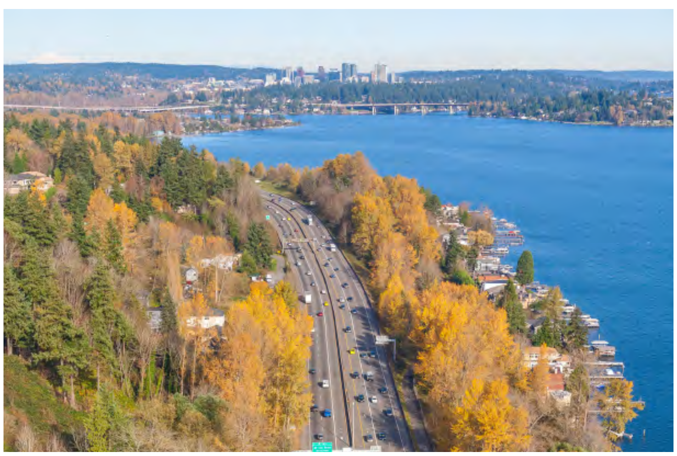
WSDOT

U. S. Department of Transportation
Federal Highway Administration

July 2018

I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project (MP 0.0 to 11.9)

Attachment G: Water Resources Discipline Report



Title VI

It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its federally funded programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equal Opportunity (OEO). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OEO's Title VI Coordinator at (360) 705-7090.

Americans with Disabilities Act (ADA) Information

This material can be made available in an alternate format by emailing the Office of Equal Opportunity at wsdotada@wsdot.wa.gov or by calling toll free, (855) 362-4ADA (4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

Notificación de Titulo VI al Público

Es la póliza de el Departamento de Transportes del Estado de Washington de asegurar que ninguna persona sea excluida de participación o sea negado los beneficios, o sea discriminado bajo cualquiera de sus programas y actividades financiado con fondos federales sobre la base de raza, color, origen nacional o sexo, como proveído por el Título VI de el Acto de Derechos Civiles de 1964. Cualquier persona que cree que sus protecciones de Titulo VI han sido violadas, puede hacer una queja con la Oficina de Igualdad de Oportunidades (OEO). Para información adicional con respecto a procedimientos de quejas de Titulo VI y/o información con respecto a nuestras obligaciones sin discriminación, por favor de comunicarse con el Coordinador de Titulo VI de la Oficina de Igualdad de Oportunidades (OEO) (360) 705-7090.

Información del Acta Americans with Disabilities Act (ADA)

Este material es disponible en un formato alternative. Envie su petición por correo electrónico al equipo de Oficina de Igualdad de Oportunidades (OEO) en wsdotada@wsdot.wa.gov o llamando gratis, (855) 362-4ADA (4232). Personas sordas o con problemas de audición pueden solicitar llamando el relé de estado de Washington al 711.

TABLE OF CONTENTS

EXHIBITS

APPENDICES

SUMMARY

What is our study approach?

The Washington State Department of Transportation (WSDOT) is proposing to construct the I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project (MP 0.0 to 11.9) (the Project). To evaluate the Project's effects on water resources during construction and operation, the Interstate 405 (I-405) team used the methods described in WSDOT's *Environmental Manual* (WSDOT 2017a). The manual provides guidance that WSDOT follows to ensure that its projects comply with local, state, and federal laws and regulations pertaining to water resources. For this Project, water resources are considered and include surface water (flow and water quality) floodplains, groundwater, and aquifers.

What are existing conditions?

The study area includes water resources from Water Resource Inventory Areas (WRIA) 8 – Lake Washington/Cedar/ Sammamish Watershed and the WRIA 9 – Green/Duwamish and Central Puget Sound Watershed. Surface waterbodies in the study area that are affected by this Project include Gilliam Creek, the Cedar River, Johns Creek, three unnamed tributaries to Lake Washington near the NE 44th Street Interchange, Coal Creek, Mercer Slough, Richards Creek, and Lake Washington. Other waterbodies from these WRIA's within the Project limits would not be affected by the Project and therefore will not be included in this document.

According to the Water Quality Atlas (Ecology 2018a), an online interactive map, the following waterbodies in the study area that would be affected by the Project do not meet state water quality standards:

- Cedar River – dissolved oxygen, pH, temperature
- Johns Creek – dissolved oxygen, fecal coliform, temperature
- May Creek – fecal coliform, temperature
- Coal Creek – dissolved oxygen
- Mercer Slough – fecal coliform, temperature

Although these waterbodies currently do not meet state standards, there have been no Total Maximum Daily Limits

(TMDLs) issued or approved by the Environmental Protection Agency (EPA).

Existing floodplains in the study area that are affected by this Project are associated with the Cedar River, May Creek, Coal Creek, and the Mercer Slough.

The most important aquifer in the study area exists along the Cedar River and is known as the Cedar Valley Aquifer. This aquifer is an EPA-designated sole-source aquifer and supplies 80 percent of the drinking water used in its service area (EPA 1988). Another regional aquifer in the study area is the Green-Duwamish Alluvial Aquifer. There would be no effects on the Green-Duwamish Alluvial Aquifer as a result of the Project, but due to its interconnectivity with the Cedar Valley Aquifer, it is discussed in Section 4, Existing Conditions, of this document.

How would the Project affect water resources?

The Project is expected to benefit water resources. Peak and base flow rates to streams and rivers and Lake Washington would not be altered negatively during construction. This Project would provide flow control and water quality treatment for the impervious areas added by the Project and would also retrofit existing untreated impervious surface areas.

During construction, work crews would clear, grade, and prepare construction areas for new pavement. Constructing this new pavement would expose bare soil, which is then easily eroded by rainfall and surface water runoff. This soil erosion can create short-term effects on surface water quality. However, because the Project would follow standard best management practices (BMPs) for erosion control, these effects would be minimal if they occur.

The Project would not negatively affect any of the identified floodplains in the study area. Work being done to remove existing bridge piers and provide habitat elements in May Creek would improve floodplain function as compared to existing conditions. Potential groundwater effects on aquifers during construction would include contamination from spills and/or reduced well capacity. However, WSDOT will implement several measures (listed in Section 6) to avoid or minimize negative effects on the aquifers.

Would there be any unavoidable effects?

Surface Water Flow

There would be no substantial adverse effects on surface water flows from the Project. Stormwater facilities would manage the peak flow rates of stormwater discharge to streams and rivers. The stormwater discharge would be less than existing conditions or the No Build Alternative.

Surface Water Quality

There would be no substantial adverse effects on surface water quality from the Project. Stormwater facilities would remove pollutants from runoff generated by the Project, in addition new BMPs will be provided that will treat previously non-treated I-405 impervious surfaces, thus, decreasing the overall pollutant loading compared to existing conditions or the No Build Alternative.

Floodplains

There would be no substantial adverse effects on floodplains due to the Project's proposed mitigation of providing compensatory storage in affected floodplains.

Groundwater

The Project would not result in any substantial adverse effects on groundwater due to the proposed special mitigation measures to protect the Sole Source Cedar Valley Aquifer—specifically, the Delta Aquifer subunit. The Delta Aquifer subunit is an important part of the Sole Source Cedar Valley Aquifer, as it directly supplies the City of Renton production wells. See Section 4, Existing Conditions, for more detail.

How would water resources be affected if the Project is not built?

With the No Build Alternative, conditions would not change from the status quo. The water quality and quantity retrofit proposed as a part of the Project would not be implemented, and those benefits would not be realized. With increased traffic it is expected untreated stormwater runoff to receiving surface waters will likely increase. The No Build Alternative would keep existing fish barriers as is, delaying the efforts to improve fish passage, and increase salmonid production within WRIA 8.

SECTION 1 INTRODUCTION

This report was prepared in support of the *I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project* (MP 0.0 to 11.9) (the Project) *Environmental Assessment* (EA) The Project proposes to make several roadway, structural, drainage, and transit improvements to the Interstate 405 (I-405) corridor.

The Project is part of a comprehensive strategy identified in the 2002 *I-405 Corridor Program Final Environmental Impact Statement* (EIS) and subsequent *Record of Decision* (ROD) 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.

SECTION 2 PROJECT DESCRIPTION

What improvements are proposed with the Project?

Exhibit 2-1 describes in detail the improvements proposed with the Project. Exhibit 2-2, sheets 1 through 8, show the proposed improvements on a series of maps. In general, the Project proposes to add one lane to I-405 in each direction for about 9 miles beginning on I-405 near SR 167 and continuing approximately 1 mile north of I-90. The Project would also add a general purpose (GP) (auxiliary) lane to southbound I-405 between MP 6.7 (north of N 30th Street) and 7.1 (south of NE 44th Street) and MP 9.4 (north of 112th Avenue SE) to 10.5 (north of Coal Creek Parkway). The existing high-occupancy vehicle (HOV) lane on I-405 and the additional lane would be operated as a two-lane express toll lane (ETL) system. Additional details describing the ETLs are provided in the next question, "How would the express toll lanes work?"

Exhibit 2-1. Improvements Proposed with the I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project

Project Element	I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project
I-405/I-5 Interchange Exhibit 2-2, Sheet 1	– Extend the southbound left lane at the I-5 interchange west for approximately 500 feet to provide additional merge distance.
I-405 Lanes and Shoulders from SR 167 to north of I-90 Exhibit 2-2, Sheets 2 through 8	– Create a dual ETL system from MP 2.9 (northeast of the I-405/SR 167 interchange) and MP 11.9 (north of the I-405/I-90 interchange) by adding one new lane in each direction and converting the existing HOV lane to an ETL. – Convert the existing HOV lane to a single ETL from MP 2.4 (at the I-405/SR 167 interchange) to MP 2.9 on northbound I-405 and from MP 1.6 (in Renton over Springbrook Creek) to MP 2.9 on southbound I-405. – Add an additional GP (auxiliary) lane on southbound I-405 between MP 6.7 (north of 30th Street) and MP 7.1 (south of NE 44th Street) and MP 9.4 (north of 112th Avenue SE) to MP 10.5 (north of Coal Creek Parkway). – Bring I-405 up to current freeway standards where feasible.
I-405 Tolling from SR 167 to north of I-90 Exhibit 2-2, Sheets 2 through 8	– Construct tolling gantries to collect the tolls for the ETL system (see description in the row above).
Cedar Avenue Exhibit 2-2, Sheet 4	– Reconstruct the bridge over I-405 to widen southbound I-405.
Renton Avenue Exhibit 2-2, Sheet 4	– Reconstruct the bridge over I-405 to widen southbound I-405.
Cedar River Bridge Exhibit 2-2, Sheet 4	– Widen the southbound I-405 bridge over the Cedar River.
Sunset Boulevard N Interchange Area Exhibit 2-2, Sheet 4	– Widen the I-405 northbound and southbound bridges over Sunset Boulevard N.
NE Park Drive Interchange Area Exhibit 2-2, Sheet 5	– Widen the I-405 southbound bridge over NE Park Drive.
N 30th Street Interchange Area Exhibit 2-2, Sheet 5	– Replace the local road overpass abutment slopes with retaining walls on both sides of I-405 and lower the southbound I-405 roadway by approximately one foot.
NE 44th Street Interchange Area Exhibit 2-2, Sheet 6	– Replace the northbound and southbound I-405 bridges over May Creek with two new single span bridges and provide habitat improvements. – Replace the NE 44th Street bridge over I-405. Construct new direct access ramps and two inline transit stations (one in each direction) in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines (ORCA), and site furnishings such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Realign and reconstruct the northbound access to I-405 from a loop ramp to a new on-ramp from Lake Washington Boulevard NE. – Build four roundabouts along local arterials. – Construct an at-grade park-and-ride lot at Lake Washington Boulevard N and N 43rd Street with a minimum of 200 parking stalls and a roundabout (improvements would be built, but may be built by Sound Transit or others).

Exhibit 2-1. Improvements Proposed with the I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project

Project Element	I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project
112th Avenue SE Interchange Area Exhibit 2-2, Sheet 7	– Replace the 112th Avenue SE bridge over I-405. – Construct new direct access ramps, two inline transit stations (one in each direction) in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines (ORCA), and site furnishings such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Construct a roundabout on 112th Avenue SE. – Reconfigure the Newport Hills Park-and-Ride.
Coal Creek Parkway Interchange Area Exhibit 2-2, Sheet 7	– Construct a new southbound I-405 bridge on a new alignment. Convert the existing southbound I-405 bridge to northbound ETLs. – Convert the four local road intersections on Coal Creek Parkway SE to roundabouts.
I-405/I-90 Interchange Area Exhibit 2-2, Sheet 8	– Reconfigure the I-405 southbound to I-90 eastbound ramp from one to two lanes. – Realign the I-405 northbound to I-90 eastbound ramp. As part of this work, construct two new bridges over the eastbound I-90 ramp to Factoria Boulevard and over Factoria Boulevard.
Fish Passage Exhibit 2-2, Sheet 6	– Construct four fish passage crossings for unnamed tributary (UNT) 08.LW.0283 (formerly Gypsy Creek). – Construct a fish passage crossing under I-405 mainline for Stream UNT 08.LW.7.7A.[a] – Construct a fish passage crossing under I-405 mainline for Stream UNT 08.LW.7.8.[a]
Lake Washington Trail Exhibit 2-2, Sheets 6 and 7	– Realign and reconstruct the existing trail west of its current location to reside in the King County's Eastside Rail Corridor property between Ripley Lane in Renton (MP 7.7) and Coal Creek Parkway in Bellevue (MP 10.2). As part of this work, widen a portion of the King County's Eastside Rail Corridor Regional Trail.
Noise Walls Exhibit 2-2, Sheets 4, 6, 7 and 8	– Construct 4 new noise walls. – Relocate 2 existing noise walls.
Stormwater Management Exhibit 2-2, Sheets 1 through 8	– Add 46.92 acres of new PGIS and 5.7 acres of non-PGIS. – Provide enhanced treatment for 100% of new impervious surfaces. – Retrofit 51 percent (111.5 acres) of existing untreated PGIS and continue to treat stormwater from the 21.27 acres of PGIS that currently receives treatment. – Treat a total of 179.69 acres of PGIS.
Construction Duration	– 5 years of construction is expected from 2019 through 2024. – The direct access ramps and associated transit improvements at 112th Avenue SE, reconfiguring the Newport Hills Park-and-Ride lot, and building four roundabouts on Coal Creek Parkway SE may be constructed after 2024, depending on when allocated funds for these elements become available.

ETL = express toll lane GP = general purpose; HOV = high-occupancy vehicle; MP = milepost PGIS = pollutant generating impervious surfaces

[a] For these culverts, a restrictor plate will be put in place to prevent flooding until a downstream barrier is removed, at which time the restrictor plate will be removed.

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 the ETLs proposed with the Project. The 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 this 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 would be 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 would show up to three toll rates for different toll zones, or destinations. Drivers would 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 of these pricing approaches are used together, it means that 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 be required to set the *Good To Go!* pass to the HOV mode to avoid charges. Single-

How does dynamic pricing work?

Electronic monitors along the roadway measure real-time information on the speed, congestion, and number of vehicles in the 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:

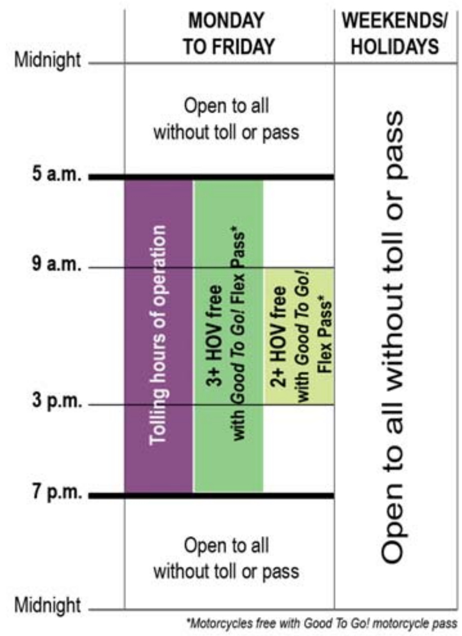
- **SOVs** would pay a toll to use the lanes.
- **Transit, HOV 3+, and Motorcycles** would travel for free with a *Good To Go!* pass.
- **HOV 2+** would travel for free from 9 a.m. to 3 p.m. with a *Good to Go!* pass. From 5 a.m. to 9 a.m. and 3 p.m. to 7 p.m. HOV2+ would pay a toll to use the ETLs with 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.

occupant vehicles (SOVs) could choose to pay a toll to use the ETLs during operating hours with or without a *Good To Go!* pass.

- **Occupancy Requirement**s – 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 (HOV2+) with a *Good To Go!* pass. Motorcycles ride toll-free in the ETLs with a *Good To Go!* pass. During non-operating hours, SOVs will not be permitted to enter the ETLs from ramps where access is provided directly from local streets. SOV access would only be permitted from freeway GP entry and exit points.
- **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 would 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.

What is a *Good to Go!* Account?

A Good To Go! account is the cheapest and easiest way to pay tolls in Washington. With an account, your tolls will be paid automatically without having to stop at a toll booth or worry about bills in the mail. For more information please go to: http://www.wsdot.wa.gov/GoodToGo/default.htm



How would the Project be constructed?

WSDOT expects to construct the Project using a design-build contract. Design-build is a method of project delivery in which WSDOT executes a single contract with one entity for design and construction services to provide a finished product. With design-build projects, contractors have the flexibility to offer innovative and cost-effective alternatives to deliver the Project, improve project performance, and reduce project effects. Some design modifications that the contractor may propose could affect the Project footprint and design details described in this EA; however, if the contractor proposes modifications not covered by this EA, environmental review would be conducted as needed.

Construction work would include the removal of existing asphalt and concrete surfaces, clearing and grading adjacent areas, laying the aggregate roadway foundation, and placing of asphalt and concrete surfaces. Changing the vertical and horizontal alignments of the I-405 mainline would require earthwork, with approximately 780,000 cubic yards of excavation and approximately 700,000 cubic yards of fill.

Construction equipment such as backhoes, excavators, front loaders, pavement grinders, jack hammers, pile drivers, trucks, as well as grading and paving equipment would be used. Equipment used for construction would include cranes, pile drivers, drilling rigs and augers, backhoes and excavators, jack hammers, concrete pumping equipment, and slurry processing equipment.

Staging areas in unused right of way would provide room for employee parking, large equipment storage, and material stockpiles. The contractor may also find other locations for construction staging.

Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 1 of 8

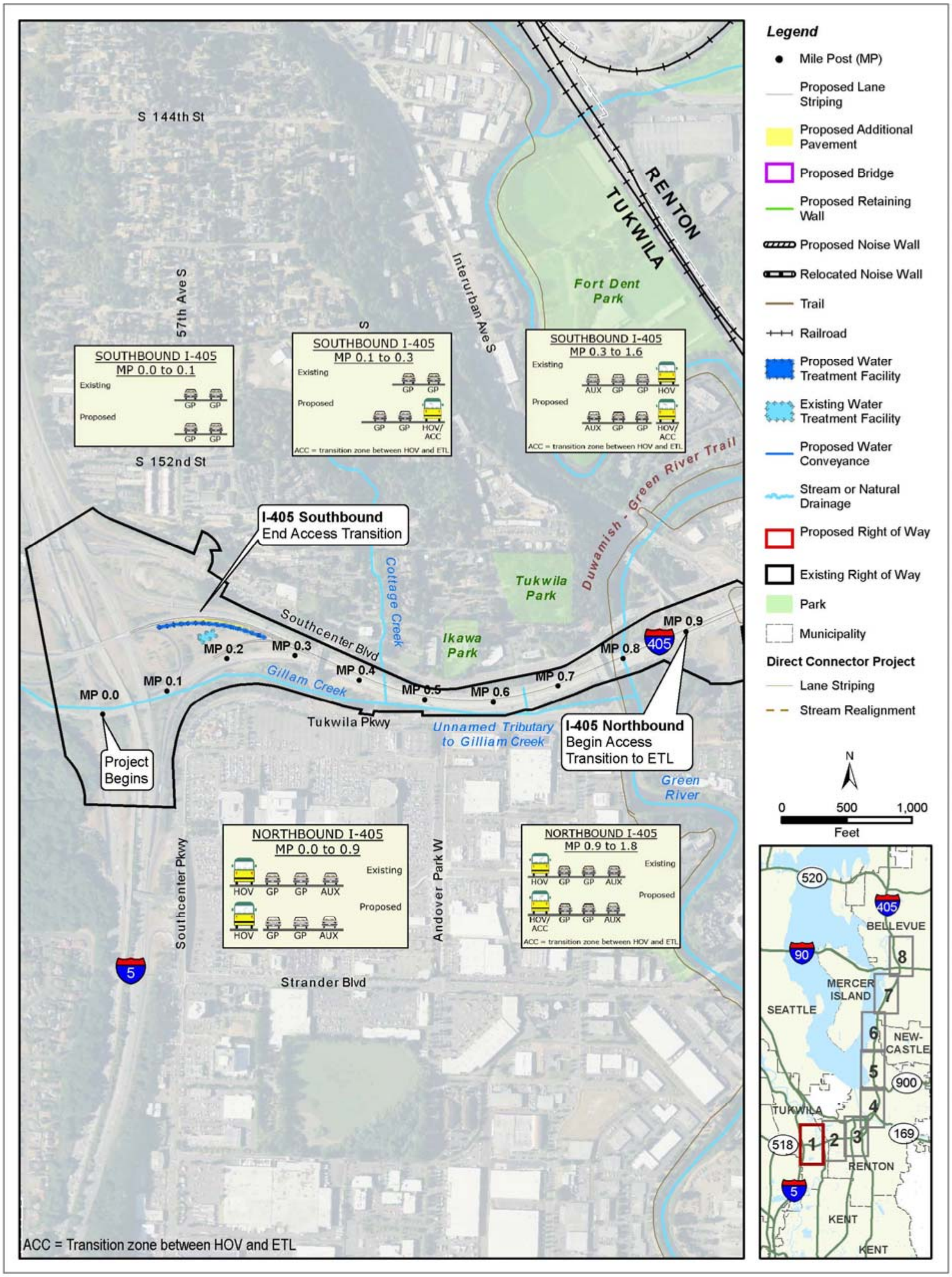


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 2 of 8

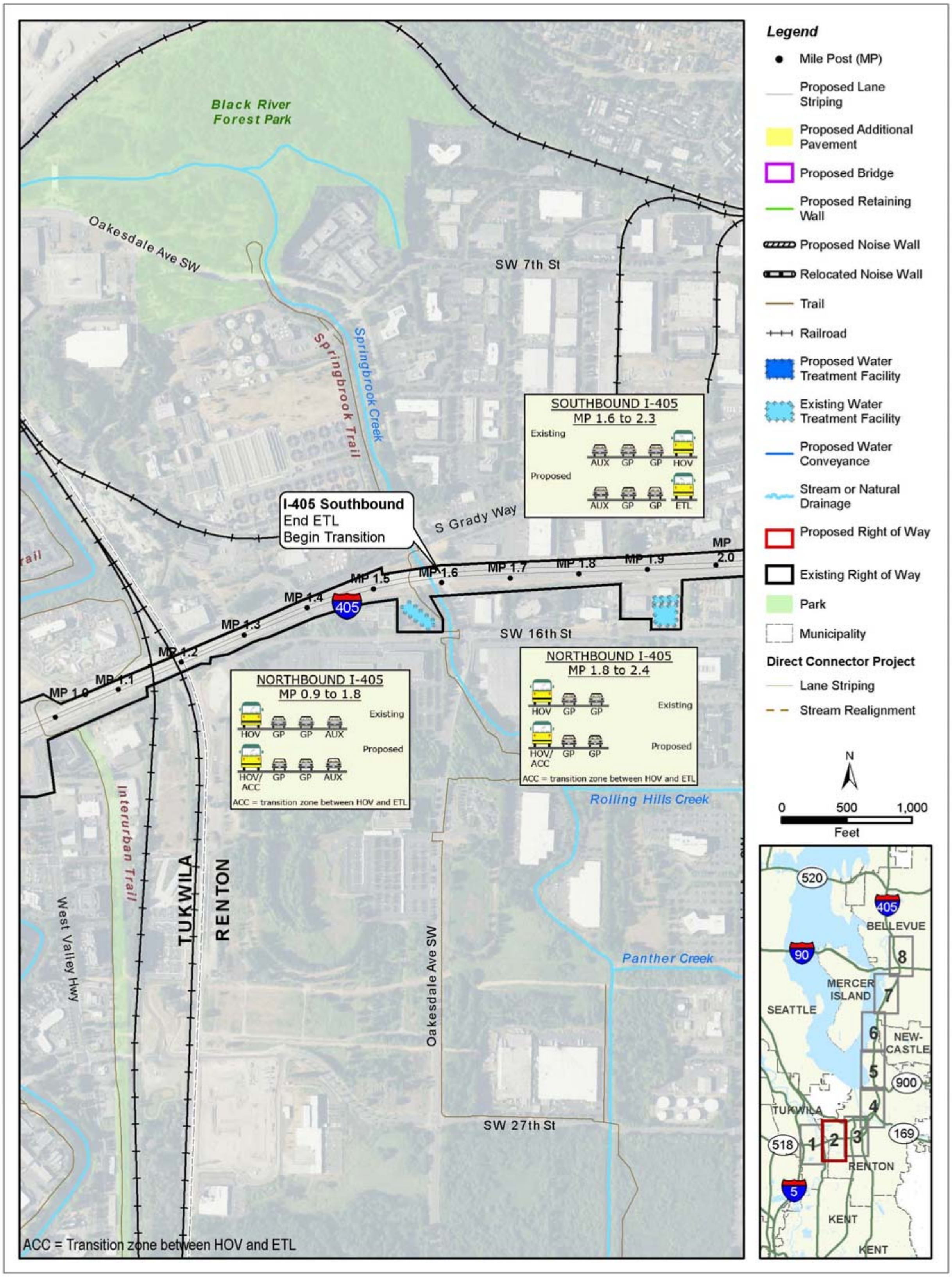


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 3 of 8

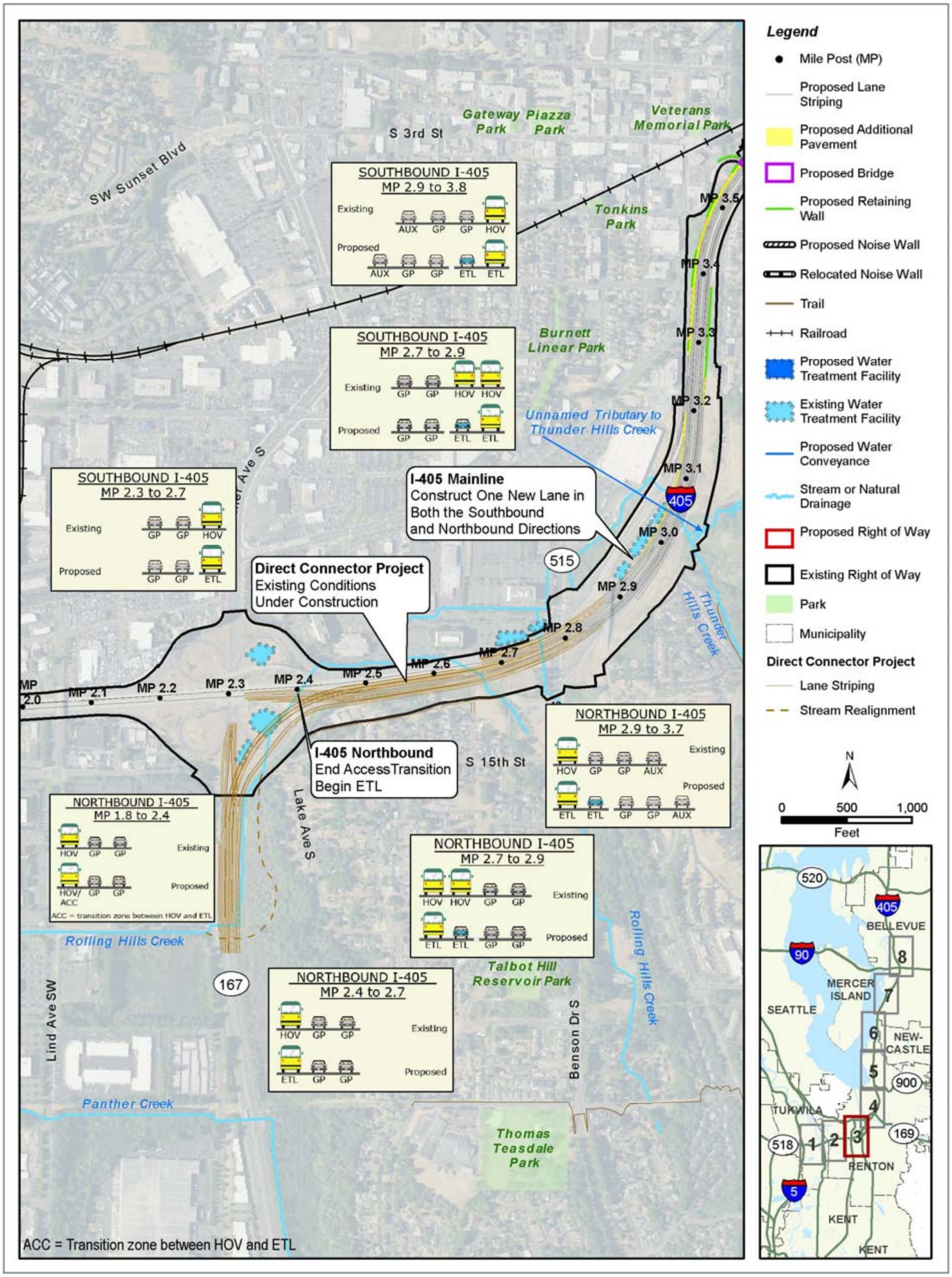


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 4 of 8

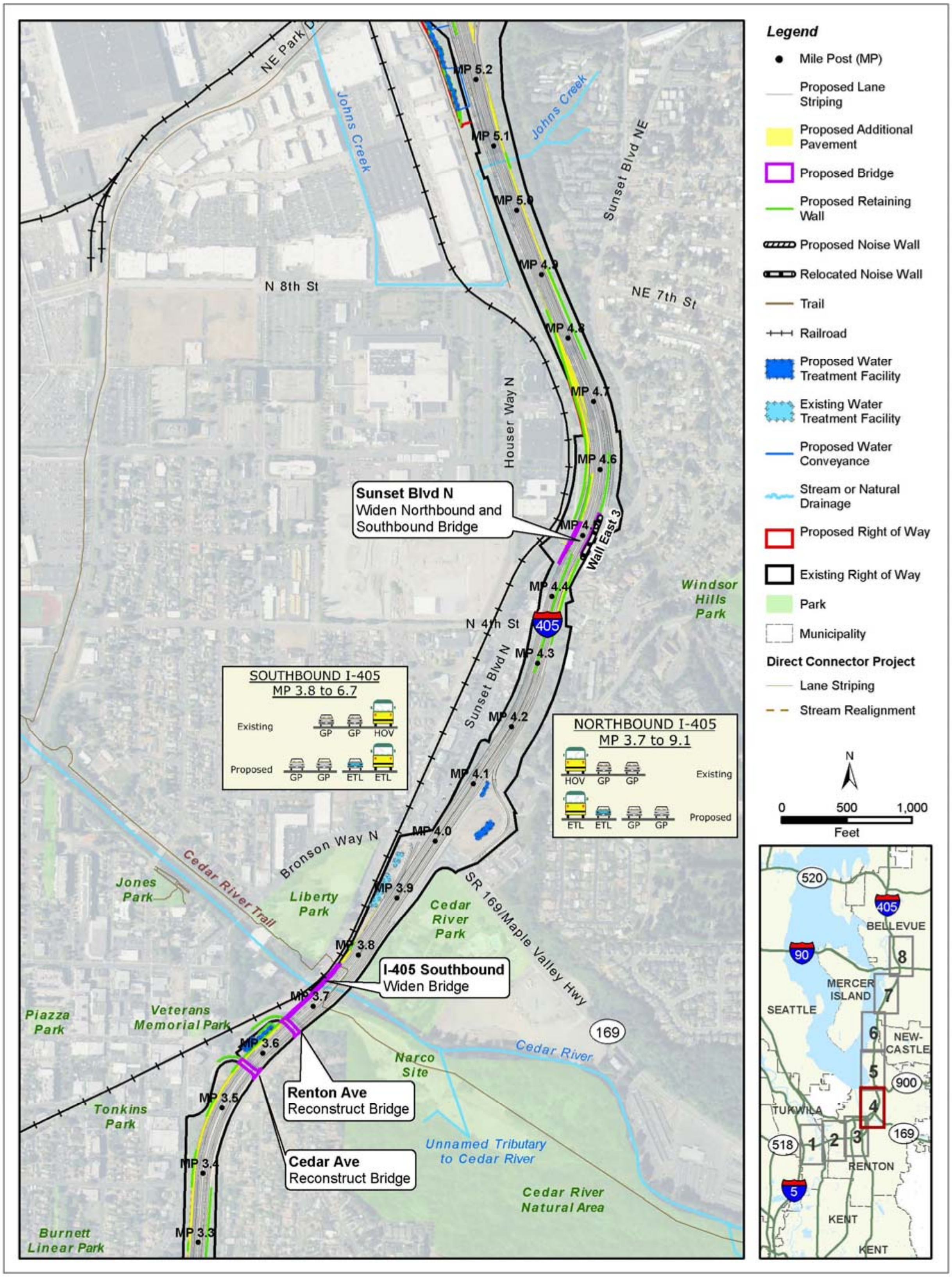


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 5 of 8

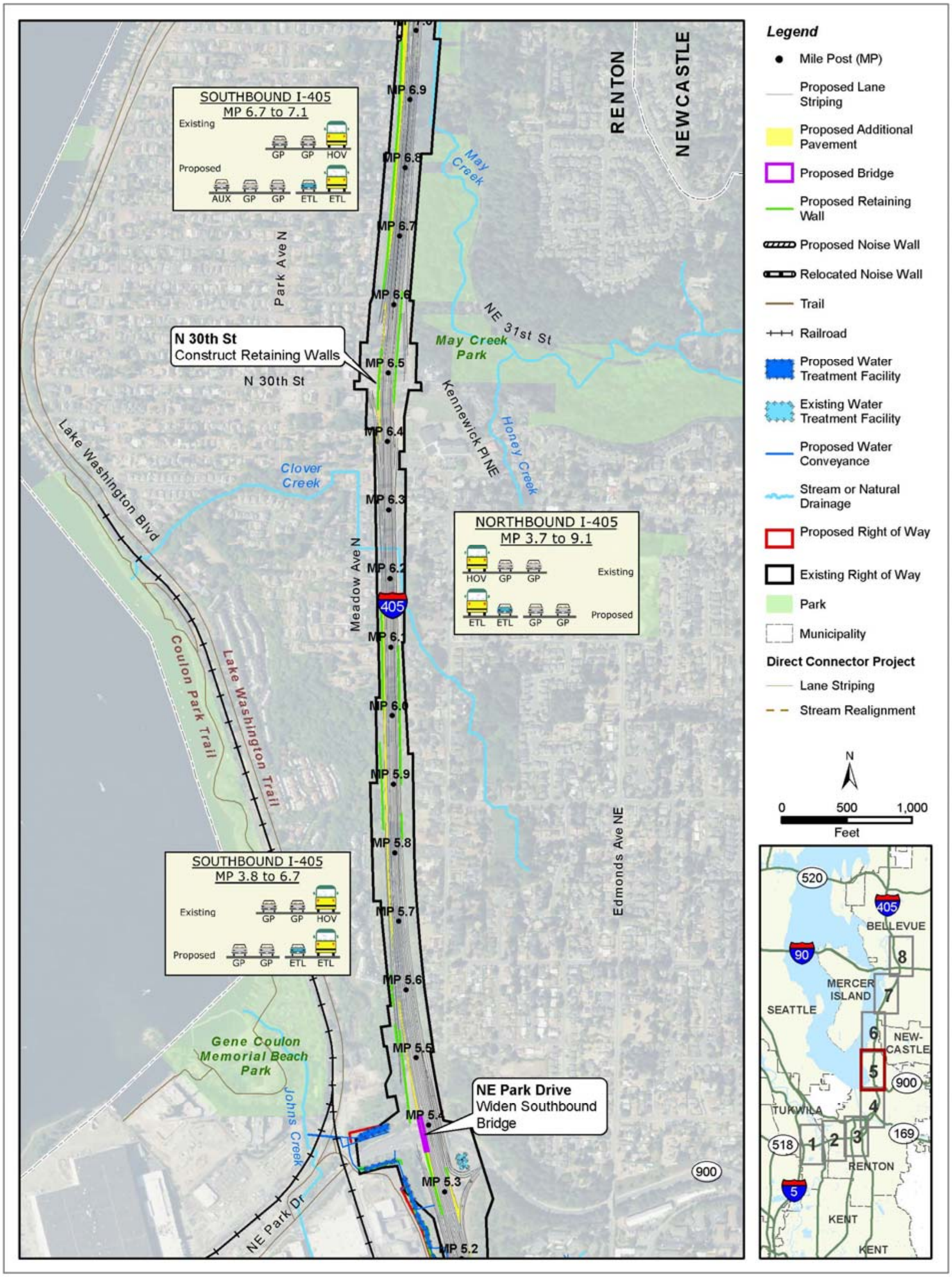


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 6 of 8

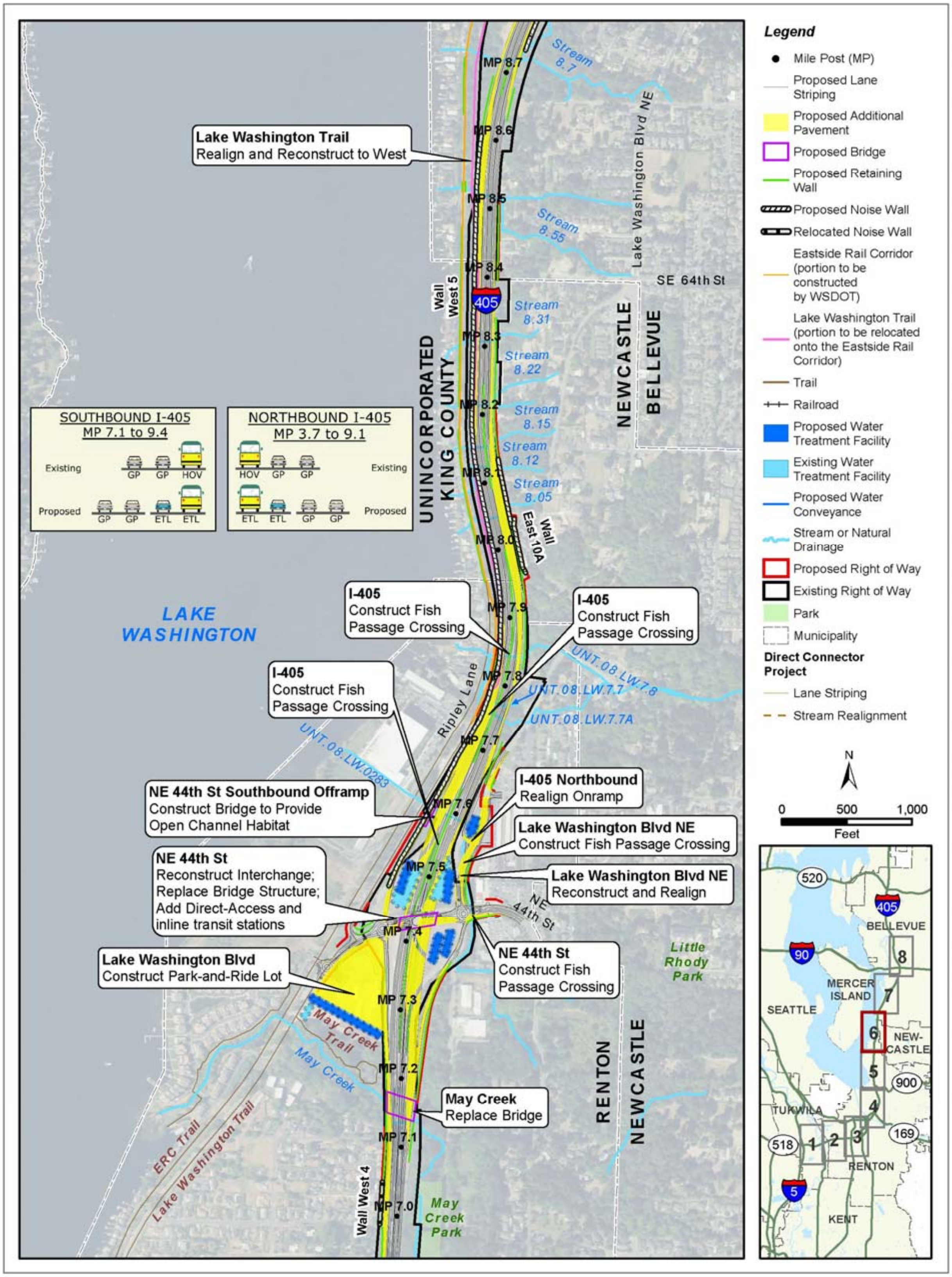


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 7 of 8

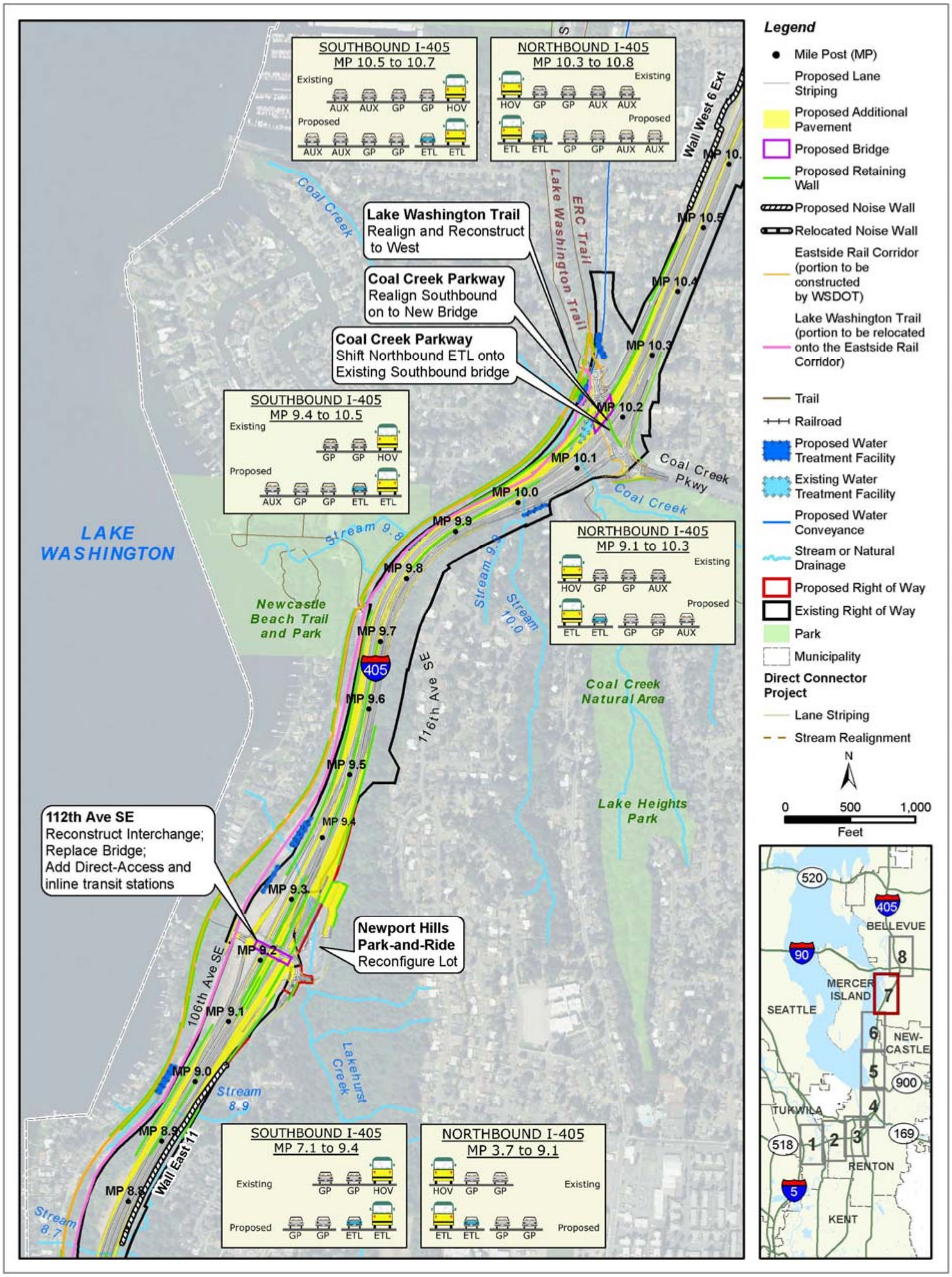
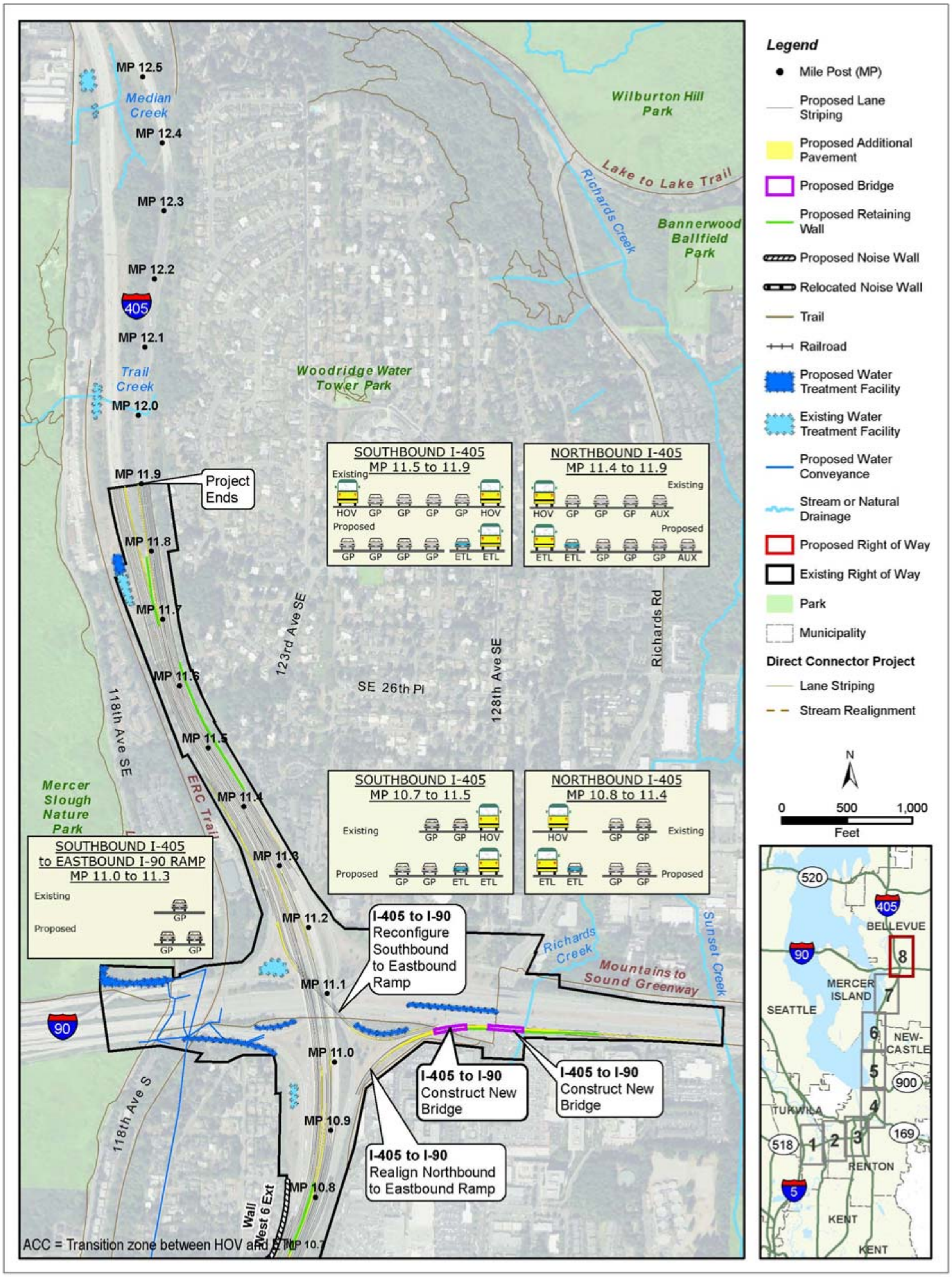


Exhibit 2-2. I-405, Tukwila to I-90 Vicinity Express Toll Lanes Project Improvements, Sheet 8 of 8



SECTION 3 STUDY APPROACH

What is the study area and how was it determined?

The study area addressed in this report is located within the Water Resources Inventory Area (WRIA) 08 – Cedar/Sammamish/Lake Washington and WRIA 09 – Duwamish/Green Watersheds, and includes nine major sub-watersheds that affected by the proposed Project. These major sub-watersheds include the Lower Green River – West, Cedar River, East Lake Washington – Renton, East Lake Washington – Bellevue South, Coal Creek, and Mercer Slough sub-watersheds.

The construction footprint for the Project was used to determine the study area, which is defined as the area affected by proposed improvements to I-405 from I-5 in Tukwila to just north of I-90 in Bellevue.

The study area includes existing and proposed new WSDOT right of way. Along streams and rivers, the study area extends 300 feet upstream and 1,320 feet (one-quarter mile) downstream to assess effects on those waterbodies.

What policies or regulations apply to determining effects on water resources?

Natural water resources typically include surface water (also in the form of stormwater), floodplains, lakes, wetlands, and groundwater and aquifers. Within the study area, a wide range of these resources exists. Listed below are each of the analyzed water resources elements, followed by the policies and regulations referenced for determining the Project's effects on these elements, and the agencies with implementing authority. Not included in the list below, but of equal importance, are the manuals and guidelines of the local jurisdictions, including the *King County Surface Water Design Manual* (King County 2016). Many of the local jurisdictions have their own manuals, or have adopted the Washington State Department of Ecology (Ecology) *Stormwater Management Manual* (Ecology 2014).

General Water Resources

- National Environmental Policy Act (NEPA) – United States Environmental Protection Agency
- Endangered Species Act (ESA) – United Stated Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries
- Federal Clean Water Act (CWA) – Ecology and U.S. Army Corps of Engineers (Corps)
- State Environmental Policy Act (SEPA) – Ecology
- WSDOT *Hydraulics Manual* M 23-03.05 (WSDOT 2017b)
- WSDOT *Environmental Manual* M 31-11.17 (WSDOT 2017a)

Surface Water

- The Water Pollution Control Act, Revised Code of Washington (RCW) 90.48
- WSDOT *Highway Runoff Manual* (HRM) M 31-16.04 (WSDOT 2016)
- WSDOT *Temporary Erosion and Sediment Control* (TESC) *Manual* M 31-09.01 (WSDOT 2014)
- WSDOT *Qualitative Procedures for Surface Water Impact Assessments* – (WSDOT 2009)
- WSDOT *Maintenance Manual* M 51-01.07 (WSDOT 2017c)
- *Stormwater Management Manual for Western Washington* (Ecology 2014)
- Washington State Shoreline Management Act – Ecology
- Critical Areas Ordinance for shorelines and wetlands – King County

Floodplains

- FHWA's Technical Advisory T6640.8A (FHWA 1987)
- The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 (FEMA 1997).
- Presidential Executive Order 11988, Floodplain Management (FEMA 1977)

- The Flood Control Management Act of 1935, RCW 86.16
- Title 21A of the King County Code and the Surface Water Runoff Policy in Chapter 9.04 – King County
- Critical Areas Ordinance for floodplains – King County, City of Bellevue, City of Newcastle, City of Renton, City of Tukwila. These floodplain ordinances include a provision that requires compensatory mitigation for flood storage that is lost due to fill in jurisdictional floodplains.

Groundwater and Aquifers

- The Safe Water Drinking Act – EPA
- Washington State Wellhead Protection requirements outlined in Washington Administrative Code (WAC) 246-290-135(4) – State of Washington
- WSDOT *Geotechnical Design Manual* M 46-03.11 (WSDOT 2015)
- King County Public Water System Rules and Regulations, Chapter 12 (12.24.010) – King County
- Aquifer Protection Area (APA) requirements outlined in Renton Municipal Code (RMC) 4-9 – City of Renton

How did we collect information for this report?

Information for this report was acquired through a review of multiple sources, listed below:

- Multiple basin or watershed plans, including the May Creek Basin Action Plan (King County and City of Renton 2001), the *Coal Creek Basin Plan and Draft Environmental Impact Statement* (King County and City of Bellevue 1987), and the Lower Cedar River Basin and Nonpoint Pollution Action Plan (King County Department of Natural Resources 1997)
- WRIA maps from Ecology
- Topographic and resource maps
- Light Detection and Ranging (LiDAR) for land elevations and topographic information

- Geographic information system (GIS) maps and databases
- Aerial photography
- Water quality studies and recent water quality data
- Agency webpages
- Data provided from City of Bellevue, City of Newcastle, City of Renton, City of Tukwila, and King County personnel

Additional water resources information was collected during a series of site visits where experts in the fields of fisheries, wetlands, wildlife, road design, drainage design, and permitting surveyed and collected data on the natural and manmade features located within the study area.

Resource-specific data that were collected for this report are discussed below.

Surface Water

- Wetland delineations
- Review of Ecology's 303(d) list of impaired water bodies
- Review of Ecology's Total Maximum Daily Load (TMDL) list
- Defining stormwater surface and piped system flow patterns through online interactive GIS map research and field and topographic surveys to verify
- Information collected through discussions with the City of Bellevue, City of Newcastle, City of Renton, City of Tukwila, and local community members to better understand water resources issues and concerns

Floodplains

- Review Federal Emergency Management Agency (FEMA) Flood floodplain designations within the study area and Flood Insurance Rate Maps (FIRMs)
- Review of past relevant floodplain restoration and mitigation studies

Groundwater and Aquifers

- Sole Source Aquifers and Group A and B Wellhead Protection Area information from city and county databases
- Ecology databases on wells and water rights within the study area

How did we evaluate effects?

The methods described in WSDOT's *Environmental Manual* were used to evaluate the Project's effects on surface water flows and water quality, floodplains, and groundwater during construction and operation. The manual provides guidance that WSDOT follows to ensure that its projects comply with local, state, and federal laws and regulations. The evaluation methods for each water resource is discussed in further detail in the following sections.

Surface Water

Baseline, or existing conditions, were compared with the proposed Project drainage designs to determine the new impervious pavement distribution and the affected receiving waters including streams, rivers, or Lake Washington. The affected receiving waters were determined through consultation with biologists analyzing Project effects.

As directed by WSDOT’s HRM, the change in impervious area was used to calculate new runoff volumes. These volumes were used to verify the number and size of water quality/flow control treatments needed to protect the receiving waters.

Following the guidelines within WSDOT’s TESC Manual, the appropriate TESC best management practices (BMPs) were selected to meet the statewide stormwater pollution prevention plan (SWPPP) discharge sampling and reporting requirements in the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit.

In accordance with WSDOT’s *Environmental Manual* (WSDOT 2017a), the annual pollutant loads were calculated using the HI-RUN model to assess the probability of effects for pollutant loading, concentrations, and mixing zones.

Floodplains

Baseline conditions were compared to the proposed Project footprint to determine if construction activities would require disturbance within floodplain areas. FEMA floodplain elevation maps were used to define the volumes of cut or fill proposed within the floodplain areas. If, for a floodplain area, more material would be removed than placed as fill, then the Project would not negatively affect floodplain storage capacities.

Groundwater and Aquifers

The proposed Project design and likely construction methods were reviewed to evaluate the Project's potential effects on groundwater and the APAs located within the Project footprint. Evaluations were based primarily on sound engineering principles, WSDOT practices, and professional judgment. Part of WSDOT's practice is to use the *Geotechnical Design Manual* (WSDOT 2015), which contains many WSDOT design and construction practices that minimize effects on groundwater.

SECTION 4 EXISTING CONDITIONS

What are existing conditions for surface water in the study area?

The I-405 freeway crosses several large and small streams and other watercourses (including urban storm drains and modified natural watercourses) in the study area. The study area is located within the WRIA 08 – Lake Washington/Cedar/Sammamish and WRIA 09 – Green/Duwamish and Central Puget Sound watersheds. Surface waterbodies that would be affected by the proposed Project in the study area include Gilliam Creek, the Cedar River, Johns Creek, three unnamed tributaries to Lake Washington near the NE 44th Street interchange, Coal Creek, Mercer Slough, Richards Creek, and Lake Washington. Other waterbodies from these WRIA's within the Project limits would not be affected by the Project and, therefore, are not included in this document.

In general, the surface waterbodies within the study area have been significantly altered from their natural states to accommodate urban growth. This alteration has included bank hardening, such as installing riprap and placing streams in constricted channels and pipes; reducing or removing streamside vegetation; straightening stream channels; and removing in-stream habitat. The installation of levees has also reduced the historic floodplains associated with many of these waterbodies. Dramatic changes have also occurred in the vegetation surrounding these waterbodies. A mix of immature native vegetation and non-native invasive plant species has replaced what was once predominantly mature native vegetation. Exhibit 4-1, sheets 1 through 8, show existing stormwater facilities and floodplains in the study area.

Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 1 of 8

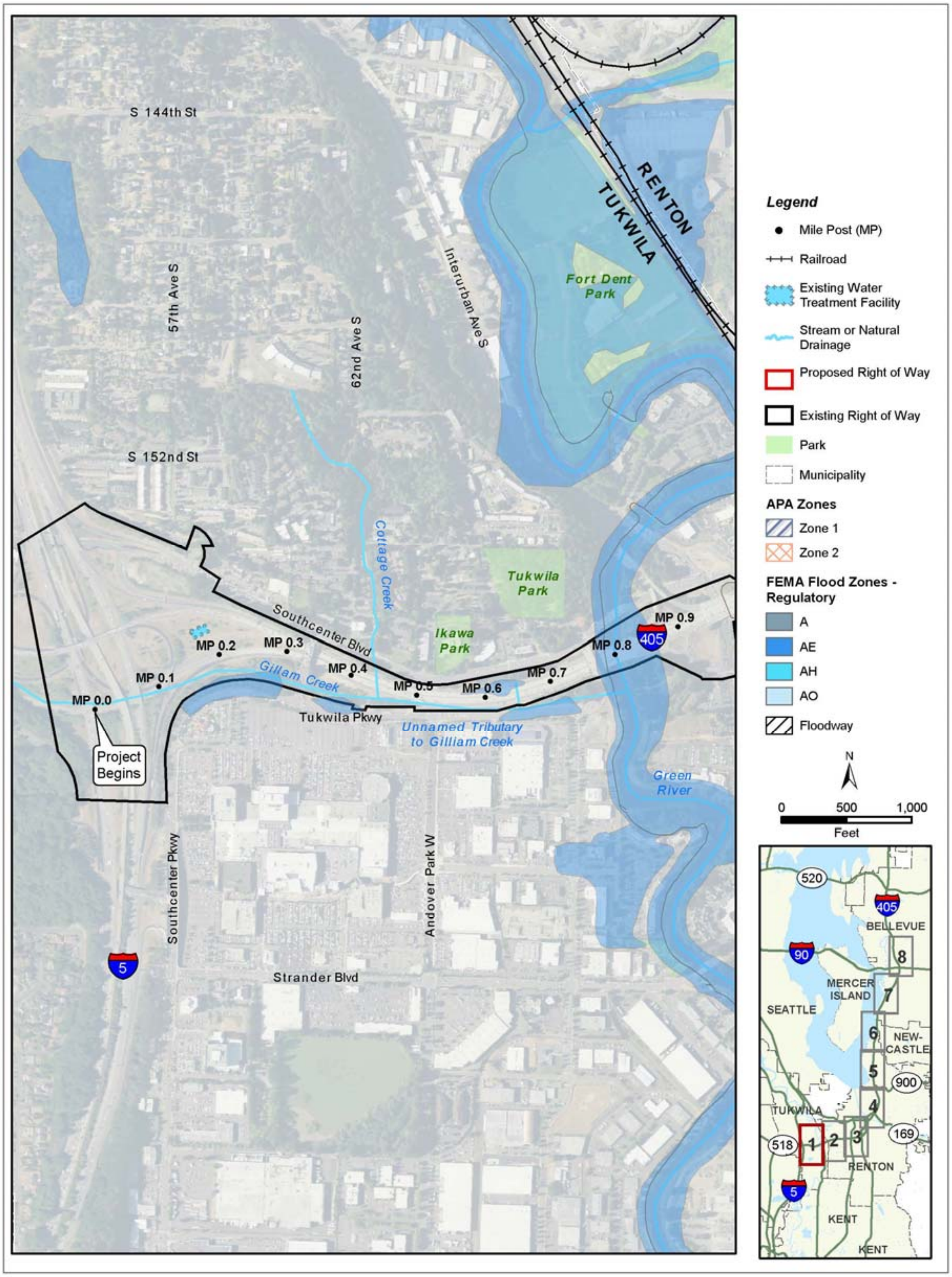


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 2 of 8

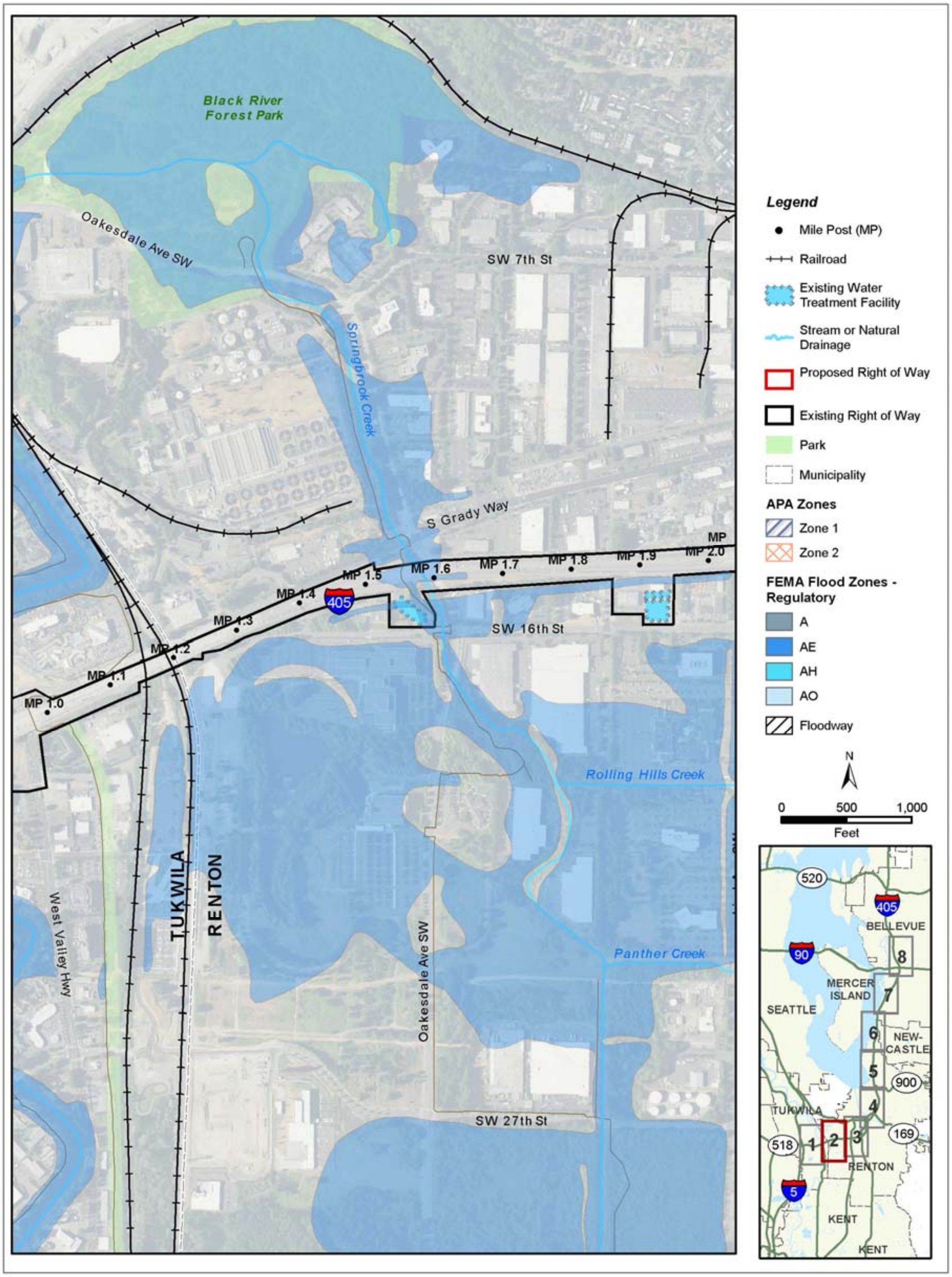


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 3 of 8

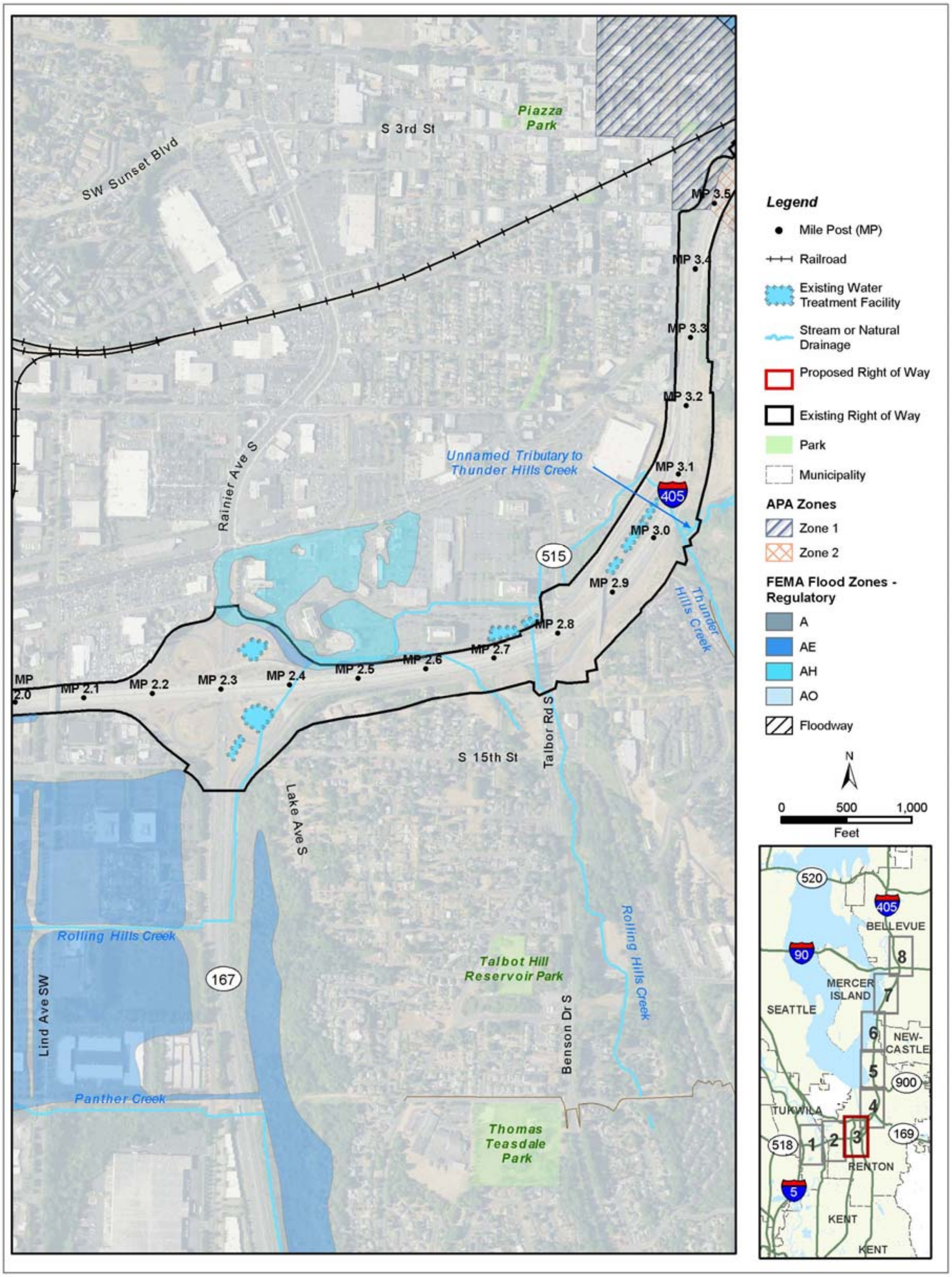


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 4 of 8

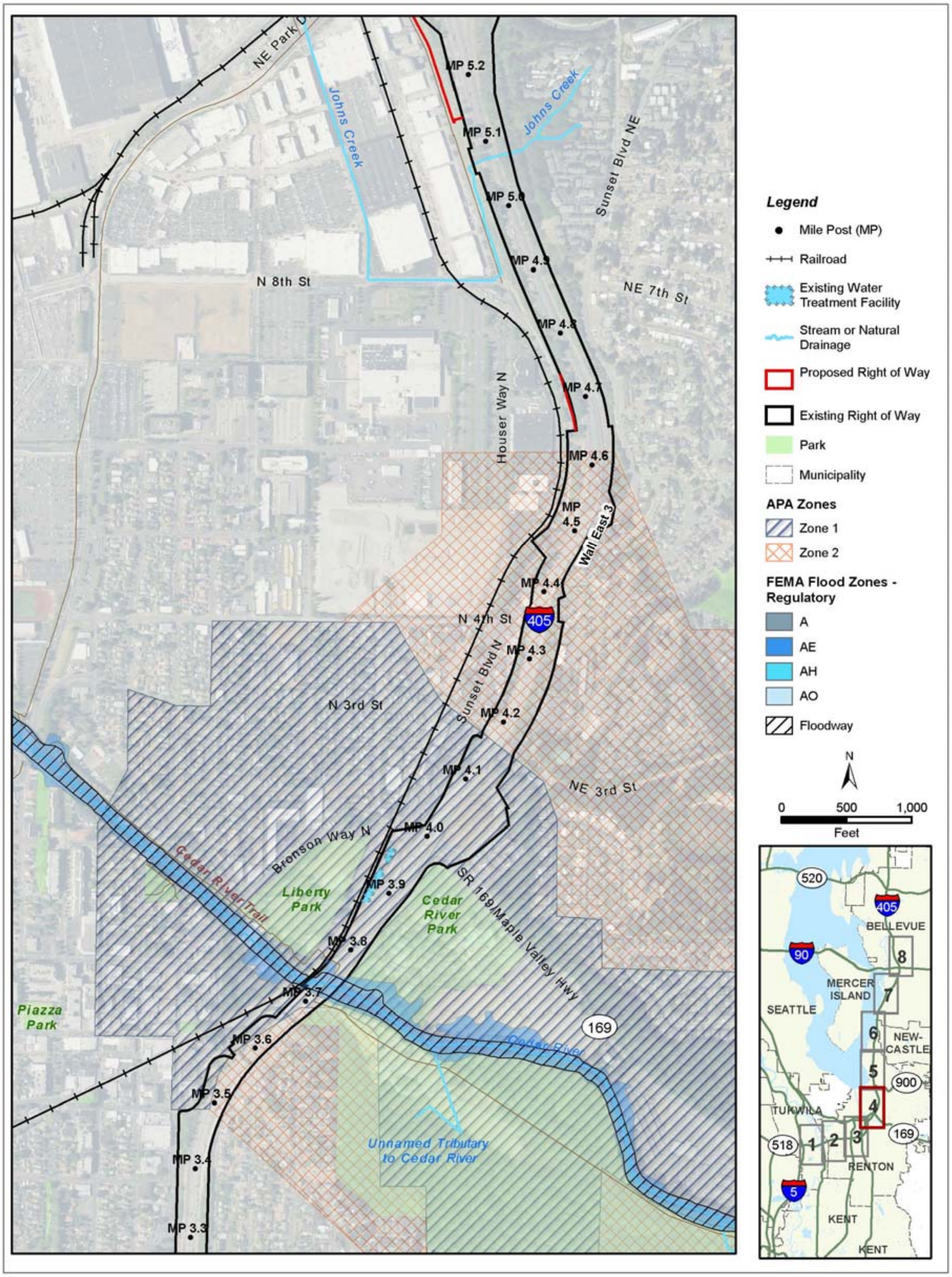


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 5 of 8

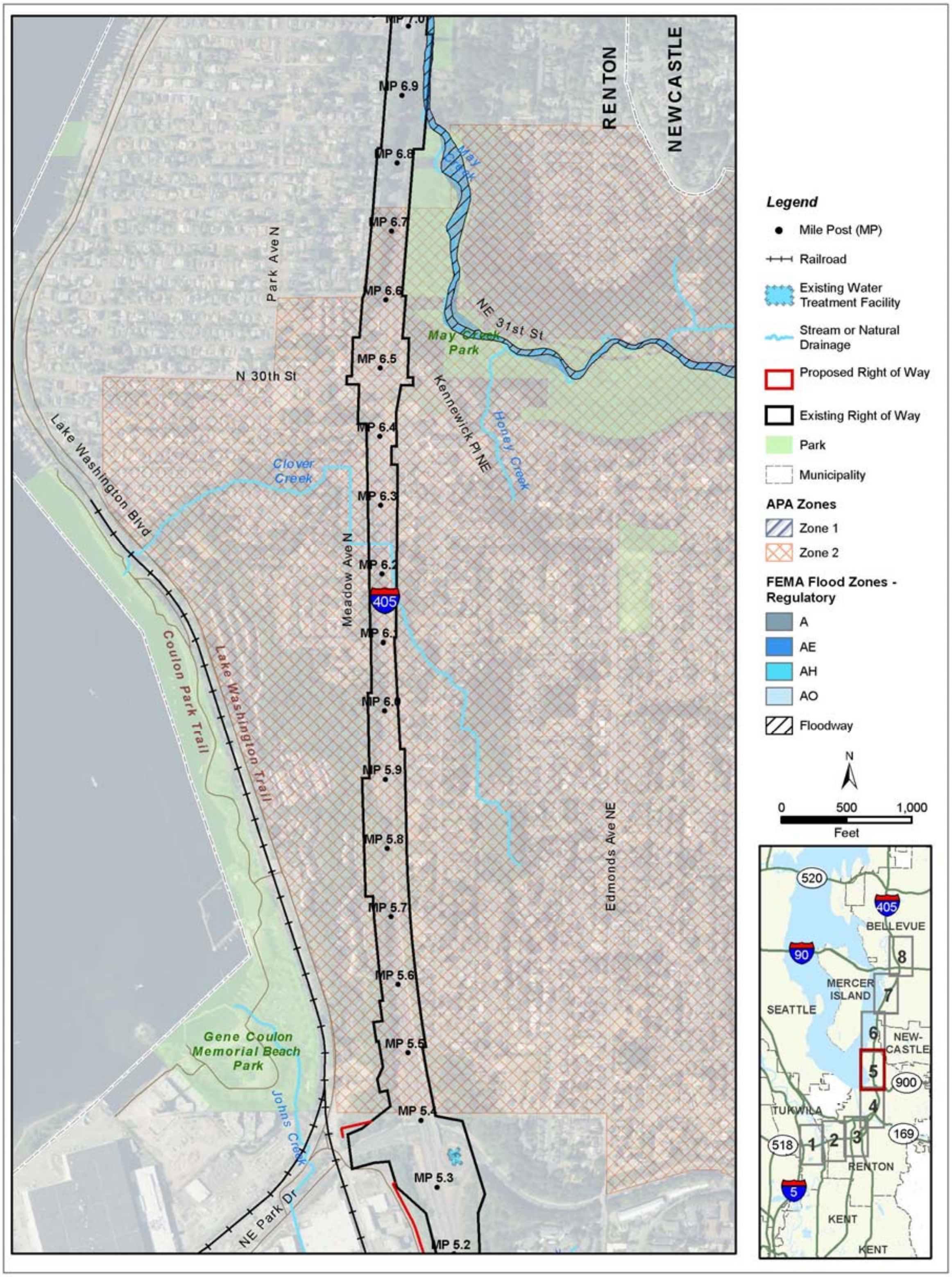


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 6 of 8

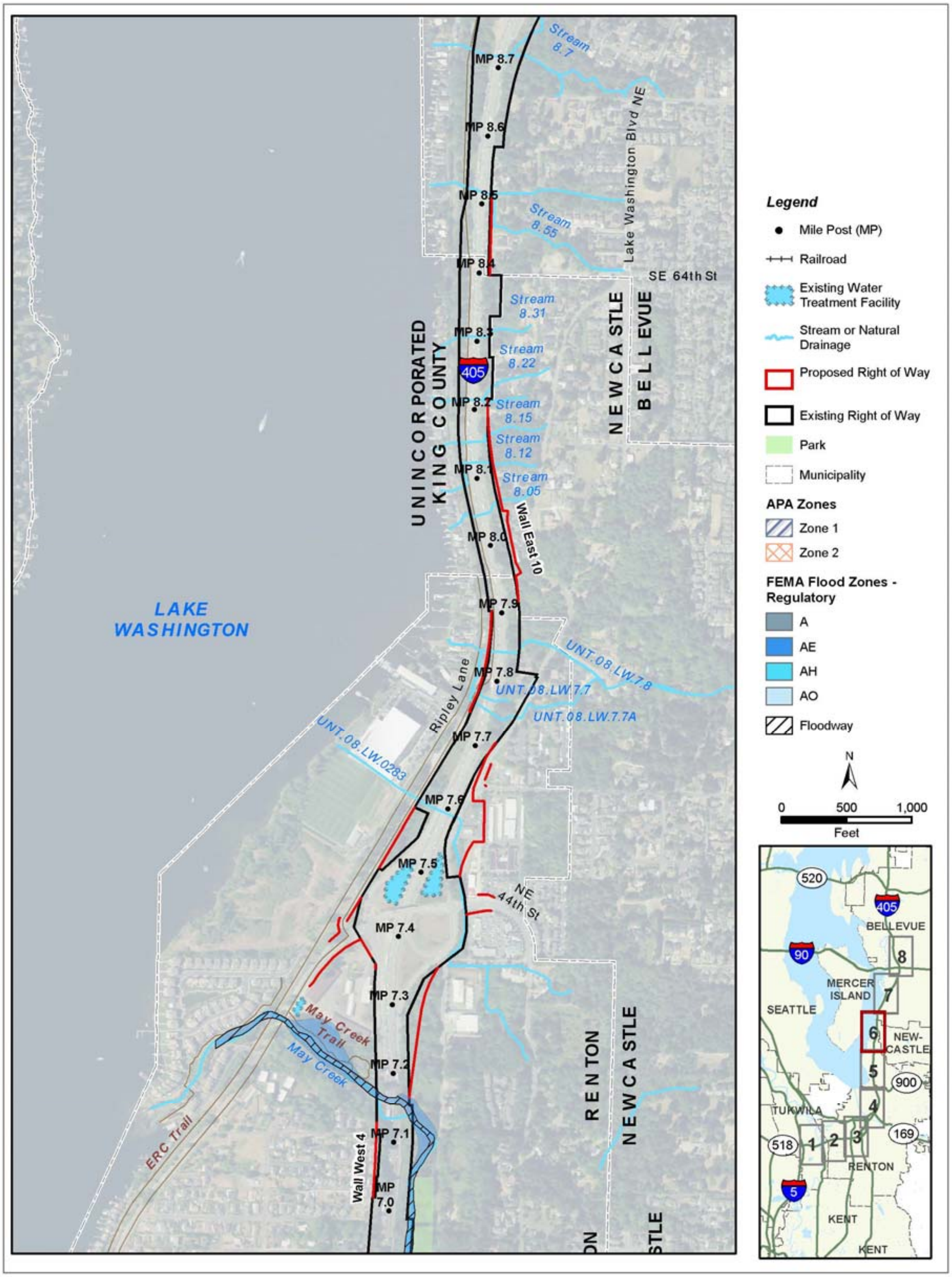
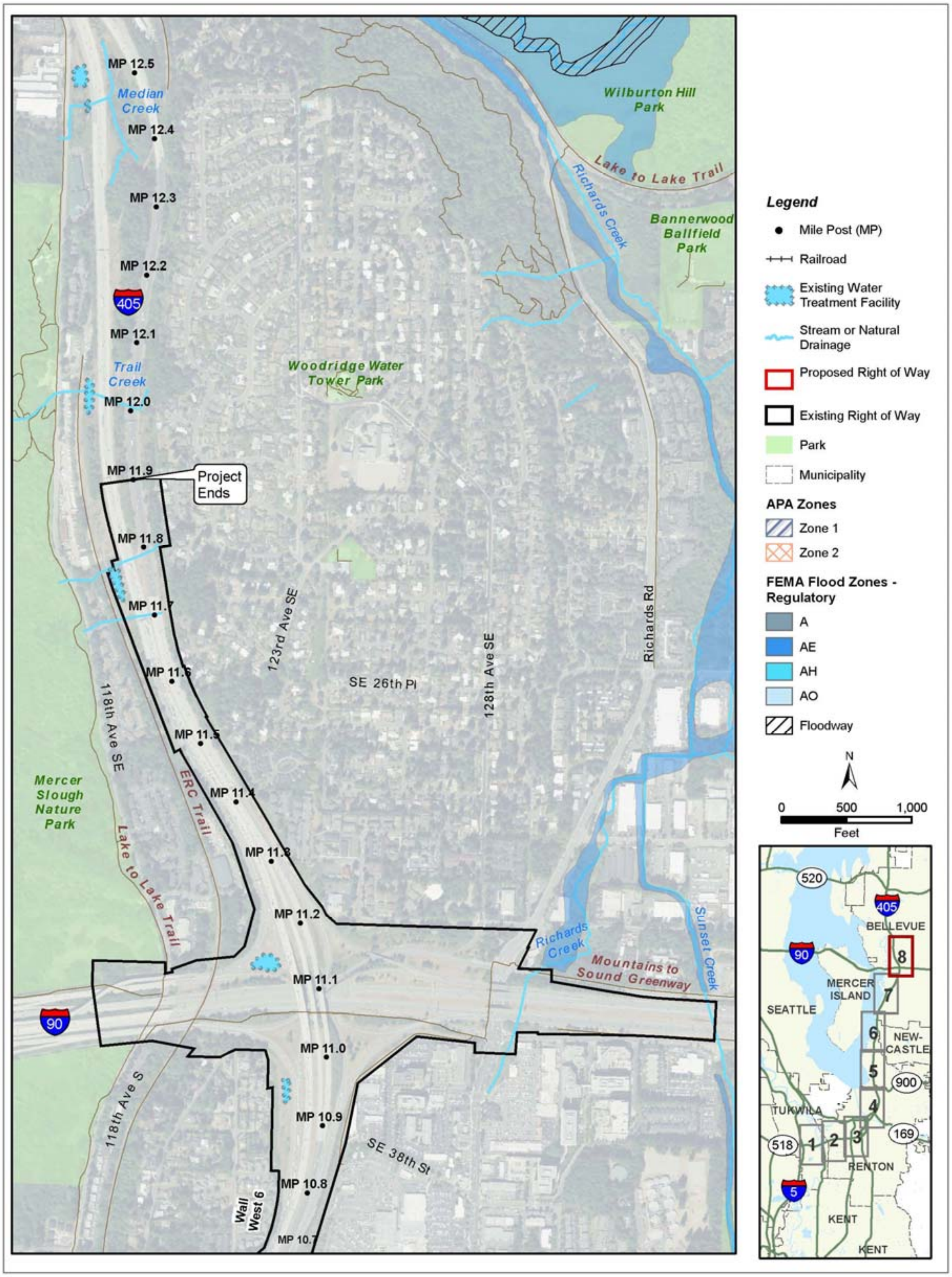


Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 7 of 8

Exhibit 4-1. Existing Floodplains and Stormwater Facilities, Sheet 8 of 8



In addition to these naturally occurring streams, watercourses, and human-made drainage systems, I-405 and related facilities contribute surface runoff during storm events. The following sections describe these surface waters within the study area starting at the I-405/I-5 interchange and moving northbound.

Gilliam Creek

Gilliam Creek flows along the south side of I-405 to the Green River in a series of open channels and large culverts. It has a basin size of approximately 1.21 square miles. Gilliam Creek enters the Green River via a 108-inch-diameter flap gate, which prevents high flows in the Green River from entering the creek. Surface water runoff in its drainage area is conveyed through a network of underground pipes, drainage ditches, and open stream channels.

Cedar River

The Cedar River originates in the Cascade Range near Abiel Peak and generally flows west to its mouth at Lake Washington. The Cedar River drains 184 square miles and provides half of the total annual flow into Lake Washington. The upper Cedar River watershed is a protected area called the Cedar River Municipal Watershed that provides water for the City of Seattle. The lower Cedar River basin has an extensive surface water network that includes 15 named tributaries and many high-value wetlands and lakes. The final two miles of the river before it discharges to Lake Washington is the most intensely developed portion of the basin. Land uses west of I-405 from the Cedar River and north to the Park Avenue interchange are mostly commercial and heavy industrial (Boeing's Renton plant and related facilities), with small pockets of residential development. Immediately east of I-405, suburban development covers the slopes upstream from the freeway, with small areas of park and protected open space in the side canyons of tributary streams. Direct stormwater discharges into the Cedar River are exempted from flow control provisions according to the HRM.

Johns Creek

The Johns Creek watershed covers 1,370 acres north of the Cedar River. The area drains through the City of Renton storm drain system (a mix of underground storm drains and some surface ditches) into a remnant section of Johns Creek, which, in turn, drains to Lake Washington at Gene Coulon Memorial

Park. Five small watercourses or storm drains crossing I-405 contribute to stormwater runoff (both off-site and highway) to Johns Creek and the city storm drains. Soils downstream of I-405 are predominantly alluvial and till, with a moderate to high runoff potential. A terrace of recessional outwash soil with high infiltration capacity crosses the northern portion of the combined watershed upstream of I-405. The area is heavily developed with residential, commercial, and industrial uses. Approximately 60 percent of the land cover is impervious. Specific information on surface water quality for this area is not available; it is assumed to be typical of an urbanized watershed without stormwater treatment.

May Creek

The May Creek basin encompasses a 14-square-mile area located in King County between the Cedar River and Coal Creek. The basin lies primarily within unincorporated King County, but the western and southwestern portions of the basin, approximately 12 percent, are within the City of Renton; the northwestern 20 percent of the basin is in the City of Newcastle. The surface waters of May Creek and its tributaries include 26 miles of mapped streams, two small lakes (Lake Boren and Lake Kathleen), and over 400 acres of wetlands. May Creek originates in the steep, forested slopes of Cougar and Squak mountains and in the highlands of the Renton Plateau. As many of its tributaries converge on the flat floodplain and wetlands of May Valley, the creek broadens and flows through rural pastures, small commercial areas, and suburban developments.

A natural rock sill near 148th Avenue SE (approximately 3.4 miles upstream of the I-405 crossing of May Creek) controls the gradient of the valley, which contains extensive wetlands. Downstream of 148th Avenue SE, May Creek enters a deep canyon, cutting through Vashon advance outwash deposits.

May Creek flows through May Creek Park toward I-405, just north of the NE 30th Street interchange. The creek turns north, parallels I-405 a short distance, then crosses beneath I-405 to the south of the NE 44th Street interchange. After crossing the highway, May Creek flows west about 1,000 feet before crossing beneath Lake Washington Boulevard NE. The creek then flows southwest a short distance to Lake Washington.

The May Creek riparian corridor is relatively continuous and forested, especially in the lower watershed. The stream has been channelized and the streambanks armored in a few locations. The reach of the creek downstream of Lake Washington Boulevard flows through a former lumber mill site.

Unnamed Tributaries at NE 44th Street Interchange Vicinity

Within the NE 44th Street interchange, there are three unnamed tributaries (UNTs) to Lake Washington: UNT 08.LW.0283, UNT 08.LW.7.7A, and UNT 08.LW.7.8. Forested areas and residential development, with small areas of commercial development, generally characterize the watersheds of these three UNTs. UNT 08.LW.0283 has a drainage area of 0.45 square mile that contains approximately 18 percent forested areas, 42 percent other pervious areas, and 40 percent impervious areas. UNT 08.LW.7.7A has a drainage area of 0.17 square mile that contains approximately 17 percent forested areas, 51 percent other pervious areas, and 32 percent impervious areas. UNT 08.LW.7.8 has a drainage area of 0.07 square mile that contains approximately 35 percent forested areas, 46 percent other pervious areas, and 19 percent impervious areas. The soils within the watershed include alluvium, outwash soils deposited from glacial activity, and some lacustrine deposits.

UNT 08.LW.0283 generally flows south to north, concentrating runoff in the foothills east of I-405. It crosses under Lincoln Avenue, NE 43rd Street, NE 44th Street, Lake Washington Boulevard, and I-405, with a straightened, highly modified open channel between each of the culvert crossings. Downstream of I-405, this UNT flows west through a City of Renton stormwater detention site containing an engineered step-pool channel before entering a series of four 30-inch-diameter pipes.

UNT 08.LW.7.7A generally flows east to west beginning in the foothills east of Lake Washington Boulevard. After crossing beneath Lake Washington Boulevard, the stream enters a heavily vegetated area and flows in a straight channel upstream of the I-405 roadway crossing. UNT 08.LW.7.7A enters an approximately 139-foot-long, 18-inch-diameter corrugated metal pipe culvert to cross beneath I-405, and then emerges from beneath the freeway in an 18-inch-diameter concrete culvert and flows west beneath a chain-link fence before turning north into a conveyance channel paralleling Ripley Lane NE. This channel crosses west beneath Ripley Lane NE in an approximately 35-foot-long, 18-inch-diameter concrete culvert and continues north between the railroad and Ripley Lane NE in a poorly defined channel before tying into UNT 7.8 beneath a railroad trestle. From the confluence of these two UNTs, the streams enter an approximately 40-foot-long, 24-inch-diameter, privately owned CMP culvert beneath a driveway to an approximately 130-foot-long, 27-inch-wide steel flume before entering a 24-inch-diameter culvert out to Lake Washington.

UNT 08.LW.7.8 generally flows east to west and receives flow from a residential hillside. Here, two tributaries cross beneath Lake Washington Boulevard into a densely forested area near I-405. Within 200 feet of the freeway, the channel becomes incised as it crosses beneath I-405 in a 12-inch-diameter CMP culvert. The stream passes approximately 240 feet beneath I-405, a bicycle path, the 84-inch-diameter King County Metro sewer line, and Ripley Lane NE before it outlets into an 18-inch-diameter concrete culvert and flows into a rock-lined conveyance channel.

Coal Creek

The Coal Creek basin has an area of 6.2 square miles and is contained within the boundaries of King County, the City of Newcastle, and the City of Bellevue. The headwaters of Coal Creek originate in the Cougar Mountain area of unincorporated King County approximately 7 miles east of Lake Washington. The creek flows northwest through the Newcastle city limits and into Bellevue, west of I-405, where it discharges to Lake Washington at Newport Shores.

Coal Creek crosses beneath I-405 in a concrete box culvert at MP 10.14, south of the Coal Creek Parkway interchange. An instream sediment control structure is located at the inlet to this culvert immediately east of 119th Avenue SE. A small tributary stream, Newport Creek, enters the Coal Creek upstream of the culvert within the sediment pond area. A very large diameter force main sewer line crosses Newport Creek and Coal Creek upstream of a steep series of log weirs designed for fish passage over the sewer line.

Glacial till soils with high runoff potential cover more than 95 percent of the basin. Coal Creek cuts down through sequences of bedrock, till, and advance outwash deposits, as well as coal seams and many unstable deposits of coal tailings and slag. Several slopes associated with the mining operation are eroded and susceptible to landslides. The creek drops through a steep ravine between river mile (RM) 2.7 and RM 4.0. In the lower watershed, the creek is likely fed by groundwater contained in advanced outwash.

Mercer Slough and Richards Creek

Mercer Slough is situated in a broad wetland receiving basin that drains south into Lake Washington. The tributaries to Mercer Slough are Kelsey Creek, West Tributary to Kelsey Creek, Goff Creek, Richards Creek, Valley Creek, and Sturtevant Creek. The overall Mercer Slough drainage is 16.1 square miles, of which about 4,375 acres are currently impervious surface (City of Bellevue 2018).

Mercer Slough is a system of dredged channels and adjacent wetlands. It is a large-volume water body connected to Lake Washington with very low gradient, slow flows, and a large volume of water surrounding the wetland habitat. The main slough flows approximately 1.5 miles southwest from I-405 to Lake Washington. The upper end of Mercer Slough is an outlet for Richards and Sturtevant Creeks.

The Mercer Slough wetland is a palustrine (depressional freshwater) wetland that covers an approximately 367-acre area. It the largest wetland that remains connected to Lake Washington and contains the largest peat deposit in King County. The Mercer Slough wetland is designated as a shoreline of statewide significance per the Washington Administrative Code and the State Shoreline Management Act.

Water Quality of Surface Waters

Ecology prepares a 303(d) list that identifies waterbodies that do not meet the state water quality standards and the reasons why. According to the Water Quality Atlas (Ecology 2018a), an online interactive map, the following waterbodies that would be affected by the Project do not meet state standards:

- Cedar River – dissolved oxygen, pH, temperature

- Johns Creek – dissolved oxygen, fecal coliform, temperature
- May Creek – fecal coliform, temperature
- Coal Creek – dissolved oxygen
- Mercer Slough – fecal coliform, temperature

Although these waterbodies currently do not meet state standards, there have been no TMDLs issued or approved by EPA.

Project effects were also evaluated according to Ecology's 2012 *Stormwater Management Manual for Western Washington*, as amended in December 2014, guidelines for wetland hydrology assessment.

What are existing conditions for floodplains in the study area?

The FEMA FIRM maps for the study area show floodplains associated with the Green River, Springbrook Creek, Panther Creek, Rolling Hills Creek, the Cedar River, May Creek, Coal Creek, and the Mercer Slough (FEMA 2018).

Cedar River

Historic efforts to control flooding in the Cedar River included building Masonry Dam and a levee system along the river. However, flooding still occurs. The most apparent surface water problem in the lower Cedar River basin is repeated flooding in Renton. During major storms, over 300 homes along the lower Cedar River are exposed to flooding. Renton had major flooding in 1975, 1990, and 1995 that caused millions of dollars in damage. Commercial losses in downtown Renton, especially at the Renton Municipal Airport and at the Boeing facility near the mouth of the river, have been substantial. When the river flow reaches 4,200 cubic feet per second (cfs), the Renton Airport experiences flooding and SR 169 may overtop and close. No flooding occurs on I-405.

Streamflows are typically at their peak on the Cedar River during periods of high precipitation (November through February) and during high snowmelt (April to May) (King County 1993). The regulation of the upper basin for the City of Seattle's water supply affects flow in the Cedar mainstem, as well as inflow to Lake Washington (King County 1993).

Urbanization in the watershed has resulted in longer-lasting flood peaks in the main part of the Cedar River. Flood flows in Renton are most often correlated with and caused by peak flows entering the Cedar River from the upper basin above Landsburg Dam. Generally, flows from tributaries below Landsburg Dam cause lower, earlier flow peaks in Renton, which are followed by larger peaks from the upper basin.

FEMA's FIRM for the Cedar River (Map 53033C0977 F, Panel 977 of 1725 FEMA 2018) identifies a Special Flood Hazard Area designated as Zone AE near the I-405 crossing.

May Creek

Flooding and drainage problems in the May Creek basin are mainly related to past alteration of natural stream channels, the filling of natural detention areas, undersized conveyance systems, and improper installation of drainage measures (King County 2018) (City of Renton 2018). Increases in impervious surfaces have aggravated basin flooding and erosion problems.

Sediment has deposited in May Valley, a natural floodplain located 4.5 to 7 miles upstream of Lake Washington and I-405, thus reducing the channel capacity and adversely affecting aquatic habitat. Stormwater runoff, increased because of development, is causing downcutting and bank erosion in May Creek tributaries, including Newport Hills Creek, Gypsy Creek, and Honey Creek. Channel downcutting and bank erosion is also occurring in May Creek Canyon. As erosion occurs, sediment is created, which is then deposited at the mouth of May Creek. An average of 2,000 cubic yards of sediment per year is dredged from the mouth of the creek (King County and City of Renton 2001).

The primary flooding problems in the May Creek basin are found in May Valley, which stores runoff and reduces its force in its extensive wetlands and floodplains, thereby decreasing peak flows entering May Creek Canyon downstream. Gersib et al. (Gersib 2004) reported that peak flows at the head of May Creek Canyon (above Coal Creek Parkway) are 60 to 70 percent of the total at I-405.

In the lower basin, flooding problems primarily occur in the area around Lake Boren, in the lower canyon area along Jones Avenue NE, and downstream in the delta near the mouth of May Creek. May Creek Canyon, through which lower May

Creek flows, is an undeveloped area. Flooding problems in May Creek Canyon are primarily the result of surface water runoff and groundwater seepage from the steep canyon walls rather than excessive overflow from May Creek (FEMA 2001). Erosion in this canyon is a natural occurrence; however, much of the sediment erosion and transport is the result of urban development in this basin.

FEMA's FIRM for the May Creek area (Map 53033C0664 F, Panel 664 of 1725, FEMA 2018) shows that the May Creek floodplain in the Project study area, as well as the areas immediately upstream and downstream, are designated as Zone AE. The regulatory floodway and the 100-year floodplain boundaries coincide beneath the I-405 bridge crossing.

Coal Creek

The major flood problems in the Coal Creek basin are those of inundation and damage to private property from floodwaters flowing over the bank, primarily along low-gradient reaches of the stream (FEMA 2001).

Gersib et al. (Gersib 2004) estimate that between 80 and 90 percent of the peak flow is generated above Coal Creek Parkway, where steep slopes, thin till soils, and high precipitation combine to produce high runoff rates. At Newcastle Road, where the creek drains from Cougar Mountain Regional Park, peak flows are about 20 to 30 percent of the peak flow at I-405.

FEMA's flood insurance rate map for the Coal Creek and Newport Creek area (Map 53033C0658 F, Panel 658 of 1725, FEMA 2018) shows that the Coal Creek floodplain in the study area and areas downstream, are designated as Zone AE. The FIRM notes that the 100-year flood is contained within the existing culvert. Upstream of the culvert, the floodplain for Coal Creek and its tributary Newport Creek is designated as Zone A, an area of special flood hazard, with no base flood elevation determined. No regulatory floodway is delineated for either Coal Creek or Newport Creek.

Mercer Slough

The Mercer Slough floodplain is designated as an Area of Special Flood Hazard by FEMA at the mouth of the slough and along the main channel area. There are no I-405 facility structures that encroach upon the Mercer Slough floodplain in the study area. Runoff from the I-405/I-90 interchange area currently discharges to the wetlands south of the FEMA floodplain from an existing outfall located along the south side of I-90.

FEMA's flood insurance rate map for the Mercer Slough area (Maps 53033C0658 F, Panel 658 of 1725, and 53033C0656 F, Panel 656 of 1725, FEMA 2018) shows that the Mercer Slough main channel, located west of the study area, is designated as Zone AE. Under storm conditions, Mercer Slough's main channel overtops and spreads out into the adjacent wetlands that are directly connected along the length of the main channel. The wetlands detain and reduce the force of peak storm flows and keep channel velocities below erosive levels.

What are existing conditions for groundwater and aquifers in the study area?

Most of the groundwater resources in the study area exist within sediment deposits along the Cedar River and Green River valleys. The extent of shallow aquifers closely correlates with the extent of shallow groundwater. Shallow groundwater aquifers in the study area occur mainly in alluvial sediments. Alluvial sediments in the study area consist primarily of sand, silt, and gravel. Renton Formation bedrock underlies the alluvial sediments and its depth varies considerably throughout the study area. Groundwater from the Renton Formation bedrock accumulates in the abandoned Renton coal mine tunnel. The groundwater discharges to a wetland and stream below Benson Road.

Green-Duwamish Alluvial Aquifer

The Green-Duwamish Alluvial Aquifer is an unconfined aquifer system consisting of interbedded loose to dense silty sand with organics and scattered gravel layers, soft peat, organic silt, soft to stiff silt, and clay (GeoEngineers 2005). The thickness of these sediments varies but can be over 100 feet.

Groundwater is shallow in this aquifer, often at less than 10 feet below ground surface, but varies considerably with surface topography and season. In many places, the water table is at or near land surface and is hydrologically connected to wetlands.

The permeability of this aquifer is variable. Locally, where silt or clay-rich layers have accumulated, the aquifer has a low permeability and may not yield much groundwater. No groundwater supply wells are receiving water from this aquifer within 0.5 mile of the study area (King County 2018).

Groundwater flow in the Green-Duwamish Alluvial Aquifer is complex. The presence of wetlands and drainage ditches locally influences groundwater flow patterns. The primary discharge is to the Green River, but some groundwater may also discharge to the Delta Aquifer subunit of the Cedar Valley Aquifer (see description below) and Lake Washington. Direct infiltration from precipitation recharges this aquifer, but recharge can also occur from higher elevation areas within the Green River drainage, and from overland flow from the bordering valley hills.

The Green-Duwamish Alluvial Aquifer near the study area is not used for domestic water supply or irrigation purposes. Therefore, there is no special sole-source designation for this aquifer. This aquifer would fall under the protection of state groundwater regulations that are applicable to all groundwater.

Cedar Valley Aquifer and its Subunit, the Delta Aquifer

The most important aquifer in the study area exists along the Cedar River, known as the Cedar Valley Aquifer. The Cedar Valley Aquifer is an EPA-designated "sole source aquifer."

This aquifer has been subdivided into several smaller aquifer units. The Delta Aquifer subunit is located along the lower drainage of the Cedar River and is the closest to the project limits. The Delta Aquifer subunit is unconfined and composed of alluvial sediments deposited by the lower Cedar River. Other subunits of this system include the Cedar Valley Alluvial Aquifer, the Marblewood Production Aquifer, and other aquifers further up the valley (i.e., the "Deep Aquifer"). These other subunits are located outside the study area and are not discussed in this report.

The Delta Aquifer subunit occurs within the Cedar River Valley between bedrock exposures to the south of the Cedar River and glacial uplands along the north side of the valley. Its western boundary is Lake Washington, and the eastern boundary continues southeast up the Cedar River, outside the study area. The depth to the water table varies, but it is generally shallow (less than 25 feet) in the vicinity of the study area. The Delta Aquifer subunit has a saturated thickness of between 65 and 90 feet (RH2 and Pacific Groundwater Group 1993) The Delta Aquifer subunit is recharged by infiltration from the flow of surface water and groundwater originating in the bordering hills within its drainage basin and groundwater flow from underlying bedrock. The Delta Aquifer subunit discharges to groundwater supply wells, to the Cedar River, and to Lake Washington.

Groundwater flow in the Delta Aquifer subunit is predominately along the valley from east to west. The City of Renton production wells are situated to capture most of the groundwater flowing through the aquifer.

The City of Renton petitioned EPA to designate the aquifer along the Cedar River as a sole source aquifer in March 1988 (CH2M Hill 1988) because the City's water supply to the public is dependent on this aquifer. On October 17, 1988, the Cedar Valley Aquifer was designated a sole source aquifer by EPA, thus supporting the goals of aquifer protection previously initiated by the City (EPA 1988). EPA states the reasons for designation as follows:

- The Cedar Valley Aquifer supplies at least 80 percent of the drinking water used in the aquifer service area.
- No economically feasible alternative drinking water sources exist.
- Contamination of the aquifer would pose a substantial hazard to public health.

As discussed previously, the Delta Aquifer subunit is most susceptible to potential effects from the Project.

The City has numerous groundwater monitoring wells surrounding its production wells for aquifer testing and water quality monitoring. All production wells are located within the designated sole source aquifer.

Critical Aquifer Recharge Areas

Critical Aquifer Recharge Areas (CARAs) are one element of the critical areas for which Washington's Growth Management Act (GMA) requires local governments to develop policies or regulations to protect their functions and values. CARAs are geographic areas that have a critical recharging effect on aquifers used for potable water (King County 2018). The only aquifer used for potable water in the study area is the Cedar

Valley Aquifer. Most of the recharge for the Cedar Valley Aquifer occurs in areas upriver from the study area. None of these recharge areas are classified as CARAs.

Aquifer Protection Ordinances

The City of Renton established APAs for the sole source Cedar Valley Aquifer and its production well fields. Exhibit 4-1, sheets 3, 4, and 5 of 8, present the boundaries for Cedar Valley APA Zones 1 and 2. Renton enacted local ordinances specifically to protect its sole source aquifer and production well fields within the boundaries of Zones 1 and 2. The ordinances are in the Renton Municipal Code. The code specifies construction requirements for stormwater facilities and pipelines, sewer pipelines, storage limitations for hazardous/toxic substances, and other requirements for activities within the APAs.

Groundwater

Groundwater within the study area has multiple uses, such as groundwater rights and groundwater wells. Specific uses are discussed below.

Groundwater Rights

Groundwater is extracted and used for water supply along the study area. Groundwater certificates and permits for uses that have a point of withdrawal within 0.5 mile of the study area can be researched on Ecology's Water Resources Explorer website (Ecology 2018b).

Groundwater Wells

Many documented water supply wells exist within 0.5 mile of the study area. Existing groundwater wells in the study area include Group A, Group B, and other types of groundwater wells (Ecology 2018b).

The Delta Aquifer subunit of the designated sole source, Cedar Valley Aquifer produces good quality water for potable use. It is the primary aquifer that the City of Renton uses for municipal purposes. Groundwater flow in the Delta Aquifer subunit is predominantly along the valley from east to west. The groundwater meets all Washington State Department of Health water quality criteria.

All Group A wells in the study area are owned and operated by the City of Renton. These six Group A wells are within 0.5 mile of the I-405 corridor and extract groundwater from the

Delta Aquifer subunit. The City of Renton production wells are situated to capture most of the groundwater flowing through the aquifer.

The Green-Duwamish Alluvial Aquifer within the study area is not used for water supply by water purveyors for Group A or Group B wells systems. There are other wells besides A and B wells that consist primarily of decommissioned wells, environmental monitoring wells not used for potable supply, and dewatering wells used on a temporary basis during construction (Ecology 2018b). According to a search of Ecology’s database, none of the other wells within the Project right of way are used for domestic water supply or irrigation purposes.

SECTION 5 PROJECT EFFECTS

How would the Project affect water resources during construction?

Without proper controls and/or measures to minimize effects, facility construction can have adverse effects on water quantity and quality in receiving waterways. Such effects would result from site clearing and subsequent earth-moving and excavation activities in which vegetation and other naturally occurring, soil-stabilizing materials are removed from the construction site. The exposed surface areas, slopes, and stockpiles of soil created by freeway construction would be subject to erosion until the earthwork is completed and a protective vegetative cover is restored or the surface is artificially stabilized (Barrett et al. 1995).

Although freeway construction would create adverse, short-term effects in surface waters, such effects could be minimized through implementation of the erosion controls and sedimentation BMPs that will be used for the Project.

Surface Water

Peak and base flow rates to streams and rivers would not be negatively altered during construction because detention ponds would be constructed prior to the highway widening. These ponds may be used for temporary erosion and sedimentation control.

The Project would be constructed in accordance with federal and state technical guidance, permit requirements, and WSDOT project requirements that require the use of BMPs to control construction runoff. WSDOT would prepare a TESC plan meeting the WSDOT TESC Manual (WSDOT 2014) requirements and permit conditions prior to initiating construction. The TESC plan would address clearing limits, construction access, flow control, sediment control, soil stabilization, slope protection, drainage inlet protection, channel and outlet stabilization, and pollutant control. Any increases in runoff quantity would not have any appreciable effect on local waterways.

The existing highway (baseline conditions) has some permanent flow control and runoff treatment BMPs already in place. These BMPs include ponds, biofiltration swales, ecology embankments, filter strips, and a combined stormwater quality wetland and detention facility. During construction of the new roadway and new BMPs, some existing BMPs would be removed so that they can be replaced. WSDOT would use construction BMPs to maintain water quality during construction periods when permanent BMPs may not be functional.

Construction could also create the potential for unexpected spills of hazardous materials used during the construction process. Construction work typically uses hazardous or toxic materials such as fuel, oil, concrete, paint, etc., which may be temporarily stored on site. These materials present the greatest risk near open waterbodies where streams and rivers pass under I-405. To prevent unexpected spills to waterbodies, a Spill Prevention, Control, and Countermeasures (SPCC) Plan would be prepared before construction starts. Along with the TESC Plan, the measures provided would prevent substantial effects on water quality during construction.

Floodplains

The Cedar River, May Creek, Coal Creek, Mercer Slough complex, and other smaller receiving waters and drainage systems that convey water to Lake Washington would each receive only a small percentage of total flow from construction areas. Each receiving water body is anticipated to have sufficient capacity to convey the flow to Lake Washington without increasing the existing flood risk. Detention provided during construction would help prevent downstream flooding, erosion, and sedimentation.

New cross-culverts would typically be constructed in the dry, although there could be in-water work associated with some culvert replacements. Existing streams and watercourses would be conveyed under I-405 via existing cross-culverts until the new cross-culverts and associated channel modifications are completed. This approach would maintain existing conveyance across I-405 during construction.

Groundwater and Aquifers

The study area contains wellhead protection areas and a sole source aquifer. Potential groundwater effects, including contamination and/or reduced well capacity, would be addressed by strict limits on certain activities and material handling during construction. A Memorandum of Understanding (MOU) between FHWA, EPA, and WSDOT was completed in 2014 to develop an understanding between these agencies concerning projects that may affect sole source aquifers. This MOU states that all projects will be constructed in a manner that will prevent the introduction of contaminants into an aquifer and not cause an exceedance of the maximum contaminant levels promulgated by the Washington State Department of Health in WAC 246-290-310. The MOU also provides steps to determine if a project is exempt from and EPA sole source aquifer review, of which this project is not exempt. All construction within or over the City of Renton APA Zones 1 and 2 would meet the intent of the Washington State Wellhead Protection Requirements outlined in WAC 246-290-135(4) and RMCs 4-3-050C, 4-4-030, and 4-9-015.

How would Project operations affect water resources?

Surface Water

Concrete and asphalt pavement typically have higher stormwater runoff volumes and peak runoff rates than most other land covers because these surfaces are highly impervious. Surface waters are negatively affected by an increase in flows unless they are classified in the HRM as major waterbodies that are flow control exempt. Both the Green and Cedar rivers and Lake Washington are considered major waterbodies and are flow control exempt.

For this Project, flow diversions would be implemented to direct the increased stormwater flows to the identified major waterbodies that are flow control exempt per WSDOT HRM (WSDOT 2016):

- Cedar River
- Johns Creek
- Lake Washington via conveyance systems at WSDOT-funded improvement across Virginia Mason Athletic Center in Renton
- Lake Washington via WSDOT-owned and -maintained deep water discharge conveyance systems at Bagley Lane in Bellevue
- Mercer Slough wetland complex associated with Mercer Slough and Lake Washington

These flow diversions are deviations from HRM standards and are currently in the process of being accepted.

Proposed discharge to Johns Creek and Mercer Slough have been granted flow control exemptions because their hydraulic condition is controlled by Lake Washington.

Infiltration for increased stormwater runoff rates within the study area would not be an effective method of flow control because the majority of the Project is on river valley bottom that has shallow groundwater.

Instead, WSDOT would construct stormwater facilities based on the HRM to provide treatment and detention for increased stormwater flows. WSDOT is also planning to retrofit approximately 111.5 acres of existing pollution-generating impervious surfaces (PGIS). The distribution of the new flow control facilities within the study area was determined by looking at the Project's Threshold Discharge Areas (TDAs). TDAs are defined as on-site areas draining to a single natural discharge location within 0.25 mile downstream of I-405. Exhibit 5-1 presents the increase in treatment for the study area. Peak flow rates of stormwater discharged to streams and rivers are expected to be reduced from present-day conditions because of this retrofit.

Exhibit 5-1. Stormwater Design Updates for the Project

Sub-watershed	Receiving Waterbody	TDA	Existing I-405 PGIS in TDA (acres)	Existing I-405 Treatment (acres)	Build Alternative Proposed PGIS in TDA (acres)	Build Alternative Proposed Treated PGIS (acres)
Lower Green River – West	Gilliam Creek	G1	17.78	1.11	17.80	1.19
Cedar River	Cedar River	C1	20.38	2.29	21.66	12.08
		C2	9.96	0.00	10.27	9.50
East Lake Washington – Renton	Johns Creek	J0	0.85	0.00	0.87	0.00
		J1	4.84	0.00	1.90[1]	0.00
		J2	5.44	0.00	31.90	31.90
		J3	5.73	0.00	0.00[1]	0.00
		J4	10.81	0.00	0.00[1]	0.00
		W1-1 Private Drain to Lake Washington	3.07	0.00	0.48[1]	0.00
East Lake Washington – Bellevue South	UNT 08.LW.0283	CL1 Clover Creek	2.84	0.00	0.00[2]	0.00
		M1 May Creek at I-405	12.79	0.00	0.00[2]	0.00
		M2 May Creek at Lake Washington Blvd	8.70	3.41	6.58	5.60
		W1-2 UNT 08.LW.0283	11.34	0.00	60.37	58.50
		W1-3 Private Drain to Lake Washington	1.62	0.00	0.00[3]	0.00
		W1-4 Private Drain to Lake Washington	1.71	0.00	0.00[3]	0.00
		W1-5 Private Drain to Lake Washington	2.86	0.00	0.00[3]	0.00
		W1-6 Private Drain to Lake. Washington	1.48	0.00	0.00[3]	0.00
	Lake Washington	W2-1 Pleasure Point	4.66	0.00	4.15[4]	4.15
		W2-2 Lakehurst Creek	9.57	1.22	8.60[4]	8.60

Exhibit 5-1. Stormwater Design Updates for the Project

Sub-watershed	Receiving Waterbody	TDA	Existing I-405 PGIS in TDA (acres)	Existing I-405 Treatment (acres)	Build Alternative Proposed PGIS in TDA (acres)	Build Alternative Proposed Treated PGIS (acres)
		W2-3 Bagley Lane	1.91	0.00	10.27	10.27
Coal Creek	Coal Creek	W3-1 Newcastle Beach Park	2.15	0.00	1.61[5]	1.61
		W3-2 Coal Creek Parkway	16.99	3.34	8.20[5]	4.75
Mercer Slough	Mercer Slough Wetlands	W4 I-90 Vicinity	37.67	5.43	56.66	24.54
		W5	8.80	4.47	9.51	7.00
	Richards Creek	R1	1.08	0.00	1.08	0.00
		R2	13.72	0.00	13.72[6]	0.00
Totals			218.75	21.27	265.66	179.69

TDA = total discharge area; PGIS = pollutant generating impervious surface

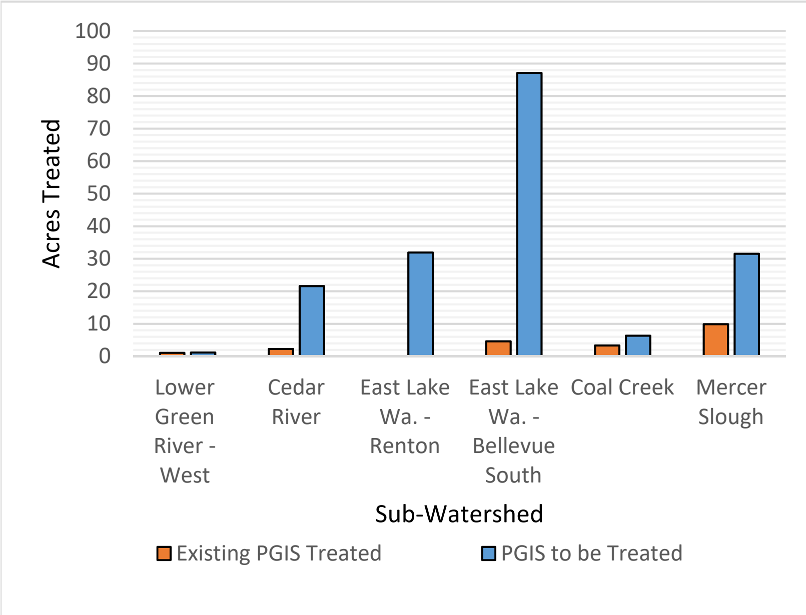
Notes:

1. WSDOT highway runoff would be diverted to J2 for runoff treatment.
2. All highway runoff flows would be diverted from Clover Creek and May Creek TDAs into TDA W1-2.
3. WSDOT highway runoff would be diverted to W1-2 for runoff treatment.
4. Area equal to new PGIS diverted from Pleasure Point and Lakehurst Creek TDAs (W2-1 and W2-2) into the TDA W2-3 (Bagley Lane direct discharge to Lake Washington).
5. Area greater than new PGIS diverted from Newcastle Beach Park and Coal Creek TDAs into the TDA W4 (I-90 vicinity discharges).
6. Area equal to new PGIS diverted from Richards Creek TDA (R) into the TDA W4. No new discharge to Richards Creek.

The Project would add 46.92 acres to the existing 218.74 acres of PGIS. Currently about 9.8 percent (21.27 acres) of stormwater runoff is treated in the study area, which would increase to 67.4 percent (179.69 acres) after Project completion. This retrofit would also treat 51 percent (111.50 acres) of the existing PGIS that is not currently being treated.

Highway runoff contains several pollutants of concern: nutrients such as nitrogen and phosphorous, which generally bond to dirt particles; heavy metals such as copper and zinc; and petroleum hydrocarbons. These contaminants accumulate on the road surface and are eventually washed away by rainfall. Exhibit 5-2 summarizes the change in runoff treatment that would result from the Project.

Exhibit 5-2. Comparison of Runoff Treatment



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

Exhibit 5-3. Pollutant Loading Percentage Change per TDA

TDA	TSS	TCu	DCu	TZn	DZn
G1	0	0	0	0	0
C1	-40	-32	-6	-35	-21
C2	-81	-68	-21	-72	-49
J0	2	2	2	2	2
J1	-61	-61	-61	-61	-61
J2	-33	47	340	26	165
J3	-100	-100	-100	-100	-100
J4	-100	-100	-100	-100	-100
W1-1	-84	-84	-84	-84	-84
CL1	-100	-100	-100	-100	-100
M1	-100	-100	-100	-100	-100

Exhibit 5-3. Pollutant Loading Percentage Change per TDA

TDA	TSS	TCu	DCu	TZn	DZn
M2	-71	-61	-34	-64	-49
W1-2	-24	45	303	27	149
W1-3	-100	-100	-100	-100	-100
W1-4	-100	-100	-100	-100	-100
W1-5	-100	-100	-100	-100	-100
W1-6	-100	-100	-100	-100	-100
W2-1	-90	-78	-33	-81	-60
W2-2	-88	-75	-30	-79	-56
W2-3	-38	34	303	15	143
W3-1	-91	-81	-44	-84	-66
W3-2	-72	-68	-57	-69	-63
W4	6	14	39	12	25
W5	-32	-22	1	-24	-11
R1	0	0	0	0	0
R2	0	0	0	0	0
Total	-46	-35	4	-38	-19

TDA = threshold discharge area; TSS = total suspended solids; TCu = total copper; DCu = dissolved copper; TZn = total zinc; DZn = dissolved zinc

Overall, our assessment shows that the Build Alternative would reduce stormwater pollutant loading for most pollutants compared to existing conditions. There would be a minor (4 percent) increase in dissolved copper, but total copper would decrease by 36 percent. The reason for the increase in dissolved copper may be because not all of I-405 would be retrofitted with stormwater treatment as part of the Build Alternative. Exhibits 5-4 and 5-5 show the change in total pollutant loading with the proposed Project as compared to the No Build for the five key pollutants assessed.

Exhibit 5-4. Total Suspended Solids

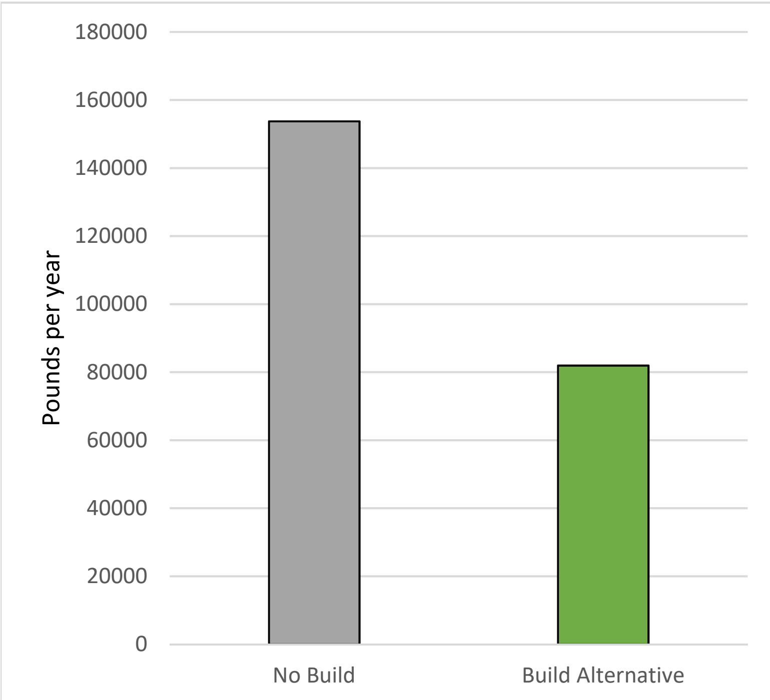
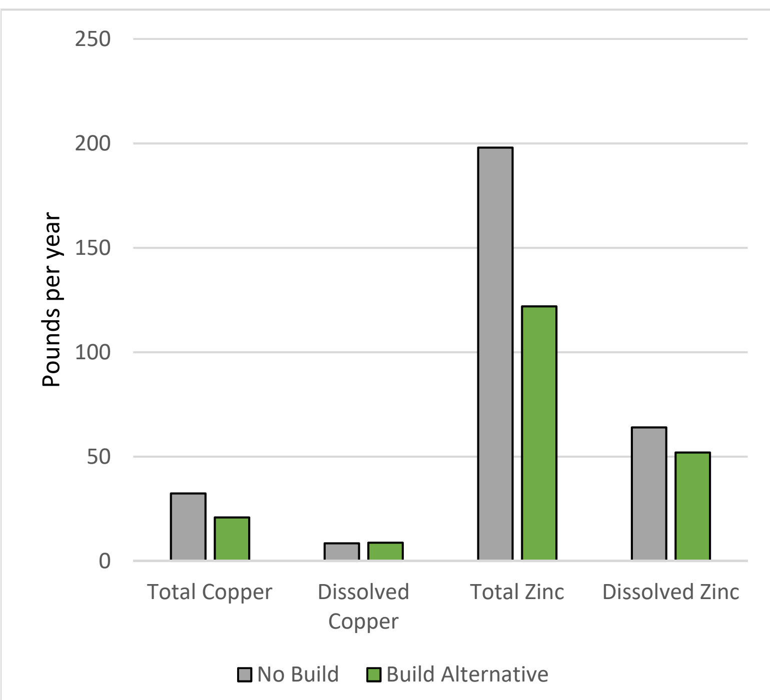


Exhibit 5-5. Total Copper and Zinc, and Dissolved Copper and Zinc



The assessment method used assumed average removal for all BMPs. However, the Project proposes to implement only enhanced treatment BMPs, which would increase contaminant removal compared to traditional BMPs, which would likely address the increase of dissolved copper discharges. The use of only enhanced treatment BMPs is a deviation from WSDOT standards, but is being implemented due to environmental commitments made during the 2006 ESA consultation.

Dissolved copper is associated with concerns about direct effects on fish. Increases in dissolved copper discharges are expected at four locations. Two of those locations, the Bagley Lake deep water discharge and the Mercer Slough wetland complex, are locations where fish are not present. An increase in dissolved copper discharges are expected at Johns Creek, a fish bearing stream and UNT 08.LW.0283. UNT 08.LW.0283 is not currently a fish-bearing stream; however, it may become a fish-bearing stream after fish passage improvements are made to this drainage as part of the proposed improvements. For both of these locations, the dilution assessment demonstrated that the mixing zone is typically less than 1 foot in areas where fish may be present.

Enhanced stormwater treatment facilities, or BMPs, are designed and constructed in accordance with the WSDOT HRM (WSDOT 2016) to effectively remove these pollutants from the stormwater runoff. Within the project limits, several of the existing treatment facilities would need to be abandoned or modified due to changes in the highway configuration. Exhibit 5-6 presents a list of the existing facilities and the subsequent Project effects on those facilities.

Exhibit 5-6. Existing I-405 Detention/Treatment Facilities

TDA	Milepost	Type of Facility	Project Impacts
G1	0.18	I-5 vicinity Media Filter Drain Type 3	Replace
G1	0.20	I-5 vicinity pond	To remain
G1	0.89	Media Filter Drain Type 3	Outside work limits
G1	0.90	Media Filter Drain Type 3	Outside work limits
G1	0.92	Media Filter Drain Type 3	Outside work limits
G2	0.90	SR 518 Vicinity Pond - Detention	Outside work limits
S1	1.35	Flow splitter with Media Filter Drain Type 4	Outside work limits
S1	2.23	Media Filter Drain Type 3	Outside work limits
S1	2.29	Media Filter Drain Type 3	Outside work limits
S1	1.90	Detention with compost-amended biofiltration swale	Outside work limits
S2.1	2.33	NE quadrant - multi-cell sediment ponds	Outside work limits
S2.1	2.35	SE quadrant pond – detention with compost-amended biofiltration swale	Outside work limits
S2.2	2.72	Talbot Road pond – Media Filter Drain Type 4 with detention pond	Outside work limits
S2.2	2.75	Renton Village pond – detention with compost-amended biofiltration swale	Outside work limits
S2.2	2.78	NB I-405 on-ramp - Media Filter Drain Type 4	Outside work limits
S2.2	2.84	NB I-405 off-ramp - Media Filter Drain Type 4	Outside work limits
S2.3	3.00	Benson Pond – two Media Filter Drain Type 4 installations with Detention	Outside work limits
C1 (Cedar River south bank)	3.95	Lined spill containment pond	Replace
C1 (Cedar River north bank)	3.95	Lined spill containment pond	To remain
J1 (Johns Creek)	4.63	96-inch-diameter underground tank	Abandon
J1 (Johns Creek)	4.80	72-inch-diameter underground tank with coalescing plate oil/water separator	Abandon
J1 (Johns Creek)	5.05	96-inch-diameter underground tank with coalescing plate oil/water separator	Abandon
J1 (Johns Creek)	5.09	96-inch-diameter underground tank with coalescing plate oil/water separator	Abandon
J1 (Johns Creek)	5.15	96-inch-diameter underground tank with coalescing plate oil/water separator	Abandon

Exhibit 5-6. Existing I-405 Detention/Treatment Facilities

TDA	Milepost	Type of Facility	Project Impacts
J1 (Johns Creek)	5.28	96-inch-diameter underground tank with coalescing plate oil/water separator	Abandon
J1 (Johns Creek)	5.34	Wet pool treatment pond	Abandon
J2 (Johns Creek)	5.42	96-inch-diameter underground tank with coalescing plate oil/water separator	Abandon
J2 (Johns Creek)	5.47	Two 96-inch-diameter underground tanks with 200-feet-long biofiltration swale	Abandon
W1 (UNT 08.LW.0283)	7.44	Wet pool treatment pond	Abandon
W1 (UNT 08.LW.0283)	7.47	Flood control backwater pond	Abandon
W2	9.30	Media Filter Drain Type 3	Abandon
W2	9.36	Media Filter Drain Type 3	To remain
W2	9.51	Media Filter Drain Type 3	Abandon
W3 - Coal Ck. (Coal Creek)	10.14	Detention pond with Media Filter Drain Type 6	Abandon
W3	10.20	Median - biofiltration swale	To remain
W4 - south	10.80	Media Filter Drain Type 3	To remain
W4 - south	10.90	Media Filter Drain Type 3	To remain
W4 - south	10.95	Media Filter Drain Type 3	To remain
W4 – south	10.95	Detention pond	To remain
W4 - south	11.00	Media Filter Drain Type 3	To remain
W4 - north	11.15	Flow splitter to combined stormwater treatment wetland/detention pond	To remain
W-5	11.75	Pond B - combined stormwater treatment wetland/detention pond	Modify

TDA = total discharge area

As a part of this Project, several new treatment facilities would be constructed to treat the increased stormwater flows. The Project would also modify some of the existing facilities to meet treatment requirements. The amount of treatment proposed typically exceeds the number of acres that would be required according to the HRM. This additional treatment is consistent with the permit and ESA consultation commitments. Exhibit 5-7 presents the new and modified treatment facilities proposed for the Project. Exhibit 5-8, sheets

1 through 8, present the location of the proposed treatment facilities in the study area.

Exhibit 5-7. Proposed New or Modified Treatment Facilities

TDA	Milepost	Type of Facility	Area Treated
G1	0.20 (M)	Reconstruct Media Filter Drain Type 3 for widening	1.28
C1	3.60 (LT)	Spill containment - reconstruct existing lined pond to accommodate runoff treatment	10.50
C1	3.60 (LT)	New compost-amended biofiltration swale	10.50
C2	4.05 (RT)	New compost-amended biofiltration swale	9.50
C2	4.10 (RT)	New detention to match peaks in downstream conveyance to the Cedar River	9.50
J2	5.18 (LT)	New compost-amended biofiltration swale	10.86
J2	5.25 (LT)	New compost-amended biofiltration swale	4.3
J2	5.30 (LT)	New compost-amended biofiltration swale	1.68
J2	5.41 (LT)	New compost-amended biofiltration swale	15.06
M2	7.30 (LT)	New compost-amended biofiltration swale	2.19
W1-2	7.37 (RT)	New compost-amended biofiltration swale	29.69
W1-2	7.46 (LT/RT)	New compost-amended biofiltration swale	28.81
W1-2	L. WA Blvd. NE to NB On-ramp	New compost-amended biofiltration swale	0.55
W2-1	8.95 (LT)	New compost-amended biofiltration swale	4.28
W2-2	9.27 (LT)	New compost-amended biofiltration swale	8.60
W2-3	9.41 (LT)	New compost-amended biofiltration swale	10.27
W3-1	9.87 (LT)	New compost-amended biofiltration swale	1.61
W3-2	10.00 (RT)	New compost-amended biofiltration swale	4.13
W3-2	10.17 (LT)	New compost-amended biofiltration swale	8.25
W3-2	10.26 (LT)	New compost-amended biofiltration swale	6.25
W3-2 to W4	10.26 (LT) to 11.12 (LT)	New flow diversion with vortex separator pre-treatment. Connect conveyance to flow dispersion on the north side of I-90	14.5
W4	I-90 median	New compost-amended biofiltration swale	1.5
W4	EB I-90 to SB I-405 ramp	New Media Filter Drain Type 3	1.04
W4	EB I-90 to NB I-405 ramp	New Media Filter Drain Type 3	0.32
W4	EB I-90 median	New Media Filter Drain Type 3	0.77

Exhibit 5-7. Proposed New or Modified Treatment Facilities

TDA	Milepost	Type of Facility	Area Treated
W4	WB I-90 median	New Media Filter Drain Type 3	1.72
W4	SB I-405 to EB I-90 ramp	New Media Filter Drain Type 3	0.36
W5	11.75 (LT)	Modify combined stormwater treatment wetland/detention pond to comply with current sizing for post-project condition	7.00

TDA = total discharge area; M = median; LT = left; RT = right; NB = northbound; EB = eastbound; SB = southbound

Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 1 of 8

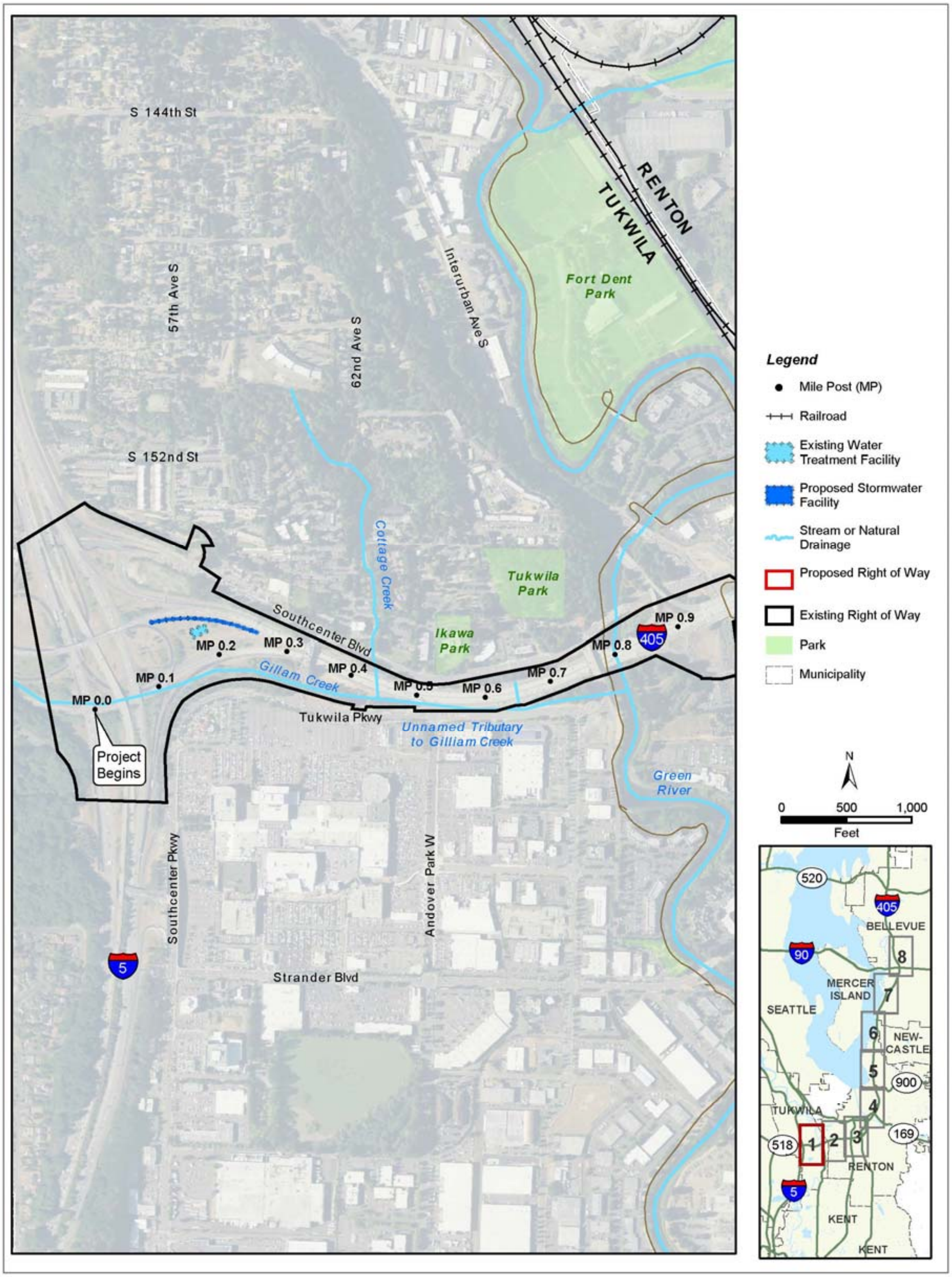


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 2 of 8

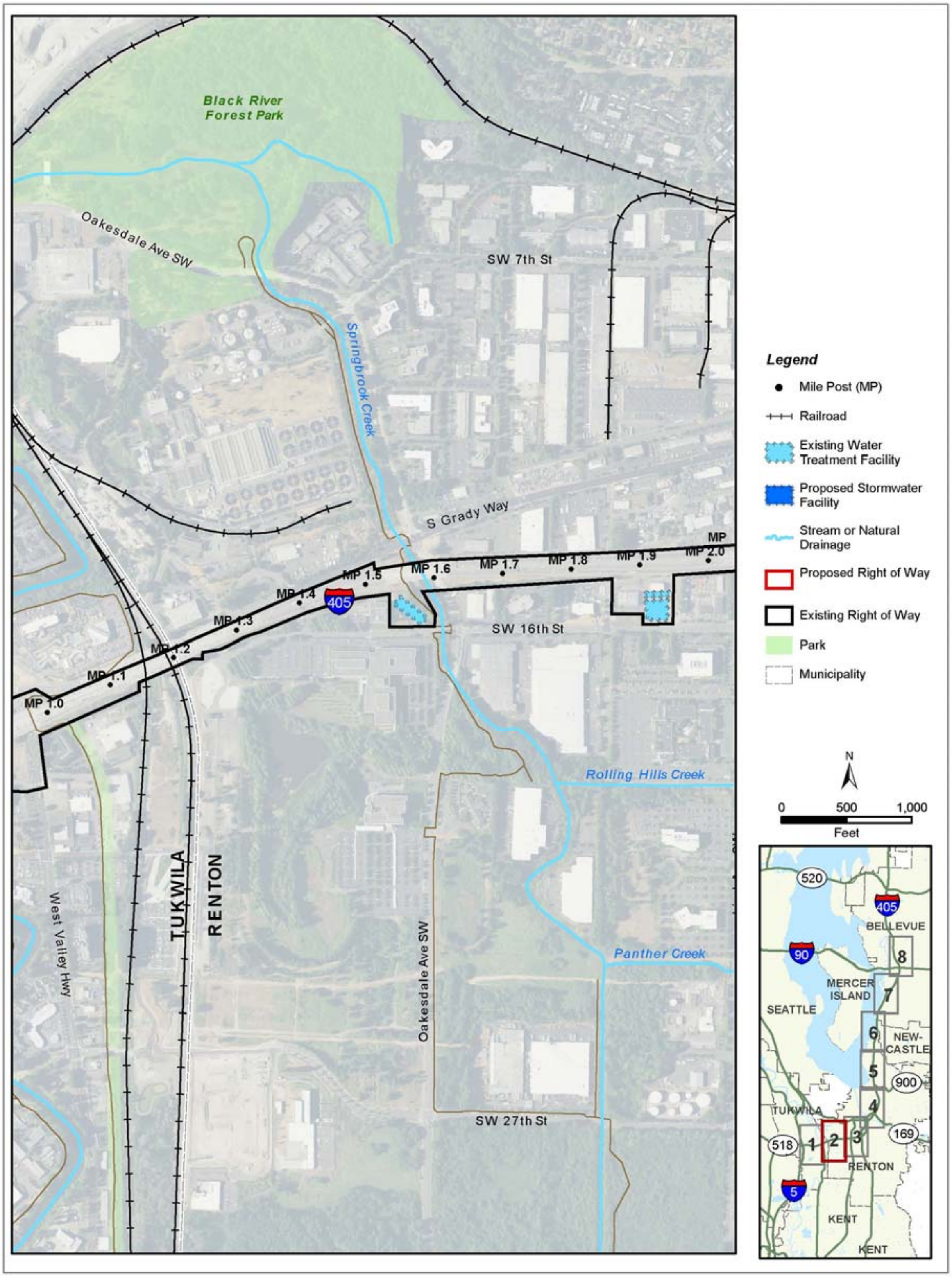


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 3 of 8

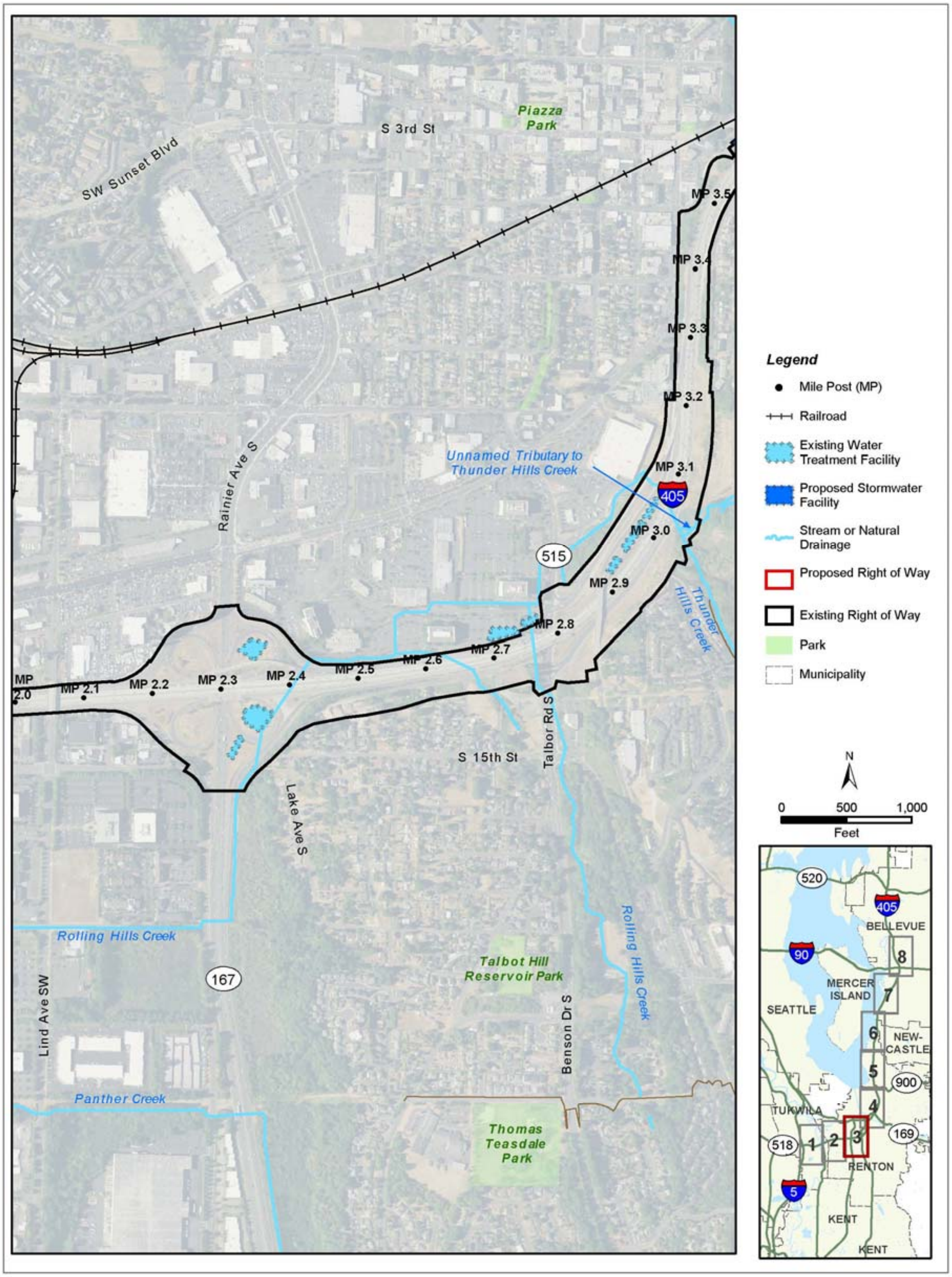


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 4 of 8

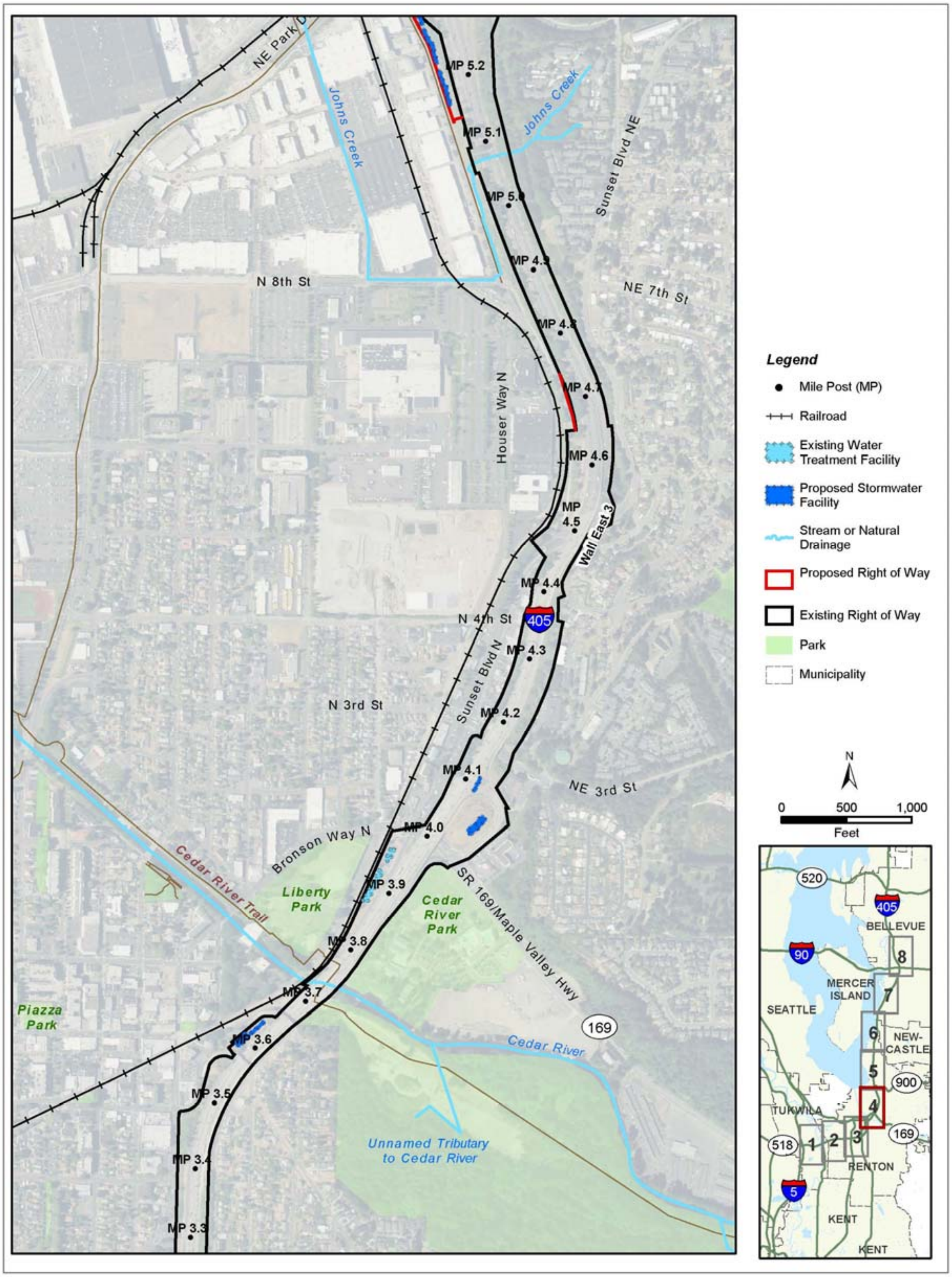


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 5 of 8

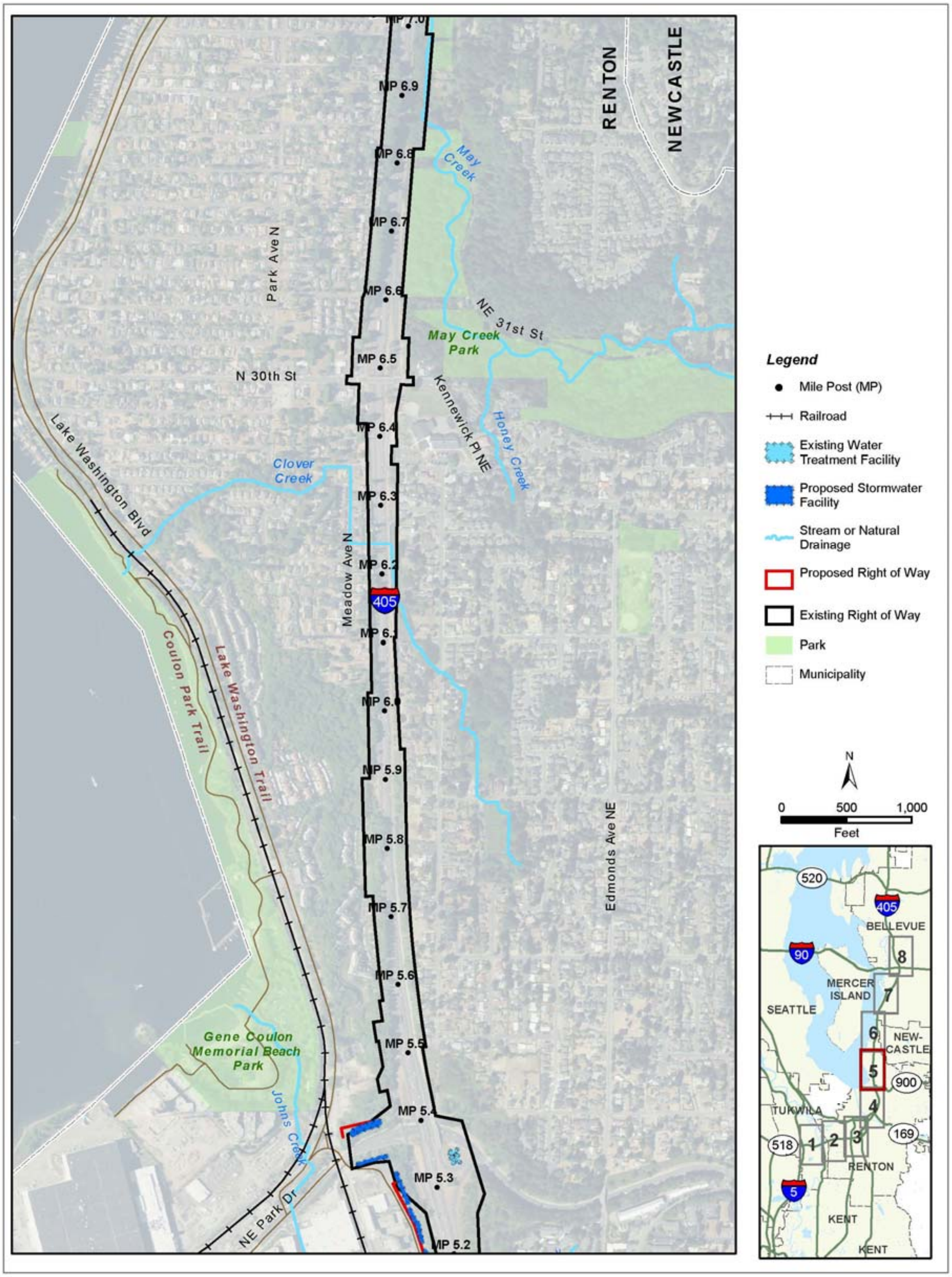


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 6 of 8

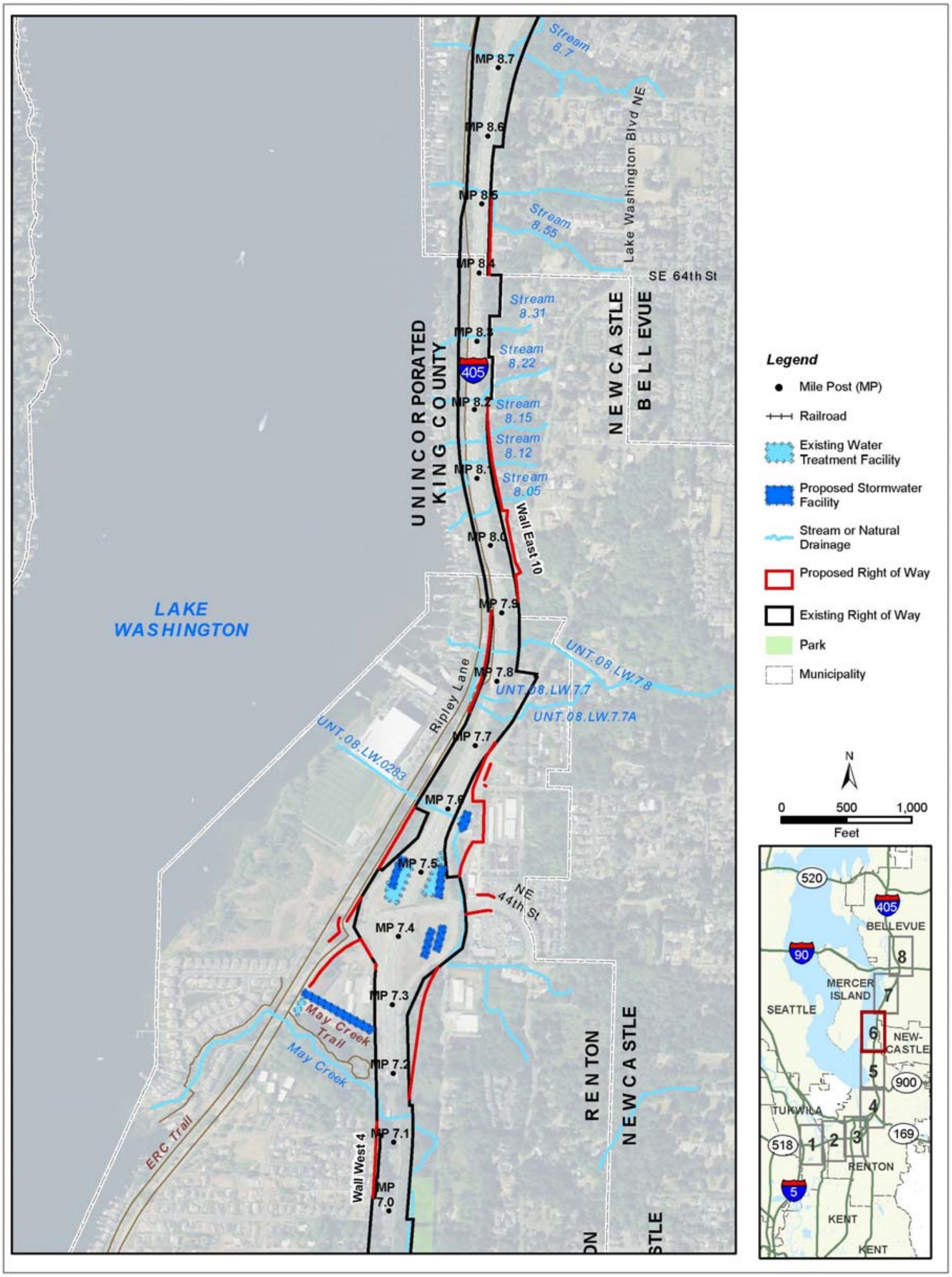


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 7 of 8

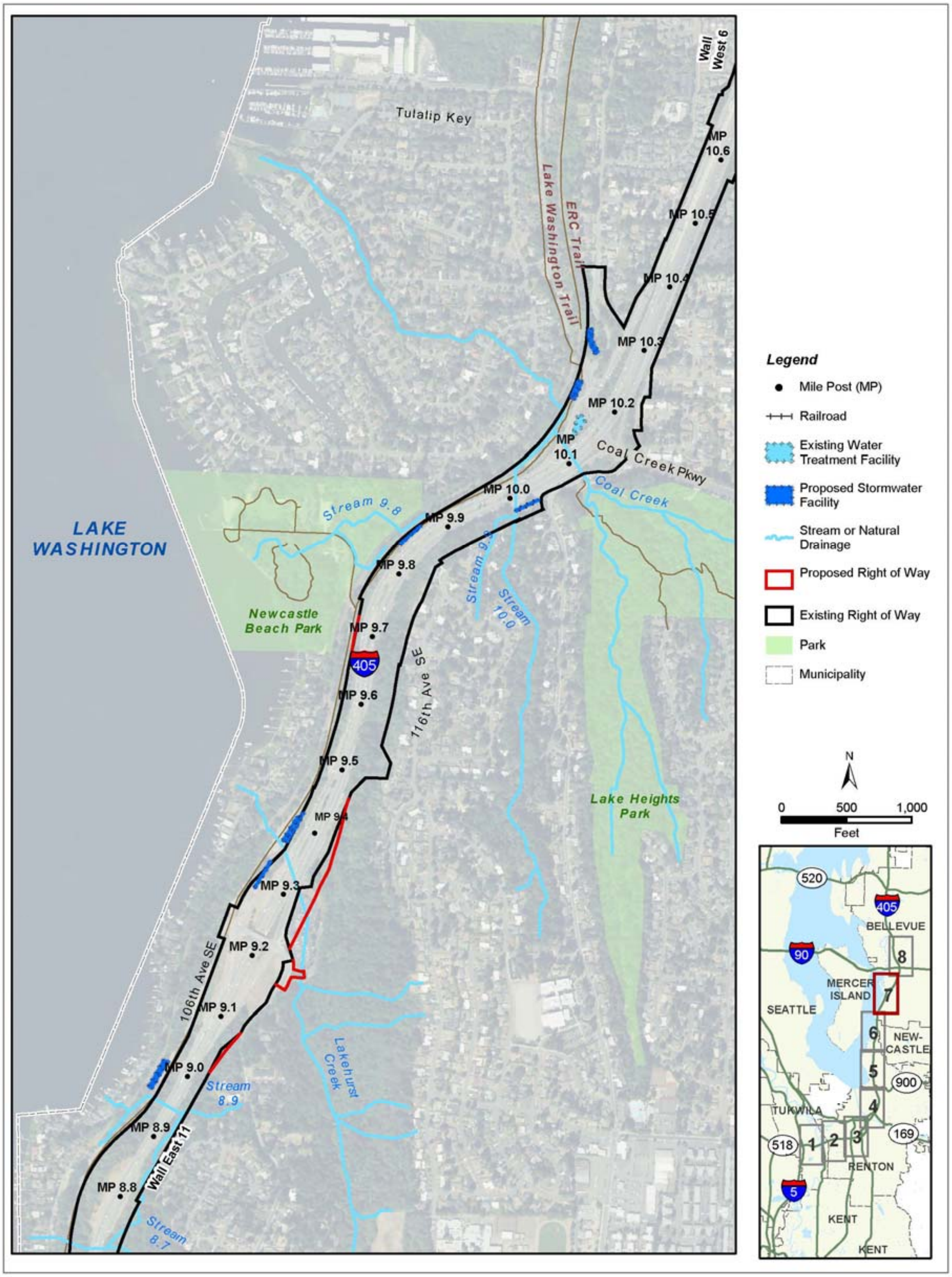
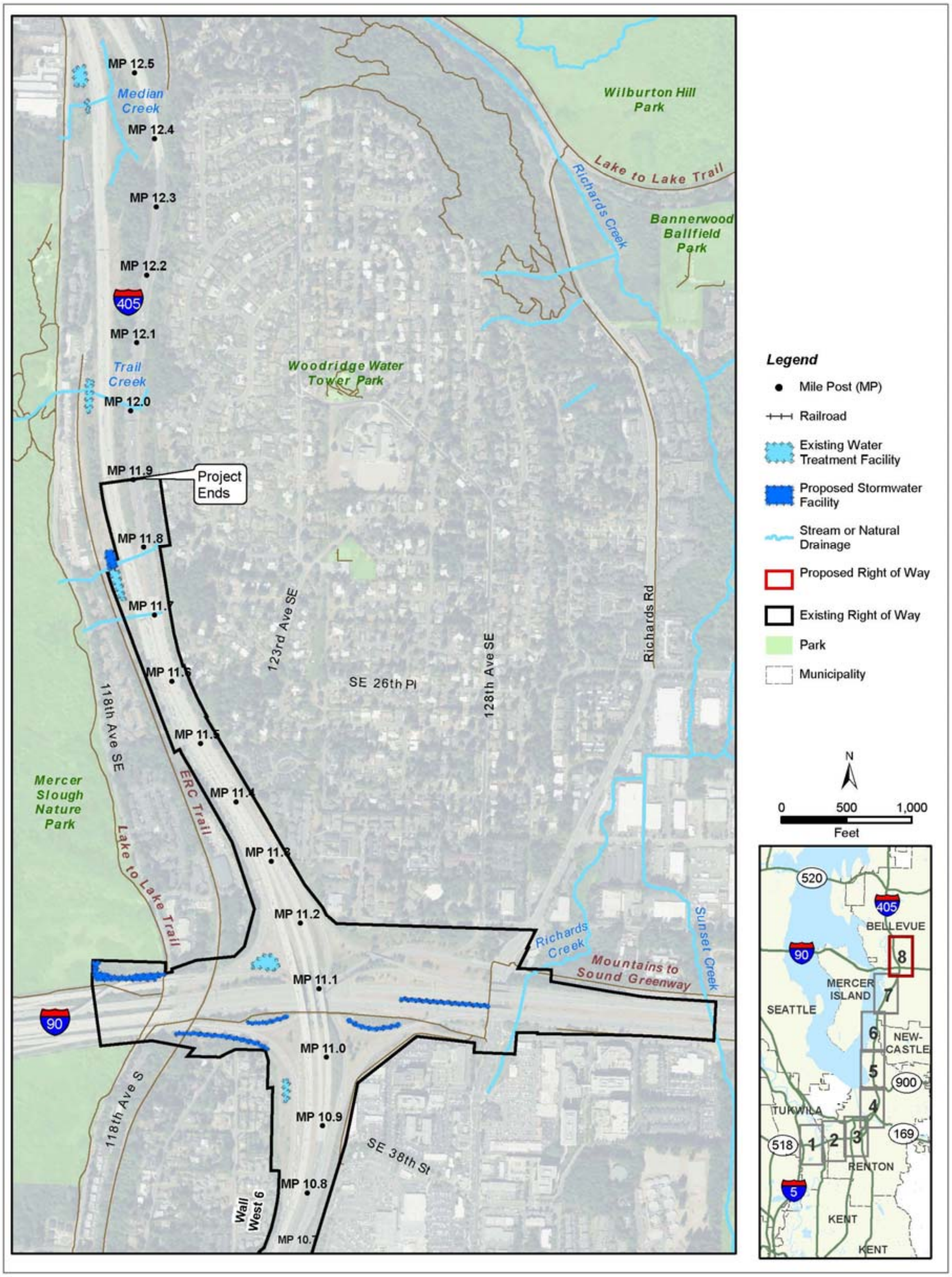


Exhibit 5-8. Existing and Proposed Stormwater Facilities, Sheet 8 of 8



The Build Alternative is not expected to negatively affect the water quality parameters of the waterbodies included on Ecology’s 303(d) List in the study area:

- Cedar River – dissolved oxygen, pH, temperature
- Coal Creek – dissolved oxygen
- Green River – dissolved oxygen
- Johns Creek – dissolved oxygen, fecal coliform, temperature
- May Creek – fecal coliform, temperature
- Mercer Slough – fecal coliform, temperature
- Springbrook Creek – dissolved oxygen, fecal coliform

Temperature and dissolved oxygen in local waterbodies are seasonal concerns and can be influenced by lakes and open water ponds (Booth 2002). Open-water ponds such as detention facilities allow runoff to be exposed to the sun and warm up a few degrees. However, the detention facilities for this Project are small relative to the flow of the rivers to which they would discharge and they would not have wetpools. The facilities from this Project would be dry during the summer when river temperatures are highest and dissolved oxygen is lowest.

Fecal coliform bacteria are typically not considered a significant concern in runoff from highways and so it is not expected that this Project would affect the existing fecal coliform issue in any of these waterbodies.

Zinc is a constituent on the 303(d) list that is a primary concern for highway runoff. Zinc can be efficiently removed from highway runoff using enhanced BMPs.

Floodplains

The Project would be designed and constructed to meet all current federal, state, and local standards for floodplain management. No floodplains or floodways designated as Special Flood Hazard Areas would be affected.

Channel and floodplain enhancements would occur within the East Lake Washington – Bellevue South subbasin. Three unnamed tributaries, UNT 08.LW.0283, UNT 08.LW.7.7A, and UNT 08.LW.7.8 would have their existing culverts replaced with fish passage structures. Additionally, on UNT

08.LW.0283, two open channel and floodplain areas would be constructed between I-405 and NE 43rd Street for fish passage and improved habitat.

Removal of existing bridge piers out of the floodplain and habitat improvements have been added to May Creek, but no in-water work would be required. The effects would be self-mitigating because the performance criteria would be required to meet the City of Renton zero-rise floodplain requirement.

Groundwater and Aquifers

The increase in impervious surfaces would not substantially affect the total amount of recharge to the various shallow alluvial aquifers in the study area, as the majority of recharge to these aquifers is derived from much larger, upgradient drainage areas outside the I-405 corridor. The increase in impervious areas caps a greater portion of the soils that are covering these shallow aquifers, but this change is so small in the context of the overall basin that the impact to recharge would be insignificant. Storm runoff from the impervious areas would also be captured and treated prior to being allowed to infiltrate, thus reducing the chances of introducing contaminants into the aquifer system.

Walls built for the Project would be constructed with underdrain systems. These systems would likely intercept a portion of groundwater flow and temporarily affect groundwater until the groundwater levels reach equilibrium at some point downstream of the highway.

Would the Project have indirect effects that may be delayed or distant from the Project?

Driscoll et al. reported that surrounding land use is the most important general factor influencing pollutant loads on highways (Driscoll et al. 1990). In general, highways in heavily developed areas have greater pollutant loads. Although the Project adds more highway surface area, the overall pollutant load would be significantly decreased, as this project treats all new pavement area, as well as 51 percent more of the existing untreated highway runoff.

The watersheds in the study area are already developed. Although substantial new growth is not anticipated in the study area, some redevelopment in local areas could take place. However, this development would be required to comply with applicable regulations protecting surface waters, floodplains, groundwater, and aquifers in the area.

What would happen if the Project were not built?

We evaluated a No Build Alternative to compare the effects of maintaining the status quo to the effects of the Build Alternative. With the No Build Alternative, only routine activities such as road maintenance, repair, and safety performance improvements would take place over the next 20 years.

With the No Build Alternative, conditions would not change from the status quo. The water quality and quantity retrofit proposed as a part of the Project would not be implemented, and those benefits would not be realized. The continued discharge of untreated stormwater to surface waters would continue, likely furthering damage to the environment. The No Build Alternative would keep existing fish barriers as-is and not improve fish passage, which would hinder the efforts to increase salmonid production within WRIA 8.

SECTION 6 MEASURES TO AVOID OR MINIMIZE EFFECTS

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

WSDOT proposes the following mitigation measures during Project construction:

- WSDOT will protect groundwater with the use of standard BMPs.
- WSDOT will prepare and implement a temporary erosion and sediment control (TESC) plan and a spill prevention control and countermeasures (SPCC) plan. The SPCC plan will include provision for an environmental compliance assurance inspector to be present during Project construction within the sole source aquifer to monitor groundwater quality, storage of hazardous substances and chemical use practices, and the containment of hazardous chemicals, as appropriate.
- WSDOT will protect Renton's sole source aquifer from Project impacts when working in aquifer protection areas (APA) Zones 1 and 2. As appropriate, when working in APA Zones 1 and 2, WSDOT will comply with the following sections of the Renton Municipal Code (RMC), as appropriate: Section 4-4-030, Development Guidelines and Regulations – General; Section 4-4-060, Grading, Excavation, and Mining Regulations; Section 4-9-015, APA Permits; and, Section 4-3-050, Critical Areas Regulations.
- Stormwater flow control and runoff treatment facilities located in the City of Renton's APA Zone will be designed to satisfy the requirements of the City's APA, including prevention of stormwater infiltration. Pipelines will be impervious and designed according to pipeline specifications in the RMC 4-3-050H.6.
- WSDOT will identify and develop staging areas for equipment repair and maintenance away from all drainage courses, according to environmental permit requirements, and outside of the City of Renton's APA Zone 1. In APA Zones 1 and 2, washout of concrete trucks will not be allowed to infiltrate the ground and

wastewater from vehicle and equipment washing will be disposed to the sanitary sewer

- WSDOT will ensure that fuel and chemical storage, fueling operations for construction vehicles, and equipment during construction is located within secondary containment areas. These areas will be surfaced with an impermeable material and sized to contain the volume of stored fuel and/or chemicals. The SPCC plan will specify that storage of fuels and toxic materials can only take place away from drainage courses and outside of APA Zone 1. The SPCC plan will also specify measures to be taken in the event of a spill.
- WSDOT will locate spill response equipment at regular and specified intervals along the project alignment.
- WSDOT will conduct construction within the City of Renton's APA Zones 1 and 2 in compliance with the Washington State Wellhead Protection requirements outlined in WAC 246-290-135(4), RMC 4-3-050 C and H, and RMC 4-9-015.
- During construction, WSDOT will conduct groundwater monitoring and sampling to assess project effects on the aquifer and water quality. In the event of a spill that cannot be mitigated by excavating contaminated soil, WSDOT will conduct groundwater monitoring to monitor for spills that can affect the sole source Cedar Valley Aquifer. If necessary, existing City of Renton monitoring wells can be supplemented with additional monitoring wells at key locations and used for monitoring water quality during construction activities in the APA Zone 1. If monitoring indicates there are impacts on the City's water supply, mitigation measures and design elements would be identified as required by WAC 246-290-135.

What measures will WSDOT take to mitigate effects on water resources from Project operation?

- WSDOT will construct the new I-405 roadway over the City of Renton APA Zone 1, with an impervious liner underneath the pavement for additional protection from spills escaping the stormwater collection system.

- WSDOT will ensure that fuel and chemical spills from vehicles within the sole source Cedar Valley Aquifer are captured and contained by the stormwater collection and detention system. The stormwater system will detain spills in either vaults or ponds. The detention vault or pond will have shut-off capability for containing a spill or release.
- WSDOT will establish a plan in compliance with Washington State Wellhead Protection requirements outlined in WAC 246-290-135(4) and the City of Renton RMC 4-3-050 C and H, and RMC 4-9-015 to ensure protection for the City of Renton's APA Zones 1 and 2.
- Within APA Zones 1 and 2, WSDOT will construct either a lined open-channel, or piped stormwater conveyance system.
- WSDOT will ensure that the roadway and access ramps over APA Zone 1 will have berms or curbs to collect and route major spills to the stormwater collection system. The system will be constructed in accordance with City of Renton requirements for sanitary sewage facilities in APA Zone 1 areas and will be sized to contain a liquid spill from a double tanker.
- WSDOT will control stormwater so that peak and base flows of receiving waters are not adversely affected by treated stormwater discharge from the expanded impervious surface areas created by the Project.

SECTION 7 REFERENCES

Barrett, M.E., R.D. Zuber, E.R. Collins, J.F. Malina, R. J. Charbeneau, and G. H. Ward. 1995. *A Review and Evaluation of Literature Pertaining to the Quantity and Control of Pollution from Highway Runoff and Construction*. CRWR Online Report 95-5. Center for Research in Water Resources, University of Texas at Austin.

Booth, D.B. 2002. *Regional, Synchronous Field Determination of Summertime Stream Temperature in Western Washington*. The Washington Water Resource: quarterly report of the Center for Urban Water Resources Management.

CH2M Hill. 1988. Final Sole-Source Aquifer Petition for the Cedar River Aquifer. Renton, Washington.

City of Bellevue. 2018. Drainage Basins. Retrieved on 02/2018 from https://utilities.bellevuewa.gov/conservation-and-the-environment/drainage-basins/.

City of Renton. 2018. GIS information on-line (COR Map). Retrieved in March 2018 from http://rp.rentonwa.gov/Html5Public/Index.html?viewer=CORMaps.

Driscoll, E.D., Shelley, P.E., and Strecker, E.W. 1990. Pollutant Loadings and Impacts from Highway Stormwater Runoff, Vol. III: Analytical Investigation and Research Report. Federal Highway Administration, Office of Research and Development Report No. FHWA-RD-88-009.

Ecology (Washington State Department of Ecology). 2014. *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014*.

Ecology. 2018a. Water Quality Atlas. Retrieved on March 2018 from https://fortress.wa.gov/ecy/wqamapviewer/map.aspx.

Ecology. 2018b. Water Resources Explorer. Retrieved on March 2018 from https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx.

Environmental Protection Agency (EPA). 1988. *Sole Source Aquifer Designation of the Cedar Valley Aquifer, King County, WA*. Federal Register. Volume 53, Number 191. October 3, 1988. Washington D.C.

Federal Highway Administration (FHWA). 1987. *Technical Advisory T6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. March.

Federal Emergency Management Agency (FEMA). 1977. *Executive Order 11988, Floodplain Management*. May 24.

FEMA. 1997. The National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973.

FEMA. 2001. King County Washington and Incorporated Areas Flood Insurance Study. revised December 6.

FEMA. 2018. Flood Insurance Rate Map. Panel numbers 53033C0656F, 53033C0658F, 53033C0664 F, 53033C0977 F, 53033C0978 F, 53033C0979 F. Retrieved in February 2018 from https://msc.fema.gov/portal/search?AddressQuery=Bellevue%20WA#searchresultsanchor.

GeoEngineers. 2005. Geotechnical Baseline Report, I-405, I-5, to SR 169; Nickel Package (South Renton); Renton, Washington.

Gersib, Richard, et al. 2004. Enhancing Transportation Project Delivery through Watershed Characterization, I-405 Case Study. Report to the Washington State Department of Transportation Urban Corridors Office.

King County and the City of Bellevue. 1987. *Coal Creek Basin Plan and Draft Environmental Impact Statement.*

King County. 1993. Cedar River Current and Future Conditions Report. Department of Public Works.

King County and the City of Renton. 2001. *May Creek Basin Action Plan.*

King County. 2016. *King County Surface Water Design Manual.*

King County. 2018. iMap web site. Retrieved in March 2018 from https://gismaps.kingcounty.gov/iMap/.

King County Department of Natural Resources. 1997. *Lower Cedar River Basin and Non-point Pollution Action Plan.* July 1997.

RH2 and Pacific Groundwater Group. 1993. Renton Groundwater Model Design, Development, and Calibration Final Draft Report.

Washington State Department of Transportation (WSDOT). 2009. *Qualitative Procedures for Surface Water Impact Assessments*. April.

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

WSDOT. 2015. *Geotechnical Design Manual.* M46-03.11. May.

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

Washington State Department of Transportation (WSDOT). 2017a. *Environmental Manual.* M3 - 11.17. June.

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

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

APPENDIX A ACRONYMS AND ABBREVIATIONS

Term	Meaning
ADA	Americans with Disabilities Act
APA	aquifer protection area
BMP	best management practice
CARA	critical aquifer recharge area
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DCu	dissolved copper
DZn	dissolved zinc
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ETL	express toll lane
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	flood insurance rate map
GIS	geographic information system
GMA	Growth Management Act
GP	general purpose
HOV	high-occupancy vehicle
HPA	Hydraulic Project Approval
HRM	Highway Runoff Manual
I-405	Interstate 405
LiDAR	light detection and ranging
MOU	memorandum of agreement

Term	Meaning
MP	milepost
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OEO	Office of Equal Opportunity
PGIS	pollutant-generating impervious surface
RCW	Revised Code of Washington
RM	river mile
RMC	Renton Municipal Code
ROD	Record of Decision
SEPA	State Environmental Policy Act
SOV	single-occupant vehicle
SPCC	Spill prevention, control, and countermeasures
SR	State Route
SWPPP	stormwater pollution prevention plan
TCu	total copper
TDA	threshold discharge area
TESC	temporary erosion and sediment control
TMDL	total maximum daily load
TSS	total suspended solids
TZn	total zinc
UNT	unnamed tributary
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resources Inventory Area
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission