April 2018

I-405, Downtown Bellevue Vicinity Express Toll Lanes Project (MP 11.9 to 14.6)

Attachment G: Water Resources Discipline Report

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What is our study approach?

The I-405, Downtown Bellevue Vicinity Express Toll Lane Project (MP 11.9 to 14.6) (the Project) team evaluated existing conditions for tributaries to Lake Washington in the study area, associated wetlands, and highway runoff. This assessment included a review of existing flow patterns, water quality, land use, floodplains, peak flow conditions, steep slopes, wetlands and other water bodies, and water treatment and conveyance facilities.

We evaluated future conditions by analyzing the following drainage characteristics of the Build Alternative: the Project's general plan and conceptual designs for stormwater conveyance, potential stormwater treatment facilities, and discharge points.

What are the existing conditions?

Surface water in the study area generally drains from east to west, with all surface flows eventually discharging into Lake Washington. The lake has two large tributaries (Sturtevant Creek and Kelsey Creek) that cross the Interstate 405 (I-405) roadway in the study area. Those two large tributaries enter the Mercer Slough just west of I-405. Additionally, there are many other small tributaries and watercourses crossing the freeway that drain to the Mercer Slough wetland complex. Exhibit 2-1 in Section 2, Project Description, shows the tributaries in the study area.

Within the study area, floodplain areas have been identified by the Federal Emergency Management Agency (FEMA) for City of Bellevue water bodies Mercer Slough and lower Kelsey Creek. These floodplains are subject to federal, state, and local regulations.

What would be the effects on water resources if the Project is not built?

If the Project is not built, the growth in the region traffic demand would further degrade traffic operations in the study area. This congestion would cause drivers to seek alternative routes, including local streets. The Project's stormwater treatment retrofit improvements would not occur; therefore, untreated runoff from the more congested roadways would continue to reach water resources in the study area.

What would be the Project's effects on water resources?

Surface Water

The Project would add 2.7 acres to the existing 104.4 acres of highway pavement in the study area, which would increase stormwater runoff volume and flow rates. WSDOT would mitigate these changes by improving how highway runoff is collected and by modifying or adding to stormwater management along I-405. Other surface water effects or outcomes include the following:

- The Project would include new impervious surface areas that would generate additional runoff from precipitation falling on pavement. WSDOT would collect the runoff from existing and new impervious surface for treatment following guidelines in the WSDOT *Highway Runoff Manual* (HRM) (WSDOT 2016).
- The Project would result in a minor increase in dissolved copper but reduce total copper, total and dissolved zinc, and total suspended solids discharged from the Project to local drainages.
- WSDOT would modify existing or add new detention storage to control flow where applicable. Discharges to Mercer Slough are exempt from flow control requirements.
- WSDOT would apply HRM guidelines that are current when the Project is advertised.
- The Project would not affect surface water or floodplains.

Floodplains

The Project would not physically encroach on any existing 100-year floodplain designated as a Special Flood Hazard Area and would not affect downstream or upstream flood levels.

What measures would be used to avoid or minimize effects?

WSDOT would design and construct the Project to meet all applicable federal, state, and local requirements for stormwater management, groundwater, and floodplain management for avoiding surface water effects. These requirements include permits, plans, and any local jurisdiction agreements.

With proper design, implementation, and maintenance of the best management practices (BMPs), stream crossings, and highway stormwater facilities, there should be no effects on surface waters, groundwater, or floodplains from the Project.

The Project would modify or construct a new collection and conveyance system for stormwater from study area subbasins to serve the highway widening, in accordance with the WSDOT *Hydraulics Manual* requirements. The Project would also provide runoff treatment and flow control facilities to meet the HRM requirements.

The Project would include runoff treatment retrofit to improve surface water quality compared to existing conditions, and would continue toward reaching the goals set by the 2003 I-405 Corridor Improvement Project *Record of Decision*.

The Project would meet the downstream analysis requirements of the WSDOT *Hydraulics Manual* and, therefore, would protect upstream and downstream conditions within the 100-year floodplain.

Would there be any unavoidable effects?

The Project would add 2.4 acres to the existing 42.1 acres of highway pavement, which would increase runoff. New flow-control facilities would control the rate of runoff for the periods when flows are damaging to the water bodies, but the streams and wetlands would receive more water volume via surface runoff and groundwater recharge would be reduced. The relative scale of the Project would be small compared to the overall scale of the basins, and the Mercer Slough wetland hydrology (where most of the Project would discharge) is primarily influenced by water surface elevations in Lake Washington. Therefore, these unavoidable changes in volume of runoff would be negligible to the water resources in the study area.

Because stormwater treatment can only remove a percentage of the total pollutant load, any increase in pollutant-generating surfaces (impervious road areas) would result in some residual increase in pollutant load. WSDOT would mitigate this condition by designing stormwater runoff treatment systems to treat 3.16 acres more area than the new impervious surface area. As a result, WSDOT would maintain flow conditions where required and reduce the quantity of suspended solids and total metals discharged.

What would happen if the Project is not built?

Under No Build conditions, the volume of runoff and pollutant loading would be the same as under existing conditions, and there would be no effects on floodplains. Because No Build would not increase impervious surface area, there would be no change in stormwater runoff volume generated in the study area, or in the way that the Project would manage runoff. Runoff water quality would also be the same as under existing conditions since the pollutant-generating surface area would be unchanged.

SECTION 1 INTRODUCTION

This discipline report was prepared in support of the *I-405, I-Downtown Bellevue Vicinity Express Toll Lanes Project (MP 11.9 to 14.6)* (the Project) *Environmental Assessment* (EA) to evaluate environmental effects related to proposed improvements on I-405.

The Project is part of a comprehensive strategy identified in the 2002 *I-405 Corridor Program Final Environmental Impact Statement* and subsequent Federal Highway Administration (FHWA) *Record of Decision* to reduce traffic congestion and improve mobility along the state's second-busiest highway. The Project is needed because travelers on I-405 face one of the most congested routes in the state, particularly during peak travel times.

What are the primary features of the Project?

The Project would widen to accommodate an additional lane both northbound and southbound. The additional lane would be coupled with the existing northbound and southbound high-occupancy vehicle (HOV) lane to create a dual express toll lane (ETL). When combined with the existing dual ETL north of NE 6th Street the Project would result in a continuous ETL system from Interstate 90 (I-90) in Bellevue to Interstate 5 (I-5) in Lynnwood.

What is the purpose of this report?

The purpose of this Water Resources Discipline Report is to evaluate the effects of No Build and the Project on water resources and floodplains in the study area. The project team determined surface water effects by comparing existing conditions with an estimate of future conditions after completion of the Project.

The project team evaluated existing conditions of tributaries to Lake Washington study area associated wetlands, and highway runoff. The evaluated conditions included, flow patterns, water quality, land use, floodplains, peak flow conditions, steep slopes, wetlands and other water bodies, and water quality treatment and conveyance systems.

The project team evaluated future conditions by analyzing the following drainage characteristics of the Project: the Project's general plan and conceptual designs for stormwater conveyance, potential stormwater treatment facilities, and discharge points.

Why are water resources an important element to consider?

Surface water is water stored or flowing at the earth's surface. This includes both natural bodies of water such as rivers, lakes and wetlands, as well as water in human-made facilities such as canals, lakes, and piped drainage systems.

Effects on surface water are important to the Project because when pervious surfaces such as soil and vegetation are converted to surfaces such as pavement, stormwater cannot infiltrate into the ground and stormwater volumes that accumulate on the surface increase. When natural ground cover changes to a smooth impervious surface, runoff velocity also increases. Increased runoff volume and velocity can cause erosion of streambanks and scouring of streambeds and increase flooding risks.

Highway runoff can also affect the quality of receiving waters, such as a stream or lake, if no measures are taken to remove excessive pollutants.

Floodplains are areas subject to inundation by flood events. Floodplains are important because the effectiveness of rivers and floodplains to convey and store floodwater and minimize flood risks can be adversely affected by human development that physically changes the floodplain. Encroachment upon existing floodplains could increase flood elevations and have adverse social and ecological effects.

SECTION 2 PROJECT DESCRIPTION

What improvements are proposed with the Project?

The Project would extend along I-405 approximately 2.7 miles from just north of the I-90 interchange (MP 11.9) to north of the NE 6th Street interchange (MP 14.6). The Project proposes the following improvements by mile posts, as shown in Exhibit 2-1, sheets 1 and 2:

- **Northbound I-405, I-90 to NE 6th Street (MP 11.9 to 13.7) –** Develop approximately 1.6 miles of new lane in the northbound direction by widening or restriping I-405 from MP 11.9 to 13.5. In this same section of I-405, convert the existing HOV lane to an ETL. The new lane coupled with the existing HOV lane would create a dual ETL. Between MP 13.5 and 13.7, convert the existing HOV lane to an ETL. The ETL would connect to the existing ETLs from downtown Bellevue to Lynnwood. Westward expansion of I-405 is proposed south of SE 8th Street, and eastward expansion is proposed north of SE 8th Street.
- **Southbound I-405, I-90 to NE 6th Street (MP 11.9 to 13.7) –** From MP 11.9 to 12.5, reconfigure the existing outside HOV lane to the inner roadway and convert both of the existing HOV lanes to ETLs. From MP 12.5 to 13.5, develop a new lane by widening or restriping. This new lane coupled with the existing HOV lane would result in a dual ETL south of NE 4th Street. Between MP 13.5 and 13.7, convert the existing HOV lane to an ETL. The ETL would connect to the existing ETLs from downtown Bellevue to Lynnwood. Where new pavement is needed, eastward expansion is proposed.
- **I-405 Eastside Rail Corridor Overpass (MP 12.4) –** Build a new northbound I-405 bridge structure adjacent to the existing I-405 structure over the Eastside Rail Corridor Regional Trail. The new structure would carry the two ETLs and the GP lanes would remain on the existing structure.
- **Eastside Rail Corridor Regional Trail (MP 12.09 to 12.49) –** Construct a new bridge for nonmotorized

travel over southbound I-405 near MP 12.15. Build a section of nonmotorized trail to connect with the Eastside Rail Corridor Regional Trail.

- **SE 8th Street Interchange (MP 12.78) –** Widen the northbound I-405 overpass over SE 8th Street.
- **Main Street Overpass (MP 13.31) –** Reconstruct the Main Street bridge (photo on right) over I-405.
- **Northbound I-405 to SR 520 Ramp (MP 14.6) –** Widen the existing northbound off-ramp to SR 520 from two lanes to three lanes for approximately 600 feet beginning where the NE 10th Street on-ramp merges onto the I-405 ramp.
- **Stormwater –** Build new flow control and runoff treatment facilities.
- **Other Improvements –** Provide pavement markings, drainage improvements, permanent signing, illumination, intelligent transportation systems, barriers, and tolling gantries.
- **Context Sensitive Solutions –** Incorporate CSS to enhance mobility, safety, the natural and built environment, and aesthetics throughout the Project corridor.
- **Property Acquisitions –** Acquire portions of five commercial and public properties to accommodate the Project.
- **Minimization Measures –** Implement avoidance and minimization measures or compensate for unavoidable effects on the environment, as described in Chapter 6, Measures to Avoid or Minimize Effects.

Existing Main Street Overpass

What are Context Sensitive Solutions?

The *Context Sensitive Solutions (CSS)* process is a model for transportation project development that has received much discussion and broad acceptance. Its essence is that a proposed transportation project must be planned not only for its physical aspects and road serving specific transportation objectives, but also for its effects on the aesthetic, social, economic, and natural environment, as well as the needs, constraints, and opportunities in a larger community setting.

Exhibit 2-1. Project Improvements, Sheet 1 of 2

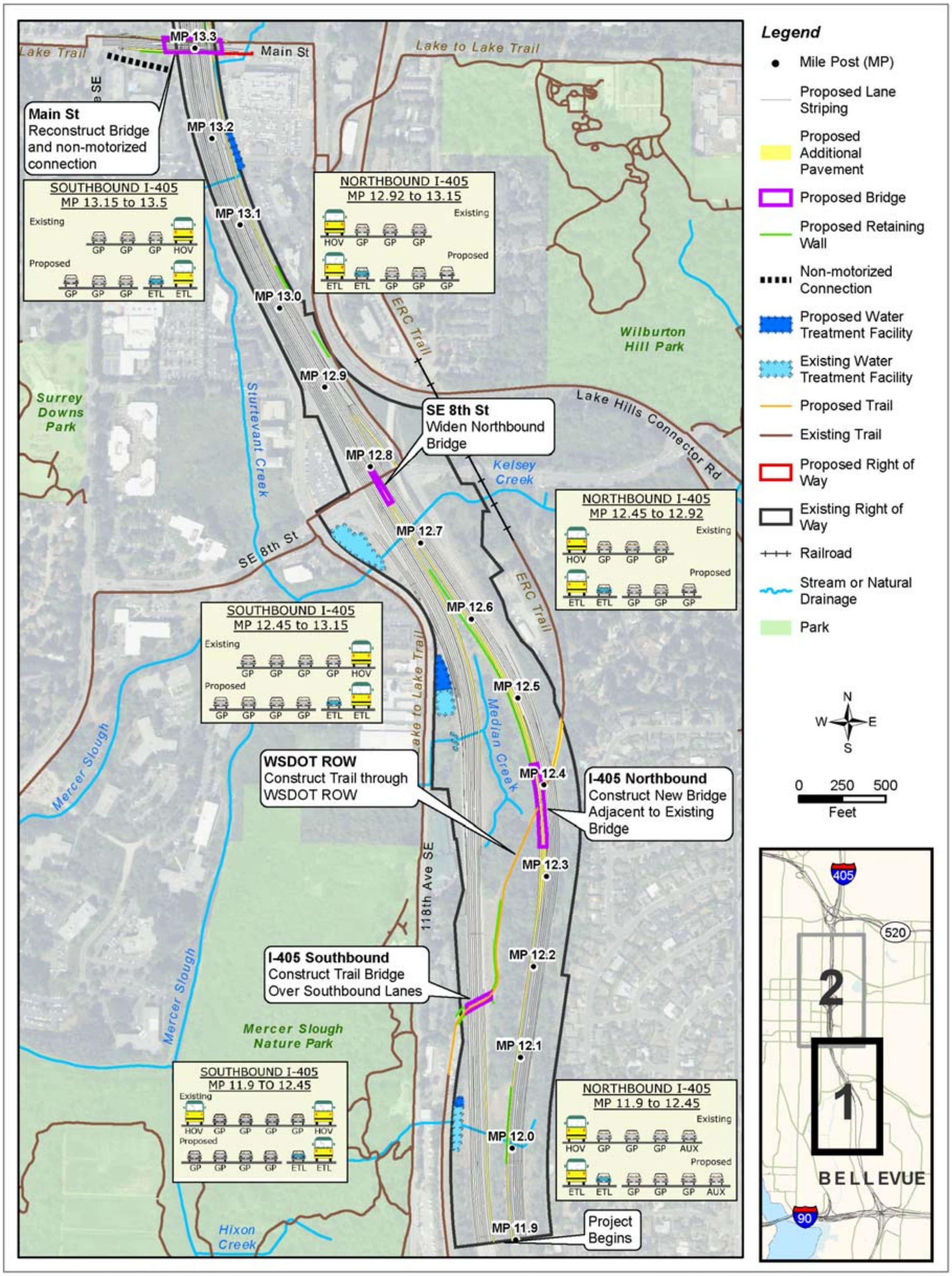
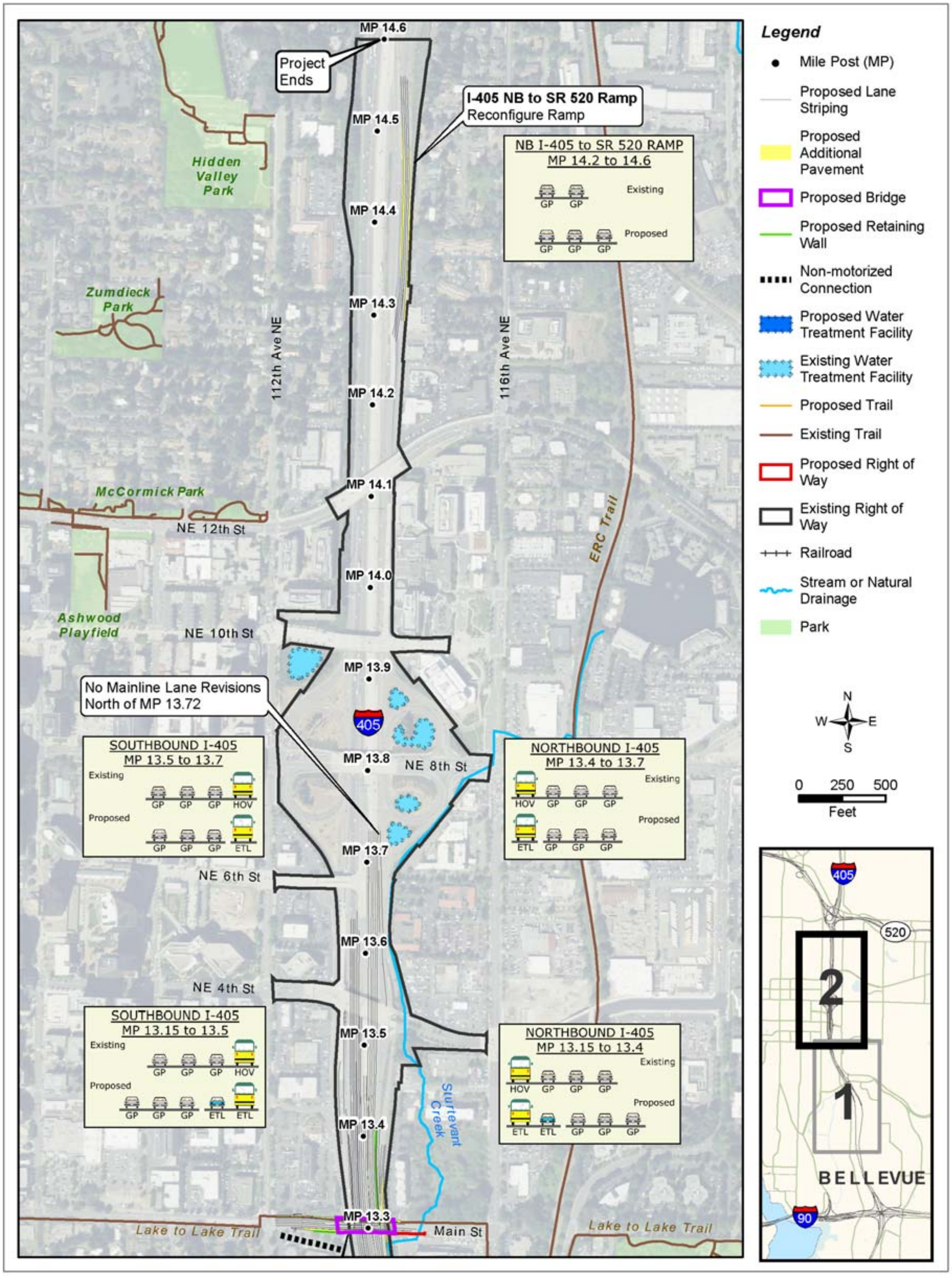


Exhibit 2-1. Project Improvements, Sheet 2 of 2



How would the express toll lanes work?

At this time, the Washington State Transportation Commission (WSTC) has not established operational hours, user exemptions, occupancy requirements, and operating parameters for ETLs proposed with the Project. WSTC would set operational requirements for the ETLs prior to opening day. For this analysis, we assumed the requirements for the current I-405, Bellevue to Lynnwood ETL system would be used for the Project. These assumptions, listed below, represent the most recent operating guidance from the WSTC for ETLs:

- **Limited Access –** The system would have designated entry and exit points, with a buffer between the ETLs and the GP lanes. These access points would vary in length, depending on the location.
- **Dynamic and Destination Pricing –** The I-405 ETL system would use both dynamic and destination pricing to determine a driver's toll at the time they enter the ETL. With *dynamic pricing*, toll rates vary based on congestion within the corridor to maintain performance. Electronic signs are used to communicate the current toll rate for drivers. Toll rates are updated every few minutes, but the driver's price is set when they enter the system. With *destination pricing*, the toll is based on the driver's destination. Toll signs show up to three toll rates for different toll zones, or destinations. Drivers pay the rate they see upon entering the ETLs to reach their destination, even if they see a different toll rate for their destination further down the road. When both pricing approaches are used together, it means the toll that drivers pay is based both on the congestion in the corridor and the distance they are traveling.
- **Operating Hours and *Good To Go!* Passes –** The ETL system is expected to operate from 5 a.m. to 7 p.m. on weekdays, with the system toll-free and open to all at other hours and on major holidays. Transit, HOVs, and motorcycles would need to have a *Good To Go!* pass to use the ETLs for free during operating hours. Eligible HOV users would

How does dynamic pricing work?

Electronic monitors along the roadway measure real-time information on speed, congestion, and number of vehicles in the *express toll lanes (ETLs)*. This information is used to determine whether tolls go up or down to optimize lane use.

As the ETLs become congested, toll rates increase, and as congestion decreases, toll rates decrease. The use of dynamic pricing allows the lanes to operate with high volumes, but avoid becoming congested.

When would tolls be charged to use the ETLs?

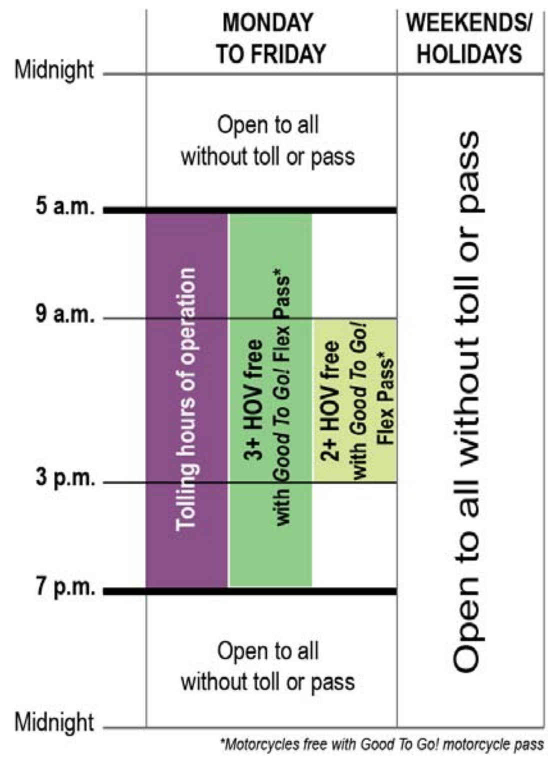
It is assumed the ETLs would operate from 5 a.m. to 7 p.m. on weekdays. At all other times and major holidays, the lanes would be free and open to all without a *Good To Go!* pass.

During operating hours:

- **SOVs** would pay a toll to use the lanes.
- **Transit, HOV 3+, and Motorcycles** would travel for free with a *Good To Go!* pass.
- **HOV 2+** would travel for free from 9 a.m. to 3 p.m. with a *Good To Go!* pass. From 5 a.m. to 9 a.m. and 3 p.m. to 7 p.m. HOV2+ would pay a toll to use the ETLs with or without a *Good To Go!* pass.
- **Large vehicles** over 10,000 pounds gross vehicle weight would not be able to use the ETLs at any time.

be required to set the *Good To Go!* pass to the HOV mode to avoid charges. SOVs could choose to pay a toll to use the ETLs during operating hours with or without a *Good To Go!* pass.

- **Occupancy Requirements –** During the peak periods (weekdays from 5 a.m. to 9 a.m. and 3 p.m. to 7 p.m.), transit vehicles and carpools with three or more persons (HOV 3+) would be able to use the lanes for free with a *Good To Go!* pass. From 9 a.m. to 3 p.m., the system would be open toll-free to those with two or more passengers with a *Good To Go!* pass. Motorcycles ride toll-free in the ETLs with a *Good To Go!* pass.
- **Vehicle Weight –** Vehicles over 10,000 pounds gross vehicle weight will be prohibited, which is consistent with HOV lane restrictions throughout Washington.
- **Electronic Tolling –** Payments will be made via electronic tolling with a *Good To Go!* pass. For drivers who choose not to use a *Good To Go!* Pass, WSDOT offers optional photo billing (pay by mail) for an extra fee.



How would tolling revenue be used?

Federal law and state law provide specific requirements on how toll revenues can be used. Federal law regarding the use of toll revenues is contained in 23 United States Code (USC) Section 129 (a)(3). This law states that all toll revenues received from operation of the toll facility are used for such things as debt service, a reasonable return on investment for any private financers of the Project, operations and maintenance costs, and payments associated with any public–private partnership agreements.

In addition to these federal requirements, the Revised Code of Washington (RCW) 47.56.820 requires that all revenue from an eligible toll facility must be used only to construct, improve, preserve, maintain, manage, or operate the eligible toll facility on or in which the revenue is collected. Similar to the federal law, expenditures of toll revenues must be approved by the

Legislature and must be used only to cover operations and maintenance costs; to repay debt, interest and other financing costs; and to make improvements to the eligible toll facilities.

As required by state law, all toll revenue generated from the Project ETLs would be used to construct, improve, preserve, maintain, manage, or operate the I-405 corridor.

What is the Project construction schedule?

Construction of the Project is expected to last up to 5 years beginning in 2019 and ending in 2024.

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SECTION 3 STUDY APPROACH

What is the study area and how was it determined?

The study area for the water resources analysis in this report includes the Project right-of-way and the lower portions of the three stream basins that drain to Lake Washington. Water bodies that receive runoff from the study area are Sturtevant Creek, Kelsey Creek, Median Creek, and Lake Washington/Mercer Slough wetland (I-90 interchange area).

What policies or regulations are related to effects on water resources?

Surface Water

Numerous federal, state, and local regulatory programs address surface waters and floodplains. FHWA requires analysis of potential encroachments on the 100-year floodplain and/or regulatory floodway. Substantial encroachments or incompatible floodplain development can adversely affect project approval. FHWA guidance on evaluating the potential changes to floodplains is contained in FHWA Technical Advisory T6640.8A (1987). Additional guidance is available in the FHWA *Environmental Guidebook* (FHWA 1982).

WSDOT's *Environmental Manual* (WSDOT 2017) provides guidance on evaluating the effects of highways on water quality and surface water (Section 431) floodplains (Section 432), and other related areas, including wetlands, groundwater, and land use.

See Section 8, References, for a complete list of additional sources of information used in the analysis of surface water effects.

Floodplains

Floodplains are areas prone to periodic inundation and are generally associated with streams, rivers, or lakes. The Federal Emergency Management Agency (FEMA) has developed maps that illustrate floodplains that have at least a 1 percent probability of flooding in a given year. These are defined as *100-year floodplains* because they flood with at least 1 foot of water on average once every 100 years. Flood Insurance Rate Maps (FIRMs) indicate FEMA-delineated floodplains. At the local government scale, King County Code (KCC) 21A.24 has designated certain areas as *zero-rise floodways* and requires that new development not cause a measurable rise (0.01 foot or more) in base flood elevation (BFE). Project team review of the available mapping found that there would be no change to any aspect of the floodplains in the study area. Exhibit 3-1 illustrates floodplains in the study area and where they are in relation to proposed Project improvements. Appendix D, Summary of Surface Water and Floodplain Regulations, summarizes relevant surface water and floodplain regulations.

Groundwater and Aquifers

Groundwater pertains to the water contained in the soil and bedrock below the ground's surface. Groundwater quality and quantity were considered because changes can affect water supplies for drinking water and water available for surface water bodies such as lakes, streams, and wetlands.

A Critical Aquifer Recharge Area (CARA) ordinance provides local governments with a mechanism to protect the functions and values of a community's drinking water by preventing pollution and maintaining supply through the Growth Management Act (GMA), RCW 36.70A and WAC 365-190-100. No CARAs were identified in the study area. The City of Bellevue website indicates that drinking water is acquired through the Cascade Water Alliance, an association of seven municipalities and water districts in King County, which serves as a regional water supply agency and wholesale water provider. In the study area, drinking water comes from the protected watersheds of the Cedar and South Fork Tolt Rivers in the Cascade Mountains. WSDOT reviewed King County databases and found that there are no designated CARAs in the study area.

Although the Kelsey Creek aquifers are not within a designated CARA, groundwater is shallow, without a surface low-permeability protective layer, and is susceptible to contamination.

Exhibit 3-1. Proposed Stormwater Improvements, Sheet 1 of 3

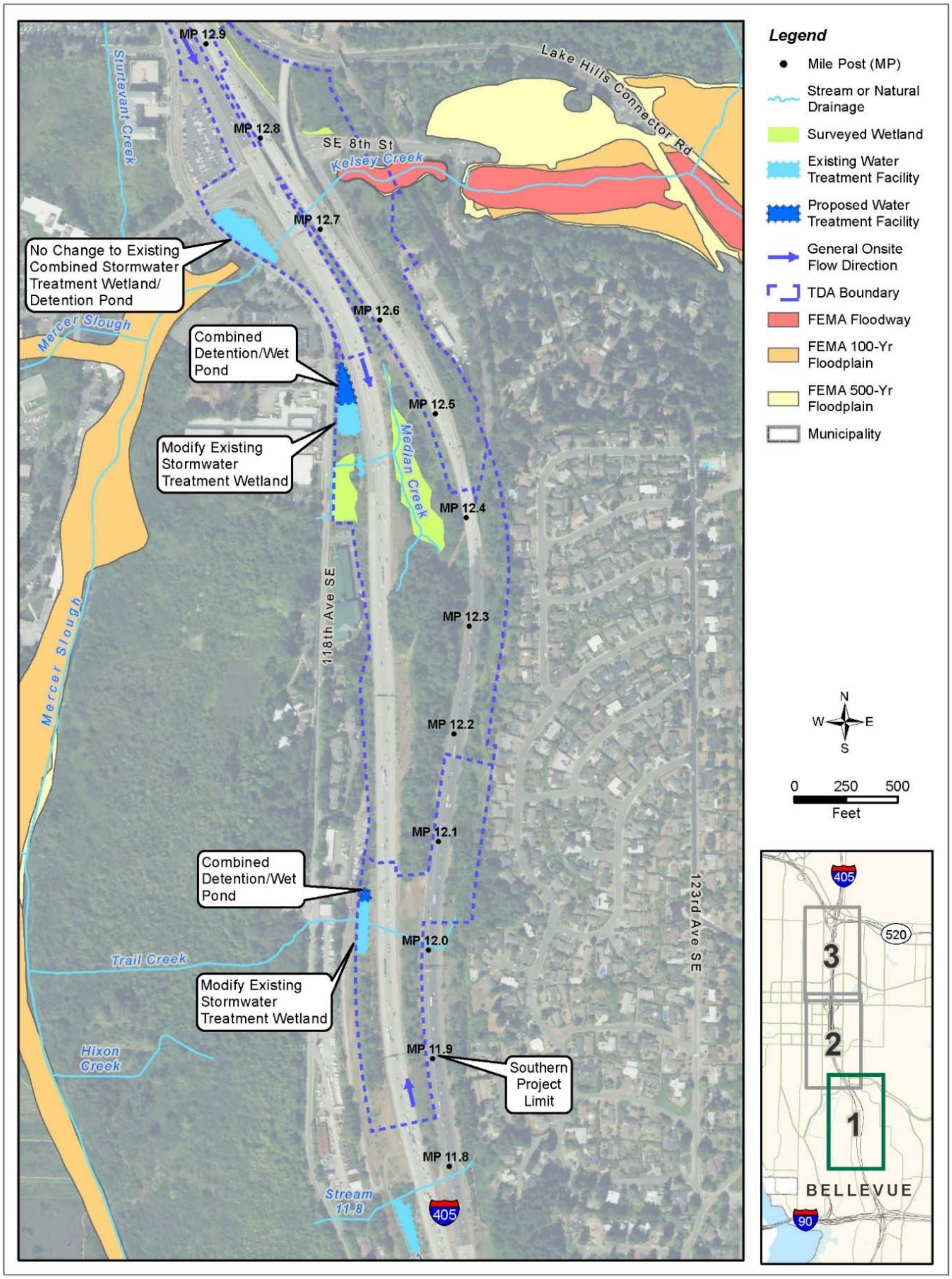


Exhibit 3-1. Proposed Stormwater Improvements, Sheet 2 of 3

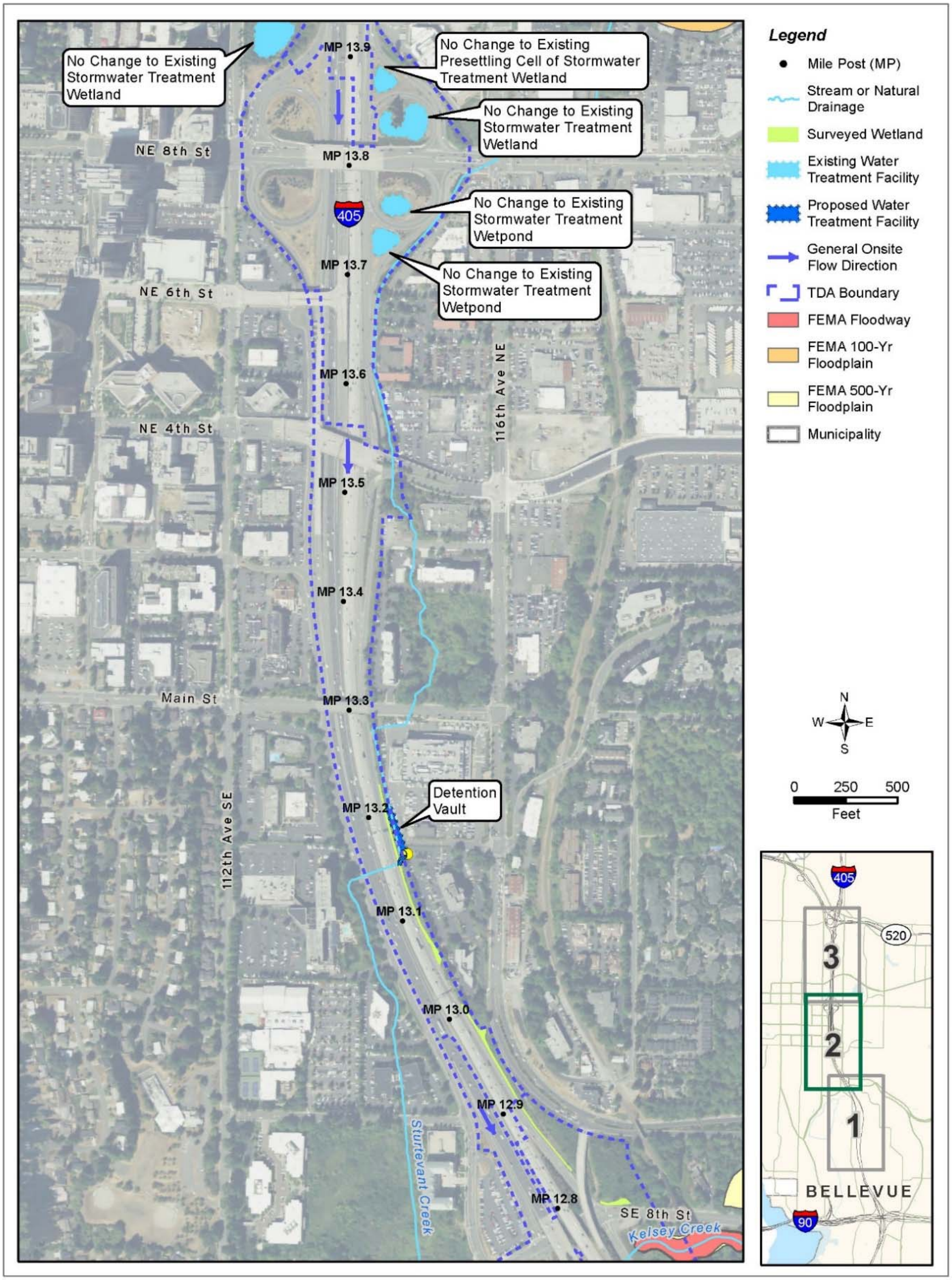
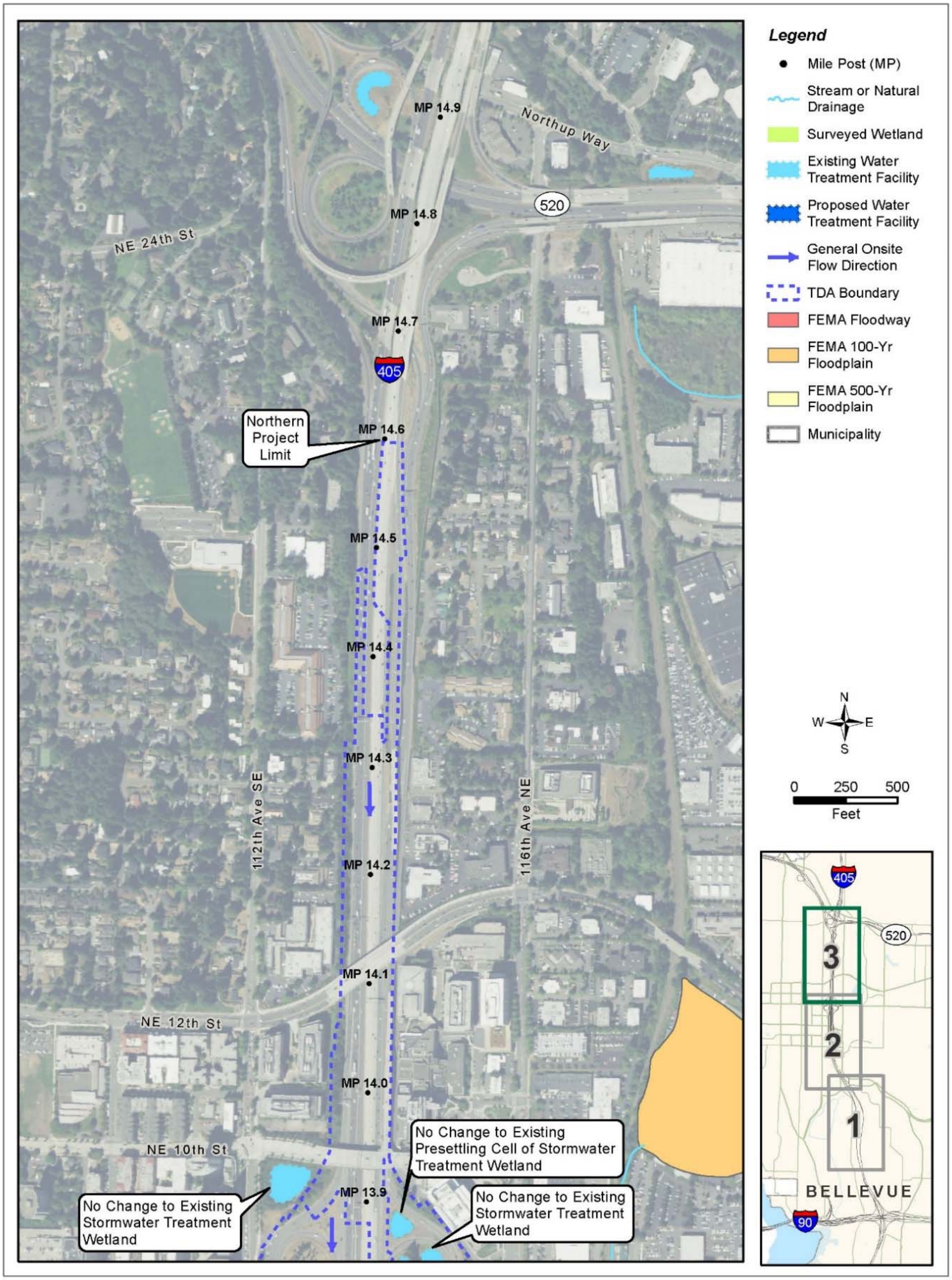


Exhibit 3-1. Proposed Stormwater Improvements, Sheet 3 of 3



How did we collect information for this report?

Surface Water and Floodplains

The project team used the following design information in the preparation of this report:

- Preliminary stormwater management facility siting options
- Existing stormwater management facilities, and deficiencies with existing drainage systems (identified by state and local agencies)
- Drainage areas and outfall locations for highway runoff that occur with existing conditions and would occur for the Project
- Estimates of proposed new impervious areas
- Stormwater management facility concepts
- Temporary Erosion and Sediment Control (TESC) Plan performance objectives and a list of best management practices (BMPs)
- Survey mapping, aerial photography, proposed roadway geometry, and an inventory of existing stormwater features

The project team also reviewed and summarized the Project's stormwater plan for runoff collection, conveyance, treatment, and discharge to receiving waters. This plan includes collection and treatment of highway runoff to mitigate the changes generated from new impervious surfaces. *Highway Runoff Manual* (HRM)-compliant enhanced runoff treatment BMPs would treat an equivalent area of highway pavement before the runoff is discharged into existing storm drains and waterways.

The project team evaluated existing conditions for Lake Washington, tributaries to Lake Washington in the study area, and highway runoff. This assessment included a review of current flow patterns, water quality, land use, floodplains, and peak flow conditions; steep slopes; wetlands and other water bodies; and constructed conveyance and treatment facilities.

Groundwater and Aquifers

The project team obtained published articles through reference searches from various agencies such as the U.S. Geological Survey (USGS), Washington State Department of Ecology (Ecology), U.S. Environmental Protection Agency (EPA), and King County.

The project team also reviewed WSDOT records for the I-405 corridor and searched agency websites for geology, soils, and groundwater conditions. This review identified sensitive areas and information on wells and water rights.

How did we evaluate effects?

The purpose of this Water Resources Discipline Report is to evaluate the effects of No Build and the Project on surface water resources and floodplains in the study area. The project team determined surface water effects by comparing existing conditions with an estimate of future conditions following completion of the Project.

Surface Water

The project team assessed potential effects of the Project on water quality using methods described in Section 431 of the *Environmental Manual* and in the WSDOT HRM (WSDOT 2016). WSDOT designed the stormwater management features for the Project using the HRM. The assessment also assumed that construction would follow the WSDOT *Temporary Erosion and Sediment Control Manual*.

The WSDOT conceptual stormwater mitigation concepts were evaluated using the FHWA method to estimate runoff and pollutant loading from the Project. This method calculates the percent change in discharge pollutant loading for five key pollutants that scientists have observed in highway runoff studies (total suspended solids, total and dissolved copper, and total and dissolved zinc). The method estimates the percentage change that was used to assess the Project for post-treatment effects on water quality. Each threshold discharge area (TDA) was evaluated individually. (Study area TDAs are discussed in Section 4, Existing Conditions, and are shown in Exhibit 4-3.) To put the post-construction pollutant-loading estimates in perspective, the assessment also includes results for the entire Mercer Slough drainage area, as TDA C and D both contribute to that water body.

The project team evaluated existing conditions for Lake Washington, its study area tributaries, and highway runoff. This assessment included a review of existing flow patterns, water quality, land use, floodplains, peak flow conditions, steep slopes, wetlands and other water bodies, and human-made drainage and/or treatment systems.

The project team evaluated future conditions by analyzing the following drainage characteristics of the Project: the Project's general plan and conceptual designs for stormwater conveyance, potential stormwater treatment facilities, and discharge points.

Floodplains

The project team also evaluated floodplain effects using methods described in the *Environmental Manual*, Section 432.

The project team collected National Flood Insurance Program Flood Insurance Rate Maps (FIRMs) both from the FEMA Map Service Center and the City of Bellevue websites to review where floodplains exist in the study area. The team then evaluated the project footprint to determine where the Project would fill or excavate within floodplains.

Floodplains are important because they can store floodwaters during high flow, thereby offsetting flooding of other areas downstream. When development or natural processes (e.g., landslides, sediment deposition) encroach on floodplains, they reduce the available flood storage. This can result in changes in stream velocity, bank erosion, or location of flooding that can cause damage to habitat or human development elsewhere along the stream. Floodplains may also provide wildlife habitat and migration corridors, and may filter pollutants from overland flow that would otherwise contaminate the associated stream.

Groundwater and Aquifers

The project team used the following methods to evaluate the Project's potential effects:

- Reviewing the proposed Project design concept and likely construction methods.
- Evaluating the potential effects of groundwater and aquifers on the Project, based on the existing site conditions and standard WSDOT practices in the *Geotechnical Design Manual.*

The evaluations were based primarily on experience, expert judgment, WSDOT practices, and sound engineering principles.

SECTION 4 EXISTING CONDITIONS

What are the surface waters and drainage systems in the study area?

Surface water in the study area generally drains from east to west, with all surface flows eventually discharging into Lake Washington. Exhibit 4-1 illustrates the Bellevue drainage areas (basins) as delineated by the City of Bellevue.

All the basins in the study area are part of the Ecology water resource inventory area (WRIA) designated as WRIA 8, Lake Washington/Cedar River. I-405 crosses large and small streams and other watercourses (including urban storm drains and modified natural watercourses) that drain into the Mercer Slough or associated wetland complex that eventually discharges to Lake Washington. I-405 contributes to surface runoff in the streams and other water courses during storm events. Precipitation averages 40 inches per year, with the rainy season occurring from October through April. Rainfall is usually light or moderate. Ecology has published median concentrations for various metals at a Bellevue monitoring location during storm events (Ecology 2009).

The following sections describe the affected environment in the study area, including Lake Washington, Mercer Slough and its associated wetlands, Sturtevant Creek, Kelsey Creek, Median Stream, Trail Creek, and existing drainage systems along I-405.

How do existing conditions help us understand current stresses on water resources?

The existing conditions can indicate the current stress on the water resources through the study area. Stresses can include visible signs of erosion, flooding, and water quality. Clean Water Act Section 303(d) listings are a good indication that the resources are already affected by development.

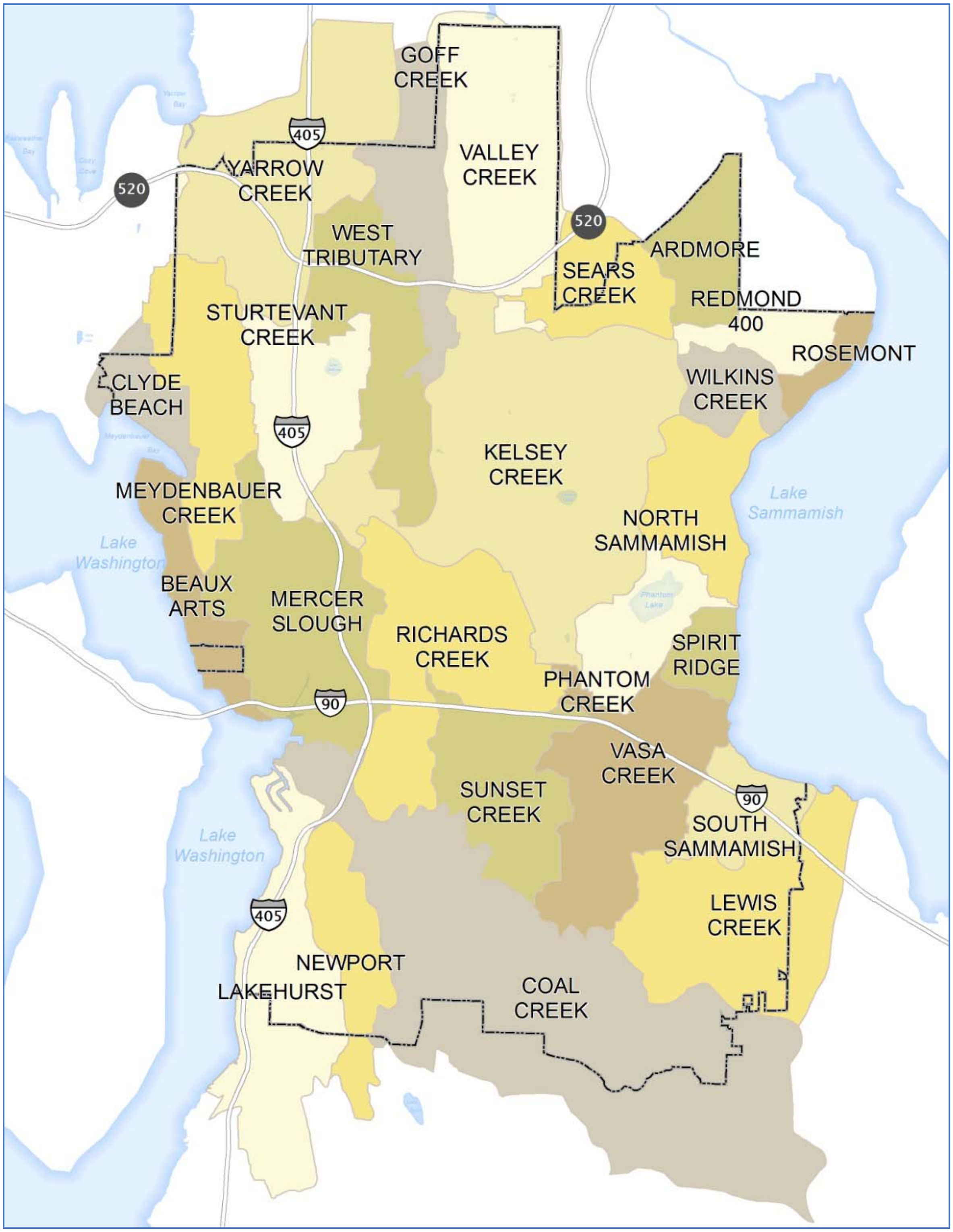
WSDOT Maintenance staff, local residents, and the I-405 program team's long history working in the area has resulted in a wealth of knowledge about the baseline condition.

Lake Washington

Lake Washington, the largest lake in King County and the second largest natural lake in the state, receives its main inflows from the Cedar and Sammamish Rivers.

Lake Washington, which is approximately 22 miles long with over 50 miles of shoreline, drains approximately 472 square miles of area. The basin containing Lake Washington is a deep narrow glacial trough with steep sloping sides. The lake's average depth is about 108 feet and, in places, exceeds 200 feet. The lake contains an average water volume of 2,350,000 acre-feet. Lake Washington connects to Puget Sound via Lake Union and the Lake Washington Ship Canal (Ship Canal).

Exhibit 4-1. Bellevue Drainage Areas



Lake Washington's two major tributaries are the Cedar River at the southern end, which contributes approximately 57 percent of the annual hydraulic load, and Lake Sammamish via the Sammamish River in the north, which contributes approximately 30 percent of the hydraulic load. The Mercer Slough is one of the many smaller tributaries that make up the remaining 13 percent of flows into Lake Washington.

The Ship Canal provides the only outlet from Lake Washington. Prior to construction of the Ship Canal, the natural outlet of Lake Washington was the Black River on the southern end of the lake. The construction of the canal in 1916 lowered Lake Washington's water level by 9 feet to its present level. The shoreline changed substantially, as did the points where the lake's tributary streams discharge into the lake.

Two primary types of sediment, till and outwash, were deposited in the Puget Sound region when the glaciers receded. Till was formed from sediments deposited at the base or edges of glaciers, while outwash soils were produced from streams flowing from melting glaciers. Because of its high impermeability, till typically creates high runoff conditions. Conversely, outwash soils can generate both high and low runoff rates, depending on their location. Outwash deposits may also contain groundwater partially confined by till, which can be an important water source for streams and wetlands.

Most of the contributing area surrounding Lake Washington is urban; 63 percent of the watersheds are developed (Washington State Department of Natural Resources). In general, land use in the study area is highly urban in the western portions near Lake Washington and becomes more suburban and then rural toward the east.

Flooding and high water in King County are most common from November through February during periods of heavy rainfall or rapid snowmelt. However, according to King County data, rivers in the county have flooded in every month but August (King County 2006).

Largest Tributaries

All study area streams drain to Mercer Slough tributaries or the slough's associated wetlands and then to Lake Washington. Mercer Slough drains most of the City of Bellevue through several tributaries and covers an area of 10,871 acres (Exhibit 4-1). The City of Bellevue has delineated

Sturtevant Creek and Kelsey Creek as the major tributaries. Median Stream and Trail Creek are internal to the Mercer Slough basin.

Exhibit 4-2 summarizes the general characteristics of these major tributaries. Located within King County and the City of Bellevue, these streams and their associated basins reflect moderate to highly urbanized conditions. All of the basins in the study area have been affected by urban development and impervious surfaces. Each of these tributaries also has reaches where floodplain areas have been designated as Special Flood Hazard Areas by FEMA. Exhibit 2-1 in Section 2, Project Description, shows these tributaries.

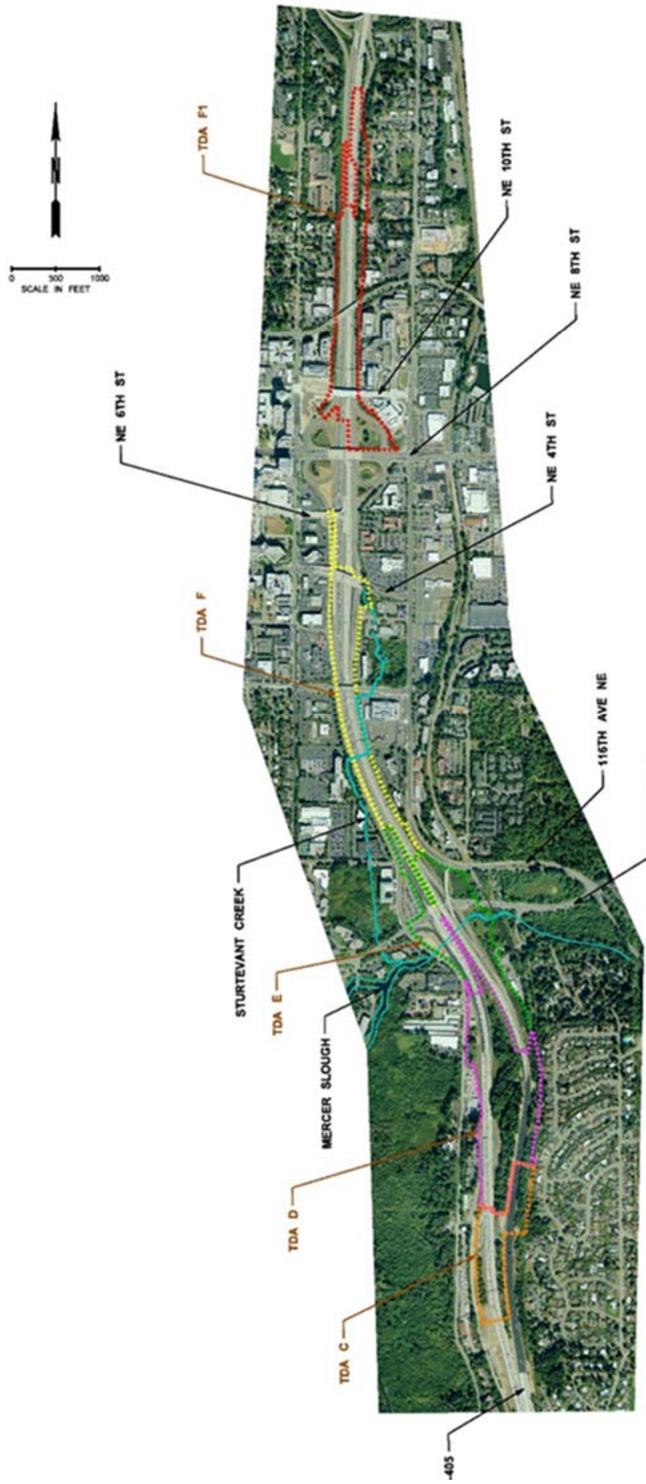
Exhibit 4-2. Characteristics of the Major Tributaries in the Study Area

Characteristic	Sturtevant Creek	Kelsey Creek
Drainage Area (square miles)	1.2	14.8
Average Annual Discharge (cubic feet per second)	Unknown	23[a]
Tributary to	Mercer Slough	Mercer Slough
Length (miles)	0.8	1.5
Crosses I-405 at river mile (RM)	0.4	1.5
I-405 Crossing Structure	Culvert	Culvert

[a]Upstream of I-405 crossing at U.S. Geological Survey gauge 12120000 Mercer Creek near Bellevue, Washington.

The study area topography is hilly, with the overall drainage direction to the west. The topography of the study area drains to the four individual TDAs shown in Exhibit 4-3. TDAs are WSDOT right-of-way areas draining to a single or multiple natural discharge locations that combine within 0.25 mile (as determined by the shortest flow path). South of Kelsey Creek (MP 11.1 to about 12.6), the study area is on the west slope of a hill between Mercer Slough and Kelsey Creek. Drainage from this area is from east to west and includes TDA C and TDA D.

Exhibit 4-3. Location of Threshold Discharge Areas C through F



TDA C discharges through a WSDOT cross culvert that continues under the Eastside Rail Corridor Regional Trail and 118th Avenue SE to a short channel section (Trail Creek) that was constructed along a City of Bellevue park trail. The channel eventually disperses out as sheet flow into the Mercer Slough wetland complex. A combined stormwater treatment wetland/detention pond BMP provides treatment for a portion of the highway runoff in this TDA before discharging into a manhole on the cross culvert.

TDA D discharges into wetlands associated with Median Creek located at MP 12.5 between I-405 and 118th Avenue SE. Flows continue through a City of Bellevue street culvert into a wetland pool area on the west side of 118th Avenue SE. No outlet channel was found, so the project team assessment assumes that flows eventually overtop the pond banks to flow into the Mercer Slough wetland complex. A combined stormwater treatment wetland/detention pond BMP provides treatment for a portion of the highway runoff in this TDA before discharging through a flow dispersal system into the wetland just north of the Median Stream culvert under southbound I-405.

TDA E is associated with Kelsey Creek (crosses I-405 between MP 12.7 and 12.8). Stormwater in TDA E collects in an existing stormwater treatment pond, which outfalls into Kelsey Creek near its convergence with Mercer Slough.

From approximately MP 12.6 to 12.9, drainage is toward Kelsey Creek on the east side of I-405 and to Mercer Slough on the west side of I-405. North of approximately MP 12.9, drainage flows to Sturtevant Creek. The highway elevation ranges from about 82 feet to 179 feet above mean sea level (msl) in the northbound lanes and from about 39 feet to 144 feet above msl in the southbound lanes.

TDA F is associated with Sturtevant Creek (crosses I-405 between MP 13.1 and 13.2). There is no existing stormwater treatment or flow control in the existing WSDOT drainage system. Stormwater in this TDA includes I-405 areas that are collected in drainage systems that eventually discharge into Sturtevant Creek on the west side of I-405.

For TDA F1, the existing flow control facility will be modified to mitigate minor shoulder widening on the SR 520 braided ramps, just north of downtown Bellevue. The existing pond is located in the northeast quadrant of the NE 8th St. interchange at MP 13.88. The work will maintain the existing facility with only minor modifications to the outlet control structure.

Kelsey Creek has a fish-passable culvert across I-405 that supports anadromous fish upstream of I-405. Downstream of I-405, Mercer Slough and Sturtevant Creek support anadromous salmonid fish. The Sturtevant Creek cross culverts are currently listed as fish passage barriers due to depth and water surface drop noted on the Washington State Fish Passage Map Application website (WDFW 2017).

The Mercer Slough complex creates a natural (wetland) barrier with no channel habitat connection downstream of the Median Creek and Trail Creek culvert crossings.

Smaller Tributaries

Three unnamed non-fish-bearing streams cross the study area between MP 11.5 and 11.8 (via culverts under I-405) and drain to wetlands associated with Mercer Slough to the west of the study area and surface roads (114th Ave SE and 118th Ave SE). These streams drain to Mercer Slough, where they cease to have defined channels and become stream flows that either infiltrate into the soil or spread out into a nearby wetland.

Two perennial fish-bearing streams in the study area cross I-405 via culverts:

- **Trail Creek** (crosses I-405 between MP 12.0 and 12.1 associated with TDA C). Stormwater in TDA C collects in a culvert that is near an existing stormwater treatment pond. The culvert passes under the Eastside Rail Corridor and 118th Avenue SE before discharging to a short channel within the City of Bellevue park land. The tributary begins as a defined stream section with restoration improvements along the trail but eventually disperses into the large Mercer Slough wetland complex.
- **Median Stream**, the unnamed stream in the I-405 median (08.MS-12.4) crosses I-405 between MP 12.3 and 12.5 associated with TDA D. Median Stream is located within the I-405 median and passes through a culvert to a stream restoration site and wetland area located at MP 12.4. Recent WSDOT improvements include collecting a portion of the TDA in a stormwater treatment pond that discharges into the wetland area

to the west of I-405. Runoff continues through another culvert under 118th Avenue SE to discharge into a small pond that is flanked by the Mercer Slough wetland complex.

As with the unnamed streams, Trail Creek and Median Stream lose channel definition in the Mercer Slough wetland complex.

Floodplains

The study area intersects tributaries to Lake Washington, including the Sturtevant Creek and Mercer Slough. Mercer Slough is the only tributary that currently has a jurisdictional floodplain through the study area.

The project team collected information on surface water, floodplains, and water quality in the study area from FEMA Flood Insurance Rate Map panel numbers 53033C0656F and 53033C0658F.

No flood hazard areas are located in the study area. The nearest flood hazard areas are associated with Kelsey Creek upstream of I-405 and Mercer Slough downstream of I-405. However, culverts confine Kelsey Creek where it passes beneath I-405. The elevation of I-405 is well above the floodplain elevation of Kelsey Creek; therefore, there is no flood hazard to I-405.

Lake Bellevue, at the headwaters of Sturtevant Creek, has flooded during extreme precipitation events. Immediately upstream of I-405; however, this stream is contained in culverts with no possibility of flooding. Sturtevant Creek passes under I-405 in a culvert at MP 13.17 but does not have an associated jurisdictional floodplain. Downstream of I-405, Sturtevant Creek passes under 114th Ave SE in a culvert and then into an open channel.

Groundwater and Aquifers

The Geology, Soils, and Groundwater Discipline Report for the Project details the geologic conditions of the study area. Because I-405 is located along a hill slope, there are bands of steep terrain (greater than 40 percent grade) on the east and west sides of portions of the northbound and southbound lanes.

The soils in the study area are primarily classified as Alderwood association soils. These soils have rapid permeability at the surface and low permeability below a depth of 20 to 40 inches. This low permeability is typical of glacial origin soils with a dense layer of glacial till. The low permeability of the soils in the study area limits opportunities for using infiltration as a stormwater management technique. Geotechnical borings and soil analysis indicate that only minimal infiltration would be possible at the stormwater detention facilities.

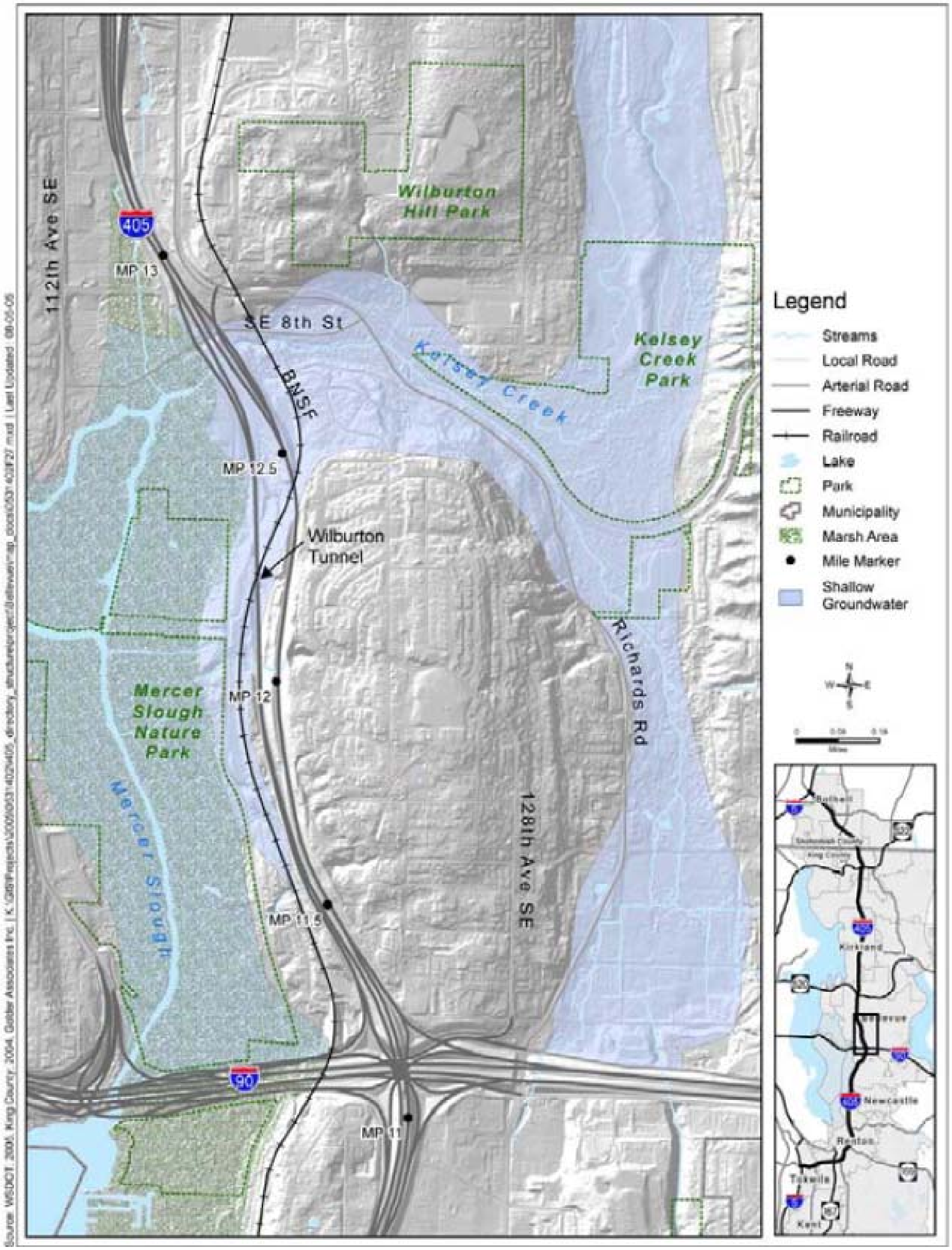
Groundwater is expected to follow the slope of the terrain flowing generally from east to west across the corridor. Where I-405 is in a significant cut section (MP 11.9 to 12.4), groundwater is known to seep out of the slope and flow as surface water in the existing drainage system.

The presence of shallow groundwater can require special measures during construction, such as dewatering of trenches dug for utilities. As shown in Exhibit 4-4, the only area likely to have substantial quantities of shallow groundwater is located south of SE 8th Street (MP 12.5 to 12.7). Perched groundwater can occur in any soil layer, particularly where outwash (free draining) soils meet compacted or less pervious layers.

Groundwater is relatively shallow in the Kelsey Creek Valley aquifer, often at less than 10 feet below ground surface in the valley bottom; however, depths vary with surface topography and season. In many places, the water table is at or near the surface and connects hydrologically to the Mercer Slough wetlands.

Groundwater flow in the Kelsey Creek Valley aquifer is primarily toward the west to southwest. The primary discharge of groundwater is to Kelsey Creek, the Mercer Slough wetlands, and the wetlands located between the northbound and southbound lanes of I-405 corridor lanes. Direct infiltration from precipitation recharges this aquifer within its drainage area, but recharge can also occur from overland flow from bordering higher-elevation areas, particularly where glacial till occurs at or near the surface.

Exhibit 4-4. Potential Shallow Groundwater in the Study Area



The Kelsey Creek aquifer groundwater quality is not well studied and little information about it exists. The project team did not find water quality testing data or the characterization of groundwater in this aquifer. Ecology monitors Kelsey Creek surface water and lists it as a limited water body following federal requirements under Section 303(d) of the Clean Water Act, which relates to impaired water bodies. The parameters found to be of concern are fecal coliform and the pesticides dichloro-diphenyl-trichloroethane (DDT), dieldrin, and heptachlor epoxide. Since the aquifer connects hydrologically to the creek, these constituents may also be affecting the groundwater quality of the aquifer.

SECTION 5 PROJECT EFFECTS

Would the Project affect water resources during construction?

Surface Water

Using standard construction BMPs, the Project is not expected to affect surface water, floodplains, or water quality.

The Project would require soil disturbance and have areas of exposed bare soil during construction. As with any construction that disturbs soil, there is a risk of surface erosion. This risk would be greatest in areas with steep slopes and erodible soils. The City of Bellevue has mapped the area of the Project from approximately MP 11.2 to 12.6 as a soil erosion hazard area due to the combination of slope and erodible soil. The Project would be constructed using WSDOT standard erosion control BMPs that would reduce the risk of soil erosion and turbidity downstream from ground clearing, excavation, grading, and soil stockpiling.

The Project would cross a 16-inch-diameter water main that is buried along the north side of SE 8th Street at depths well below I-405. King County also has a 72-inch-diameter sanitary sewer running parallel to I-405 on the east side, and it crosses in the vicinity of the Eastside Rail Corridor Regional Trail crossing. Protecting these lines is critical to preventing water quality effects. The Project would not include deep excavation at these locations, so no protective measures would be required.

Floodplains

Since the Project would not require any construction, staging, or other activity in floodplain areas, Project construction would not affect floodplains.

Groundwater and Aquifers

Project construction activities would include heavy equipment that create a risk for fuel and oil leaks that could affect groundwater. To address this, the Project contract would require the contractor to develop a detailed spill containment and countermeasures (SPCC) plan to protect ground water and aquifers during construction. If spills or leaks occur, there would be strict protocols to report and address cleanup as quickly as possible.

Would the Project affect water resources during operation?

Surface Water

The Project would add 2.4 acres to the existing 42.1 acres of highway pavement to accomplish the scope of the transportation improvement, which would result in increased runoff. Unless mitigated with stormwater detention facilities, highways and other development could alter the natural water cycle by replacing vegetation and soil with impervious surfaces.

Highways can also affect water quality because vehicles deposit particles of dust, hydrocarbons, and metals on the road surface. The Project would accommodate an increase in traffic volumes along I-405, which would result in a greater potential for fuel spills or other substance spills that could harm water quality. These substances would then be transported in surface runoff from roads to surface waters during precipitation events.

Highway right-of-way maintenance can be an additional source of pollutants. In some instances, WSDOT uses herbicides to control invasive vegetation along roadside areas. However, in the study area, use of herbicides would be limited to those areas surrounding the new stormwater detention facilities. WSDOT uses Ecology-approved BMPs to address the potential for contaminating surface water or groundwater with herbicides. WSDOT also requires weed and pest control plans to be prepared by a licensed commercial pest control operator or consultant when chemical pesticides are proposed.

WSDOT has designed stormwater detention and treatment facilities specifically to address the potential effects of highway runoff.

In TDAs C and D, the Project proposes to modify the existing two-cell wet ponds to serve as stormwater detention and treatment facilities following the HRM guidelines. Since these facilities discharge to the flow control-exempt Mercer Slough, the design would regulate stormwater pond discharge to control peak flows to protect hydrologic and hydraulic conditions between the discharge and the Mercer Slough. This would protect the downstream conveyance systems and the current hydrologic condition in the wetland.

In TDA E, the Project would modify the existing combined stormwater treatment wetland/detention pond facility to address any new contributing area, following the HRM guidelines.

In TDA F, WSDOT would construct new stormwater detention and treatment facilities as part of the Project. Since these facilities discharge to Sturtevant Creek, the design would regulate stormwater pond discharge to control peak flows and to mimic the runoff flow condition of the historic predevelopment condition.

In TDA F1, WSDOT would modify an existing flow control facility that was constructed recently as part of the I-405/NE 8th St. to SR 520 Braided Ramps Project, MP 13.68 to MP 14.97. The existing pond is located in the northeast quadrant of the NE 8th St. interchange at MP 13.88. This existing pond provides flow control to address new impervious area that was added for the northbound braided ramps along I-405 from NE 8th St. until the SR 520 interchange. The work will maintain the existing facility with only minor modifications to the outlet control structure.

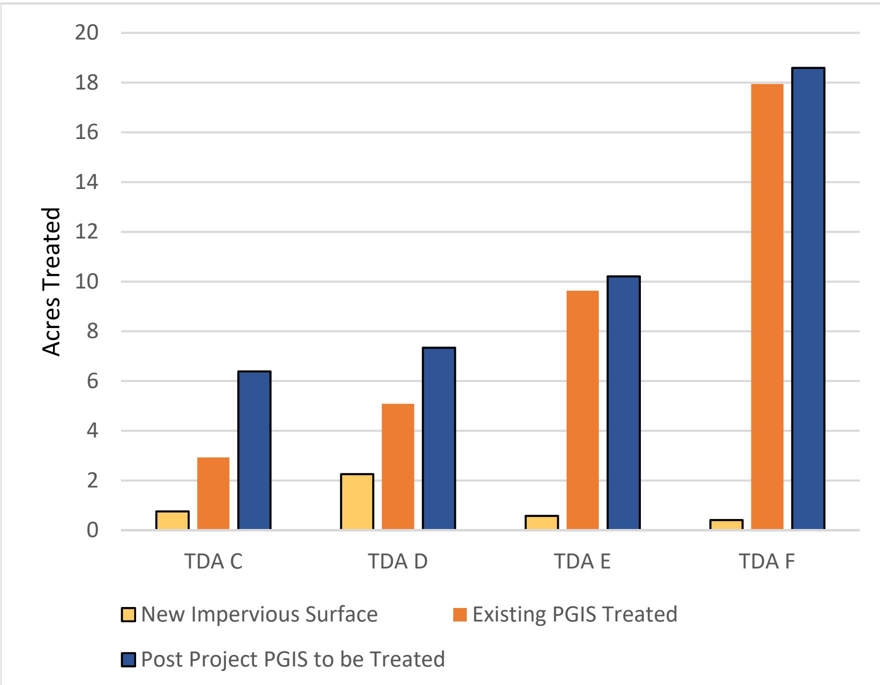
Exhibit 5-1 summarizes the change in runoff treatment that would result from the proposed stormwater conveyance system and pond modifications.

Exhibit 5-1. Proposed Stormwater Treatment Changes

TDA	Receiving Water Body	Pre-Project		Post-Project		
		Untreated	Treated	Untreated	Treated	Proposed Treatment
C	Mercer Slough via Trail Creek	1.27	2.92	0.36	3.99	Modify existing two-cell wetponds
D	Mercer Slough via Median Creek	2.79	5.00	1.47	7.18	
E	Mercer Slough	1.54	11.21	0.83	13.03	Modify existing wetland/detention pond
F	Sturtevant Creek	17.36	0	17.14	0.5	Construct new stormwater detention and treatment
F1	Sturtevant Creek	29.56	14.78	29.56	14.92	Modify existing flow control facility

Exhibit 5-2 provides the information summarized in Exhibit 5-1 in bar graph form for a visual comparison.

Exhibit 5-2. Proposed Stormwater Treatment Changes



PGIS = pollutant-generating impervious surface

The *WSDOT Quantitative Procedure for Surface Water Impact Assessments* (WSDOT 2009) provides guidelines for evaluating likely Project effects as a percent change for five key pollutant measures: total suspended solids (TSS) (sediment), total copper (TCu), dissolved copper (DCu), total zinc (TZn), and dissolved zinc (DZn). The guideline looks at average annual pollutant loading as summarized in Exhibit 5-3.

Overall, the assessment shows that the Project would reduce pollutant loading relative to existing conditions. There are a few TDAs that show minor increases, but other TDAs would more than compensate for those increases.

Exhibit 5-3. Assessment of Change in Pollutant Loading (%)

TDA	TSS	TCu	DCu	TZn	DZn
C	-49	-32	-3	-36	-16
D	-32	-19	5	-22	-7
E	-18	-6	7	-8	2
F	0	0	1	0	0

Source: WSDOT project team

Exhibits 5-4 and 5-5 illustrate the change in total loading for the Project versus No Build scenario.

Exhibit 5-4. Change in Total Suspended Solids

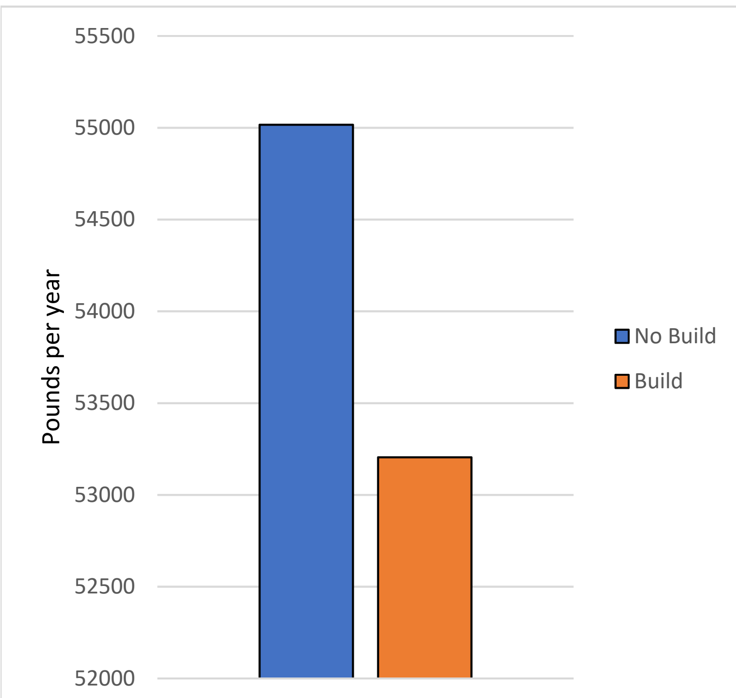
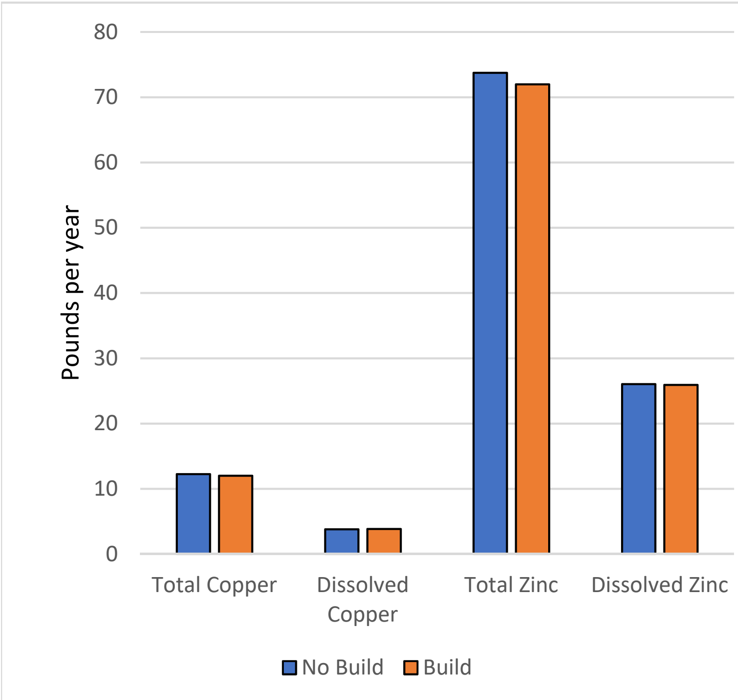


Exhibit 5-5. Change in Total Copper and Zinc, and Dissolved Copper and Zinc



Refer to Appendix C, Avoidance and Minimization Measures, for additional details.

Floodplains

Road projects can affect floodplains by encroaching into floodplain areas, thus, altering peak stream flows that can increase the base flood elevation. This would increase floodplain areas downstream or change backwater effects where construction alters stream-crossing structures.

The Project would not encroach into any floodplain areas associated with Kelsey Creek, Mercer Slough, or other stream channels.

The Project would increase impervious surface areas in the study area. However, where stormwater runoff occurs and could affect stream habitat, WSDOT would install stormwater detention and treatment ponds to attenuate flow. Since the elevation of Lake Washington controls the base flood elevation downstream of the Project (i.e., at Mercer Slough floodplains), the increase in peak flow rates of the Project would not affect the downstream base flood elevation or floodplain area.

Groundwater and Aquifers

Similar to the Project construction activities, the traveling public and freight using I-405 would create a risk for fuel and oil leaks that could potentially affect groundwater. WSDOT has developed a detailed emergency response plan to protect groundwater and aquifers during Project operation, which can be found in Chapter 1 of the WSDOT *Maintenance Manual* (WSDOT 2017).

The additional impervious area would reduce infiltration. When considered in the overall context of the study area, the Project's proposed impervious surface is insignificant relative to the overall scale of the Mercer Slough subbasin and its tributary basins. Groundwater in the Mercer Slough and wetland habitat is also known to be dominated more by the levels of Lake Washington, which is controlled by the Hiram M. Chittenden Locks.

What would be the indirect effects of the Project on water resources?

Surface Water

Project effects that are delayed or distant from the Project are referred to as indirect effects. Because the Project would manage water quality with a combination of BMPs and stormwater treatment facilities to avoid or minimize direct effects on water quality, WSDOT anticipates that there would not be any downstream effects outside the study area. The entire Project would drain to Mercer Slough or its tributaries and eventually to Lake Washington. Lakes can be more sensitive to certain types of pollution than streams. However, in the case of Lake Washington and Mercer Slough, the slough is likely to be more sensitive to water quality degradation because it has less aeration from wave action than the lake and less dilution capacity.

Floodplains

The Project would not affect floodplains located at a distance from the study area because the only floodplains downstream are those associated with Mercer Slough and Lake Washington. Because the elevation of Mercer Slough and Lake Washington are controlled entirely by operation of the Hiram M. Chittenden Locks, floodplains of these water bodies would be unaffected by changes in discharge from the study area.

Groundwater and Aquifers

No effects on groundwater and aquifers are expected as a result of the Project. The highest risk would be during construction, when WSDOT requires the contractor to prepare and follow a project-specific SPCC Plan to ensure that these risks are minimized. WSDOT operations, maintenance, and emergency response procedures have been developed to mitigate any potential long-term effects on groundwater.

What is No Build?

No Build consists only of routine maintenance projects in the study area. These projects are assumed to occur regardless of the outcome of this analysis. Therefore, these maintenance projects are referred to collectively as No Build.

What would be the No Build effects during construction and operation?

Surface Water

Under No Build, the volume of runoff and pollutant loading would be the same as under existing conditions, and there would be no effect on floodplains. Because No Build would not increase impervious surface area, there would be no change in stormwater runoff volume generated in the study area, or in the way that the Project would manage runoff. Runoff water quality would also be the same as under existing conditions since the pollutant-generating surface area would be unchanged.

Floodplains, Groundwater, and Aquifers

Under No Build, existing conditions would not change.

Were potential cumulative effects on water resources considered?

WSDOT's evaluation of cumulative effects on water resources is presented in the *I-405, Downtown Bellevue Vicinity Express Toll Lanes Project (MP 11.9 to 14.6) Environmental Assessment*.

SECTION 6 MEASURES TO AVOID OR MINIMIZE EFFECTS

What measures would WSDOT take to mitigate water resources effects during construction?

Because the Project would disturb an area of soil greater than 5 acres, the HRM (WSDOT 2016) requires that the contractor apply for a National Pollutant Discharge and Elimination System (NPDES) construction permit. This permit requires development of the following:

- TESC Plan
- SPCC Plan
- Compliance with specific state water quality standards

The TESC Plan would include BMPs to address the issues of source control, flow control, and treatment. BMPs would be site-specific and include the following (in addition to those listed in Appendix D, Summary of Surface Water and Floodplain Regulations):

- Installing check dams in drainage ditches to reduce velocity and allow fine sediment to settle
- Installing inlet protection filters to keep sediment from entering storm drains
- Protecting steep slopes
- Stabilizing open grading after a specified period if outside active work areas

The SPCC Plan would include measures to protect groundwater during construction. These measures would be developed based on the specific contractor activities on the site and would include the following:

- Developing staging areas for equipment repair and maintenance away from all drainage courses
- Protecting groundwater with the use of standard BMPs
- Providing secondary containment for fuel and chemical storage, fueling operations for construction vehicles, and equipment
- Locating spill response equipment at regular and specified intervals along the Project alignment

- Verifying that imported fill meets Model Toxic Control Act Method A or B soil cleanup standards (WAC 173-340-740) for unrestricted use

What measures would WSDOT take to mitigate water resources effects of operation?

Surface Water

WSDOT has designed stormwater detention and treatment facilities that would minimize effects on stormwater discharge flows and water quality. The stormwater facilities would treat an equivalent highway pavement area to address the 2.41 acres of new impervious surface area in each TDA following the HRM. Runoff treatment retrofit is also included for an additional 3.16 acres of project highway pavement in the study area to further mitigate water resource effects. As a result, the quality of the stormwater discharged would have a slightly increased amount of dissolved copper, but all other assessed pollutants (TSS, total copper, and total and dissolved zinc) would decrease. Exhibits 5-4 and 5-5 illustrate the magnitude of the change, and Appendix E, Stormwater Loading Calculations, provides more details on the calculation results. In addition, stormwater ponds would provide flow control, except where the Project discharges directly to Mercer Slough (TDA E).

Floodplains

The Project would not encroach upon any floodplain areas. The Project would avoid direct physical changes to streams and floodplains by using existing stream-crossing structures.

SECTION 7 UNAVOIDABLE EFFECTS

Would the Project have any effects that could not be avoided?

The Project would add 2.4 acres to the existing 42.1 acres of highway pavement, which would increase runoff. New flow-control facilities would control the rate of runoff for the periods when flows are damaging to the water bodies, but the streams and wetlands would receive more water volume via surface runoff and groundwater recharge would be reduced. The relative scale of the Project is small compared to the overall scale of the basins, and the Mercer Slough wetland hydrology (where most of the Project discharges) is primarily influenced by water surface elevations in Lake Washington. Therefore, these unavoidable changes in volume of runoff would be negligible to the water resources in the study area.

Because stormwater treatment can only remove a percentage of the total pollutant load, any increase in pollutant-generating surfaces (impervious road areas) would result in some residual increase in pollutant load. WSDOT would mitigate this condition by designing stormwater runoff treatment systems to treat 3.16 acres more area than the new impervious surface area. As a result, WSDOT would maintain flow conditions, where required, and reduce the quantity of suspended solids and total metals discharged.

SECTION 8 REFERENCES

References

Federal Emergency Management Agency (FEMA). Flood Insurance Rate Map. Panel numbers 53033C0656F and 53033C0658F. Retrieved in July 2017 from https://msc.fema.gov/portal/search?AddressQuery=Bellevue%20WA#searchresultsanchor.

King County. (2006). Flood Warning System. Retrieved in March 2006 from http://dnr.metrokc.gov/wlr/flood/flood.htm.

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Washington Department of Fish and Wildlife. (2017). Washington State Fish Passage Map Application. Retrieved data over several days in February 2017 from http://wdfw.wa.gov/conservation/habitat/fish_passage/data_maps.html.

Design Standards

The following regulations and procedures that guide design standards related to water resources were reviewed for preparing this discipline report:

City of Bellevue floodplains regulations (Land Use Code 20.25 H).

Floodplain Management, Presidential Executive Order 11988. May 24, 1977.

The National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973.

Revised Code of Washington (RCW) 89. The Flood Control Management Act of 1935.

Washington Administration Code (WAC) 173-270-050. Puget Sound Highway Runoff Program. 2003.

Washington Administration Code (WAC) 173-270-060(5)(a). Long-Range Program for Stormwater Retrofit of Existing Highways. 2003.

WSDOT. 2009. *Qualitative Procedures for Surface Water Impact Assessments*. April.

WSDOT. 2014. *Temporary Erosion and Sediment Control Manual M3109.01.* April.

WSDOT. 2016. *Highway Runoff Manual* M31-16.04February.

WSDOT. 2017. *Hydraulics Manual* M23-03.05. March.

WSDOT. 2017. *Maintenance Manual* M 51-01.07. June.

Washington State Military Department Emergency Management Division, Washington State Association of Counties, Association of Washington Cities, Ecology, and WSDOT, as described in the WSDOT *Environmental Manual* Section 431.04.

APPENDIX A ACRONYMS AND ABBREVIATIONS

Term	Meaning
BFE	base flood elevation
BMPs	best management practices
CARA	Critical Aquifer Recharge Area
CFR	Code of Federal Regulations
CSS	Context Sensitive Solutions
DCu	dissolved copper
DDT	dichloro-diphenyl-trichloroethane
DZn	dissolved zinc
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
GMA	Growth Management Act
GP	general purpose
HOV	high-occupancy vehicle
HRM	Highway Runoff Manual
I-405	Interstate 405
MP	milepost
msl	mean sea level
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
SPCC Plan	Spill Prevention Control and Countermeasures Plan
SOV	single-occupant vehicle
SR	State Route
TDA	threshold discharge areas

Term	Meaning
TESC Plan	Temporary Erosion and Sedimentation Control Plan
TSS	total suspended solids
TZn	total zinc
WAC	Washington Administrative Code
WDNR	Washington Department of Natural Resources
WRIA	Water Resources Inventory Area
WSDOT	Washington Department of Transportation
WSTC	Washington State Transportation Commission

APPENDIX B GLOSSARY

Term	Meaning
100-year floodplain	Land Subject to One-Hundred-Year Flood. The land in the floodplain subject to the flood having a one percent chance or greater of being equaled or exceeded in any given year. Also referred to as the 100-year flood.
Express Toll Lane	A limited-access freeway lane that is actively managed through a variable toll system to regulate its use and thereby express travel speeds and reliability. Toll prices rise or fall in real time as the lane approaches capacity or becomes less used. The goal of the express toll lanes is to help keep traffic moving by providing a choice for a faster, more reliable trip when drivers need it most.
Perched groundwater	A perched water table is an accumulation of groundwater located above a water table in an unsaturated zone. The groundwater is usually trapped above a soil layer that is impermeable and forms a lens of saturated material in the unsaturated zone.

APPENDIX C AVOIDANCE AND MINIMIZATION MEASURES

The following sections describe the established design and construction practices that WSDOT would include to avoid or minimize effects on the various environmental resources during both the construction and operation phases of the Project.

Measures for Geology, Soils, and Groundwater

- The Project would prepare and implement a Temporary Erosion and Sedimentation Control (TESC) Plan consisting of operational and structural measures to control the transport of sediment. Operational measures include removing mud and dirt from trucks before they leave the site, covering fill stockpiles or disturbed areas, and avoiding unnecessary vegetation clearing. Structural measures are temporary features used to reduce the transport of sediment, such as silt fences and sediment traps.
- The Project would protect the Kelsey Creek aquifer from contamination by construction-related spills by implementation of best management practices (BMPs) and a SPCC Plan. The SPCC Plan would specifically address fuel spills from vehicles and from spills from construction activities. Spill response equipment would be located at regular and specified intervals within the study area for minimizing countermeasure response times as identified in the SPCC Plan.
- The Project would ensure only clean fill is imported and placed for the Project and would require documentation for fill brought onto the site from the supplier certifying that the fill does not exceed Model Toxics Control Act (MTCA) cleanup standards according to Washington Administrative Code (WAC) 173-340. Suspect soils encountered during Project construction would be tested and, where necessary, removed from the site and disposed of in accordance with Washington State regulations.
- The contractor would identify and develop staging areas for equipment repair and maintenance away

from all drainage courses. Washout from concrete trucks would not be dumped into storm drains or onto soil or pavement that carries stormwater runoff.

- The contractor would obtain Construction Stormwater General Permit and conduct a regular program of testing and lab work to ensure that water encountered during construction meets the water quality standards specified in the permit. Sampling frequency would be according to permit requirements.
- The Project would meet the National Pollutant Discharge Elimination System (NPDES) water quality standards prior to the discharge of the encountered water to a surface water body, such as Kelsey Creek.
- If it is necessary, temporary dewatering and permanent underdrains may be necessary to control seepage for retaining walls and fill embankments, the Project would include special provisions in the design to maintain pre-project flow patterns into affected areas, including wetlands.

Measures for Hazardous Materials

Known or Suspected Contamination within the Project Right-of-Way

- The Project would prepare an SPCC Plan that provides specific guidance for managing contaminated media that may be encountered within the right-of-way.
- The Project would be responsible for remediation and monitoring of any contaminated properties acquired for this Project. WSDOT would further evaluate the identified properties before acquisition or construction occurs. Contamination in soils would be evaluated relative to the MTCA.
- If the Project encounters an underground storage tank (UST) within the right-of-way, WSDOT would assume cleanup liability for the appropriate decommissioning and removal of USTs. If this occurs, WSDOT would follow all applicable rules and regulations associated with UST removal activities.
- Construction waste material such as concrete or other harmful materials would be disposed of at approved

sites in accordance with Sections 2-01, 2-02, and 2-03 of the *WSDOT Standard Specifications*.

- The Project has the responsibility for cleanup of any soil or groundwater contamination encountered during construction within WSDOT right-of-way. Contamination would be evaluated relative to MTCA cleanup levels.
- All regulatory conditions imposed at contaminated properties associated with construction would be met. WSDOT would ensure that the site is properly contained during construction so that contaminants do not migrate offsite.

Known or Suspected Contamination Outside of the Right-of-Way

- Contaminated groundwater originating from properties located up-gradient of the right-of-way could migrate to the study area. WSDOT generally would not incur liability for groundwater contamination that has migrated into the project footprint as long as the agency does not acquire the source of the contamination. However, the Project would manage the contaminated media in accordance with all applicable rules and regulations.

Unknown Contamination

- If unknown contamination is discovered during construction, the Project would follow the SPCC Plan as well as all appropriate regulations.

Worker and Public Health and Safety and other Regulatory Requirements

The Project would comply with the following regulations and agreements:

- State Dangerous Waste Regulations (WAC 173-303)
- Safety Standards for Construction Work (WAC 296-155)
- National Emission Standards for Hazardous Air Pollutants (Code of Federal Regulations [CFR], Title 40, Volume 5, Parts 61 to 71)
- General Occupational Health Standards (WAC 296-62)

Hazardous Materials Spills During Construction

- The Project would prepare and implement an SPCC Plan to minimize or avoid effects on human health, soil, surface water and groundwater.

Measures to Avoid or Minimize Effects during Project Operation

The following sections describe the measures that WSDOT would implement during Project operation.

Measures for Surface Waters and Water Quality

- WSDOT would follow the *Highway Runoff Manual* for both the design and implementation of stormwater facilities. The Mercer Slough is a flow control-exempt receiving water body. Where drainage is to a tributary to Mercer Slough, WSDOT would construct a stormwater management system that does provide flow control.

APPENDIX D SUMMARY OF SURFACE WATER AND FLOODPLAIN REGULATIONS

- Bellevue City Code (9.12 and 20.25) governs sensitive areas and the protection of water quality and flood carrying capacity. To comply with Bellevue City Code (and other regulations), WSDOT has, as part of this Project, included stormwater design features to prevent pollution of surface water or alteration of flood-carrying capacity.
- The WSDOT *Highway Runoff Manual* (HRM) (WSDOT 2016) includes the technical requirements for protecting downstream properties from adverse effects, controlling flow, preventing erosion and sedimentation, maintaining drainage features, and controlling water quality. The HRM follows state and local guidance and requirements for surface water management.
- King County Code Section 21A.24.230-260 includes regulated floodplains and floodways. Section 21A.24.240 requires new development to not reduce effective base flood storage volume, and Section 21A.24.250 requires new development to not cause a measurable (0.01 foot) rise in base flood elevation.
- WSDOT will apply to the Washington State Department of Ecology (Ecology) for a National Pollutant Discharge and Elimination System (NPDES) Phase II Municipal Stormwater Discharge Permit that would cover discharges from the I-405 study area as well as other roadways that WSDOT manages.
- WSDOT will apply to Ecology for a general construction NPDES permit that Ecology administers to authorize ground-disturbing. This permit regulates activities where at least 5 acres of ground are disturbed for construction.
- WSDOT will apply to WA State Fish and Wildlife for a Hydraulic Project Approval (HPA). The Washington State Hydraulic Code Rules (WAC 220-110) specify that an HPA permit is required for "…construction or performance of other work that would use, divert, obstruct, or change the natural flow or bed of any of

the salt or fresh waters of the state." Modifications of stream crossings and new stormwater discharges to streams require an HPA permit.

- WSDOT will obtain a Letter of Verification from Ecology. Any time WSDOT obtains a 404, whether Individual or Nationwide permit, the agency must also obtain a Water Quality Certification (401, due to the origination from that section of the CWA) from Ecology. The Certification acknowledges that the proposed work will also maintain water quality standards. For Nationwide permits, Ecology has the discretion to issue an Individual permit or a Letter of Verification (LOV).
- State of Washington water quality standards (WAC 173-201A) describe the beneficial uses for surface waters and set standards for physical and chemical properties of those waters to attain those beneficial uses. Water quality standards address maximum concentrations of toxic substances. They also consider turbidity, suspended solids, nutrient concentrations, and appropriate ranges for temperature and acidity. Environmental Commitments made as part of the 2002 *I-405 Corridor Program Final Environmental Impact Statement*. WSDOT has committed to a number of environmental measures related to the protection of aquatic resources. These include specific measures to prevent water quality degradation, which are discussed in Section 6, Measures to Avoid or Minimize Project Effects, and a general commitment to provide water quality detention and treatment from existing impervious surfaces where feasible.

APPENDIX E STORMWATER LOADING CALCULATIONS

WSDOT Quantiative Procedures for Surface Water Impact Assessments
Method dated 4/13/2009

Table 1: Estimated annual pollutant loads from untreated and treated highway runoff in (Lbs./year • acre

Pollutant		Mean load from Untreated runoff	Mean load from Treated runoff
Total Suspended Solids		769	88
Total Copper		0.16	0.04
Dissolved Copper		0.04	0.03
Total Zinc		0.98	0.21
Dissolved Zinc		0.31	0.14

Treated Versus Untreated Pavement Assessments for the current Roadway and Stormwater Concepts

		Pre-Project Condition		Post-Project Condition					
TDA		Untreated PGIS (acres)	Treated PGIS (acres)	Untreated PGIS (acres)	Treated PGIS (acres)		New PGIS	New Treatment	
Mercer Slough Wetland									
C		1.27	2.92	0.36	3.99		0.16	1.07	
D		2.79	5.00	1.47	7.18		0.86	2.18	
Total to wetland		**4.06**	**7.92**	**1.88**	**11.17**		**1.02**	**3.25**	
Mercer Slough									
E		1.54	11.21	0.83	13.03		1.11	1.82	
Sturtevant Creek									
F		17.36	0	17.14	0.5		**0.28**	**0.50**	
Totals		**22.96**	**19.13**	**19.8**	**24.7**		**2.41**	**5.57**	**231%**
		42.09	**45%**		**56%**				
			42.09		**44.5**				

Pre-Project Total Pollutant Loads

TDA	Pollutant	Total Suspended Solids	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc
Mercer Slough Wetland						
C		1,234	0.32	0.14	1.86	0.80
D		2,586	0.65	0.26	3.78	1.56
Total to wetland		3,819	0.97	0.40	5.64	2.37
Mercer Slough						
E		2,171	0.69	0.40	3.86	2.05
Sturtevant Creek						
F		13,350	2.78	0.69	17.01	5.38
Totals:		**19,340**	**4.44**	**1.49**	**26.52**	**9.80**

Post-Project Total Pollutant Loads

TDA	Pollutant	Total Suspended Solids	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc
Mercer Slough Wetland						
C		628	0.22	0.13	1.19	0.67
D		1,762	0.52	0.27	2.95	1.46
Total to wetland		2,390	0.74	0.41	4.14	2.13
Mercer Slough						
E		1,785	0.65	0.42	3.55	2.08
Sturtevant Creek						
F		13,225	2.76	0.70	16.90	5.38
Totals:		**17,400**	**4.16**	**1.53**	**24.59**	**9.60**

I-405, I-90 to NE 6th Street Improvement Project
Summary Assessments
Calculating Percent Change of Pollutant Load = (Post-Project Load - Pre-Project Load)/Pre-Project Load

TDA	Pollutant	Total Suspended Solids	Total Copper	Dissolved Copper	Total Zinc	Dissolved Zinc
Mercer Slough Wetland						
C		-49%	-32%	-3%	-36%	-16%
D		-32%	-19%	5%	-22%	-7%
Total to wetland		-37%	-23%	2%	-27%	-10%
Mercer Slough						
E		-18%	-6%	7%	-8%	2%
Sturtevant Creek						
F		-1%	-1%	1%	-1%	0%