path across Lake Washington that will link to other elements of the regional trail system.

The new SR 520 corridor will include six lanes (two outer general purpose lanes and one inside HOV lane in each direction) between I-5 and SR 202. Overpasses along SR 520 will also be rebuilt and roadway shoulders will meet current standards (10-foot inside shoulder and 10-foot outside shoulder).

The replacement Evergreen Point Bridge will be designed to accommodate supplemental pontoons to carry the weight of light rail with future conversion of the transit/HOV lanes to light rail. The project includes transit/HOV direct-access ramps at Montlake Boulevard that can accommodate future light rail.

A flexible transportation plan will provide funding to promote alternative modes of travel and increase the efficiency of the system, including intelligent transportation and technology, traffic systems management, vanpools and transit, education and promotion, and land use as demand management.

The comment period for the SR 520 - I-5 to Medina Draft EIS closed on October 31, 2006. A Supplemental Draft EIS was issued in January 2010 and the Final EIS will be issued in 2011. Floating bridge construction is scheduled to begin in 2012 with the bridge opening in 2014.

A Finding of No Significant Impact was issued for the SR 520 - Medina to SR 202: Eastside Transit and HOV Project in May 2010. Construction is scheduled from 2011 through 2013.

### **Brightwater Conveyance System, North Creek Portal (King County Wastewater Treatment Division)**

King County is building a new regional wastewater treatment system, called Brightwater, to meet the region's long-term wastewater treatment needs. Brightwater includes a secondary wastewater treatment plant; associated pipelines, pump stations, tunnels, portals, and other facilities that make up the Conveyance System to transport wastewater to and treated effluent from the plant, and an outfall to discharge the treated effluent into Puget Sound. The North Creek Portal portion of the Brightwater Conveyance System is being constructed in the southeast quadrant of the intersection of NE 195th Street and North Creek Parkway. Activities at this site involve excavation of a 90 foot deep, 50 foot wide, and 120 foot long portal; removal of spoils from the excavation of a 2.8-mile long, 18-foot diameter tunnel; lining of the tunnel; and installation of an influent pump station and other ancillary features. Wastewater influent and treated effluent tunnels will cross under the I-405 right of way in the NE

195th Street interchange area. Construction began in 2005 and will continue through 2012.

### **North Creek Interceptor (NCI) and Olympus Meadows Trunk (OMT) Improvements (Alderwood Water & Wastewater District/King County Wastewater Treatment Division)**

The NCI/OMT Improvements Project<sup>59</sup> consisted of the installation of 16,400 feet of buried 21-inch to 54-inch sewer pipeline. Improvements to the existing NCI/OMT sewers were required to provide regional wastewater conveyance service to support current and future growth in the North Creek basin. The pipeline extends from 196th Street SE at 22nd Avenue SE in unincorporated Snohomish County, south/southeasterly to 228th Street SE at 26th Drive SE in the City of Bothell. Approximately 80,000 cubic yards of material were excavated for construction of the pipeline trench with a temporary impact area of approximately 13 acres. Eighty percent of the new pipeline is within public or private roads. The pipeline crosses 11 waterways and 2 wetlands. Ten of the waterway crossings utilize trenchless methods or pass beneath existing culverts. The project was planned to result in a net reduction of impervious surface area due to the removal of old manhole access facilities that will no longer be needed. Construction began in 2008 and lasted for two years.

### **I-405, NE 8th Street to SR 520 Braided Crossing Project (WSDOT)**

WSDOT is constructing the I-405, NE 8th Street to SR 520 Braided Crossing Project<sup>60</sup> to improve safety and reduce congestion in the vicinity of the I-405 and SR 520 interchange within the City of Bellevue. The project extends approximately 1.4 miles north along I-405, from south of NE 8th Street to the SR 520 interchange, and approximately 1.6 miles east along SR 520, from the I-405 interchange to east of 124th Avenue NE. Construction began in 2009 and the project is scheduled to be open to traffic in summer 2012.

The improvements will benefit the public by increasing overall travel speeds during peak commuter hours, reducing congestion for the public and freight vehicles improving safety, improving access and circulation to and from local streets, and providing opportunities for environmental improvements.

The proposed project improvements for the Build Alternative are described below.

#### ***Northbound I-405 to SR 520 Improvements***

- Reconfigure the existing northbound NE 4th Street on-ramp to become an auxiliary lane that exits to SR 520 as part of a two-lane exit ramp.

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<sup>59</sup> This project was selected for inclusion in the Cumulative Effects Analysis Technical Memorandum at the time of I-405, Bellevue to Lynnwood Improvement Project scoping in 2006. The NCI/OMT project was constructed in 2008 to 2010.

<sup>60</sup> <http://www.wsdot.wa.gov/projects/i405/ne8thtosr520/>

- Reconstruct portions of the NE 8th Street on- and off-ramps to and from northbound I-405.
- Rebuild the NE 12th Street bridge crossing over I-405 to accommodate the new braided crossing.
- Construct a northbound on-ramp from a new NE 10th Street bridge crossing to SR 520. The new NE 10th Street bridge will be constructed as part of another project and will be in place when this on-ramp is constructed.
- Construct grade-separated ramps to divide traffic entering northbound I-405 from NE 8th Street and traffic exiting I-405 to SR 520.
- Construct grade-separated ramps to divide traffic entering eastbound SR 520 from I-405 and traffic exiting eastbound SR 520 to 124th Avenue NE.
- Extend ramps from I-405 to eastbound SR 520 on a collector-distributor system through the 124th Avenue NE interchange to merge with the existing eastbound SR 520 at approximately 136th Place NE.
- Reconstruct the 124th Avenue NE interchange off-ramp.

#### *Other Improvements*

Other improvements proposed along the I-405 and SR 520 corridors between the project limits include retaining walls, relocating an existing noise wall, stormwater culvert improvements, and stormwater management system improvements.

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