CHAPTER 5 EFFECTS OF THE PROJECT

This chapter examines the potential effects of the I-405, Bellevue to Lynnwood Improvement Project on people and the environment. The Washington State Department of Transportation (WSDOT) project team conducted fifteen separate studies and summarized these analyses in discipline reports and technical memoranda to illustrate how the project might affect the area. We used this information to evaluate changes that can occur because of construction improvements to I-405.

How did WSDOT evaluate effects on the environment?

For the Bellevue to Lynnwood Improvement Project, the I-405 Project Team prepared the following discipline reports and technical memoranda:

- Air Quality
- Cultural, Historic, and Archaeological
- Cumulative Effects Analysis
- Economics
- Ecosystems
- Soils and Geology
- Hazardous Materials
- Land Use Patterns, Plans, and Policies
- Noise
- Section 4(f)
- Social, Public Services, and Environmental Justice
- Transportation
- Utilities
- Visual Quality
- Water Resources

The area the I-405 Team studied within each discipline report or technical memorandum varied, depending on the

What are discipline reports and technical memoranda?

A *discipline report* focuses on an environmental topic (discipline) or concern, such as wildlife, noise, water quality, or other built or natural resource. It presents an analysis of the environment with respect to the discipline, describes how the project may affect the environment, and recommends how best to avoid or minimize adverse effects to the environment.

A *technical memorandum* is typically written in lieu of a discipline report when the potential environmental impacts are minimal for that particular discipline on a specific project.

What are potential effects?

Potential effects are impacts or changes that could occur as a result of a proposed action. The effects may be ecological, aesthetic, historic, cultural, economic, social, or health-related. Examples might include the encroachment upon nearby wildlife that occurs from widening a roadway; or how increased noise levels from traffic flow might affect nearby residents.

geographic extent of potential effects being evaluated, and the type of data needed for the analysis. For example, the analysis of recreational facilities as conducted for Section 4(f) required WSDOT to collect data on publicly owned parks within one-quarter mile of the I-405 right of way. To assess effects on social characteristics, WSDOT used U.S. Census information and the Puget Sound Regional Council's (PSRC) Forecast Analysis Zone data, because these data cover a larger geographic area around I-405.

After making design modifications to minimize or avoid effects, we compared the project design to the baseline conditions. Except for traffic and transportation, baseline conditions for the Bellevue to Lynnwood Improvement Project assume completion of the improvements that are part of the Kirkland Nickel Project and the NE 8th Street to SR 520 Braided Ramps Project. By making this comparison, we determined environmental, social, and economic changes that will result from the Build Alternatives of the Bellevue to Lynnwood Improvement Project, as well as the No Build Alternative.

The baseline conditions for traffic and transportation analysis and effects used 2009 I-405 conditions, without the Kirkland Nickel Stage 2, NE 8th Street to SR 520 Braided Ramps, and the NE 195th Street to SR 527 Northbound Auxiliary Lane projects. This allowed the use of actual traffic speed and volume data to describe baseline conditions.

Team members performed research and analysis by examining all facets of the environment. They documented their findings in discipline reports and technical memoranda. We summarize the results of these analyses, by discipline, in this chapter.

On many aspects of the environment, our findings indicated that there would be few, if any, effects. For those environmental disciplines, WSDOT decided not to include further discussion (beyond the discipline reports and technical memoranda) for the following topics in this environmental assessment (EA):

- Air Quality;
- Hazardous Materials;
- Land Use Patterns and Policies;

- Soils and Geology; and
- Utilities

For a cross reference of how we compiled discipline reports in this EA with respect to the National Environmental Policy Act (NEPA) Elements of the Environment, please see Appendix A.

How did WSDOT use the environmental information to improve the project?

Our project team collected environmental data, reviewed the Kirkland Nickel Project EA along with that project's discipline reports and technical memoranda, and then identified locations and relationships in which the project could have an effect on the environment. Where possible, the team made additional design modifications to further avoid or minimize adverse effects on the environment. For example, to reduce effects to wetlands, we assembled wetland data on the preliminary design plans and looked for places where we could adjust the roadway alignment, roadside slopes, and location of stormwater facilities to minimize impacts. Our team also made numerous field visits to help develop ways of modifying the grading plan to avoid or minimize effects to streams.

What federal, state, and local transportation planning policies and agencies govern the Bellevue to Lynnwood Improvement Project?

The Bellevue to Lynnwood Improvement Project consists of roadway widening, operational changes, and other transportation improvements that contribute to implementation of the Selected Alternative of the I-405 Corridor Program Environmental Impact Statement (EIS) issued in 2002. The EIS serves as a master plan for regional transportation improvements on the east side of Lake Washington that have been initiated by the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), WSDOT, Central Puget Sound Regional Transit Authority (Sound Transit), and King County Department of Transportation (collectively referred to as the lead agencies). This corridor-wide programmatic planning document was the result of unprecedented cooperation between all the cities, legislative leaders, and agencies in the I-405 corridor.

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5.1 Traffic and Transportation

Understanding how existing traffic and transportation conditions are expected to change along I-405 over time is important to commuters, freight operators, and people who live in the region. For the proposed project, the Washington State Department of Transportation (WSDOT) assessed transportation data for three alternatives—Build Alternative 1 and Build Alternative 2, and a No Build Alternative. This chapter presents WSDOT's analysis of how traffic conditions along this section of I-405 are expected to look in the future with or without the project.

Exhibit 5.1-1: Project area

How did WSDOT evaluate traffic and transportation data for this project?

For the Bellevue to Lynnwood Improvement Project, WSDOT used the year 2009 to represent the existing traffic conditions in the corridor. We collected available WSDOT data on I-405 freeway and ramp traffic volumes and obtained local street traffic volumes from the cities of Bellevue, Kirkland, and Bothell, and King County.

The I-405 Team used the Puget Sound Regional Council (PSRC) four-county travel forecast model as a starting point for determining future travel demand. This model helps traffic engineers to predict traffic volumes and travel patterns based on the adopted land use plans within the region. We then refined the model to include I-405 specific details. We predicted traffic volumes for two future years: 2015 and 2035.

Because the high-occupancy vehicle (HOV) lanes currently experience congestion during peak travel times and HOV volumes are projected to increase, the analysis assumed a three-person carpool occupancy requirement would be in place by 2015. This is consistent with current WSDOT and Federal Highway Administration (FHWA) policy guiding HOV lane performance and operation.

What is the study area?

The study area for the I-405, Bellevue to Lynnwood Improvement Project encompasses 17 miles of I-405 from NE

6th Street in Bellevue to I-5 in Lynnwood.

In addition to the study area, our analysis includes the section of I-405 from NE 6th Street to south of I-90 and adjacent sections of I-5, SR 525, SR 522, SR 520, SR 527, and I-90. We analyzed the section of I-405 south of the study area and sections of adjacent freeways because effects in these outside areas may impact operations in the study area.

In the study area, we also analyzed the local streets and intersections adjacent to I-405 from Bellevue to Lynnwood because they may be affected by the project improvements.

What is traffic like along I-405 today?

Daily traffic

The project team compiled the existing 2009 average weekday traffic volumes from available WSDOT information. The traffic volumes are highest in the southern end of the project area and generally decrease toward the northern end. Beginning at the southern end, the section of I-405 in south Kirkland between SR 520 and NE 70th Street carries 198,000 vehicles per day. The section of I-405 between NE 85th Street and NE 116th Street carries 192,000 vehicles per day. The northern section of I-405 in Bothell between SR 527 and I-5 carries 117,000 vehicles per day. Truck traffic makes up approximately two percent of the average weekday traffic volumes in the study area.

Peak period traffic

The peak period is the time of day when the maximum amount of travel occurs. It may be specified as the morning (AM) or afternoon (PM) peak period. We define the morning peak period as the three hours from 6:00 to 9:00 AM and the afternoon peak period as the three hours from 3:30 to 6:30 PM.

Morning commute

During the morning commute, the peak travel direction is southbound where high travel demand often exceeds freeway capacity.

The I-405 and SR 522 interchange in the center of the project area experiences high congestion during the morning commute. The high volume of SR 522 traffic trying to enter southbound I-405, combined with the uphill grade of I-405, limits the number of vehicles that can pass through the merge area. South of SR 522, increased travel demand and

intermittent congestion continue to limit vehicles traveling through Kirkland to the southern end of the project area.

Southbound I-405 from SR 522 to SR 520 carries an average of 16,930 vehicles in the general-purpose lanes and 3,860 vehicles in the HOV lane during the morning peak three-hour period.

Northbound I-405 is the off-peak travel direction in the morning, and generally experiences only minor delays in the project area.

Afternoon commute

Northbound I-405 is the peak travel direction during the afternoon commute. Northbound I-405 experiences congestion when high travel demand exceeds freeway capacity. Northbound I-405 from SR 520 to SR 522 carries an average of 16,880 vehicles in the general-purpose lanes and 4,070 vehicles in the HOV lane during the afternoon peak three-hour period. Southbound I-405 is the off-peak travel direction in the afternoon and does not experience any substantial delays in the project area.

HOV lane performance

Similar to the general-purpose lanes, the HOV lanes experience congestion in the peak travel directions, and regularly do not meet WSDOT's goal of maintaining a 45 mile-per-hour speed in the HOV lane. The HOV lane congestion occurs predominately on the section of I-405 between NE 6th Street and SR 522. During the afternoon peak three-hour period, northbound I-405 from SR 520 to SR 522 has an average travel speed of 42 miles per hour in the HOV lane. During the morning peak three-hour period, southbound I-405 from SR 522 to SR 520 has an average travel speed of 47 miles per hour in the HOV lane, with some locations in this section regularly dropping below the 45 miles per hour performance standard for HOV lanes.

How will construction activities affect travel?

The Bellevue to Lynnwood Improvement Project will widen I-405 in certain locations, rebuild the I-405 bridges over NE 132nd Street, and build northbound braided ramps from NE 160th Street to SR 522. Construction may be completed in stages, depending on the availability of funding, and is expected to take approximately two and one-half years.

Construction vehicles will carry materials to and from the construction sites. During construction, the existing mainline I-405 lanes will be realigned through the construction area. Temporary night and weekend lane closures may be required for the mainline widening. Full freeway closures may be required at limited times to shift traffic between phases of construction or during demolition and construction of the NE 132nd Street bridges.

I-405 bridge construction over NE 132nd Street will occur in multiple stages to minimize impacts to local street operations. WSDOT anticipates temporary closures of NE 132nd Street under I-405 will be necessary to demolish the existing bridge and construct the new one. These closures will be minimal and limited to nights or weekends, when possible.

For the purpose of installing a cut and cover stormwater pipe to the Sammamish River, the Sammamish River regional trail may be closed at night. We estimate that construction across the trail will take two nights, and that the trail will remain open during the day. During construction, the site will be cordoned off with high-visibility fencing.

Project construction will not affect existing pedestrian-only overcrossings on I-405. Please see the Bellevue to Lynnwood Social, Public Services, and Environmental Justice Discipline Report (WSDOT 2011i) for more details on these trails.

How will the completed project affect traffic on I-405?

Transportation analysts evaluated the I-405 operational results of both build alternatives and the No Build Alternative. We evaluated the three alternatives with respect to the number of vehicle trips and average travel speeds.

2015 and 2035 morning peak period

During the 2015 and 2035 morning peak periods, Build Alternative 1 will carry more peak direction (southbound) vehicles than Build Alternative 2 and the No Build Alternative. The two build alternatives will have faster southbound general-purpose lane travel speeds than the No Build Alternative.

Southbound I-405

Build Alternative 1 will carry more total southbound vehicles (general-purpose lanes and HOV/express toll lanes combined) than Build Alternative 2 and the No Build Alternative for two sections of I-405: from I-5 to SR 522; and from SR 522 to SR 520. For the section of southbound I-405 from SR 522 to SR 520, we expect the No Build Alternative will carry an average of 16,230 vehicles and Build Alternative 2 will carry an average of 21,040 vehicles during the 2015 morning peak three-hour period. For the same section of I-405, we expect Build Alternative 1 will carry an average of 23,700 total vehicles during the 2015 morning peak three-hour period, a 13 percent increase over Build Alternative 2 and a 46 percent increase over the No Build Alternative.

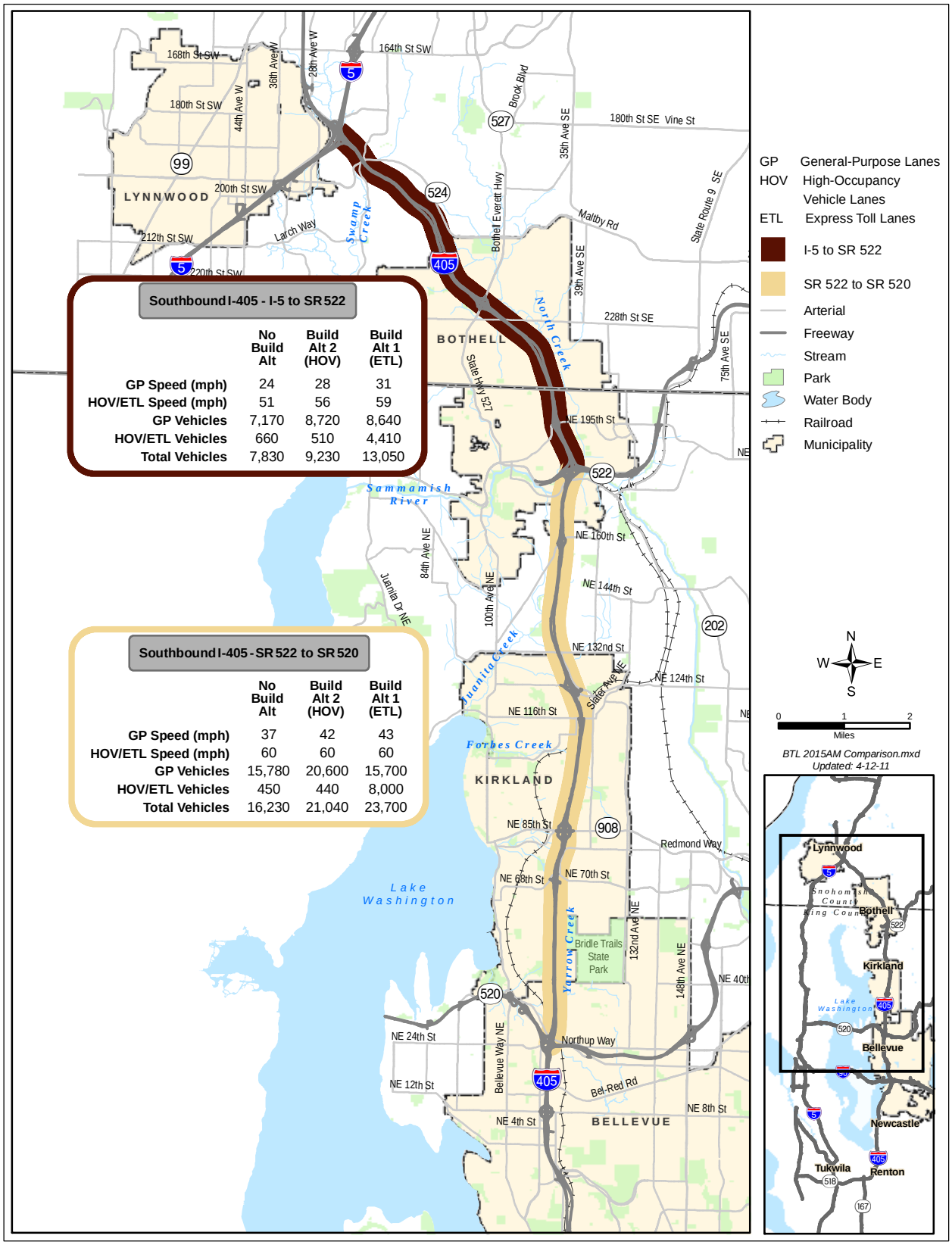
The two build alternatives will have similar southbound general-purpose lane travel speeds in the I-5 to SR 522 and SR 522 to SR 520 sections. Both build alternatives will have slightly faster general-purpose lane speeds (four to seven miles per hour) than the No Build Alternative.

The high-occupancy vehicle lanes and express-toll lanes will perform well with each of the three alternatives. The average travel speeds for the high-occupancy lanes and express toll lanes will be at least 50 miles per hour during the morning three-hour peak period.

During the 2035 morning peak period, travel demand in the study area will increase compared to the 2015 morning peak period. This will increase congestion and reduce travel speeds. The number of vehicles able to travel through the study area will decrease for all three alternatives compared to the 2015 morning peak period. Build Alternative 1 will carry more total vehicles and increase the general-purpose lane speed compared to Build Alternative 2 and the No Build Alternative for both sections of I-405 during the 2035 morning peak three-hour period.

For the three alternatives, Exhibit 5.1-2 shows the 2015 morning average three-hour vehicle trips and travel speeds for the general-purpose lanes, and HOV lane or express toll lanes. The exhibit shows southbound data for two I-405 sections from I-5 to SR 522 and from SR 522 to SR 520.

Exhibit 5.1-2: 2015 morning peak three-hour Build and No Build alternatives vehicles and speeds - southbound I-405



Northbound I-405

During the 2015 morning peak period, all three alternatives perform well for the northbound off-peak travel direction, with general-purpose and HOV lane average travel speeds near 60 miles per hour.

During the 2035 morning peak period, both build alternatives perform slightly better than the No Build Alternative.

2015 and 2035 afternoon peak period

During the 2015 and 2035 afternoon peak periods, Build Alternative 1 will carry more vehicles and increase travel speeds compared to Build Alternative 2 and the No Build Alternative.

Northbound I-405

For both sections of northbound I-405, Build Alternative 1 will carry more vehicles and increase travel speeds compared to Build Alternative 2 and the No Build Alternative during the 2015 afternoon peak three-hour period. For the section of northbound I-405 from SR 520 to SR 522, we expect the No Build Alternative will carry an average of 11,040 vehicles and Build Alternative 2 will carry an average of 16,370 vehicles during the 2015 afternoon peak three-hour period. For the same section of I-405, we expect Build Alternative 1 will carry an average of 21,790 total vehicles during the 2015 afternoon peak three-hour period, a 33 percent increase over Build Alternative 2 and a 97 percent increase over the No Build Alternative.

For all three alternatives, the general-purpose lane travel speeds will be slower in the southern section of I-405 from SR 520 to SR 520 compared to the northern section of I-405 from SR 522 to I-5. For the section of I-405 from SR 520 to SR 522, Build Alternative 1 will increase the average general-purpose lane travel speed from 21 miles per hour with the No Build Alternative to 32 miles per hour. For the same section, Build Alternative 2 will have an average travel speed of 31 miles per hour.

The high-occupancy vehicle lanes and express toll lanes will perform well with each of the three alternatives. The average travel speeds for the high-occupancy lanes and express toll lanes high will be at least 59 miles per hour during the afternoon peak three-hour period.

The 2035 afternoon peak period will also experience an increase in travel demand in the study area compared to the 2015 afternoon peak period. All three alternatives will experience reductions in the number of vehicles able to travel through the study area and general-purpose lane travel speeds compared to the 2015 afternoon peak period. Build Alternative 1 will continue carry more total vehicles and increase the general-purpose lane speed compared to Build Alternative 2 and the No Build Alternative for both sections of I-405 during the 2035 afternoon peak three-hour period.

For the three alternatives, Exhibit 5.1-3 shows the 2015 afternoon average three-hour vehicle trips and travel speeds for the general-purpose lanes, HOV lane, and express toll lanes. The exhibit shows northbound data for two I-405 sections from SR 520 to SR 522 and from SR 522 to I-5.

Southbound I-405

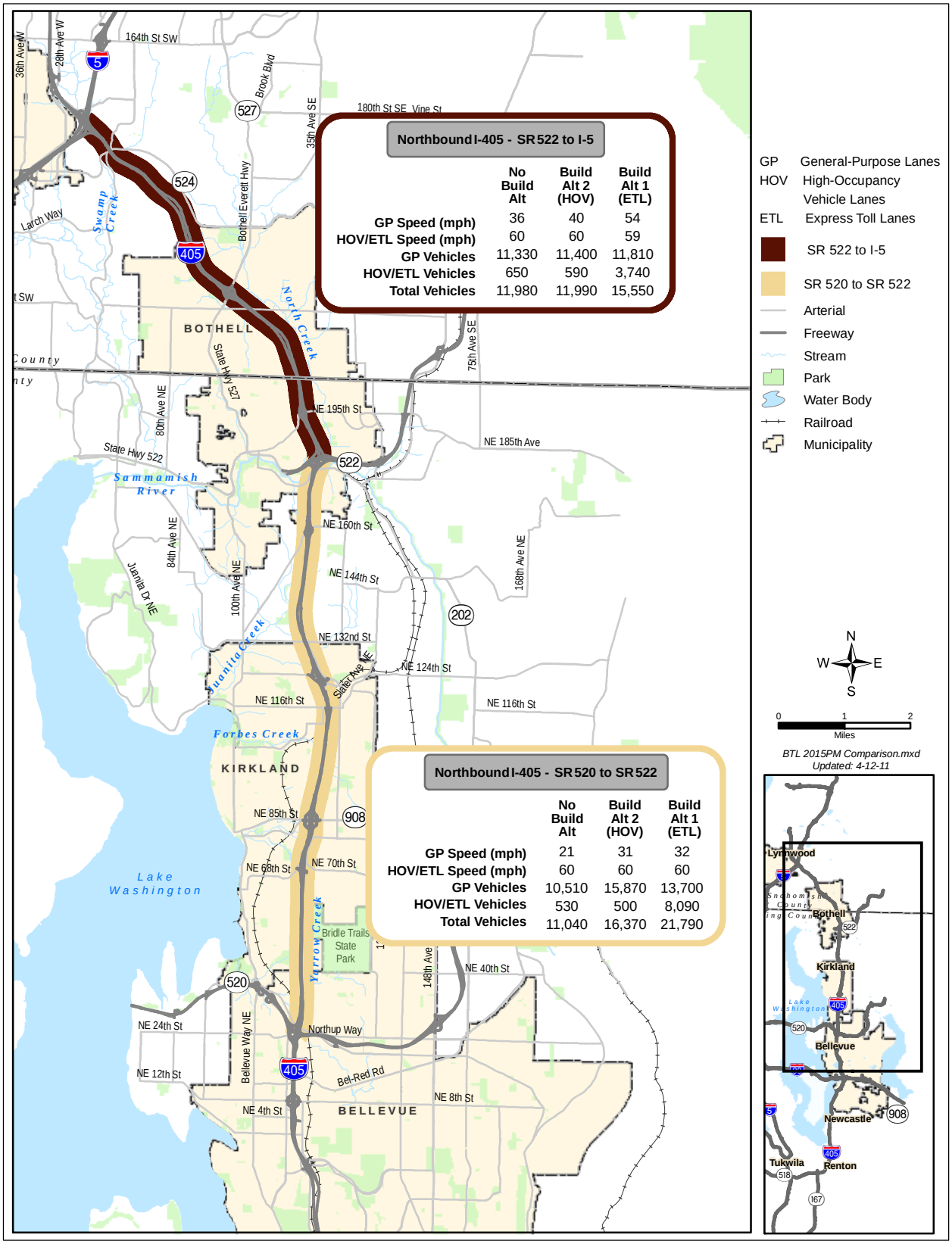
We expect the off-peak travel direction of southbound I-405 will continue to experience traffic backing up into the study area from congestion at the I-90 and Coal Creek Parkway interchanges. Build Alternative 2 and the No Build Alternative will experience more congestion because the high-occupancy vehicle lane will be underutilized, carrying 200 to 450 vehicles during the 2015 and 2035 afternoon peak three-hour periods. Build Alternative 1 will improve operations because more vehicles will be allowed to use the express toll lanes.

How will the completed project affect local arterials and streets?

Both build alternatives will increase freeway volumes and, in turn, more vehicles will use the local streets to enter and exit the freeway. While the higher freeway volumes will increase traffic near the I-405 interchanges, it will also mean a decrease in volumes on local streets used to bypass the freeway.

This analysis assumes HOV 2+ and SOVs will be allowed to use the express toll lanes via the NE 6th Street and NE 128th Street direct-access ramps with Build Alternative 1, thereby increasing traffic volumes at these locations. The increased use at the NE 6th Street direct-access ramps will reduce volumes at the nearby NE 8th Street and NE 4th Street ramps. Similarly, the increased use of the NE 128th Street direct-access ramps will reduce volumes along NE 124th Street.

Exhibit 5.1-3: 2015 afternoon peak three-hour Build and No Build alternatives vehicles and speeds - northbound I-405



Build Alternatives 1 and 2 will not change the capacity of any of the study intersections.

How will the completed project affect safety?

Both build alternatives will add capacity to I-405, which will improve operations and reduce congestion. This will, in turn, reduce congestion-related crash rates in the study area. Congestion-related crashes are rear-end and sideswipe crashes, which make up 77 percent of the 1,957 freeway crashes in the study area over a 2006 through 2009 three-year period.

Both build alternatives will reduce I-405 shoulder and lane widths in some areas of the corridor. This may increase the number of fixed-object and sideswipe crashes. However, we anticipate the lower congestion of the build alternatives will decrease the overall crash rate.

How will the completed project affect HOV lanes in general?

By the year 2015, we assume the HOV lane occupancy requirement will change from HOV 2+ to HOV 3+. This change will be due to future growth in HOV volumes and WSDOT's goal of maintaining a minimum 45 mile-per-hour HOV lane travel speed. The occupancy change from HOV 2+ to HOV 3+ will reduce the number of vehicles using the HOV lanes, which will allow those lanes to operate close to free-flow speeds of 60 miles per hour. However, similar to today, because Build Alternative 2 and the No Build Alternative will continue to allow HOVs to enter and exit the HOV lane at any location, HOV lanes may experience speeds lower than 60 miles per hour during the peak periods of traffic congestion. The reduction in speed is caused by HOV drivers slowing down as they anticipate vehicles from the adjacent slower lanes moving into the HOV lane.

Build Alternative 2 and the No Build Alternative will have similar HOV lane travel speeds during the 2015 and 2035 morning and afternoon peak periods.

Build Alternative 1 will limit the number of vehicles in the express toll lanes, which will be separated from the general-purpose lanes by a two- to four-foot-wide striped buffer and may have pylons. Vehicles will only be allowed to enter the express toll lanes at designated locations. Limited access

points should enable the express toll lanes to maintain a travel speed of at least 45 miles per hour even when the general-purpose lanes become congested.

How will the completed project affect transit?

Build Alternatives 1 and 2 will include transit shoulders on the outside of southbound I-405 from SR 522 to NE 160th Street and from SR 527 to NE 195th Street. Currently buses entering from SR 522 and traveling to the Brickyard Park-and-Ride at NE 160th Street do not have enough time to use the HOV lane to bypass congestion. Also, buses traveling from the Canyon Park Park-and-Ride at SR 527 to NE 195th Street and the University of Washington Bothell campus have difficulty weaving over to the HOV lane to bypass congestion. The transit-only shoulders will reduce the transit travel time for buses traveling from SR 522 to NE 160th Street and from SR 527 to NE 195th Street, especially during the morning commute when southbound I-405 is congested.

What would traffic be like if WSDOT did not build this project?

The No Build Alternative assumes the existing I-405 capacity between SR 520 and I-5 Lynnwood and that the I-405, NE 8th Street to SR 520 Braided Ramps Project is complete. We also assume HOV lane vehicle occupancy requirements will increase to three or more occupants (HOV 3+) in the future to meet performance policies.

By 2015, traffic demand will increase in the study area and we expect traffic congestion in the general-purpose lanes to worsen and travel speeds to decrease compared to 2009 existing conditions.

By 2035, traffic volumes will be more constrained and the duration and intensity of congestion will increase.

Will the project have substantial unavoidable adverse traffic and transportation effects?

We do not expect the project to create any substantial adverse effects to traffic or transportation.

A complete analysis of the I-405 sections in the project area is reported in Appendix P, I-405, Bellevue to Lynnwood Improvement Project Transportation Discipline Report (WSDOT, 2011k).

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5.2 Noise

Sound is an element of daily life that, when perceived as unpleasant, unwanted, or disturbingly loud, is called noise. The I-405 Team evaluated the potential effect of traffic and construction noise on public health and welfare. Federal regulations (23 CFR 772) and Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC) require a noise analysis for projects that add new, through capacity to a highway, or when a highway is realigned. This chapter summarizes the noise analysis that we used to determine if mitigation measures such as noise barriers are warranted to buffer noise sensitive areas from the roadway.

How did WSDOT evaluate noise levels for this project?

The I-405, Bellevue to Lynnwood Improvement Project noise analysts measured noise levels at 105 locations in the project area during the loudest hours of the day, when traffic volumes were high but not congested. The noise analysis team used these field measurements to validate existing conditions and Build Alternatives year 2030 computer models using Transportation Noise Model (TNM) and travel forecasts. The models predicted noise levels at 246 locations representing 1,770 residences, one hotel, two schools, one church and one park. The noise analysts compared the results of the No Build and two Build Alternative models to the baseline conditions model to determine project effects.

What are FHWA's noise abatement criteria?

If future noise levels with a project are predicted to approach within 1 dBA or exceed the FHWA noise impact criteria at a sensitive receptor, then mitigation is evaluated at the receptor. For exterior areas at residences, the criterion level is 67 A-weighted decibel (L_{eq}(h)).

A-weighted decibels measure how the human ear perceives sound.

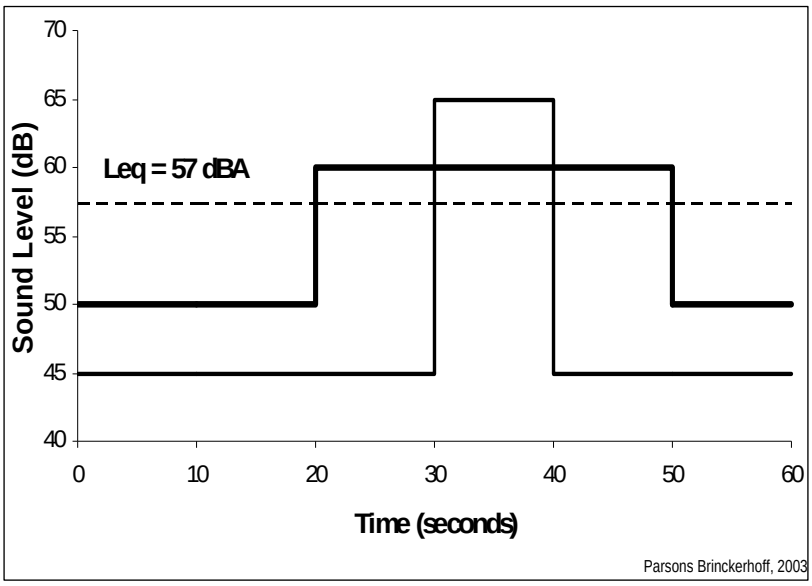
How do we describe sound?

Noise analysts widely use the equivalent sound level (L_{eq}) to describe noise in human environments. L_{eq} is a measure of the average sound energy during a specified period. It is defined as the constant level that, over a given period, transmits to the receiver the same amount of acoustical energy as the actual time-varying sound. For example, two sounds, one containing twice as much energy, but lasting only half as long as the other, can have the same L_{eq} sound levels (see Exhibit 5.2-1). L_{eq} measured over a one-hour period is the hourly L_{eq} [L_{eq}(h)],

which is used for highway noise effect and abatement analyses.

Exhibit 5.2-1: Sound patterns with the same L_{eq}

Example of two sound patterns with the same Leq (1 minute interval)



How noisy is the project area?

Baseline conditions include ten noise barriers that have been or will be built for the Kirkland Nickel Project and the NE 195th Street to SR 527 Auxiliary Lane Project. These barriers are located parallel to I-405 within the project limits. Retaining walls, limited Jersey barriers, and topography also shield some residential areas.

With these barriers, modeled L_{eq}(h) noise levels in the project area range from 49 to 76 dBA. These levels are typical of suburban outdoor sound levels (between 50 to 60 dBA and lower[1]) as well as very noisy locations (above 70 dBA) within 100 feet of a busy freeway.

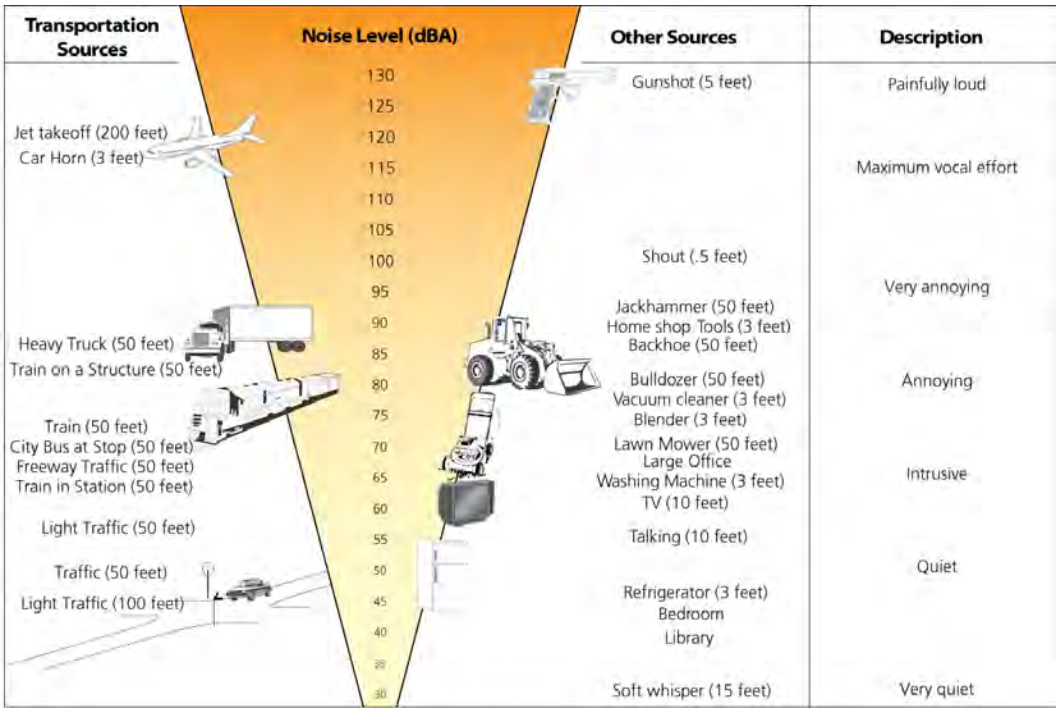
Some project area locations already approach or exceed the NAC for sensitive receptors. Locations that approach or exceed the FHWA criterion of 67 dBA L_{eq}(h) include 93 of the

[1] *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* Report Number 550/9-74-004. EPA 1974.

246 modeled locations. These 93 locations represent 446 residences and one church.

To illustrate how loud these noise levels are in comparison to daily life, Exhibit 5.2-2 presents typical A-weighted sound levels from various sources, such as a quiet whisper or light wind at 30 dBA, to a jet takeoff at 120 dBA. A typical conversation is in the range of 60 to 70 dBA.

Exhibit 5.2-2: Sounds we hear every day



What are the typical sources of construction noise?

Construction activities will generate noise during the construction period. Typically, construction is carried out in reasonably distinct steps, each with its own mix of equipment and noise characteristics. Roadway construction involves clearing, cut and fill (grading) activities, removing old roadways, importing and compacting fill, paving, and pile driving.

The internal combustion engine will be the most prevalent noise source at construction sites. Engine powered equipment includes earth moving and compaction, material-handling, and stationary equipment. Mobile equipment operates intermittently, with periods of high and low noise. Stationary equipment (e.g., generators and compressors) operate at fairly

constant sound levels over time. Because trucks will be present during most construction phases and will not be confined to the active construction area, truck noise could affect more area residents. Other construction noise sources will include impact equipment and tools such as pile drivers.

Construction noise will be intermittent. These noise levels will depend on the type, amount, and location of construction activities.

How will the completed project affect noise levels in the project area?

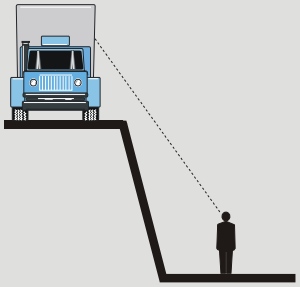
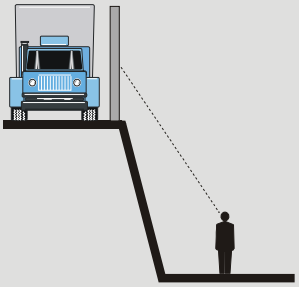
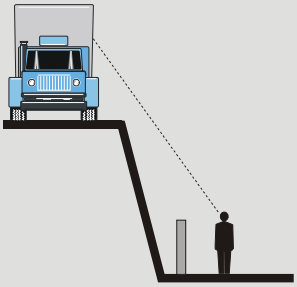
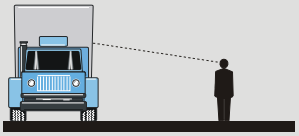
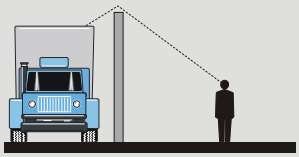
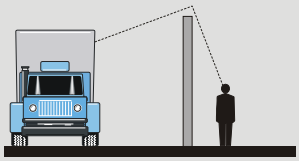
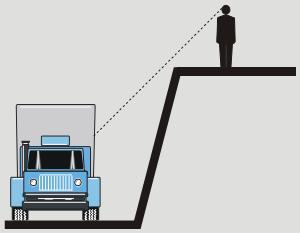
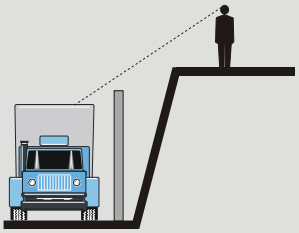
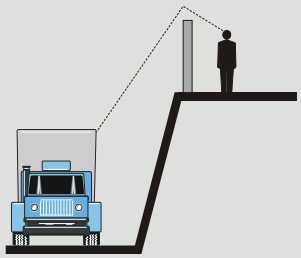
Modeling indicates that the two Build Alternatives will have the same effects on noise levels in the area. The Bellevue to Lynnwood Improvement Project will cause noise levels to either stay the same, decrease by as much as 2 dBA, or increase by up to 7 dBA by the year 2030, depending on the receptor's location within the study area.

Without mitigation, and with completion of Kirkland Nickel Project noise walls, noise levels will approach or exceed the NAC at 102 locations that represent 406 residences and one church in 2030. This is an increase of 38 residences from the 368 residences and one church predicted to experience noise levels that approach or exceed the NAC of 67 dBA for residences in 2030.

I-405 noise analysts evaluated the effectiveness of constructing noise barriers to shield noise-sensitive receptors from highway noise. A noise barrier's effectiveness is determined by its height and length and by site topography (see Exhibit 5.2-3). We evaluated noise barriers in areas where noise levels are expected to approach or exceed the NAC if the project is built.

WSDOT evaluates many factors to determine whether barriers are feasible and/or reasonable. To be ***feasible***, a barrier must be constructible in a location that achieves a noise reduction of at least 7 dBA at one or more receptors, and must provide a reduction of at least 5 dBA at most first-row receptors. To determine whether a noise barrier is ***reasonable***, noise analysts consider the number of sensitive receptors benefited by a reduction in noise of at least 3 dBA, the barriers' cost-effectiveness, and community concerns such as aesthetics and safety.

Exhibit 5.2-3: Noise barrier effectiveness

Barrier / Roadway	NONE	NEAR SOURCE	NEAR RECEIVER
ELEVATED	May be some noise reduction by terrain	Barrier is very effective	Barrier has no effect
			
LEVEL	Noise travels directly to the receiver	Barrier is effective	Barrier is effective
			
DEPRESSED	May be some noise reduction by terrain	Barrier has no effect	Barrier is effective
			

Parsons Brinckerhoff, 2003

We evaluated a total of 22 noise barriers (ten upgrade walls, 11 new walls, and one relocated wall) for the Bellevue to Lynnwood Improvement Project. Exhibit 5.2-4 shows locations analyzed for noise barriers for this project. The "Barrier Upgrade" locations on this exhibit are existing noise walls that were evaluated for an increase in height.

Noise Barrier NW1 already exists under baseline conditions because it is included as part of the Kirkland Nickel Project. This barrier will be relocated as part of the Bellevue to Lynnwood Improvement Project with the proposed Build Alternative because the I-405 mainline will be reconfigured.

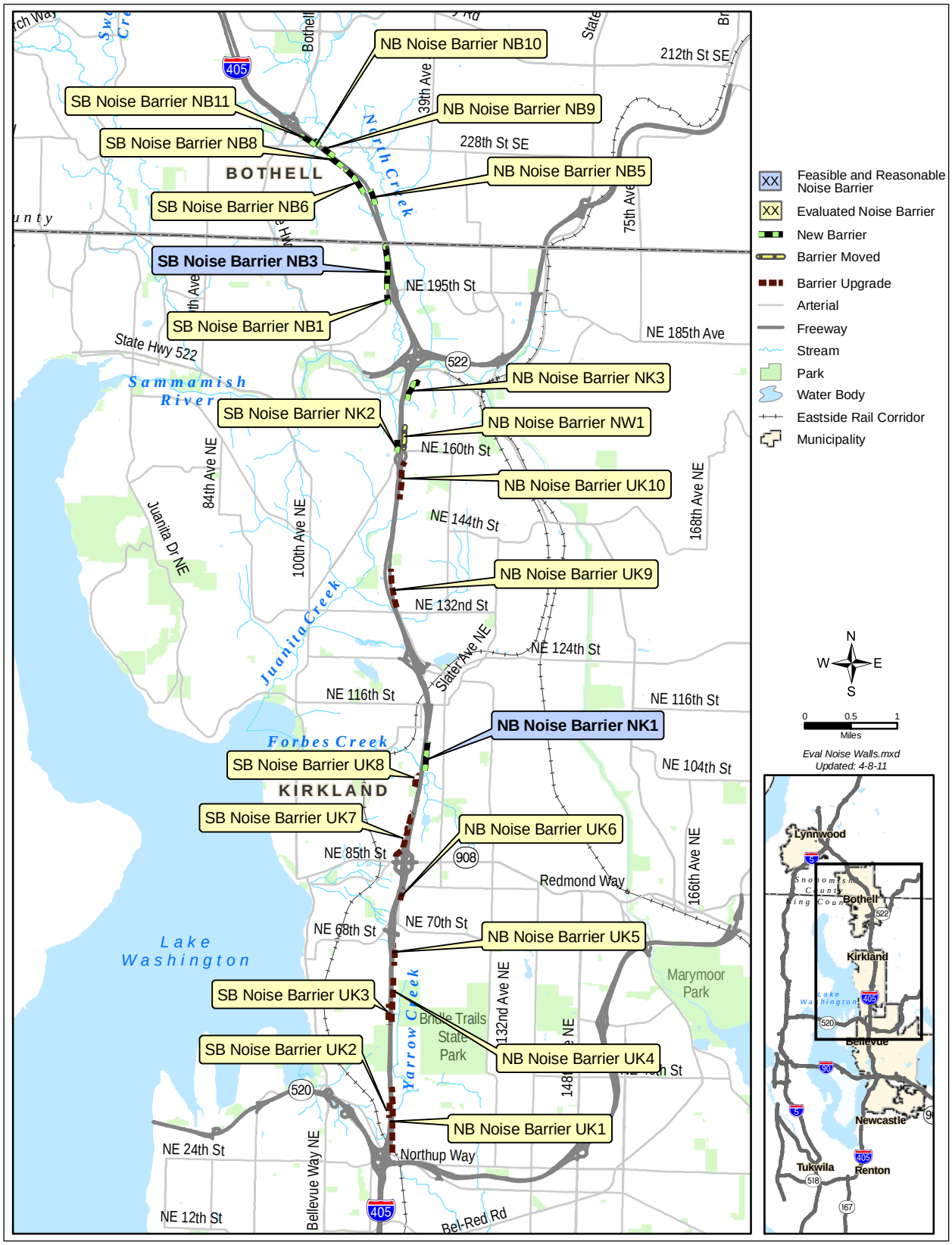
Two new noise barriers, NK1 and NB3 on Exhibit 2.2-4, are recommended for the Bellevue to Lynnwood Improvement Project. Even with these barriers, noise levels at 77 locations, representing 354 residences and one church, will continue to approach or exceed the NAC of 67 dBA. New or upgraded barriers that would result in noise levels that did not approach or exceed the NAC were not feasible or not reasonable at these locations. For example, the existing noise barrier UK1 on the east side of I-405 north of the SR 520 interchange would need to be raised by 14 feet to achieve noise levels at or near 66 dBA at residences behind it. The cost would exceed the reasonableness criteria.

What would noise levels be like if WSDOT did not build the project?

We expect that noise levels for the No Build Alternative would continue to approach, meet, or exceed the NAC at the same 368 residences and one church as discussed for existing conditions.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood Improvement Project. For specific measures that pertain to Noise, please see Chapter 6.

Exhibit 5.2-4: Evaluated noise barriers



Will the project have substantial unavoidable adverse noise effects?

Construction of the Bellevue to Lynnwood Improvement Project will not cause any substantial unavoidable adverse noise effects, per FHWA guidance stipulating that temporary construction noise effects are not substantial.

A complete analysis of noise effects in the project area is reported in Appendix L, I-405, Bellevue to Lynnwood Improvement Project Noise Discipline Report (WSDOT 2011g).

5.3 Recreational and Cultural Resources

Public spaces that offer diverse social and recreational activities can enrich minds, bodies, and spirits. Likewise, cultural and historic resources provide an important link to the past while establishing meaningful connections to our lives today. In this chapter, the Washington State Department of Transportation (WSDOT) identifies recreational and cultural resources located in the project area and how the proposed project may affect them

Because measures to avoid use of recreational lands and cultural and historic properties were incorporated into the design planning process, this project will have no impact on these resources.

What is Section 4(f) and what constitutes a use of a Section 4(f) resource?

Section 4(f) of the United States Department of Transportation Act (USDOT) of 1966 (49 USC 303) defines 4(f) properties as recreation areas that include public parks, waterfowl and wildlife refuges and historic sites.

The Act prohibits the use of land from a publicly owned park; recreation area; wildlife or waterfowl refuge; or any important historic site, in any USDOT project unless a determination is made that there is no reasonable alternative to the use of the property and the project includes all possible planning to minimize harm to the property.

The use or impact to, a 4(f) resource occurs when:

1. The recreational property is permanently incorporated into the transportation facility;
2. The land is subject to temporary occupancy and temporary or permanent adverse changes as may result during project construction; or
3. The transportation project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired or lost.

What are cultural resources?

Cultural resources include historic, archaeological and cultural resources. They can be prehistoric or historic districts, sites, buildings, structures, or objects, and traditional cultural properties included in, or eligible for inclusion in, the NRHP. Projects with federal funding, federal permits, licenses, or approvals must comply with Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires federal agencies, including FHWA, to take into account the effects of a project on cultural resources included in or eligible for inclusion in the National Register of Historic Places (NRHP).

WSDOT makes every effort to avoid adverse effects to cultural resources in planning, constructing, operating, or maintaining the state's transportation system. When it is not possible to avoid adverse effects, WSDOT will minimize and mitigate effects.

How did WSDOT identify and evaluate recreational resources?

Our I-405 project team conducted site investigations at each recreational resource within the project area. We also coordinated with the cities of Kirkland and Bothell; King County; King County Conservation District; the Washington State Recreation and Conservation Office. Finally, we confirmed ownership, determined how and when each resource was acquired, determined the resource's historical and projected public usage, and learned how each agency will manage the resources in the future.

How did WSDOT identify and evaluate cultural resources in the project area?

The I-405 Team prepared the cultural, historic, and archaeological resources technical memorandum consistent with requirements of Section 106 of the NHPA.

Our team consulted with the state Department of Archaeology and Historic Preservation (DAHP) and interested tribes, including the Muckleshoot Indian Tribe, the Snoqualmie Tribe, the Tulalip Tribes, and the Yakama Nation.

We also coordinated with the Duwamish Indian Tribe, which is presently not federally recognized. As part of the

government-to-government consultation, WSDOT sought and implemented tribal input regarding the area of potential effect (APE). WSDOT also provided the findings of the cultural resources survey.

A professional archaeologist evaluated cultural resources and a professional historian surveyed all historic resources in the project area that predate 1965. The year 1965 was selected to cover all historic resources that would be 50 or more years old by the time any part of the project is built.

What did investigators find?

Recreational and waterfowl/wildlife resources

There are 19 publicly-owned parks resources and one waterfowl and wildlife refuge near the proposed Bellevue to Lynnwood Improvement Project right of way (see Exhibit 5.3-1). These resources are located within the jurisdictions of Bellevue Kirkland, Bothell, and King County. Exhibit 5.3-2 lists the parks and recreation area resources from south to north, compares each resource with Section 4(f) criteria, and identifies those resources that will be protected as Section 4(f) properties. Exhibit 5.3-3 lists the one waterfowl and wildlife refuge area.

Both build alternatives and the No Build Alternative avoid impacts to Section 4(f) resources. As such, a Section 4(f) evaluation is not required to be included in the National Environmental Policy Act (NEPA) documentation for this project.

Cultural Resources

Thirteen historic structures and three potential archaeological sites were identified within the APE. Of these resources, only the Hosmer/Fries home (see Exhibits 5.3-1 and 5.3-3) was determined eligible for inclusion in the National Register of Historic Places (NRHP.) The residence will not be directly or indirectly affected by proposed construction under either of the build alternatives.

The State of Washington Department of Archaeology and Historic Preservation (DAHP) concurred with our historic properties findings in a letter dated March 9, 2009. (*See appendix D for Agency and Tribal Correspondence)*

Exhibit 5.3-1: Recreational and cultural resources identified in the study area

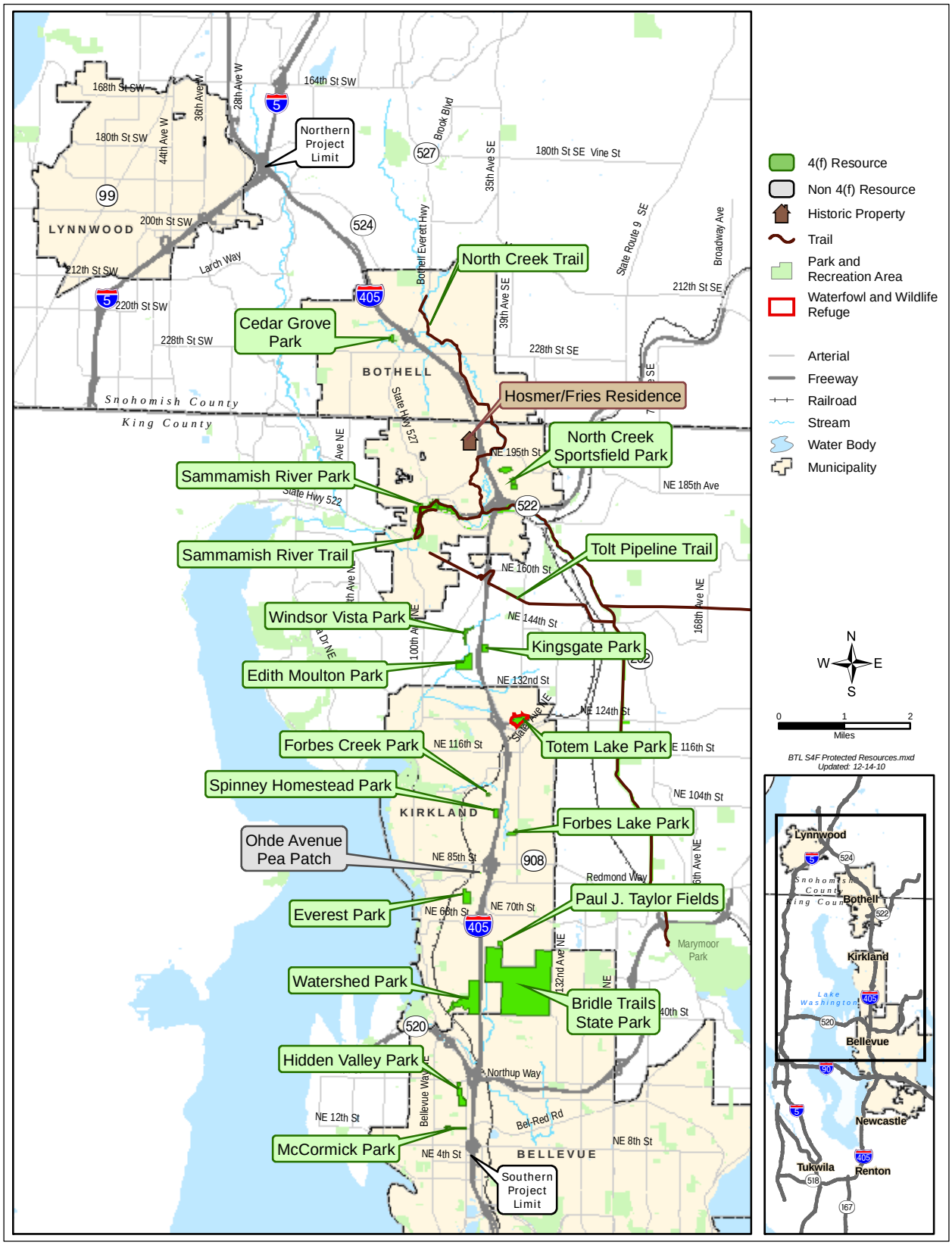


Exhibit 5.3-2: Park and recreation areas compared against Section 4(f) criteria

Property	Publicly Owned	Open to the Public	Major Purpose is Recreation	Significant as a Park	Section 4(f) Protected Property
McCormick Park	Yes	Yes	Yes	Yes	Yes
Hidden Valley Sports Park	Yes	Yes	Yes	Yes	Yes
Watershed Park	Yes	Yes	Yes	Yes	Yes
Bridle Trails State Park	Yes	Yes	Yes	Yes	Yes
Paul J. Taylor Fields	Yes	Yes	Yes	Yes	Yes
Everest Park	Yes	Yes	Yes	Yes	Yes
Ohde Ave. Pea Patch[2]	Yes	Yes	No	No	No
Forbes Lake Park	Yes	Yes	Yes	Yes	Yes
Spinney Homestead Park	Yes	Yes	Yes	Yes	Yes
Forbes Creek Park	Yes	Yes	Yes	Yes	Yes
Edith Moulton Park	Yes	Yes	Yes	Yes	Yes
Kingsgate Park	Yes	Yes	Yes	Yes	Yes
Windsor Vista Park	Yes	Yes	Yes	Yes	Yes
Tolt Pipeline Trail	Yes	Yes	Yes	Yes	Yes
Sammamish River Trail	Yes	Yes	Yes	Yes	Yes[3]
Sammamish River Park	Yes	Yes	Yes	Yes	Yes
North Creek Sportsfields	Yes	Yes	Yes	Yes	Yes
North Creek Trail	Yes	Yes	Yes	Yes	Yes
Cedar Grove Park	Yes	Yes	Yes	Yes	Yes

[2] *Ohde Avenue Pea Patch is designated as a park in the Kirkland Comprehensive Park, Open Space, and Recreation Plan, 2001. However, in order to satisfy the requirements of Section 4(f), its major purpose must be recreation and it must be a recreational resource that is considered significant. During coordination with the City of Kirkland, it was agreed that Ohde Avenue Pea Patch does not meet the Section 4(f) criteria.*

[3] *The Sammamish River Trail is considered a transportation facility where it crosses the WSDOT right-of-way. Per 23 CFR 774.13(f)(3), the trail is not protected under Section 4(f) on the right of way.*

Exhibit 5.3-3: Historic properties, archaeological sites, and wildlife or waterfowl refuge compared against Section 4(f) criteria

Historic Properties and Archaeological Sites			
Property	Listed on National Register of Historic Places (NRHP)	Status	Section 4(f) Protected Property
Hosmer/Fries Residence	No	Eligible for inclusion in NRHP	Yes
Wildlife or Waterfowl Refuge			
Property	Publicly Owned	Designated for protection of wildlife species and/or migratory birds	Section 4(f) Protected Property
Totem Lake Park	Yes	Yes	Yes

Investigative probing in November 2006 uncovered a stone tool in an area identified as archaeological site 45KI757. Initially thought to be eligible for National Register of Historic Places (NHRP) listing, subsequent subsurface excavation, data recovery and thorough laboratory testing, revealed that the site contained only a single cultural artifact and was not eligible for listing. WSDOT provided copies of the data recovery report (WSDOT, 2009d) to DAHP and interested tribes. In a letter dated February 17, 2010, DAHP agreed that the area was not eligible for listing on the NHRP.

Will the project have unavoidable adverse effects on recreational and cultural resources?

Because measures to avoid impacts to recreational and cultural resources were incorporated into the design planning process, the Bellevue to Lynnwood Improvement Project will have no impacts on these resources. The project will not:

- Require acquisition of any Section 4(f) resource lands;
- Impose any adverse temporary occupancy on resource lands; or
- Create constructive use effects at any of the identified Section 4(f) resources.

The project will not result in unavoidable adverse effects on cultural resources. Prior to construction, an unanticipated

discovery plan (UDP) will be developed that will describe the procedures to be followed if archaeological materials or human remains are discovered during construction.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood Improvement Project. For specific measures that pertain to Recreational and Cultural Resources, please see Chapter 6.

Complete analyses of recreational and cultural resources in the project area are reported in Appendix M, I-405, Bellevue to Lynnwood Improvement Project Draft Section 4(f) Technical Memorandum (WSDOT 2011h), and Appendix F, Cultural, Historic, and Archaeological Technical Memorandum (WSDOT 2008b).

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5.4 Communities, Businesses, and Services

Access to social and public services are important to local communities. Unanticipated interruptions or delays can create major inconveniences for individuals that rely on I-405 to travel to and from these services, or those who use public transit along the corridor. In this chapter, the Washington State Department of Transportation (WSDOT) identifies communities and populations, businesses and employment, the social and public services offered within the project area, and how the proposed project may affect them.

What types of social and economic data did WSDOT evaluate for this project?

The I-405 Project Team collected information to identify existing social elements such as community cohesion (neighborhood population characteristics and linkages with churches, schools, and other community facilities and services); parks and recreation activities and facilities; population characteristics and growth; government, religious and social facilities and services; and pedestrian, transit and bicycle facilities. Information sources included websites for local jurisdictions within the project area, geographic information systm (GIS) mapping, interviews with area service providers, and United States (U.S.) Census Bureau data.

The analysis included service providers if at least a portion of their service area intersects the half-mile project area. We also identified services without defined boundaries, such as churches and community organizations within this range of study.

What communities, businesses, and services are located in the project area?

Communities

Six jurisdictions lie within or in proximity to the project area. These are the cities of Bellevue, Kirkland, Bothell, and Lynnwood, and unincorporated areas of King County and Snohomish County. Numerous neighborhoods within these jurisdictions make up the diverse communities that encompass the project area.

Business and employment sectors

Five major employment sectors were analyzed for this EA, including: retail; finance, insurance, real estate, and services (FIRES); manufacturing; wholesale trade, communication, and utilities (WTCU); and government and education. Exhibit 5.4-1 shows the 14 forecast analysis zones (FAZs) in the project area. Exhibit 5.4-2 shows the year 2000 employment and population for each FAZ and Exhibit 2.4-3 shows the distribution by employment sector in each of the 14 FAZs.

Historically, the Bellevue to Lynnwood Improvement project area has provided a small share of the region's jobs, accounting for only 1.8 percent in 1970, and rising to 6.6 percent in 2000.

Social and public services

Social and public services in the project area include parks and recreational facilities, religious institutions, schools, pedestrian and bicycle facilities, libraries, public transportation facilities, emergency and healthcare facilities, and utilities. Exhibit 5.4-4 shows the location of many of these resources.

Exhibit 5.4-1: Project area employment and population Forecast Analysis Zones

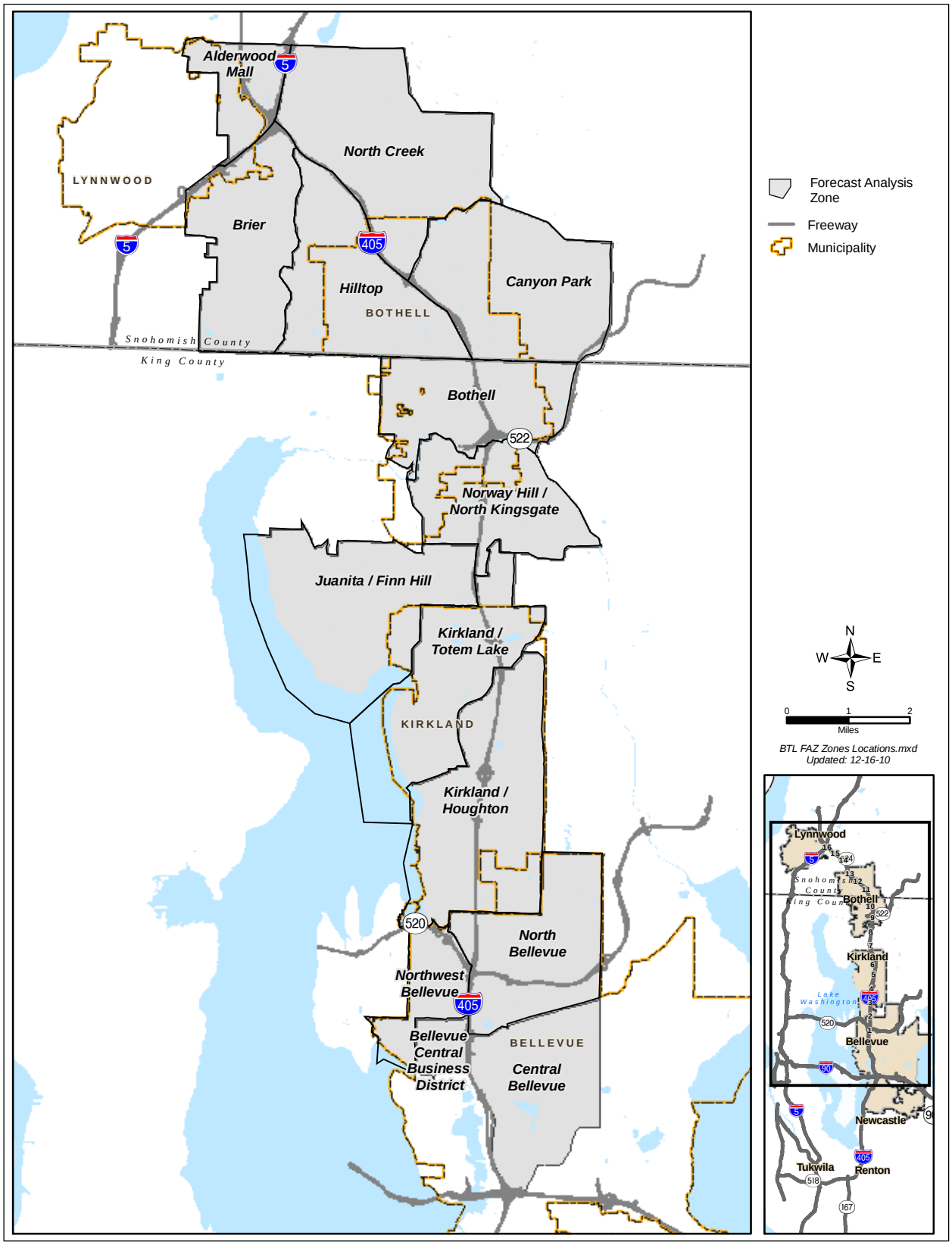


Exhibit 5.4-2: Distribution of employment and population in study area by FAZ in 2000

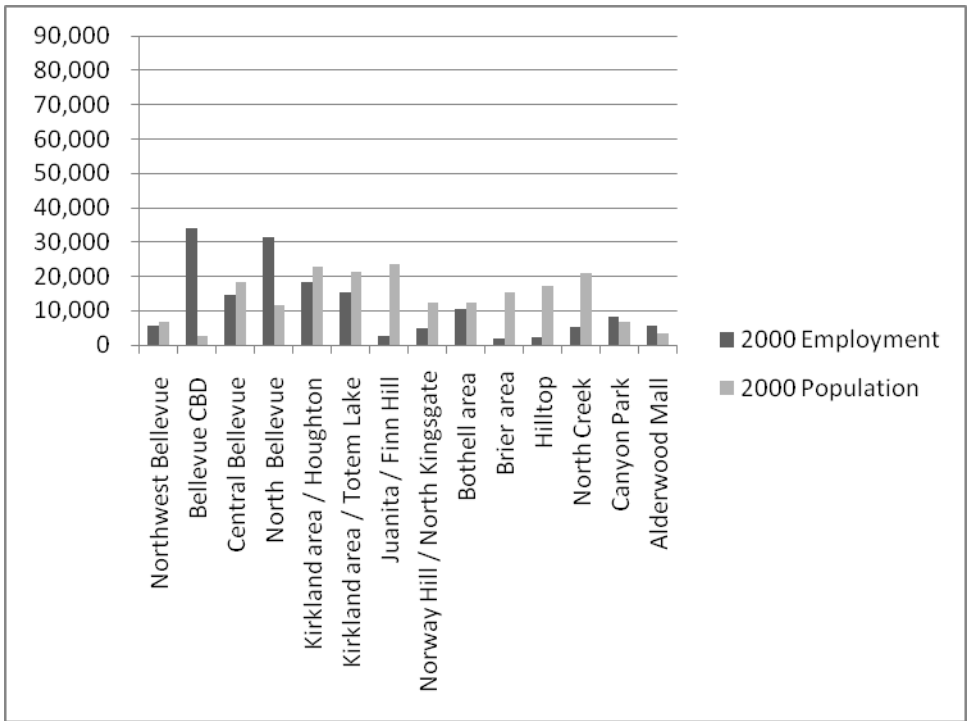


Exhibit 5.4-3: Employment sector composition by FAZ – 2000

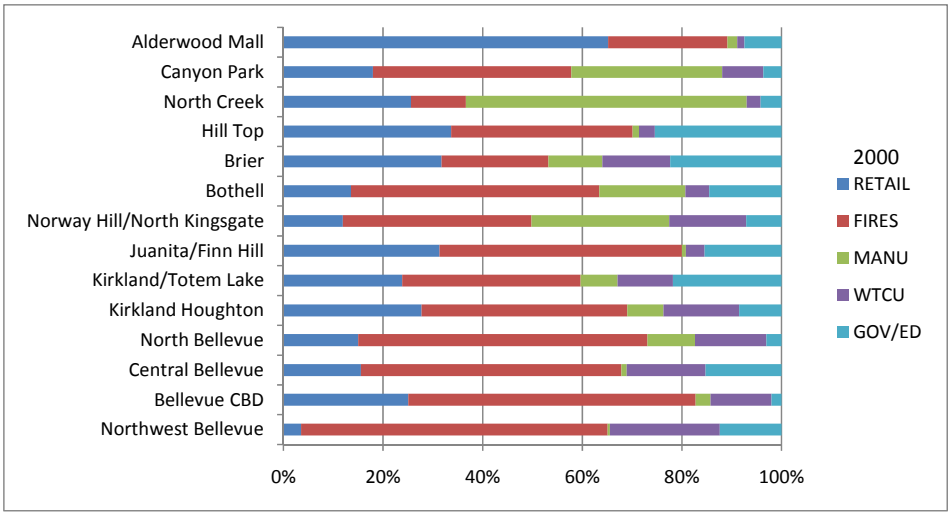
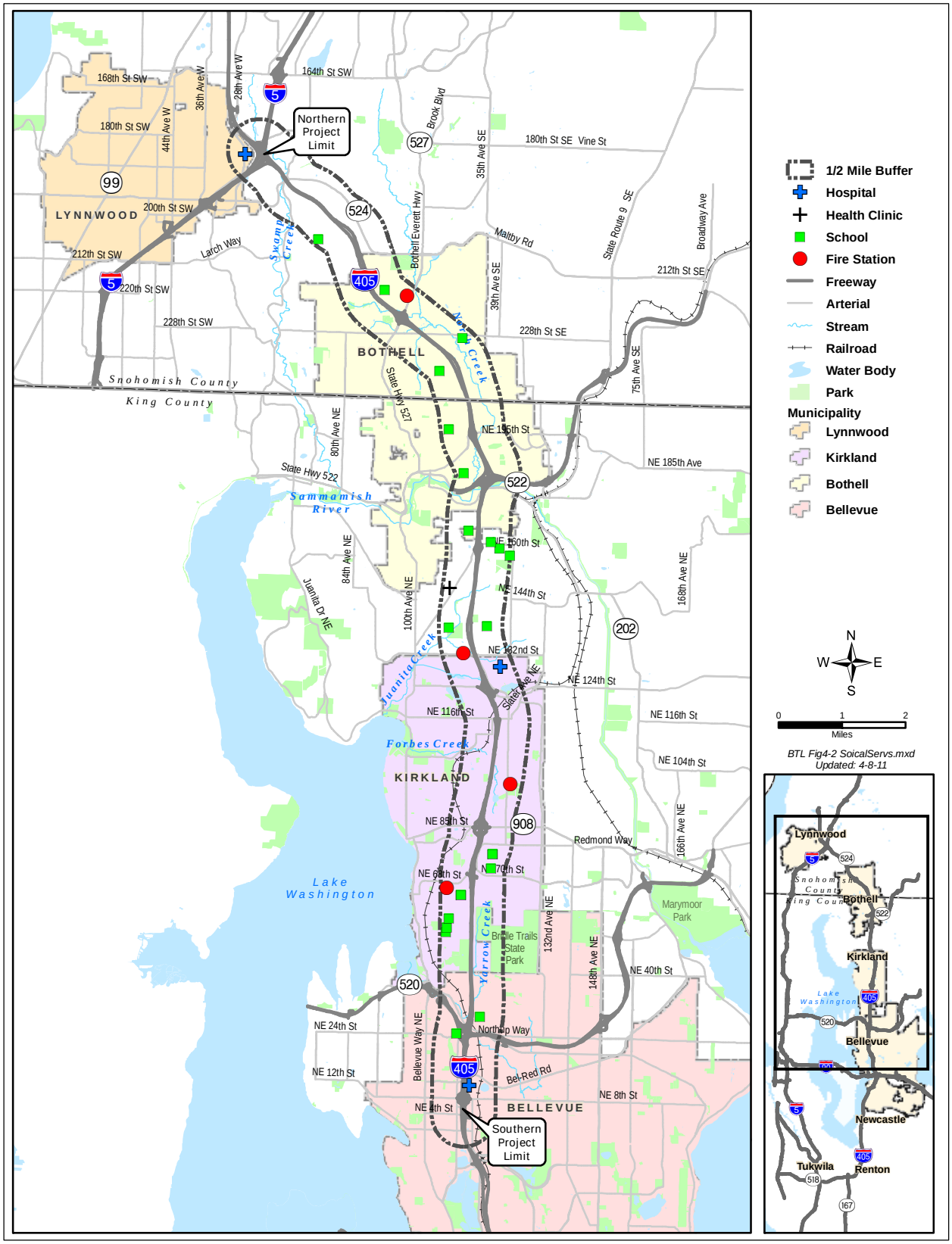


Exhibit 5.4-4: Social and public services within the project area



How do we define *minority*?

Individuals listed in the 2000 Census as Black (a person having origins in any of the black racial groups of Africa); Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or American Indian/Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition); or some other race.

Who lives and works in the project area?

The 68-square-mile project area, made up of Puget Sound Region Council (PSRC) forecast analysis zones (FAZs) along the project route, was home to 195,538 people in the year 2000 and represented 6.0 percent of the total population and 12 percent of the employment in the Central Puget Sound Region (King, Kitsap, Pierce, and Snohomish counties).

For analysis of minority and low-income population, the I-405 Team looked at Census Tract Block Groups along the project corridor. These Block Groups had a population of 101,867 in year 2000, about 52 percent of the population in the FAZs. Approximately eight percent of the study area population in 2000 was elderly (65 years or older). Approximately twenty-three percent of the study area population in 2000 was disabled (all types of disabilities). Four percent of study area residents are low-income. This is similar to the cities of Bothell and Kirkland (5 percent low-income each) and lower than the City of Bellevue (6 percent low-income) and City of Lynnwood (9 percent low-income). Eighteen percent of study area residents are minorities. This percentage is similar to the cities of Bothell and Kirkland (17 percent minority each) and lower than the City of Bellevue (28 percent minority) and City of Lynnwood (29 percent minority). Of the minorities in the study area, 4 percent are Hispanic, 1 percent are African American, less than 1 percent are American Indian/Native Alaskan, 9 percent are Asian, less than 1 percent are Native Hawaiian/Pacific Islander, less than 2 percent are some other race, and 3 percent are two or more races. The study area has substantial numbers of people who speak Spanish, Vietnamese, Chinese, or Russian.

Will any properties be acquired?

No new right of way will be acquired. However, easements will be needed from three parcels; none of the easements will change the current use of those parcels. No businesses will be displaced by either of the Build Alternatives.

Will any public services be displaced?

No public services will be displaced as a result of the project.

How will construction activities affect communities, businesses, and services?

Build Alternative 1

The project with Build Alternative 1 will widen I-405 in certain locations, build northbound braided ramps between NE 160th Street and SR 522, and add express toll lanes. We expect construction to take approximately three years, but construction activity in some locations will take substantially less time.

Communities

Construction activities will have minor short-term effects such as increased noise, increased dust, and increased traffic congestion that could affect people living and working in and traveling through the project area. Construction would affect minority and low-income populations the same way the community is affected.

Because these construction effects are localized and temporary, they will have no substantial negative effect on the cohesiveness of neighborhoods or the social interactions of residents within the neighborhoods.

Businesses and employment

Sales taxes on construction costs will accrue to Washington State, King County, Snohomish County, the cities of Bellevue, Kirkland, and Bothell, and other local jurisdictions and taxing districts. Assuming some project funding will come from outside the region (state and federal funding), the project will create some short-term employment for the region.

Public services

Public services such as emergency response services, police, and school buses could experience slight delays due to project construction activities. However, these delays will be minimal because the project will minimize road closures, delays, and detours. Temporary closures will be limited to nights or weekends when possible.

Utilities

Construction activities such as pile driving, excavation, fill placement, and other earth disturbances may affect underground utilities. Special construction techniques, pipe protection, or full relocation could be required if utility

conflicts are confirmed. These activities could cause short-term disruption in services and inconvenience to customers.

Overhead utility lines and poles could also interfere with project improvements requiring relocation or extra safety measures when working in close proximity.

Identification of potential utility conflicts is based on known information available during the preliminary engineering stage of the project. Currently, there are approximately 68 possible utility conflicts identified as part of preliminary engineering. Of that total number, four have been identified as confirmed utility conflicts. Confirmed conflicts will be resolved during construction by relocation or protection in place. In some cases relocation prior to construction may occur. The utility franchise holder permit agreements stipulate that potential utility conflicts within WSDOT right of way are to be relocated at the utility provider's expense.

Mitigation measures will be applied where confirmed utility conflicts cannot be avoided through project design.

Build Alternative 2

Build Alternative 2 will have similar impacts during construction, but express toll lanes will not be built.

How will the completed project affect communities, businesses, and services?

Build Alternative 1

The improved accessibility resulting from project improvements will benefit the economy by improving the flow of people, goods, and services to and from the area. See Appendix H, I-405, Bellevue to Lynnwood Improvement Project Economics Technical Memorandum (WSDOT 2011c) for more detailed information. This alternative will include transit-only shoulders that will improve travel times for buses traveling on southbound I-405 from SR 527 to NE 195th Street and from SR 522 to NE 160th Street.

Build Alternative 2

For all areas except transportation, project operational effects for Build Alternative 2 will be similar to those for Build Alternative 1. Build Alternative 2 will continue to allow high-occupancy vehicles (HOVs) to enter and exit the HOV lanes at

any location. This may cause the HOV lanes to experience slower speeds during the peak periods of traffic congestion because HOV drivers tend to slow down as a precaution in case a driver from the adjacent slower lane decides to enter the HOV lane. Like Build Alternative 1, Build Alternative 2 will include transit-only shoulders.

How will the project affect minority and low-income populations?

Project construction

Construction of either of the two build alternatives would affect minority and low-income populations the same way the community is affected.

Project operation

For most disciplines, project operation of Build Alternatives 1 or 2 would affect minority and low-income populations in the same way that the non-minority and non-low-income community is affected (see "How will the completed project affect communities, businesses, and services?" above). The only exception is transportation, which is expected to have slightly different effects to low-income populations depending on which alternative is selected.

The following criteria were used to determine disproportionate effects on environmental justice populations:

1. A minority and/or low-income population would predominantly bear the effects; or
2. The minority and/or low-income population would suffer the effects and the effects would be appreciably more severe or greater in magnitude than the adverse effects suffered by the non-minority and/or low-income population.

To address the first criterion for disproportional effect, we looked at the proportion of low-income users in the project travelshed. That percentage (9 percent) is not appreciably different than the percent of low-income residents in King County (8 percent) and Snohomish County (7 percent). These numbers indicate that the facility does not serve an area with a disproportionately high number of low-income people, so it does not appear that a low-income population would predominantly bear the effects.

What is a travelshed?

A travelshed is the geographic area encompassing the origins and destinations of all vehicles using a given facility such as a highway. The purpose of a travelshed is to identify the effects on the users of the facility.

Build Alternative 1

With respect to the second criterion, the toll to enter the express toll lanes with could range between $0.50 and $4.85 in 2015, and between $0.75 and $10.80 in 2035. In 2015, the average toll rate is expected to be $0.90. By 2035, the average toll rate is expected to be $2.95. To travel in the express toll lanes for free, all HOV 3+ travelers would need to purchase a transponder at a cost of $5 to $12, and may need to set up an account with an initial $30 minimum amount due to the type of toll collection system that would be used. Persons with lower incomes might be less able, or unable to pay the tolls to use the express toll lanes because it represents a higher portion of their income, or to purchase the transponder and set up the account for free access as an HOV 3+. Low income transit riders that rely on transit more than the general population, will not pay additional costs for tolling. Those with higher incomes would be better able to pay the tolls to use the express toll lanes because it represents a lower percentage of their income. However, the express lane toll may be avoided, or its burden reduced, by using the general-purpose lanes at no cost, carpooling, taking public transit, or taking an alternative route. Thus, no disproportionately high and adverse effects on low-income populations are anticipated.

Compared to No Build, travel times for drivers including SOVs and HOV 2+ traveling in the free general purpose lanes would improve due to the addition of one lane in each direction on I-405. In 2035, Build Alternative 1 will carry more total vehicles in all locations traveling at faster speeds in most locations than No Build and Alternative 2. In addition, drivers of SOVs and HOV 2+ would experience additional travel time reductions if they choose to pay to use the express toll lanes.

Compared to No Build, transit would benefit from the addition of southbound transit shoulders between SR 522 and NE 160th Street, and between SR 527 and NE 195th Street. Transit and HOV 3+ not in the express toll lanes will experience faster travel speeds in the general-purpose lanes in most locations compared to No Build and Build Alternative 2. Improved transit reliability may benefit low-income populations who have less flexibility in their job schedules.

To travel in the express toll lanes for free, transit and HOV 3+ will be required to have a transponder. These travelers would need to pay a one-time fee to purchase a transponder and may

need to open a Good to Go! account. Currently, it costs about $5 to $12 to purchase a transponder and $30 to set-up a pre-paid account. Travelers who choose not to obtain a transponder would still be able to use the express toll lanes. They would receive a bill in the mail.

Build Alternative 2

Build Alternative 2 will increase the total number of vehicles traveling on this section of I-405 compared to the No Build Alternative, but it would not accommodate as many vehicles as would Build Alternative 1. Vehicles that qualify for HOV lane use will continue to enter and exit the HOV lanes at any location, causing the HOV lanes to experience slower speeds during the peak periods of traffic congestion.

What would happen to these communities, businesses, and services if WSDOT did not build this project?

The No Build Alternative includes no additional construction beyond what is planned for and committed to within the corridor. The No Build Alternative assumes construction of the Kirkland Nickel Project. These construction activities will generate effects on the community independent of the Bellevue to Lynnwood Improvement Project. The effects from the Kirkland Nickel Project are addressed in *I-405, SR 520 to SR 522 - Kirkland Nickel Project Environmental Assessment* (WSDOT 2005c).

With the No Build Alternative, public services would experience the current congestion as under existing conditions, but would not experience any further delays due to project construction activities.

Freeway delays could encourage drivers to seek alternative routes on local and regional roadways, choose to travel by different means or different times, or forego their desired trips altogether. An increase in drivers seeking alternative routes could lead to increased cut-through traffic in neighborhoods. This would result in the increased air quality, social, and safety effects associated with increased neighborhood traffic on roadways that may not be designed or intended for high volumes of through traffic.

All project alternatives, including No Build, assume a three-person occupancy requirement (HOV 3+) by 2015. Vehicles

that qualify for HOV lane use would continue to enter and exit at any location, causing the HOV lanes to experience slower speeds during the peak periods of traffic congestion. In addition, the transit reliability and safety benefits of the Build Alternative would not be realized with the No Build Alternative. The deterioration of transit travel times under the No Build Alternative in particular would negatively affect minority and low-income populations who rely on transit to reach their destinations.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood Improvement Project. For specific measures that pertain to Communities, Businesses, and Services, please see Chapter 6.

Will the project have substantial unavoidable adverse effects on communities, businesses and services?

Our analysis has determined the project will not have any substantially adverse effects to communities, businesses, social resources or public services. In addition, either of the build alternatives will not result in disproportionately high and adverse effects to minority or low-income populations.

Complete analyses of economic; social and public services, and environmental justice are reported in: Appendix H, I-405, Bellevue to Lynnwood Improvement Project Economics Technical Memorandum (WSDOT 2011c); Appendix N, Social, Public Services, and Environmental Justice Discipline Report (WSDOT 2011i); and Appendix Q, Utilities Technical Memorandum (WSDOT 2011l).

5.5 Visual Quality

The assessment of visual quality is subjective in nature because viewers bring their own personal values and perspectives to recognizing and evaluating visual environments. The Federal Highway Administration (FHWA) methodology has been developed to reduce subjectivity and evaluate visual resources in an objective, qualitative, and quantitative process. In this analysis, the Washington State Department of Transportation (WSDOT) evaluated visual resources by examining both their character and quality, and how these visual traits could create impacts within the project area.

View of a noise wall from the community side

View of a noise wall from the freeway side

How did WSDOT evaluate visual resources for this project?

For the Bellevue to Lynnwood Improvement Project, analysts evaluated visual quality by identifying the visual resources of the affected environment; by determining the potential changes to resources that will result from the project; and by evaluating the viewer response to those changes. When observing and evaluating their visual environments, viewers typically draw upon their own personal values and perspectives. The methodology presented in this chapter provides an objective approach to assessing the visual environment and proposed project changes.

The project team used the geographic information system (GIS) to:

(a) define the boundaries of the visual assessment area, and

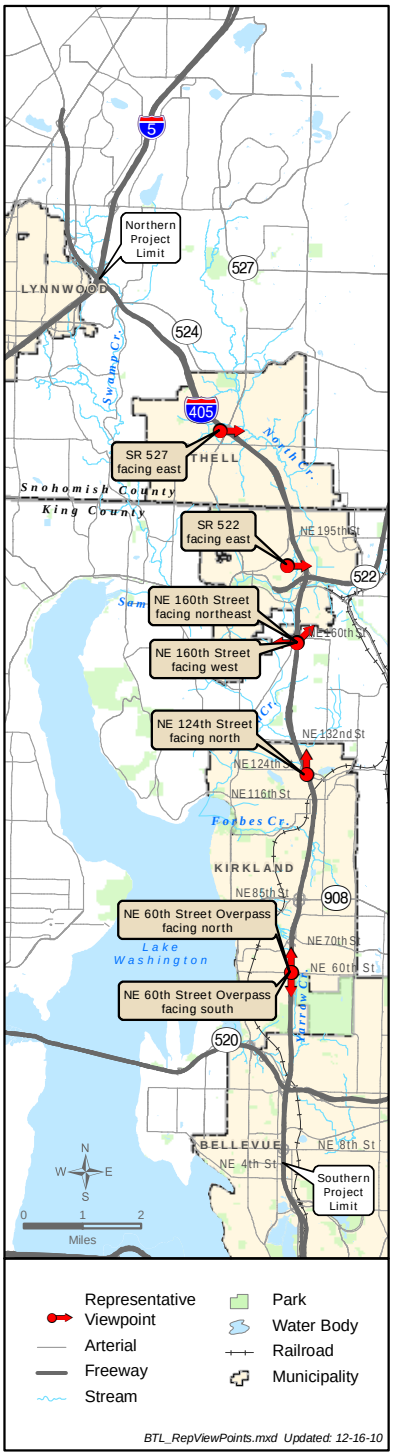
(b) evaluate what parts of the project area may be visible from the project and what parts of the project are visible from the surrounding areas.

GIS can help define a "topographic viewshed" – or the part of the project area that is visible based solely on topography.

What is a viewshed?

A viewshed is the area that can be seen from a given viewpoint or group of viewpoints; it is also that area from which a particular viewpoint or group of viewpoints can be seen.

Exhibit 5.5-1: Representative viewpoints



What views can people currently see in the project area?

The I-405 Team selected seven representative viewpoints for visual quality evaluation. The team used the methods and criteria of the FHWA *Visual Impact Assessment for Highway Projects* manual (FHWA 1981) to assign a numerical rating on a seven-point scale to each of the viewpoints. Views were scored on criteria of vividness, intactness and unity. These viewpoints are shown in Exhibit 5.5-1 and listed below:

Representative viewpoints looking away from the highway

- I-405 at NE 60th Street overpass (views facing south and north); and
- I-405 at the NE 160th Street ovrepass (view facing northeast).

Representative viewpoints looking toward the project

- I-405 at the NE 124th Street overpass (view to north);
- I-405 northbound near NE 160th Street (Sonoma Villero Condominiums, view facing west);
- SR 522 (University of Washington Bothell Campus, view facing east); and
- SR 527/I-405 interchange area (view facing east).

Our basis for selecting these viewpoints was their easy accessibility by the public. Viewpoints from individual residences were not specifically addressed.

What project features will have noticeable effects?

The use of context-sensitive solutions (CSS) techniques will enhance vividness of the constructed environment and will alleviate the minor effects to visual resources. For example, retaining existing natural vegetation to the maximum extent practical, and planting new vegetation to screen constructed elements, can be incorporated within project facilities. Other areas subject to CSS include structural elements, such as lighting and signs.

How will construction activities affect what people see?

The proposed project will create temporary visual effects for highway users and neighbors during construction. Construction activities will reduce the visual quality in the project area due to the presence of construction equipment, materials, signs, and construction staging areas. Temporary lighting may be used for nighttime construction of some project elements. Construction effects to visual resources will be temporary, and will cease when construction is complete.

Views looking away from I-405

The visual effects of construction will not change most views from I-405. Screening by topography, vegetation, and/or existing structures restricts most views to the foreground or middle ground. Where distant views are present, they will remain visible. Clearing of vegetation for construction will generally be limited to areas adjacent to the existing facilities.

View facing northeast from I-405 at NE 160th Street NB on-ramp

Views looking toward I-405

Most of the residential areas to the east and west of the I-405 corridor are screened from the highway by a combination of vegetation, topography, and structures. Views of I-405 are limited and occur primarily at cross streets and associated interchanges, or local roads that are near the freeway. In some cases, existing noise walls will obscure the construction activity from surrounding areas.

How will the completed project affect what people see?

The overall visual quality effects of the Bellevue to Lynnwood Improvement Project will be minor. I-405 is an existing major freeway, and since improvements in most of this area include additional pavement on either side of the shoulder or other improvements within existing right-of-way, most viewpoints will remain relatively unchanged. Two viewpoints will decrease slightly in their overall visual quality rating because a new retaining wall and noise wall will be constructed. The viewpoint score for the view facing northeast from the NE 160th Street on-ramp decreases from 2.7 to 2.2. The viewpoint score for the west facing view from the Sonoma Villero Condominiums decreases from 2.7 to 2 on a 7-point scale. In

Sonoma Villero Condominiums

this visual quality analysis, we categorize a score of 2 as low visual quality, and a score of 3 as moderately low. Therefore, the viewpoints remain in a low to moderately low score bracket, and the overall visual quality effects for the project are considered to be minor. Permanent effects of the project will be minor because viewer sensitivity is relatively low and CSS elements will be incorporated into the project.

A noise wall 20 to 30 feet high will be located about 15 to 20 feet away from several Sonoma Villero Condominiums. The wall will slightly decrease the score for visual quality at that viewpoint.

I-405 users will be exposed to increased human-made encroachment and complexity within the corridor; however, these changes are slight when compared to existing conditions. Portions of the project area where 20 feet or more of new pavement will be added are already the most highly developed, encroached-upon areas.

Additional project elements, such as signage, retaining walls, stripe buffers, and other structural elements, will be within the existing right of way, and, in many cases, within the existing screening of noise walls and vegetation.

Vegetation removal within the right of way to accommodate the additional express toll and general-purpose lanes will have a slight adverse effect on the visual environment. CSS techniques, such as landscaping and the use of aesthetically-pleasing designs for I-405 and related facilities, will enhance the attractiveness of the constructed environment and will alleviate minor effects to visual resources.

What would happen to visual resources if WSDOT did not build this project?

The No Build Alternative for the Bellevue to Lynnwood Improvement Project assumes that no new improvements would be made beyond those being constructed as a part of the Kirkland Nickel Project and NE 8th Street to SR 520 Braided Ramps Project. Therefore, no changes in visual quality beyond those created as part of those two projects would occur.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood

Improvement Project. For specific measures that pertain to Visual Quality, please see Chapter 6.

Will the project have unavoidable adverse effects on visual quality?

The effects of project construction and operation are minor, as discussed earlier in this technical memorandum. While the average overall visual quality rating in the project area decreased slightly from 2.95 to 2.7 on a 7-point scale, the visual quality remains moderately low to low, as assessed in the baseline conditions.

A complete analysis of visual quality is reported in Appendix R, I-405, Bellevue to Lynnwood Improvement Project Visual Quality Technical Memorandum, (WSDOT 2011m).

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5.6 Water Resources

Water resources—surface water, floodplains, water quality, and groundwater— are essential to maintaining human health, fish and wildlife habitat, and vegetation. These resources can be affected by roadway projects because increased impervious surfaces can lead to changes in water movement, degrade the surface water that drains to streams and, thereby, affect natural habitats. These changes can also influence flooding and groundwater recharge[4]. In this chapter, we evaluate how the proposed project may impact water resources.

How did WSDOT evaluate water resources for this project?

For the I-405, Bellevue to Lynnwood Improvement Project (Bellevue to Lynnwood Improvement Project), WSDOT evaluated four primary elements of water resources within the project area—surface water, floodplains, water quality, and groundwater. WSDOT's approach to each of these elements, along with the results of our analysis, is presented below.

Surface water and floodplains

The I-405 Team assessed existing highway runoff and conditions for tributaries to Lake Washington within the project area. This assessment included a review of current flow patterns, land use, floodplains, and peak flow conditions; steep slopes; wetlands and other water bodies; and human-made drainage and/or treatment systems. We determined the effects on surface water and floodplains by comparing existing conditions and estimating future conditions that will occur during construction and after completion of the project.

Existing conditions were evaluated for major floodplains within the project area. The assessment of existing conditions

[4] *The infiltration of water into the earth. Groundwater recharge may increase the total amount of water stored underground or only replenish supplies depleted through pumping or natural discharge.*

included a review of existing floodplain characteristics and land uses, pertinent regulations, peak flow estimates, and any historic flooding problems.

Water quality

Analysts qualitatively addressed potential effects on water quality during construction. Potential effects on water quality during operation were based on comparing annual pollutant loading of contaminants for the two Build Alternatives and the No Build Alternative as estimated by the I-405 WSDOT stormwater team.

Groundwater

Analysts reviewed the proposed project design concept and likely construction methods with respect to groundwater effects based on the existing site conditions and standard WSDOT practices.

What water resources are found in the project area?

Surface water

The project area includes several perennial streams and rivers. The location of these water bodies is shown on Exihibit 5.6-1 and listed below (from south to north):

- Yarrow Creek
- Forbes Creek
- Juanita Creek
- Sammamish River
- North Creek

North Creek discharges to the Sammamish River, a tributary to Lake Washington. The remaining streams listed above are tributaries to Lake Washington. Although the northern limit of the project extends into the Swamp Creek drainage basin, the project includes only minor disturbances, such as the installation of signs and gantries that do not have the potential to substantially impact water resources in the Swamp Creek basin. Therefore, the Swamp Creek basin is not discussed in this assessment.

Exhibit 5.6-1: Water resources in the project area

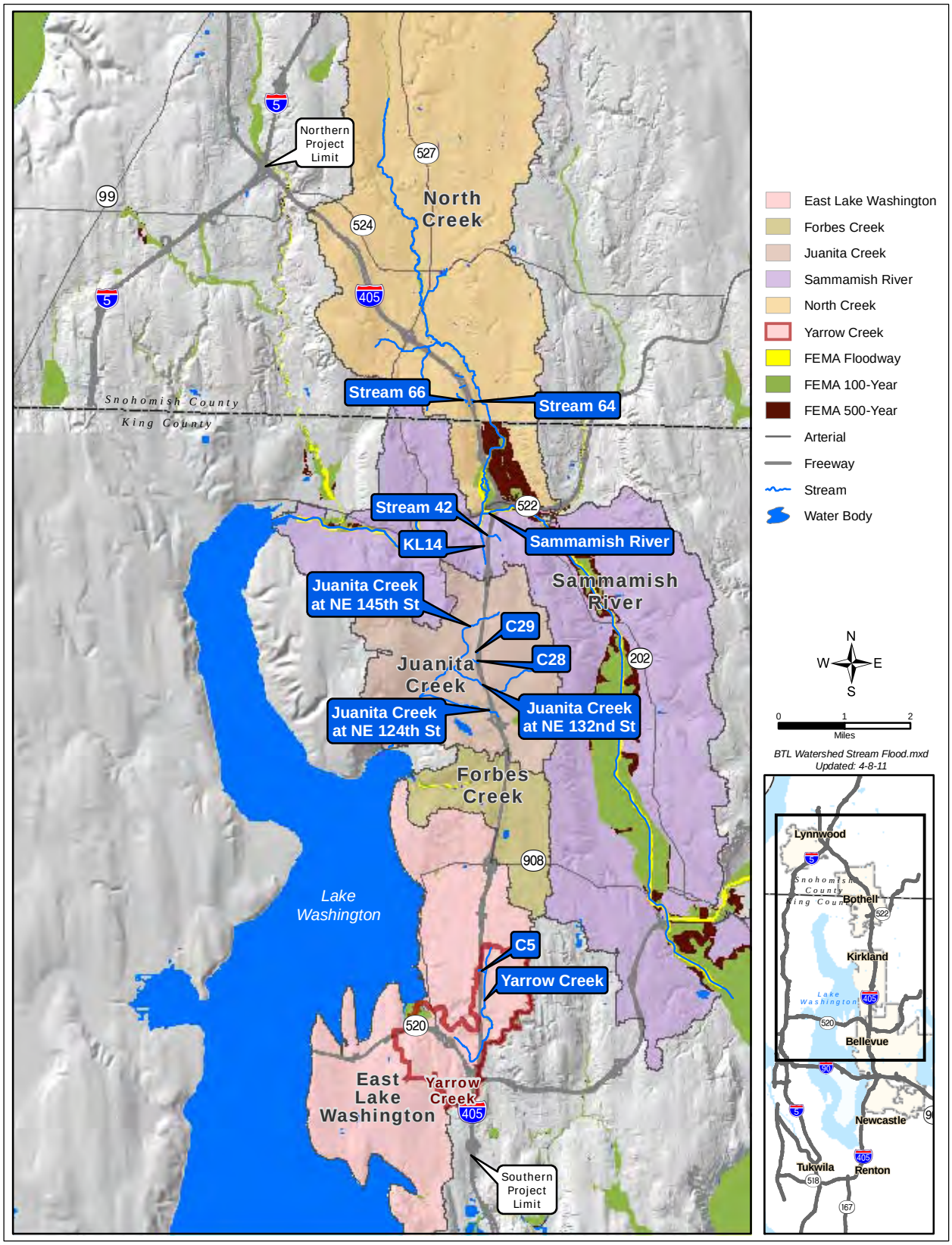

Exhibit 5.6-2: Location of Group B wells

Surface waters are located within the urbanized and suburban areas of King and Snohomish counties and have been modified as a result of development.

Floodplains

There are no 100-year floodplains in the Bellevue to Lynnwood Improvement project area that have been designated as Areas of Special Flood Hazard by the Federal Emergency Management Agency (FEMA). Floodplains occur downstream of I-405 near the mouths of Yarrow Creek, Forbes Creek, and Juanita Creek (Exhibit 5.6-1). I-405 is elevated above the floodplains on the Sammamish River and North Creeks.

Groundwater

The Bellevue to Lynnwood project area is characterized by two general groundwater conditions. The lowland areas (Totem Lake area, Sammamish River Valley area, and the four creeks—North, Yarrow, Forbes, and Juanita) are underlain by alluvium, where groundwater is relatively shallow, on the order of 10 feet below the ground surface. In these areas, excavations below the groundwater can result in continuous and substantial flows.

The upland areas are underlain by glacial soils and groundwater depths are more variable, consisting of numerous perched groundwater zones within more permeable sand zones, which can vary seasonally.

Groundwater wells

We identified many documented water wells within one-half mile of the Bellevue to Lynnwood Improvement project area based on the Ecology Well Database (Ecology 2006). The list of wells includes both resource investigation wells (monitoring wells) and water supply wells. Many of the wells in the Ecology database may not currently exist or may not be currently operational. Exhibit 5.6-2 shows the location of the single Group B classified groundwater supply well (DOH 2007). Group B wells serve between two and 14 households. The Group B groundwater well is owned and operated by Wellington Greens Water System, which serves a small homeowners association in Woodinville. The well provides potable water to six households, and is approved to serve an additional three

connections. No Group A groundwater wells (defined as serving 15 or greater households) are located downgradient of the I-405 Corridor.

Sole-source aquifers

The Safe Drinking Water Act provides special protection to aquifers where there is no physically, legally, or economically feasible alternative source, and where the aquifer supplies at least 50 percent of the area's drinking water. The designation is established by the EPA, which has the authority to restrict certain activities in these areas. There are no sole-source aquifers within the project area. One sole-source aquifer, called the Cross Valley Aquifer, is located east of the project area (see Exhibit 5.6-2).

What is water quality like now in the project area?

The project area creeks and the Sammamish River are designated as Core Summer Salmonid Habitat under Chapter 173-201A-600 of the Washington Administrative Code (WAC), as adopted by Ecology. Water quality criteria have been established by Ecology to support the Core Summer Salmonid Habitat Use.

Water bodies that are water quality limited do not meet state water quality standards for one or more parameters, and technology-based controls are not sufficient to achieve water quality standards.

The purpose of the 303(d) list is to allow the State to prioritize water bodies for protection. A water body on the 303(d) list is required to undergo a "total maximum daily load" (TMDL) study that leads to an allocation of the allowable input of the pollutants so that water quality standards can be achieved. There have been no TMDL studies conducted for the project water bodies, with the exception of the fecal coliform TMDL study recently completed for North Creek (Ecology 2002). Fecal coliform is not a highway product.

What is total maximum daily load (TMDL)?

A TMDL is part of the water clean up plan for each water body on Ecology's 303(d) list. It is a calculation of the maximum amount of a pollutant that a water body can receive and still meet State water quality standards. Percentages of the TMDL are allocated to the various pollutant sources.

The *Statewide Water Quality Assessment 303(d) List* (Ecology 2008) indicates that Yarrow Creek (at Yarrow Bay), Juanita Creek, the Sammamish River, and North Creek are water quality limited (Ecology 2008). North Creek is listed as water quality limited because of low levels of dissolved oxygen in Snohomish County and because of temperature downstream

of the project in King County. The Sammamish River is listed because of elevated fecal coliform and low levels of dissolved oxygen. Juanita Creek is listed because of elevated temperatures, elevated fecal coliform, and low levels of dissolved oxygen. Lake Washington is also listed on the 303(d) list because of elevated fecal coliform at the downstream end of Forbes Creek, the NE 85th Street storm drainage system, and Yarrow Creek. Yarrow Creek is also listed due to low levels of dissolved oxygen. Water bodies that are water quality limited do not meet state water quality standards for one or more parameters, and technology-based controls are not sufficient to achieve water quality standards.

How will construction activities affect water resources?

Surface water and floodplains

Both build alternatives will be constructed in accordance with federal and state technical guidance, permit requirements, and WSDOT design and construction 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, detention ponds, and other BMPs provided during construction will help prevent downstream flooding, erosion, and sedimentation. Exhibit 5.6-3 shows the permanent and temporary stream and stream buffer effects from the construction and operation of the project.

Exhibit 5.6-3: Summary of permanent and temporary stream and stream buffer effects

Stream	Permanent stream effects (sq ft)	Temporary stream effects (sq ft)	Permanent buffer effects (sq ft)	Temporary buffer effects (sq ft)
Yarrow Creek	0	0	10,105	4,195
Juanita Creek at NE 145th (west of I-405)	0	0	8,340	0
Juanita Creek at NE 145th (east of I-405)	0	0	2,890	650
C28	470	0	260	605
C29	354	0		0
KL14	0	0	3,537	0
Stream 42	173	0	9,897	0
Sammamish River	450	400	1,775	2,280
Total	1,447 (0.03 acre)	400 (0.01 acre)	36,804 (0.84 acre)	7,730 (0.18 acre)

Groundwater

Project operation will result in negligible effects on groundwater. Pollutant loads and potential effects from pollutants on groundwater will generally decrease slightly as a result of improved stormwater management. 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 baseflows downstream of the project.

In Snohomish County, areas of low to moderate aquifer sensitivity, which are classified by Snohomish County as critical aquifer recharge areas, exist within the study area. Roadway construction and operation is allowed within these critical aquifer areas. WSDOT will require an Environmental Compliance Plan that includes a Temporary Erosion and Sediment Control (TESC) Plan and a Spill Prevention, Control, and Countermeasures (SPCC) Plan to be complete and accepted by WSDOT prior to the start of construction

activities. These plans will specify the BMP measures used to prevent groundwater contamination along the entire project including any special measures applicable to the moderate groundwater sensitivity areas.

Water quality

WSDOT does not anticipate adverse water quality effects during construction because appropriate measures to avoid or minimize effects will be employed. BMPs will minimize short-term erosion effects associated with clearing and grading activities, such as increased turbidity and sedimentation in receiving waters. See Chapter 6 for measures that will be followed to minimize or avoid effects to water resources during construction.

How will the completed project affect water resources?

Surface water and floodplains

What is infiltration?

Infiltration is the passage of water through the soil surface into the subsoil. Infiltration is one way drainage flows are controlled. If soil has a good infiltration rate, then infiltration is often integrated as part of the surface water management approach.

When pervious surfaces, such as soil and vegetation, are converted to an impervious surface, such as pavement, stormwater cannot infiltrate into the ground and stormwater runoff increases. When natural ground cover is changed to a smooth impervious surface, runoff velocity also increases. Increased runoff volume and velocity can cause erosion of stream banks, scouring of streambeds, and increase flooding risks.

Both of the Build Alternatives will increase impervious area by about 18.2 acres which is about an eight percent increase from the No Build Alternative. The Build Alternatives will include adequate detention (flow control) facilities to prevent increases in peak flows and velocities or downstream flooding as a result of the greater impervious areas.

The design approach to stormwater quality treatment for the Build Alternatives will be to expand on existing treatment facilities. Opportunities for infiltration will be pursued during the course of the final design. Exhibit 5.6-4 describes the existing and proposed stormwater quality treatment facilities in each basin.

Exhibit 5.6-4: Summary of existing and conceptual stormwater treatment facilities[5]

Basin	No Build Alternative Stormwater Treatment Facilities	Build Alternatives Stormwater Treatment Facilities
Yarrow Creek	Media filter drain treatment facilities that would be able to treat 2.08 acres.	Add stormwater treatment as media filter drain facilities to treat 0.30 acres and modify the detention pond as an infiltration pond that will treat an additional 2.04 acres for a total of 4.43 acres treated.
East Lake Washington	Media filter drain treatment facilities that would be able to treat 1.05 acres.	Add stormwater treatment as media filter drain facilities that will treat 4.70 acres and add a new combined stormwater treatment wetland/detention pond that will treat an additional 1.03 acres for a total of 6.78 acres.
Forbes Creek	Media filter drain treatment facilities that treat 14.01 acres.	Build additional media filter drain treatment facilities that will treat 1.94 acres for a total of 15.95 acres.
Juanita Creek	Media filter drain treatment facilities that treat 13.62 acres and a combined stormwater treatment wetland/detention pond that would be able to treat 1.32 acres.	Add stormwater treatment as media filter drain facilities that will treat 5.69 acres and add two new combined stormwater treatment wetland/detention ponds that will treat 1.30 more acres for a total of 21.93 acres treated.
Sammamish River	Media filter drain treatment facilities that treat 1.48 acres and a combined stormwater treatment wetland/detention pond that would be able to treat 1.05 acres.	Add media filter drain treatment facilities that will treat 8.11 acres and a stormwater treatment wetland pond that will treat an additional 10.73 acres for a total of 21.37 acres.
North Creek	Media filter drain treatment facilities that treat 4.97 acres. 0.19 acres of existing runoff was constructed early as mitigation for this Project.	New media filter drain treatment facilities that will treat and additional 0.13 acres for a total of 5.10 acres.

[5] *Conceptual designs as noted here may change during final design. The intent would be to provide equal or greater levels of treatment or equivalent treatment BMPs or both as the design continues.*

The Build Alternatives will not substantially change existing stormwater drainage patterns with the exception two new outfalls to the Sammamish River. In this location, the new conveyance system will divert a portion of on-site and off-site runoff to a new discharge on the south bank of the Sammamish River. The resulting new drainage pattern will relieve flow from critical drainage and landslide areas. The other new outfall to the Sammamish River will discharge on the north bank from a new treatment facility.

In other locations, highway runoff will discharge to receiving waters through existing outfalls or through new outfalls that following existing drainage patterns. The highway runoff will continue to discharge to existing storm drains or conveyances, and ultimately reach Lake Washington.

The design criteria for the proposed stormwater facilities are described in the *I-405, Bellevue to Lynnwood Improvement Project Conceptual Hydraulic Summary* (WSDOT 2011p). The primary reference is WSDOT's *Highway Runoff Manual* (HRM) (WSDOT 2010a).

Locations of proposed stormwater facilities are shown on Exhibit 4-2, sheets 1 through 17, in Chapter 4, Project Description.

Groundwater

Project operation will result in negligible effects on groundwater. Pollutant loads and potential effects from pollutants on groundwater will generally decrease slightly as a result of improved stormwater management. 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.

Water quality

Both of the Build Alternatives will each increase impervious area by about 18.2 acres which is about an eight percent increase from the No Build Alternative. Although the Build Alternatives will have more impervious area than the No Build Alternative, the Build Alternatives will have lower pollutant loads for the project corridor than the No Build Alternative because they will treat stormwater from both new and existing impervious surfaces. Total and dissolved copper and zinc pollutant loads will be about two to four percent

lower with the Build Alternatives. Currently, a portion of the existing impervious surfaces discharges without treatment. Overall, the project will result in a negligible change in pollutant loads to the project area water bodies.

What would happen to water resources if WSDOT did not build this project?

There would be no construction activities with the No Build Alternative; therefore, no effects on the water resources in the study area would occur.

The stormwater treatment improvements proposed as part of the project would not be implemented and the pollutant loading and critical drainage and landslide areas (Stream KL14 and Riverside Drive) in the Sammamish River basin would remain.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood Improvement Project. For specific measures that pertain to Water Resources, please see Chapter 6.

Will the project have unavoidable adverse effects on water resources?

The build alternatives include design and implementation of a stormwater management system including best management practices (BMPs) and other treatment of highway runoff treatment and flow control that meet applicable federal, state, and local standards. These stormwater management features are an integral part of the project. We do not anticipate unavoidable adverse effects to water resources to result from either of the build alternatives.

A complete analysis of water resources in the project area is reported in Appendix S, I-405, Bellevue to Lynnwood Improvement Project Water Resources Discipline Report (WSDOT 2011n).

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5.7 Ecosystems

Ecosystem elements—wetlands, aquatic resources, and wildlife habitat—are protected by federal, state, and local laws because of their important ecological functions and social value. The Washington State Department of Transportation (WSDOT) has coordinated with federal, state, and local government agencies that regulate the resources in the project area. In this chapter, we identify wetlands, aquatic resources, and wildlife habitat found in the area and explain how the proposed project may affect them.

Forested wetland

Emergent wetland

Scrub-shrub wetland

How did WSDOT identify and evaluate ecosystems in the project area?

Wetlands

The I-405 Team first conducted a review of existing wetland information based on recommendations found in the Corps *Wetland Delineation Manual* (Environmental Laboratory 1987), the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Corps 2008), and the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997). The team reviewed recent aerial photographs of the study area, the National Wetland Inventory (USFWS 1987, 1988), and the 1990 King County Sensitive Areas Map Folio (King County 1990). The team also consulted local government information, including the 2010 publications of the City of Bellevue Land Use Code Critical Areas Overlay District (Bellevue 2010), the City of Kirkland Sensitive Areas Maps (Kirkland 2010), and the City of Bothell Critical Areas Regulations (Bothell 2010). The team referred to the Washington State Department of Fish and Wildlife (WDFW) Priority Habitats and Species database (WDFW 2006), and obtained additional information about the location of known hydric soils using maps published by the Natural Resources Conservation Service (NRCS) (NRCS 1995, 1998).

The team also reviewed the WSDOT Kirkland Nickel Project Wetlands Discipline Report (WSDOT 2005a) and Wetlands Biology Report (WSDOT 2005b), the WSDOT I-405/NE 195th

Street to SR 527 – Northbound Auxiliary Lane Project Wetland Impacts Report (WSDOT 2009b), and the NE 8th Street to SR 520 Braided Ramps Project Wetland Biology Report (WSDOT 2008a) to evaluate the wetlands delineated for those projects. In direct coordination with the regulatory agencies, we have determined the wetland delineations and functions information contained in these reports are still relevant for this project.

What is riparian habitat?

Riparian habitat is defined as the aquatic and terrestrial habitat adjacent to streams, lakes, estuaries, or other waterways.

Aquatic resources

Team members used the information collected on aquatic resources for the Kirkland Nickel Project as part of the baseline information for this project. During the fall of 2006, and the fall of 2010, project biologists collected additional information by conducting surveys of project area streams and rivers to determine the quantity and quality of in-stream and riparian habitats. For the Bellevue to Lynnwood Improvement Project, the I-405 Team conducted surveys for streams not previously surveyed in the Kirkland Nickel Project and completed reconnaissance-level stream surveys for streams studied for the Kirkland Nickel Project if effects to these streams could occur from this project. Tree surveys were conducted in September 2007 in seven stream corridors.

What is a wetland delineation?

Delineating a wetland means identifying the boundaries of a wetland based on the presence of three features: vegetation, soils, and hydrology.

Endangered Species Act Considerations

WSDOT prepared a Biological Assessment (BA) for the project, in compliance with the Endangered Species Act (ESA) that addressed potential adverse effects of changes to water quality on listed aquatic species (WSDOT 2007a). On December 11, 2008, the National Marine Fisheries Service concluded that the project "is not likely to jeopardize the continued existence of Puget Sound Chinook salmon, Puget Sound steelhead, or result in the destruction or adverse modification of designated critical habitat for Puget Sound Chinook salmon" (NMFS 2008). The US Fish and Wildlife Service concurred with WSDOT's "may affect, likely to adversely affect" determination for the bull trout on December 31, 2008 and provided mandatory terms and conditions intended to minimize certain adverse effects (USFWS 2008).

Wildlife habitat

The I-405 Team used land cover geographic information system (GIS) data received from King and Snohomish

counties, and from the Kirkland Nickel Project to identify the types and conditions of upland vegetation and habitat resources within the project area. Project biologists then field-verified the GIS data by comparing the mapped upland vegetation communities with actual cover types found in the project area. In addition, the team members collected background information on wildlife and plant species by reviewing plant and animal databases.

What ecosystems are located in the project area?

Exhibit 5.7-1 shows the wetland and aquatic resources, and wildlife habitat study areas along the 17-mile project corridor.

Wetlands

The I-405 Team identified 21 wetlands totaling 13.62 acres within the project area. Team members confirmed the delineations of the ten wetlands surveyed for the Kirkland Nickel Project where potential effects from the Bellevue to Lynnwood Improvement Project were identified. Team members also performed wetland delineations where proposed widening of the right of way and other associated improvements might affect wetlands that had not previously been delineated as part of the Kirkland Nickel Project.

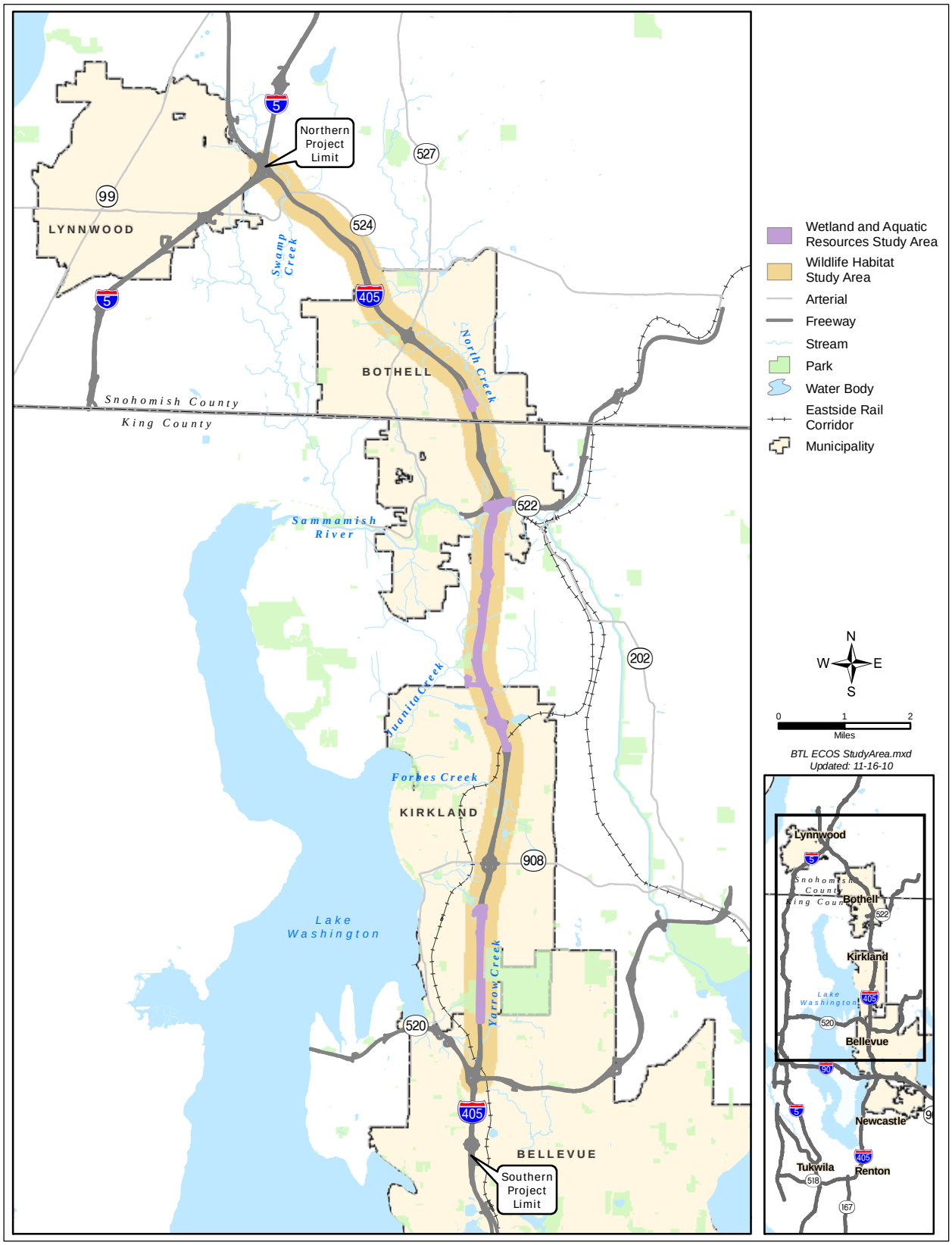
Wetland ratings

State and local resource agencies rate or categorize wetlands according to their relative rarity, importance, and function. Project biologists collected field data on most of the wetlands in the project area and categorized them according to the Washington State Department of Ecology (Ecology) rating system, and applicable local jurisdictions' rating systems. Please refer to the Wetland Biology Report, Bellevue to Lynnwood Improvement Project (WSDOT 2011o) for detailed examples of Ecology's wetland rating forms.

Ecology rating system

Under Ecology's rating system, three major wetland functions are analyzed: flood and erosion control; water quality improvement; and wildlife habitat. Once the wetland is rated, it is assigned to a category according to the following criteria:

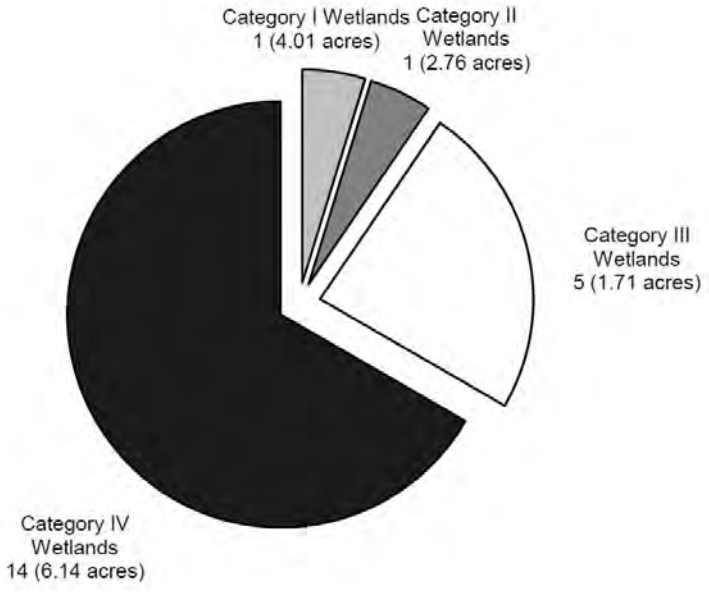
Exhibit 5.7-1: Ecosystems



- **Category I** wetlands represent a unique or rare wetland type, or are more sensitive to disturbance, or are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime.
- **Category II** wetlands are difficult, though not impossible, to replace, and provide high levels of some functions.
- **Category III** wetlands have a moderate level of function. They have been disturbed in some way and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- **Category IV** wetlands have the lowest levels of functions and are often heavily disturbed.

Exhibit 5.7-2 shows the acreage of the 21 wetlands in the project area assigned to each category.

Exhibit 5.7-2: Acreage of wetland types in the project area



Aquatic resources

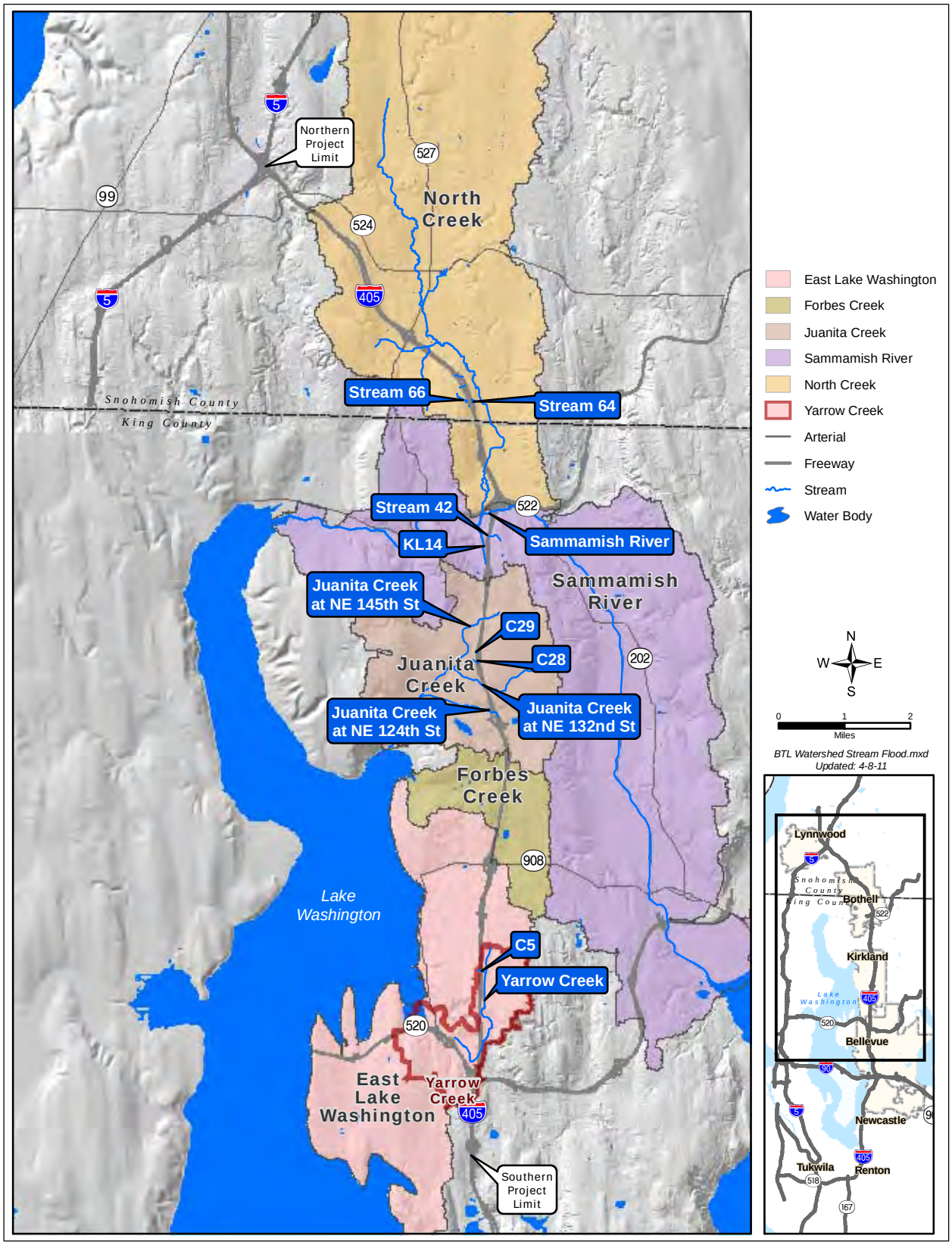
Watersheds and streams

There are five basins in the project area: East Lake Washington basin, Forbes Creek basin, Juanita Creek basin, Sammamish River basin, and North Creek basin. Of the sixteen streams in the project area, none is located in the Forbes Creek basin (Exhibit 5.7-3).

What is a watershed?

A watershed is 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.

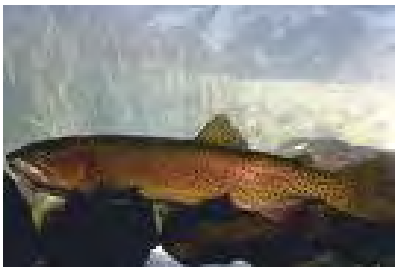
Exhibit 5.7-3: Project area basins and streams



The function and character of the project area streams have been altered by the effects of intensive residential development. Examples of land use activities that have altered the drainage characteristics include logging, vegetation clearing, new impervious surfaces, new buildings, placement of streams into culverts, and new water quality treatment and detention items such as ponds or detention facilities. Removal of native vegetation in and around streams, the addition of impervious surfaces, and the rerouting of stream channels changes the patterns and quantity of water and nutrients, recharge capabilities, and temperature regulation.

Large woody debris at Forbes Lake

Biologists conducted tree surveys for seven of the 12 streams in the project area. The purpose of the surveys was to identify the potential for large woody debris recruitment to each stream, specifically to identify tree presence (species and size), and the location of trees relative to the streams (impacted or not). Nine tree species were identified. The abundance of each species in the survey area is, in descending order, bigleaf maple (*Acer macrophyllum*), Douglas-fir (*Pseudotsuga menzeseii*), red alder (*Alnus rubra*), western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), black cottonwood (*Populus balsamifera* spp. *trichocarpa*), Garry oak (*Quercus garryana*), Sitka willow (*Salix sitchensis*), and Pacific willow (*Salix lucida* spp. *lasiandra*).



Cutthroat trout

While conducting tree surveys, we found many deciduous and evergreen trees (625 trees total) in the project area that have the potential to become large woody debris now and in the future. All of these trees are within the clearing and grading limits and some will likely be removed during construction. Therefore, the project likely will reduce large woody debris recruitment to streams in the project area.

Aquatic species

Despite altered habitat conditions, streams in the project area still support various species and life history stages of fish (Streamnet 2006). These streams—Yarrow Creek (also known as KL1), Juanita Creek and the Sammamish River—also serve as important migration corridors for various resident and anadromous fish. The primary resident fish species using these systems are cutthroat trout (*Oncorhynchus clarkii*), sculpin (*Cognas* species), stickleback (*Gasterosteus aculeatus*), and longnose dace (*Rhinichthys cataractae*). The primary

American crow

anadromous fish species migrating as well as rearing in these streams is coho salmon (*Oncorhynchus kisutch*) (Streamnet, 2006).

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.

On September 2, 2005, the National Marine Fisheries Service designated critical habitat for 19 ESUs of Pacific salmon and steelhead in Washington, Oregon, and Idaho, including the Puget Sound ESU of Chinook salmon (Federal Register 2005a). There is no designated Chinook salmon critical habitat in the study area.

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 (Streamnet 2006). Bull trout or Dolly Varden have rarely been observed in the Lake Washington system (excluding Chester Morse Lake) in the last 30 years, with only a few specimens recorded (Bradbury and Pfeiffer 1992, as cited in WDFW 2004).

On September 26, 2005, USFWS designated critical habitat for the Coastal-Puget Sound population of bull trout (Federal Register 2005b). There is no designated bull trout critical habitat in the study area.

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 (NMFS 2011).

Wildlife habitat

Based on the available habitat, wildlife species that commonly occur in urban areas also occur in the project area. This includes, but is not limited to, coyote (*Canis latrans*), opossum (*Didelphus virginianus*), raccoon (*Procyon lotor*), and other small

mammals. Domestic and feral wildlife, including dogs (*Canis familiaris*) and cats (*Felis catus*), are also likely to be present. Common bird species include American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), and red-tailed hawk (*Buteo jamaicensis*).

Special status wildlife

Based on the Washington Department of Natural Resources (WDNR) Natural Heritage Program (NHP), the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS), and the U.S. Fish and Wildlife Service (USFWS) databases, there are two special status wildlife species documented within one mile of I-405. Exhibit 5.7- shows these species, their status, and their documented occurrence in the project area.

Exhibit 5.7-4: Special status species documented in the project area

Species	Status No. of colonies/nests	
Great blue heron *Ardea heodias*	State monitor species 2 colonies	
Osprey *Pandion haliaeetus*	State monitor species 2 nests	

Two active osprey nests are located approximately one-quarter mile from I-405. One nest is located on the east side of I-405, between SR 522 and SR 527 (WDFW 2006). The other osprey nest is located in Hidden Valley Sports Park and is thought to be an alternate nest.

Two great blue heron colonies are within one mile of I-405. One colony exists near the I-405/I-5 interchange at the north end of the project, near Swamp Creek, and the second colony occurs north of SR 520 near the Yarrow Bay wetland complexes. In 1994, the Swamp Creek colony consisted of eight nests and, in 1996, there were 16 nests with ten great

What is a special status wildlife species?

Special status wildlife species include those listed as endangered or threatened under the Endangered Species Act (ESA); species that are candidates or are proposed for listing under the ESA; species of federal concern; and species listed by the Washington Department of Fish and Wildlife as endangered, threatened, candidate, sensitive, and other priority species.

What are State Monitor Species?

State monitor species are not considered species of concern by the Washington Department of Fish and Wildlife (WDFW). However, WDFW monitors these species for status and distribution to prevent them from becoming endangered, threatened, or sensitive.

blue herons. As of 2004, the colony is still active with nine to ten nests observed (WDFW, 2006). The great blue heron colony near the Yarrow Bay wetlands consisted of six nests during 1986-1987 King County surveys. This colony is still active.

Critical Habitat

The USFWS identifies designated critical habitat for marbled murrelet (*Brachyramphus marmoratus*) and northern spotted owl (*Strix occidentalis caurina*) in both King and Snohomish counties. However, no designated critical habitat occurs within the project area.

Vegetation

Project biologists identified four land cover types for upland vegetation in the project area: forested, shrubs and grasses, maintained vegetation, and impervious surface or area. Land cover in the project area totals 5,100 acres.

The forested land cover consists of vegetated areas where tree species with an average height greater than 20 feet are the predominant vegetation. Forested areas total approximately 1,625 acres, or approximately one-third of the total project area. In general, forested areas in the project area include stands where Douglas-fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*) are dominant. Mixed stands of deciduous trees, such as black cottonwood (*Populus balsamifera* spp. *trichocarpa*), red alder (*Alnus rubra*), and bigleaf maple (*Acer macrophyllum*) are common in forested areas adjacent to streams in the project area. Plant species common in the understory include vine maple (*Acer circinatum*), Himalayan blackberry (*Rubus armeniacus*), salmonberry (*Rubus spectabilis*), willows (*Salix* species), and sword fern (*Polystichum munitum*).

An estimated 245 acres, or five percent of the roadside area within in the project is covered in grass and shrub type plant communities.

Approximately 860 acres, or approximately 17 percent of the roadside area, is covered with a mixture of non-indigenous undesirable plant species and areas restored with native plant species. Non-native species are primarily Himalyan blackberry and Scot's broom. Restored areas are dominated by indigenous snowberry and Oregon grape interspersed with stands of coniferous and deciduous trees.

Special status vegetation

There are no known occurrences of special status plant species in the project area (WDNR 2006). The nearest special status plant species, giant golden chinquapin (*Chrysolepis chrysophylla*), is approximately one mile east of the project area.

How will construction activities affect ecosystems in the project area?

Both Build Alternatives have the same construction footprint. Construction effects on wetlands, aquatic resources and wildlife habitat are the same for both alternatives.

Wetlands

Permanent effects

To build the project, construction will need to occur in and adjacent to wetlands and their buffers. Of the total 13.62 acres of wetlands in the project study area, avoidance and minimization measures have reduced the permanently affected area to 0.38 acre. The largest portions of affected wetlands are Category III (0.14 acres) and IV wetlands (0.24 acres), which provide moderate to low functions.

The 0.38 acre of permanent impact arises from five wetlands that will be partially filled and three wetlands (21.4M, 21.5M, and 22.8R) that will be completely filled. Exhibit 5.7-5 shows the location of the wetlands affect by the proposed project. In addition, the project will convert approximately 1.21 acres of wetland buffer areas into new roadway facilities.

However, with the proposed mitigation to compensate for the loss of 0.38 acres, a positive contribution to wetlands will be realized. More and higher quality wetland areas will be created and enhanced than will be filled. For specific measures that pertain to wetlands, please see Chapter 6.

Exhibit 5.7-6 shows the number and area of wetlands permanently affected by wetland category.

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Exhibit 5.7-5: Wetlands affected by the proposed project

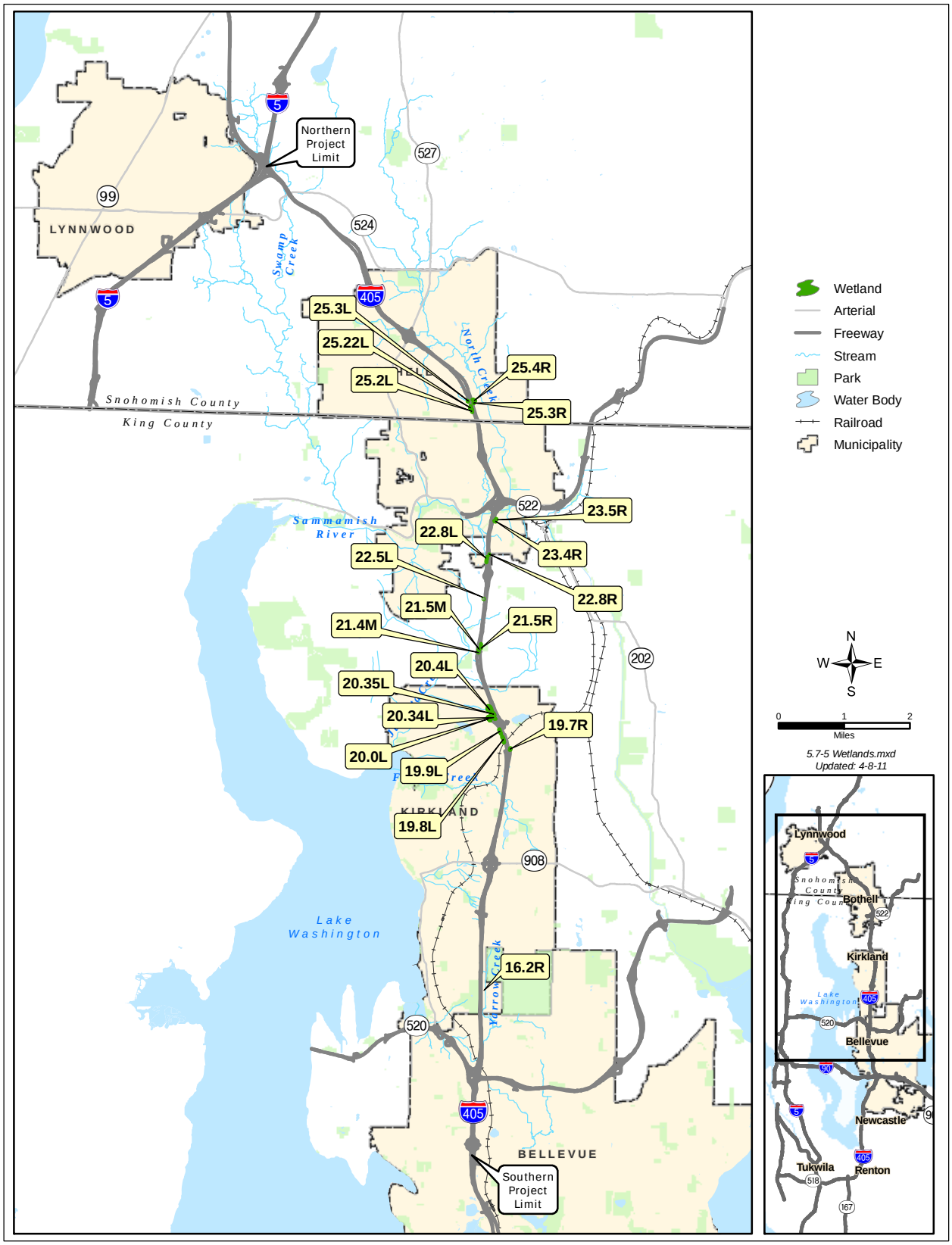
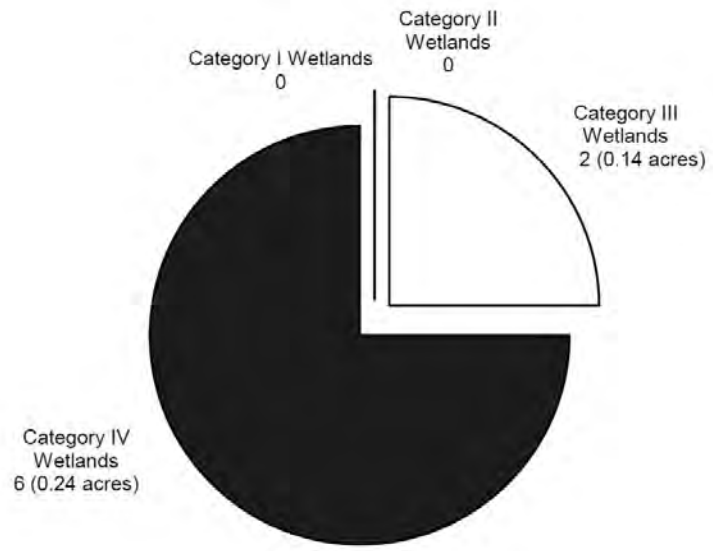


Exhibit 5.7-6: Proportion of permanent wetland effects by wetland category and number and area of affected wetlands



Temporary effects

WSDOT may need to temporarily place fill in wetlands and buffers to allow adequate room for construction activities. About 0.03 acres of wetlands will be temporarily affected out of a total of 13.62 acres of wetland in the project study area. About 0.47 acres of wetland buffer will be temporarily affected out of a total 26 acres of wetland buffer in the project study area.

These construction disturbances will result in a short-term loss of wetland functions. Erosion and sedimentation caused by construction activities could increase the amount of sediment settling within a wetland and reduce the quality of habitat available for invertebrate life and habitat for plants. Additionally, loose sediment may reduce the potential water quality and quantity benefits provided by those wetlands.

Aquatic resources

Permanent effects

Permanent effects to streams can result from construction activities occurring below the ordinary high water mark (OHWM) of the water body. Examples include placement of new structures and extension of culverts. In total, 0.03 acre of stream will be permanently affected by the project. The

primary effect to streams will be the loss of stream channel habitat in non-fish bearing streams.

Permanent effects from construction, such as the addition of impervious surfaces or extensions of culverts, may not necessarily compromise stream functions. Small changes to stream riparian zones resulting from this project will not detrimentally affect the stream's ability to support fish and other aquatic life.

A total of 0.84 acre of stream buffer also will be permanently affected by project construction. Permanent effects to stream buffers include removal of vegetation within the stream buffer that provides shade and cover, and conversion of stream buffer habitat.

Stream buffers regulate stream temperature through shading, contribute large woody debris and organic material, and provide bank stabilization. Removing vegetation from the stream buffer can permanently alter some of the stream's functions.

Temporary effects

Temporary effects include vegetation clearing, soil disturbance, and sedimentation during construction. The Sammamish River will experience temporary effects totaling 0.01 acre of stream. The buffers of four streams in the project area will be temporarily affected during construction, totaling 0.18 acre.

A summary of permanent and temporary stream and stream buffer effects is presented above in Exhibit 5.6-3 in the "Water Resources" section.

Wildlife habitat

Permanent effects

Approximately 17 acres of vegetation, equal to less than two percent of the project area, will be permanently removed and converted to impervious surface with the project. Of the 17 acres, 6.0 acres are forested habitat and 11 acres are maintained vegetation. The area of land cover permanently affected by project construction is very small (0.6 percent) relative to existing land cover in the project area.

The permanent loss of approximately 17 acres of vegetation will affect wildlife species in the study area. The permanent removal of 6 acres of forested land cover and 11 acres of

maintained vegetation will eliminate this habitat for wildlife species currently using these habitat types. Some wildlife species using these habitats will disperse elsewhere in the study area to locate available habitat.

Temporary effects

Approximately 55 acres of vegetation, equal to two percent of the project area, will be temporarily affected by construction activities such as clearing and grading. Of this total, 22 acres are forested habitat, 0.4 acres are shrubs and grasses, and 33 acres are maintained vegetation.

Temporary effects on wildlife species include noise associated with general and localized construction activities. Although resident wildlife are more adapted to urban environments and associated noise levels, some wildlife species will be affected during localized construction activities when noise levels noticeably increase. Noise can disturb wildlife by disrupting communication, interfering with mating, and reducing the ability to obtain sufficient food, water, and cover.

General construction equipment will generate maximum noise levels between approximately 69 and 106 A-weighted decibels (dBA) within 50 feet of the localized construction activity (WSDOT 2011g). Construction noise at locations more than 50 feet from the source will decrease at a rate of 6 dBA per doubling of distance from the construction activity. Based on the maximum noise level (106 dBA), noise levels will decrease to ambient noise levels at approximately 1,600 feet from the localized activity. Wildlife species within 1,600 feet of the localized construction activity may travel to similar habitats in the study area. More than 1,600 feet from the localized construction areas and activities, the effects of construction-related noise are expected to be minimal.

Due to the localized increases in noise levels, wildlife species are expected to move to other habitats in the study area. Increase in the number of animals moving into currently-inhabited areas may result in animals competing for shelter, resting, or foraging habitat. However, wildlife species will disperse to other areas only during these specific times and will most likely return to the general area upon completion of the construction activity.

How will the completed project affect ecosystems in the project area?

Wetlands

Most wetlands in the study area are currently affected by the lack of modern stormwater control, conveyance, and management facilities. Wetlands and the water quality functions they provide would likely continue to be affected by untreated runoff entering the wetlands, as well as by sediment transport and erosion. However, enhanced water quality treatment will improve the quality of water entering some wetlands in the study area.

Aquatic resources

Effects on aquatic resources will result from the operation of stormwater facilities, including culverts, installed or extended during project construction. Stormwater facilities, which include detention ponds and ecology embankments, will collect runoff from all new impervious surfaces created by the project. The water will be treated for enhanced water quality before discharge to streams or the Sammamish River. Enhanced treatment will remove more contaminants such as copper and zinc, than untreated water. This will improve the quality of water entering streams in the project area.

Effects to stream base and peak flows are not anticipated because stormwater flow control facilities will be maintained or improved by the project to maintain existing base and peak flows to streams in the study area.

Wildlife habitat

Operation of the project is not anticipated to affect wildlife habitat. As noted above in the project construction discussion, wildlife species in the study area are more adapted to urban environments and associated noise levels. Thus, noise levels from the additional vehicle traffic on I-405 are not anticipated to affect wildlife species in the study area.

Maintained vegetation in the right of way will be mowed and maintained for safety purposes. This land cover type will still provide poor habitat for wildlife in the study area. No other operational effects to wildlife habitat are anticipated with the Build Alternatives.

What would happen to ecosystems if WSDOT did not build this project?

Operational effects to wetlands and aquatic resources will occur under the No Build Alternative. Both wetlands and streams in the study area that currently receive untreated runoff would likely continue to be affected by these conditions. Water quality functions provided by wetlands and stream water quality would continue to be affected by sediment transport and erosion. Minor routine roadway safety improvements would continue to take place. Maintained vegetation in the right of way would be mowed and maintained for safety purposes. This land cover type would still provide poor habitat for wildlife in the study area. No other operational effects to wildlife habitat are anticipated under the No Build Alternative.

WSDOT proposes mitigation measures to avoid or minimize effects to human health and the environment during construction and implementation of the Bellevue to Lynnwood Improvement Project. For specific measures that pertain to Ecosystems, please see Chapter 6.

Will the project have unavoidable adverse effects on ecosystems?

The Bellevue to Lynnwood Improvement Project will be designed to avoid effects to wetlands, aquatic resources, and wildlife habitat to the extent practicable. Project elements, such as locating project features away from these resources, will be incorporated throughout the design of the project. However, the project will result in effects to wetlands, streams and rivers, and upland vegetation that cannot be avoided due to the project design.

The permanent impact to 0.42 acres of streams and wetlands cannot be avoided due to the current roadway design. Wetlands and their buffers will incur effects that will compromise their ability to provide water quality, hydrologic, and habitat functions. Four of the 12 streams in the study area, totaling 0.03 acre of stream channel, will be permanently affected by roadway widening or culvert extensions. The stream buffers of six of the streams (a total of 0.84 acre) will be permanently affected by the project.

The project will result in the permanent loss of 17 acres of upland vegetation (6.0 acres of forested habitat and 11 acres of maintained vegetation). Wildlife habitat will incur effects that will result in habitat fragmentation and reduction of specific habitat types in the study area.

In addition to these direct effects, each of these elements could also experience effects that are delayed or distant from the project area.

All project effects to ecosystems in the study area will be mitigated in accordance with the requirements of applicable local, state, and federal laws. This mitigation will provide a means to off-set project effects and potentially improve the condition of the overall ecosystem in the study area.

A complete analysis of ecosystems in the project area is reported in Appendix I, I-405, Bellevue to Lynnwood Improvement Project Ecosystems Discipline Report (WSDOT, 2011d).

5.8 Cumulative Effects

Cumulative effects are important to consider during the construction and operation of a project because they can be either positive or adverse, and they ensure that project actions are not considered in isolation. This analysis expands on the cumulative effects analysis presented in the Washington State Department of Transportation (WSDOT) I-405 Corridor Program Final EIS by addressing how cumulative effects may affect the area within and surrounding the proposed project.

What are cumulative effects and why do we study them?

The Council on Environmental Quality[6] defines cumulative effects as:

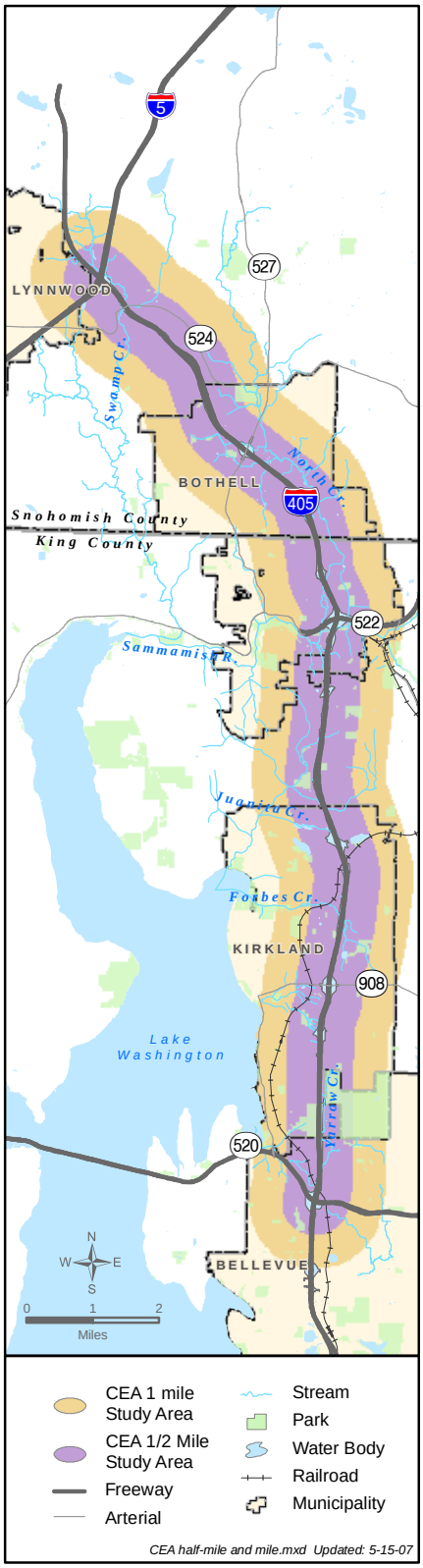
> *"The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions."* [7]

We examine cumulative effects recognizing that WSDOT and other agencies, jurisdictions, and private developers are advancing a variety of other transportation and non-transportation projects in the same timeframe, with many of these projects located near the proposed Bellevue to Lynnwood Improvement Project. It is important to consider if meaningful cumulative effects might result from a collection of individually minor but collectively noticeable actions taking place over a period of time.

[6] *The federal agency charged with implementing the National Environmental Policy Act.*

[7] *40 CFR 1508.7 Protection of Environment, Council on Environmental Quality, Cumulative Impact*

Exhibit 5.8-1: Cumulative effects geographic boundaries



Cumulative effects can be positive or negative, depending on the environmental resource being evaluated. Some environmental resources can be both positively and negatively affected by the same project.

How does this cumulative effects analysis relate to the analysis in the I-405 Corridor Program Final EIS?

For the cumulative effects analysis for the Bellevue to Lynnwood Improvement Project, WSDOT analysts used the cumulative effects analysis in the *I-405 Corridor Program Final EIS* as a starting point. The I-405 Corridor Program cumulative effects analysis focused on air quality, energy, fish and aquatic resources, surface water, and wetlands.

For the Bellevue to Lynnwood Improvement Project, we analyzed four environmental resources—air quality, surface water, wetlands, and aquatic resources. We based our analysis on project scoping, agency consultations, and the anticipated direct and indirect effects on these resources resulting from the proposed project, and the other projects considered in this cumulative effects analysis (see page 5.8-3). We have also included a discussion of the relationship of the project construction and operation to climate change and greenhouse gas emissions.

For the project-level analysis, neither energy nor farmlands (disciplines that are typically considered when assessing cumulative effects) were included. WSDOT did not analyze energy because the difference in energy consumption at the regional level is expected to be inconsequential. Both build alternatives have the same construction footprint and amount of pavement and structures. For this reason, there will be no difference between the two build alternatives in construction effects on greenhouse gas emissions. We also determined that farmlands will not be affected by the project.

What time and geographic boundaries did WSDOT use for this analysis?

The geographic boundary for the project-level air quality analysis is one-half mile from the centerline of the project. This boundary enabled WSDOT to consider 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 project-level wetlands, surface water, and aquatic habitat analyses are one mile from the centerline of the project. By expanding this geographic boundary beyond the area of direct effects considered for the project, we were able to conduct a more comprehensive analysis of the cumulative effects on the environmental resources. This geographic boundary included the area evaluated in the biological assessment (BA) that was prepared for the project under the Endangered Species Act (ESA).

The time period from 1974 through 2040 was chosen for the four environmental resources analyzed. The starting year, 1974, is when the region became "non-attainment" for carbon monoxide (CO_2) air quality standards. The ending year, 2040, is the regional planning year for land use, transportation and air quality. The "Transportation 2040" (PSCOG 2010) Metropolitan Transportation Plan was adopted in May 2010 and is based on the adopted regional land use plan, and the basis for analysis of project conformity to the State Implementation Plan (SIP) for compliance with the federal Clean Air Act (CAA). The air quality analysis for the Bellevue to Lynnwood Improvement Project uses the 2040 planning year.

How did WSDOT identify other projects to include in this analysis?

We consider other project effects when those projects are within or near the geographic boundaries and timeframe used for this project's cumulative effects analysis. To be considered, other projects must also be reasonably foreseeable, which typically means they are planned, approved, and funded. Specific projects considered in this cumulative effects analysis are:

- SR 520 Bridge Replacement and High-occupancy Vehicle (HOV) Project (WSDOT);
- I-405, NE 8th Street to SR 520 Braided Crossing Project (WSDOT);
- North Creek Interceptor (NCI) and Olympus Meadows Trunk (OMT) Improvements (Alderwood Water and Wastewater District/King County Wastewater Treatment Division); and

- Brightwater Conveyance System, North Creek Portal (King County Wastewater Treatment Division).

How will construction activities contribute to cumulative effects?

Air quality

We anticipate that project construction will produce temporary effects on air quality such as: (a) increases in particulate emissions; (b) carbon monoxide (CO) and oxides of nitrogen (NO_x) in the exhaust of construction equipment; (c) increases in CO and NO_x emitted from vehicles that may be 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.

No indirect effects associated with air quality changes from construction of the Bellevue to Lynnwood Improvement Project are expected.

Construction-related cumulative effects on air quality resulting from the Bellevue to Lynnwood Improvement Project in combination with other projects will likely be localized, temporary, and of low magnitude with mitigation measures in place. Effects will be minor because of the distance between the projects and their respective schedules, duration, and characteristics.

Surface water

Construction of the Bellevue to Lynnwood Improvement Project could temporarily increase runoff volumes. However, construction in accordance with federal and state technical guidance, permit conditions, and WSDOT project specifications, will include the use of best management practices (BMPs) to control the rate of runoff and, where practical, retain runoff on the site. Effects will be localized, temporary, and of low magnitude should they occur.

Increased runoff during construction could increase the total suspended solids in the receiving waters, negatively affecting fish and organisms living in the waters. These effects are anticipated to be localized, temporary, and of low magnitude should they occur.

The project will incorporate numerous regulatory requirements and permit conditions (for example, the National

Pollutant Discharge Elimination System [NPDES] Construction Stormwater Permit conditions) designed to avoid and minimize adverse effects related to water quality and quantity of runoff. Assuming that similar mitigation measures will be followed for the other projects considered in this cumulative effects analysis, adverse construction-related cumulative effects on surface water should be temporary and of low magnitude.

Wetlands

Construction will require work in and adjacent to wetlands (see Exhibit 5.7-5 in the previous chapter). Portions of eight wetlands, totaling 0.38 acres, and 1.2 acres of wetland buffer, will be permanently filled. Additionally, approximately 0.03 acres of wetlands and 0.47 acres of wetland buffers will be temporarily disturbed, resulting in a short-term reduction or loss of wetland functions. WSDOT will restore the affected wetlands and wetland buffers after construction is completed. Restoration will include replanting with appropriate vegetation according to a project-specific restoration plan.

With the proposed mitigation to compensate for the loss of 0.38 acres, a positive contribution to cumulative effects to wetlands will be realized. More and higher quality wetland areas will be created and enhanced than will be filled. The SR 520 Bridge Replacement and HOV Project and the I-405, NE 8th Street to SR 520 Braided Crossing Project will also create or enhance more acres of wetlands than are filled or permanently impacted.

The North Creek Interceptor and Olympus Meadows Trunk Improvements Project will temporarily affect wetlands and 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.

Aquatic resources

The I-405 Corridor Program FEIS (Washington, 2002) described the longstanding trend in Washington and the corridor study area of increasing regulation of aquatic habitat alteration. In 1949, the state legislature passed a law giving the Washington Department of Fish and Wildlife (WDFW) jurisdiction over activities in or near state waters. In the 1980s

and 1990s, all local municipal jurisdictions in the I-405 study area adopted sensitive areas ordinances which typically establish restrictions on disturbance of aquatic habitat.

Cumulative effects under the corridor selected alternative would be slightly higher pressure for growth in the north and south of the corridor study area. The growth pressure effects in the corridor study area are not likely to result in substantial effects to fish.

Within the Bellevue to Lynnwood Improvement Project study area, some aquatic habitats will experience temporary and permanent direct effects from project construction. There will be some loss of existing stream habitat in some streams. Some streams will also experience flow modifications and increases in the length of the stream carried in a culvert. Some project features will require construction below the ordinary high water mark (OHWM), within riparian zones, or within buffers for some streams. Because most of the existing riparian vegetation in the aquatic resources study area is moderately to severely degraded, we do not expect effects from project construction on the riparian vegetation to be substantial.

The specific project elements that will affect aquatic resources are:

- Widening pavement northbound near Yarrow Creek;
- Enclosing median streams C28 and C29 in culverts; and
- Adding a northbound lane and constructing stormwater improvements in the vicinity of stream KL14.

The SR 520 Bridge Replacement and HOV Project, in particular, will involve substantial in-water work. Potential construction effects, including loss of riparian vegetation, temporary increased sedimentation, 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 regulatory agencies, and by including avoidance measures in the project design.

The I-405, NE 8th Street to SR 520 Braided Crossing Project will construct new roadways and roadway structures (culverts for example) within or near the unnamed tributary to Sturtevant Creek. The primary effect to this stream is the loss of stream channel habitat. Construction activities will also clear riparian vegetation within the stream buffer. This will

remove vegetation that provides shade and cover to the stream and for aquatic species. However, since the unnamed tributary to Sturtevant Creek's stream buffer is degraded, construction activities in the study area are not likely to cause substantial effects. In addition, the proposed stream mitigation, already constructed on the unnamed tributary to Sturtevant Creek, provides higher quality stream channel and buffer than the impacted area.

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

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

Climate change – greenhouse gas emissions

Vehicles emit a variety of gases during their operation; some of these are greenhouse gases (GHGs). The GHGs associated with transportation are water vapor, carbon dioxide (CO_2), methane (also known as "marsh gas"), and nitrous oxide (used in dentists' offices as "laughing gas"). Any process that burns fossil fuel releases CO_2 into the air. Carbon dioxide makes up the bulk of the emissions from transportation.

National estimates show that the transportation sector (including on-road vehicles, construction activities, airplanes, and boats) accounts for almost 30 percent of total domestic CO_2 emissions. However, in Washington State, transportation accounts for nearly half of GHG emissions because the state relies heavily on hydropower for electricity generation, unlike other states that rely on fossil fuels such as coal, petroleum, and natural gas to generate electricity. The next largest contributors to total GHG emissions in Washington are fossil fuel combustion in the residential, commercial, and industrial sectors at 20 percent; and electricity consumption, also 20 percent. Exhibit 5.8-2 shows the gross GHG emissions by sector, nationally and Washington State.

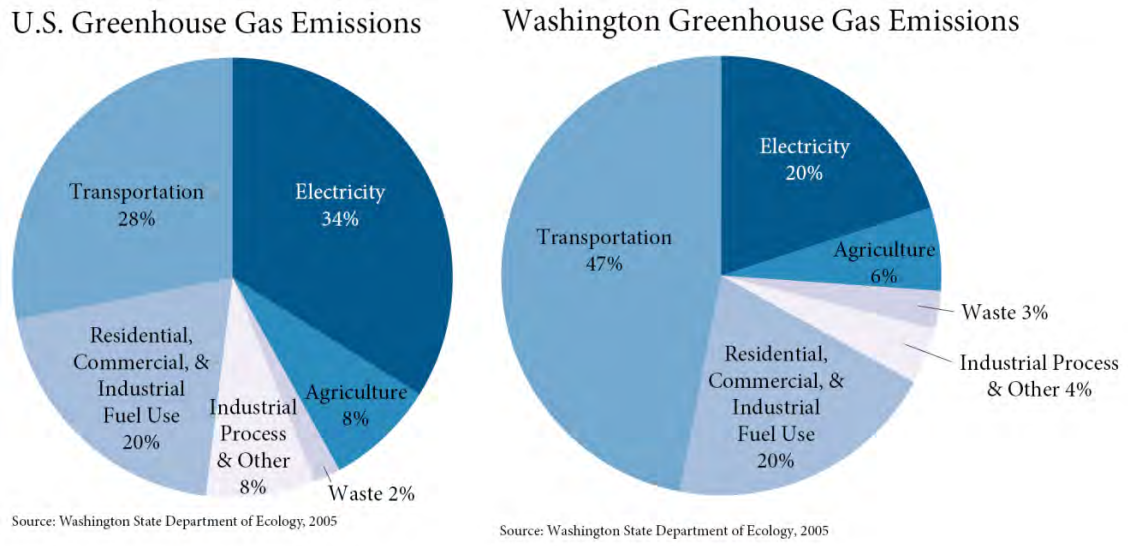
What efforts are underway to reduce greenhouse gas emissions in Washington State?

In 2007, Governor Gregoire and the legislature set greenhouse gas reduction goals for Washington State:

- 1990 greenhouse gas levels by 2020;
- 25 percent reduction below 1990 levels by 2035 ; and
- 50 percent reduction by 2050.

Also in 2007, the Climate Advisory Team was formed by Governor's Executive Order 07-02 to find ways to reduce greenhouse gas emissions. The final report included 13 broad recommendations, many of which are now being implemented.

Exhibit 5.8-2: Greenhouse gas emissions by sector for the US and Washington State (2005)



In March 2008, the Governor signed Washington's Climate Change Framework/Green-Collar Jobs Act (HB 2815), which was developed with the help of a broad coalition of business, environment, education, labor and energy leaders. This law includes, among other elements, statewide per capita VMT reduction goals as part of the state's GHG emission reduction strategy. The final report and other information on the process are available at: http://www.ecy.wa.gov/climatechange/2008CAT_overview.htm.

In 2009, the Governor issued Executive Order 09-05. Under the order WSDOT is currently leading an effort to evaluate the changes needed in transportation, including reductions in VMT, to meet the state's greenhouse gas reduction goals. The agency is collaborating with businesses, environmental groups, transportation advocates, and local and regional jurisdictions to complete this work. WSDOT promotes effective, measurable, and balanced emission reduction strategies.

How will this project minimize emissions while under construction?

Construction of the project is currently planned to last three and one-half years, from 2012 to 2015. The project traffic control plan includes detours and construction timing designed to minimize delays and inconveniences to travelers. WSDOT will delineate active construction areas, staging areas, and material transfer sites in a way that reduces standing wait times for equipment.

How will the completed project contribute to cumulative effects?

Air quality

I-405 Corridor Program FEIS (WSDOT, 2002) described a national and regional trend of decreasing pollutant emissions from transportation sources, even as average weekday vehicle miles increased from 30 million vehicle miles in 1981 to 65 million vehicle miles in 1999. Regionally, maximum measured CO concentrations decreased over the 1978 to 1998 twenty-year period. This trend has continued over the 1998 to 2008 ten-year period (PSCAA, 2009).

The Bellevue to Lynnwood Improvement Project will not cause any National Ambient Air Quality Standards (NAAQS) exceedences for CO, which indicates that it will meet the U.S. Environmental Protection Agency (EPA) project-level and regional conformity requirements (WSDOT 2011a). We do not anticipate any indirect effects associated with air quality changes resulting from operation of the Bellevue to Lynnwood Improvement Project.

The Bellevue to Lynnwood Improvement Project will add capacity to I-405, and, as a result, decrease congestion and improve traffic flow. The benefits to air quality should be

realized through 2040 (WSDOT 2011a). The other HOV and transit projects included in the cumulative effects analysis may also help improve the transportation system's efficiency and decrease existing CO levels in parts of the air quality project 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.

Surface water

The I-405 Corridor Program FEIS evaluated cumulative surface water effects on the 134,000 acres of the corridor study area. The study area was estimated to have about 43,000 acres of impervious area in 2000 and an additional 10,500 acres of impervious area added by 2020. The corridor selected alternative was estimated to add 974 acres of the 10,500 acres of new impervious area. The introduction of stormwater management practices and controls beginning ion the 1970s and 1980s has reduced the rate of hydrologic and water quality degradation in developing areas.

The Bellevue to Lynnwood Improvement Project will add approximately 10 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 (WSDOT 2010a), and Ecology's Stormwater Management Manual for Western Washington (Ecology 2005), so that stormwater discharges from the highway will meet the water quality and peak discharge criteria required by state and local authorities (WSDOT 2011n). The project will include detention facilities to prevent increases in peak flows and velocities or downstream flooding from the additional impervious surface area. Existing runoff patterns will be altered at two new outfalls to the Sammamish River.

Groundwater hydrology could be altered because of the increased impervious surface area. However, the increase should not substantially affect the total amount of recharge to the shallow aquifers near the project; the majority of recharge to these aquifers is from drainage areas beyond the project's physical limits, or footprint (WSDOT 2011n).

Similar to the Bellevue to Lynnwood Improvement Project, the I-405, NE 8th Street to SR 520 Braided Crossing Project, and the SR 520 Bridge Replacement and HOV Project also will

improve water quality by retrofitting water quality treatment facilities to treat some of the existing impervious area that is not currently being treated. The other projects included in this cumulative effects analysis will comply, at a minimum, 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 in the project area should result.

Wetlands

The state of Washington lost an estimated 31 percent of its wetlands prior to 1980 (WSDOT, 2002). More than 90 percent of wetlands in urban areas have been lost. Since 1980, wetlands have been identified as providing important economic and environmental functions. Washington adopted state goals for no net loss of acreage or ecological function of wetlands in 1989. The 1990 Growth Management Act and later amendments require all counties and cities to adopt regulations for controlling development pressures on wetlands and other critical areas. While the goal of "no net loss" has not been met, the rate of wetland loss is decreasing while the effectiveness of wetland restoration and replacement activities is increasing.

The I-405 corridor selected alternative was estimated to increase pressure for growth in the north and south of the corridor study area. The growth pressure effects are not likely to result in substantial effects to wetlands.

Some wetlands that exist within the Bellevue to Lynnwood Improvement Project 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 project construction will continue to be affected by such 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. We do not anticipate indirect effects from project operation.

Proposed compensatory wetland mitigation will provide high-quality wildlife habitats away from roadside intrusions. Other projects considered in this cumulative effects analysis could also positively affect wetlands through their compensatory

mitigation. Operation of the SR 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. Improved conditions may result from those projects retrofitting water quality treatment, and by further treating discharges from the new impervious surfaces.

Aquatic resources

Proper maintenance and continued operation of the Bellevue to Lynnwood Improvement Project's water treatment facilities, culverts, and fish passage facilities, when combined with those associated with the SR 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.

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.

Climate change – greenhouse gas emissions

For 30 years, WSDOT has supported carpooling, vanpooling, and public transportation through the funding, building, and maintenance of the freeway HOV system, ferries, rail, and other programs. WSDOT has an Incident Response Team (IRT) of 55 vehicles that patrol 500 miles of highway, including the I-405 corridor and connecting highways to clear blocking incidents quickly and safely. IRT clears 98.6 percent of all incidents in less than 90 minutes, reducing the amount of time motorists spend sitting and idling in traffic.

The most valuable contributions are found in the delivery of well-planned transportation improvements. WSDOT and our partners are actively implementing the 2005 Transportation Partnership Act, a 16-year plan to meet Washington State's most critical transportation needs. Many of these local, regional, and statewide transportation system improvements, including the Bellevue to Lynnwood Improvement project, work in conjunction with ongoing programs to help reduce the number of miles that vehicles need to travel each year. Together these efforts combine to create more efficient driving conditions, offer mode choices, and help move us implement GHG reduction goals.

What is WSDOT's approach to climate change at the project level?

In our work, we have found that the GHG emissions from a single project action are usually very small. Often emissions are reduced by completed projects which can improve the efficiency of the transportation corridor. However, overall, users of the transportation system contribute close to half of the state's GHG emissions (see Exhibit 5.8-2). WSDOT believes that transportation GHG emissions are better addressed at the region, state, or transportation systems level where multiple projects can be analyzed together. The regional Transportation 2040 plan (PSRC 2010) contains a "Four-Part Greenhouse Gas Strategy."

What effect will the transportation improvements from this project have on greenhouse gas emissions?

The state and federal investments in transportation projects are made to improve current conditions of the multi-modal transportation network. The Bellevue to Lynnwood Improvement Project will reduce stop and go conditions and increase the reliability of transit and HOV travel times. The woody tree and shrub species used to restore disturbed areas may eventually function to sequester carbon as the vegetation matures.

What would happen if WSDOT did not build this project?

Improvements and enhancements associated with the Bellevue to Lynnwood Improvement Project affecting air quality, surface water, wetlands, and aquatic resources would not occur. The Bellevue to Lynnwood Improvement Project would not produce any construction-related or operational effects.

The No Build Alternative would not provide any relief to traffic congestion in the project area. However, the I-405, Bellevue to Lynnwood Improvement Project Air Quality Technical Memorandum[8] predicts the No Build Alternative would have the same CO concentrations as Build Alternative 2.

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[8] *See Appendix E, WSDOT 2011a.*

Assuming other projects considered in this cumulative effects analysis are constructed and placed in operation, the respective contributions to cumulative effects on air quality as a result of those projects would be similar to the discussion on construction and operation cumulative effects described above.

A complete analysis of cumulative effects in the project area is reported in Appendix G, I-405, Bellevue to Lynnwood Improvement Project Cumulative Effects Analysis Technical Memorandum (WSDOT 2011b).