ECOSYSTEM TECHNICAL REPORT

SR 167 - 8th Street E Vicinity to 15th Street SW Vicinity
Northbound HOT Lane

March 2009

Prepared By:
Biology and Environmental Staff
Urban Corridors Office
Washington State Department of Transportation
Seattle, Washington

Washington State
Department of Transportation

THIS PAGE LEFT BLANK INTENTIONALLY

TABLE OF CONTENTS

LIST OF EXHIBITS

ACRONYMS AND ABBREVIATIONS

BMP	Best management practice
CAVFS	Compost amended vegetated filter strips
CFR	Code of Federal Regulations
CFS	Cubic feet per second
Corps	US Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DPS	Distinct population segment
Ecology	Washington Department of Ecology
EPA	US Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily significant unit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Federal Insurance Rate Maps
GIS	Geographical Information System
GMA	Growth Management Act
HOT	High-occupancy toll
HOV	High-occupancy vehicle
HUC	Hydrologic Unit Code
HRM	Highway Runoff Manual
LWD	Large woody debris
MOA	Memorandum of agreement
MP	Milepost
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service

NWI	National Wetlands Inventory
OBL	Obligate
OHWM	Ordinary high water mark
PAB	Palustrine aquatic bed
PEM	Palustrine emergent
PFO	Palustrine forested
PGIS	Pollution-generating impervious surface
PSS	Palustrine scrub-shrub
RCW	Revised Code of Washington
RM	River mile
ROW	Right-of-way
SEPA	State Environmental Policy Act
SMA	Shoreline Management Act
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
TSS	Total suspended solids
USDA	United States Department of Agriculture
USFWS	United Stated Fish and Wildlife Service
USGS	US Geologic Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

GLOSSARY

Term	Meaning
Amphibians	A group of vertebrate animals that spend part of their time on land and part in the water. Amphibians must return to the water to breed and they have distinct larval and adult forms.
Anadromous fish	A fish species that spends a part of its life cycle in the sea and returns to freshwater streams to reproduce (for example, salmon, steelhead, and trout).
Bank	The slope of land adjoining a body of water, such as a river, lake, wetland, or drainage channel. With respect to flowing waters, banks are either right or left as viewed facing in the direction of the flow.
Bankfull channel	The stream channel formed by the dominant discharge, also referred to as the active channel, which meanders across the floodplain.
Bankfull width	The width of the stream channel between the tops of the stream banks where, under high flow conditions, the water level would be even with the top of the banks. In a river with a floodplain, this is the point just before water would spill over onto the floodplain.
Base flow	The volume of flow in a stream or river during dry conditions, as opposed to conditions influenced by storm runoff. Baseflows discharge groundwater and water from upstream channels, wetlands, lakes, and ponds.
Basin	An area of land that drains to a specific water body.
Best management practice (BMP)	Innovative and improved environmental protection tools, practices, and methods that have been determined to be the most effective, practical means of avoiding or reducing environmental effects.
Buffer (aquatic resource)	A designated area along and adjacent to a stream or wetland that may be regulated to control the negative effects of adjacent development on the aquatic resource.
Channelization (streams)	Structural alteration made to straighten, widen, deepen, or otherwise modify a natural stream channel.
Cofferdam	A temporary watertight enclosure constructed around a worksite in a reservoir or on a stream, enabling the worksite to be pumped dry or the water level controlled so that construction can proceed in the dry.

Term	Meaning
Confluence	The convergence of two streams of comparable size into a single channel, or the junction where two rivers, streams, etc., flow together.
Construction footprint	The physical area affected by project construction activities.
Corridor	The road or highway and the adjacent area that is affected by and extending along the highway. The distance the corridor extends out from the highway may vary depending on different factors, such as land use and topography, or the corridor may be defined as a set width, such as 0.25 or 0.5 miles.
Critical areas	Environmentally sensitive areas defined by local critical area ordinances that typically include: aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologic hazard areas, and wetlands. Critical area functions and values are protected by local jurisdictions that require development to avoid or compensate for adverse effects on critical areas.
Critical habitat	Under the Endangered Species Act: (1) the specific areas within the geographic area occupied by a federally-listed species on which are found physical or biological features essential to conserving the species, and that may require special protection or management considerations; and (2) specific areas outside the geographic area occupied by a federally-listed species when it is determined that such areas are essential for the conservation of the species.
Culvert	A pipe or box structure that drains open channels, swales, or ditches under a roadway or embankment.
Deciduous	Trees that shed their leaves annually.
Delineation	Establishing the boundaries of a wetland by applying adopted jurisdictional methods.
Direct effect	An effect caused by an action or alternative and occurring at the same time and location. Effects may be ecological, aesthetic, historic, cultural, economic, social, or health-related.
Direct-access ramp	A ramp that provides direct access to and from high-occupancy vehicle lanes for buses, carpools, and vanpools. This avoids the need to cross several lanes of general-purpose traffic, saving time and improving traffic flow and safety.

Term	Meaning
Dominant species	A plant species that exerts a controlling influence on or defines the character of a vegetative community.
Down-gradient	The direction of flow; i.e., downstream.
Downstream	Referring to the direction of the flow of a stream or river.
Drainage ditch	An open channel designed and constructed to convey water. This may include modifications of natural drainages or man-made historic channels incorporated in a system design.
Ecosystem	A community of organisms interacting with each other, and the environment in which they live.
Effect	Something brought about by a cause or agent; a result. This may include ecological, aesthetic, historic, cultural, economic, social, health, or other effects, whether direct, indirect, or cumulative. Effects include those resulting from actions that may have both beneficial and detrimental effects.
Electrofishing	A fish sampling method that involves capturing fish using an electric shock technique.
Emergent wetlands	Wetlands comprised of plants that are rooted in shallow water or saturated soil but have foliage that extends out of the water or above the ground surface.
Encroachment	Any action, including the placement of fill and the construction of piers and bridge abutments, that will occur within the limits of the regulatory floodplain; intrusion by roads or development into habitat areas that reduces the area available to wildlife, or reduces the functions of the habitat area.
Endangered species	Any species that is in danger of extinction throughout all or a substantial portion of its range.
Endangered Species Act (ESA)	Federal legislation adopted to prevent the extinction of plants and animals.
Erosion	The wearing away of soil or rock by the action of running water, wind, ice, or geologic agents. For this analysis, erosion relates primarily to stormwater runoff.
Escapement	The number of adult fish that enter a fresh water system to spawn.
Evolutionarily Significant Unit (ESU)	The term used by the National Marine Fisheries Service for a fish species population protected by a listing under the Endangered Species Act.

Term	Meaning
Federally-listed species	Any species of fish, wildlife, or plant that has been determined by the US Fish and Wildlife Service or National Marine Fisheries Service to be endangered or threatened under Section 4 of the Endangered Species Act.
Fill	Any material placed in an area to increase surface elevation.
Filter fabric fence	Cloth fencing installed around a construction site to keep soil from migrating off the site.
Filter strip	Grassy slopes that filter and diffuse stormwater running off highway shoulders.
Flap gate	An opening through which water may flow freely at low water elevations, but which closes automatically and prevents water from flowing in the opposite direction at higher water elevations.
Flood	An overflow or inundation that comes from a river, stream, tide, wave action, storm drain, or excess rainfall; any relatively high streamflow overtopping the natural or artificial banks in any reach of a stream.
Forbs	Broad-leaved flowering plants.
Forested wetland	A wetland characterized by woody vegetation that is 20 feet tall or taller.
General-purpose lane	A freeway or arterial lane available for use by all traffic.
Geographic information system (GIS)	A digital computer mapping system that can overlay a wide variety of data such as land use, utilities, and vegetative cover, and provide a spatial analysis.
Gradient	The rate at which a physical quantity, such as temperature or pressure, changes relative to change in a given variable, especially distance.
Groundwater	That portion of the water below the ground surface that is free flowing within the soil particles. Groundwater typically moves slowly, generally at a downward angle because of gravity, and eventually enters into streams, lakes, and oceans.
Groundwater recharge	The process where natural sources (infiltrating rain, snowmelt, or surface water) or pumped water enters and replenishes the ground water supply.

Term	Meaning
Growth Management Act (GMA)	Washington State legislation adopted in 1990, and subsequently amended, that requires all cities and counties in the state to conduct long-range comprehensive planning, and has more extensive requirements for the largest and fastest-growing counties and cities in the state. Such comprehensive plans must address several required topics, including but not limited to land use, transportation, capital facilities, utilities, housing, etc. The GMA requirements also include guaranteeing the consistency of transportation and capital facilities plans with land use plans.
Grub	An action where roots or stumps are cleared by digging.
Habitat	The environment or specific surroundings where a plant or animal grows or lives.
Habitat fragmentation	The separation of a habitat into pieces that are no longer physically connected to each other as a result of human development.
Hazardous materials	Any material that may pose a threat to human health or the environment because of its quantity, concentration, or physical or chemical characteristics.
Herbaceous	A plant with no persistent woody stem above the ground.
High-occupancy vehicle (HOV)	High-occupancy vehicle is a special designation for a bus, carpool, or vanpool provided as an encouragement to increase ride-sharing. Specially designated HOV lanes and parking are among the incentives for persons to pool trips, use fewer vehicles, and make the transportation system more efficient.
High-occupancy toll (HOT)	High occupancy toll (HOT) lanes are HOV lanes (for carpools of two or more, vanpools and buses) that are also open to solo drivers who pay a toll. Toll rates adjust electronically to ensure that traffic in the HOT lane is free flowing (at least 45 miles per hour 90 percent of the time) even when the regular lanes are congested. The SR 167 HOT lanes provide toll-free express trips for buses, vanpools and carpools of two or more, and also give solo drivers the option to pay for a faster, more reliable trip when they need it the most.
Hydric soil	Soils formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions (absence of oxygen) in the upper part.

Term	Meaning
Hydrologically connected	Linked to or associated with the water source of another system either through surface water, a stream, groundwater, etc.
Hydrology	Within the context of a wetland, permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil.
Hydroseed	A mixture of grass seed, fertilizer, lime, and wood fiber mulch designed to rapidly revegetate cleared areas.
Impervious surface	Pavement, roofs, and other compacted or hardened areas that do not allow the passage of rainfall or runoff into the ground.
Incised	A term used to describe down-cutting (downward erosion) by a stream. Incision deepens and often steepens the stream channel.
Indirect effect	An effect that occurs later in time or is removed in distance from the proposed action, but is still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air, water, and other natural systems.
Infiltration	The passage of water through the soil surface into the subsoil.
Invasive species	Non-native species that disrupt and displace native species.
Jurisdiction	A municipal government agency, such as a city or county, and as appropriate, federal and state agencies and federally recognized tribes. The term also can mean "to have authority over."
Land use	The type of activity (i.e., residential, commercial, or industrial) that occurs on property.
Large woody debris (LWD)	Logs, limbs, or root wads that are waterward of the ordinary high water line. To qualify as large woody debris, it must be of sufficient size to be resistant to erosion, provide bank stability, or help maintain or create habitat features important to fish life.
Levee	A manmade structure, usually an earthen embankment along the edge of a river channel, constructed to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Term	Meaning
Macroinvertebrate	Small animals that are visible with the naked eye yet have no backbone (insects, worms, larvae, etc.).
Meandering	Following a winding and turning course.
Minimization	Taking measures to reduce potential effects to the smallest practical amount, extent, size, or degree. Minimization could include alignment shifts, a commitment to seasonal construction windows, replacement of land or facilities, restoration or landscaping, or payment of fair market value for affected lands.
Mitigation	An effort to: (1) avoid the effect altogether by not taking a certain action or parts of an action; (2) minimize the effect by limiting the magnitude of the action and its implementation, by using technology or by taking affirmative steps; (3) rectify the effect by repairing, rehabilitating, or restoring the affected environment; (4) reduce or eliminate the effect over time by preservation and maintenance operations; (5) compensate for the effect by replacing, enhancing, or providing substitute resources or environments; and/or (6) monitor the effect and take appropriate corrective measures.
Mitigation bank	A mitigation project constructed in advance of planned development to mitigate for unavoidable effects on wetlands and their associated habitat. Banks are generally sized to provide sufficient mitigation for several development projects in one location. As a result, the bank typically provides higher functioning wetlands and more useable habitat than may be possible on an individual project scale.
Obligate (OBL)	In context of wetland science, it is a plant species that the USDA Natural Resource Conservation Service has defined as 'occurs almost always (estimated probability 99%) under natural conditions in wetlands'.

Term	Meaning
Ordinary high water mark (OHWM)	The elevation marking the highest water level, which is so common and maintained for a sufficient time in all ordinary years that it leaves evidence upon the landscape, such as a clear, natural line impressed on the bank, changes in soil character, destruction of or change in vegetation, or the presence of litter and debris. Generally, it is the point where the natural vegetation changes from predominately aquatic to upland species. Where the ordinary high water mark cannot be found, it is the line of mean annual flood – the highest the water gets in an average year, but not the highest it gets during extreme flooding.
Palustrine	Tidal or non-tidal freshwater areas dominated by trees, shrubs, persistent emergents, mosses, or lichens. Palustrine also includes wetlands lacking this vegetation but having the following characteristics: area less than 20 acres, no active wave-formed or bedrock shoreline, and water depth in the deepest part is less than 6.6 feet at low water.
Palustrine aquatic bed (PAB)	Surface waters dominated by plants that grow and form a continuous cover principally on or at the surface, including algal mats, detached floating mats, and rooted vascular plant assemblages. Total vegetation cover is greater than 80 percent.
Palustrine emergent (PEM)	A wetland characterized by erect, rooted, non-woody plants such as cattails, rushes, and sedges.
Palustrine forested (PFO)	A wetland characterized by woody vegetation that is 20 feet tall or taller.
Palustrine scrub-shrub (PSS)	Areas dominated by woody vegetation less than 20 feet tall, such as trees, shrubs, or young trees that are stunted due to environmental conditions.
Peak flow	The maximum instantaneous rate of flow during a storm, usually in reference to a specific design storm event.
Pier	A vertical column or substructure unit that supports an elevated structure such as a bridge.
Piscivorous animal	Animals that eat fish.
Pollutant	Any substance introduced into the environment that contaminates or otherwise adversely affects the usefulness of a resource.

Term	Meaning
Primary constituent elements	Physical and/or biological habitat features needed for the survival and successful reproduction of a species.
Priority habitats	Habitat types with unique or significant value to a diverse group of species.
Pump station	A mechanical facility that controls flows from one body of water to another.
Raptor	A raptor is a carnivorous (meat-eating) bird. All raptors share at least three main characteristics: keen eyesight, eight sharp talons, and a hooked beak. Eagles, hawks, falcons, and owls are all considered raptors.
Reconnaissance-level field survey	A qualitative investigation, where the biologist walks the site, photographs key areas, and makes observations of plants and wildlife, to assess overall site conditions.
Refugia habitat	An area of a stream that provides shelter or safety for aquatic species.
Resident fish	Fish that do not migrate out to the ocean but remain in fresh water.
Restoration	To improve a disturbed or altered wetland by returning wetland parameters that may be missing.
Retaining wall	A structure used to hold earth in place where the natural grade cannot be maintained.
Retention/detention pond	A stormwater facility designed to reduce stormwater runoff quantity and quality effects by storing the increased runoff volume that results from development, allowing the suspended particles to settle out, and then slowly releasing it at a controlled runoff rate.
Revetments	Facings of stone, concrete, or even such materials as tires, placed on a riverbank or levee to protect from erosion.
Riffle	A shallow area of a stream or river in which water flows rapidly over a rocky or gravelly stream bed.
Right-of-way	A strip of land purchased or granted prior to the construction of transportation improvements for roadway, sidewalks, sound walls, retaining walls, stormwater facilities, and other project features. This also includes permanent or temporary easements for construction and maintenance. Vacant land may also be set aside for future highway expansion under certain circumstances.

Term	Meaning
Riparian	Pertaining to anything connected with or immediately adjacent to the banks of a stream, river, or other water body.
Riparian area	The land and habitat adjacent to streams, lakes, estuaries, or other waterways, comprising the transition area between the aquatic ecosystem and the nearby upland terrestrial ecosystem. Riparian corridors, or zones, identified by soil characteristics or plant communities, include the wet areas in and near streams, ponds, lakes, springs, and other surface waters.
Riprap	A man-made armoring, facing layer, or protective mound of rocks placed to prevent erosion or sloughing of a stream bank or structure due to flow of surface and stormwater runoff.
River mile (RM)	The distance of a point on a river measured in miles from the river's mouth along the low-water channel.
Riverine	Freshwater areas that are contained within a channel and are not dominated by trees, shrubs, and persistent emergents; for example, rivers and streams.
Runoff	Rainwater or snowmelt that leaves an area as surface drainage.
Salmonid	Any member of the family Salmonidae, which includes all species of salmon, trout, and char (including bull trout).
Saturated soil conditions	A condition in which all easily drained voids (pores between soil particles) in the root zone are filled with water to the soil surface.
Scrub-shrub wetland	Wetland dominated by woody vegetation less than 20 feet tall. The vegetation may include shrubs, young trees, and trees or shrubs that may be stunted because of environmental conditions.
Sediment	Material that originates from weathering and erosion of rocks, dirt, or unconsolidated deposits and organic material. Sediment is carried and deposited by wind, ice, or water. It is often transported by stormwater runoff and may be suspended within the water.
Seep	A spot where water trickles out of the ground to form a pool or wet area.

Term	Meaning
Sensitive species	Any native wildlife species that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range without cooperative management or removal of threats.
Sheet flow	Runoff that flows over the ground surface as a thin, even layer as opposed to a concentrated stream or channel.
Shoreline Management Act (SMA)	Washington's Shoreline Management Act (SMA) was adopted by the public in a 1972 referendum "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." The SMA has three broad policies: encourage water dependent uses, protect shoreline natural resources, and to promote public access. It regulates land use within 200 inland from principal bodies of water and associated wetlands.
Shoreline Master Program	A requirement of the SMA, it identifies standards of protection for shoreline areas and contains shoreline policies, shoreline use environments (zones), and specific shoreline regulation.
Side channel	A secondary stream that splits off and then rejoins the main channel.
Slope	The change in elevation over a distance, or an inclined land form.
Species of concern	Species whose conservation standing is of concern to the US Fish and Wildlife Service, but for which status information is still needed for consideration to list the species under the Endangered Species Act.
Spill Prevention Control and Countermeasures (SPCC) plan	A plan for minimizing effects to soil, surface water, and groundwater in the event of a spill of contaminated soil, petroleum products, contaminated water, or other hazardous substances. The SPCC plan addresses construction procedures, equipment, and materials.
Staging area	Locations used during construction to provide room for employee parking, large equipment storage, and material stockpiles.
State-listed species	Species of wildlife that are considered to be at-risk and are protected by Washington State laws.
Stormwater	The portion of precipitation that does not naturally percolate into the ground or evaporate, but flows overland, in channels, or in pipes into a defined surface water channel or a constructed stormwater facility.

Term	Meaning
Stormwater detention	The process of storing stormwater in manmade facilities such as ponds or vaults and releasing the stormwater at a controlled rate. This helps control volume and rate at which stormwater enters streams and rivers. Controlling the flow of stormwater helps maintain or improve conditions in the streams and minimizes erosion of stream banks.
Study area	The area specifically evaluated for environmental effects.
Subbasin	A smaller portion, or subarea, of a watershed or catchment area.
Substrate	Organic and mineral materials that form the bed of a body of water.
Threatened species	Any species that is likely to become endangered within the foreseeable future throughout all or a substantial portion of its range.
Topography	The physical features of a geographic area taken collectively; especially, the variations in elevation of the earth's surface.
Transportation corridor	Travel routes that routinely experience the heaviest volume of vehicles to and from primary locations within a region.
Trapezoidal channel	A water conveyance channel such as a stream or ditch with a flat bottom and steep side slopes. Trapezoidal channels are typically used to convey high volumes of water such as flood or stormwater flows.
Tributary	A stream or other body of water that contributes its water to another stream or body of water.
Turbidity	A condition caused by suspended sediments or floating material that clouds the water and makes it appear dark and muddy.
Understory	The vegetation of a forest that grows in the shade of the canopy (branches and foliage of mature trees meeting overhead). The understory usually consists of smaller herbaceous and shrub species such as ferns, various berries, and ivies.
Uplands	An area that is not sufficiently wet to exhibit the vegetation, soils, and/or hydrologic characteristics associated with wetlands.

Term	Meaning
Vegetative community	A unique and defined area of vegetation within an ecosystem that is composed of specific species of plants.
Water Resource Inventory Area (WRIA)	A geographic boundary created by the State to assist in the management of water resources. In 1971, the Washington State Legislature passed Chapter 90.54RCW, the Water Resources Act of 1971. This Act directed the Department of Ecology to develop a "comprehensive state water resource program" and said that "the department may develop the program in segments" in order to focus on specific areas or issues. In 1976, Ecology adopted Chapter173-500 WAC, which split the State into 62 Water Resource Inventory Areas.
Watershed	The region of land that drains into a specific body of water, such as a river, lake, sea, or ocean. Rain that falls anywhere within a given body of water's watershed will eventually drain into that body of water.
Wetland	Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
Wetland boundary	The point on the ground at which a shift from wetlands to non-wetlands or aquatic habitat occurs. These boundaries often follow topographic contours.
Wetland hydrology	The condition where water is present during a portion (between 5 and 12.5 percent) of the annual growing season.
Wetted perimeter	The width of a watercourse that is covered with water, either flowing or non-flowing.
Wildlife corridor	Linear spaces that connect the various areas of an animal's habitat that may be important for feeding, watering, resting, and/or breeding.

THIS PAGE LEFT BLANK INTENTIONALLY

EXECUTIVE SUMMARY

What is the proposed project and why is it needed?

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound high-occupancy toll (HOT) lane from the vicinity of 8th Street E in Pacific (MP 10.2) in Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington (Exhibit 1). The construction of the HOT lane will require widening the roadway to the outside of the existing pavement between 6th Avenue N in Algona and 5th Avenue SW in Pacific. The rest of this project will be widened to the median. Ramp meters will be installed at the northbound on-ramps at the SR 167 interchanges with 8th Street E and Ellingson Road. All of the proposed widening work will occur within WSDOT right-of-way.

SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. The additional capacity that this project will provide to SR 167 will relieve congestion and improve safety for commuters traveling northbound.

What is the purpose of this ecosystem report?

This technical memorandum was prepared per the National Environmental Policy Act (NEPA), which requires all actions sponsored, funded, permitted, or approved by a federal agency to consider the environmental effects of the Proposed Action. The Washington State Environmental Policy Act (SEPA) requires a similar evaluation of environmental effects of proposed actions for state and local projects. This project is required to comply with both NEPA and SEPA, which includes a review of potential effects and possible mitigation measures. When potential effects to ecosystems exist as a result of the proposed project, a review of those potential effects and possible mitigation measures is required by both NEPA and SEPA.

This report describes the existing conditions and potential range of effects to ecosystem elements that may be attributed to

the construction and operation of the proposed project. These ecosystem elements include:

- Surface water quality and quantity
- Aquatic resources (wetlands, streams, fisheries)
- Terrestrial wildlife and vegetation

The project team analyzed each ecosystem element to determine how the proposed project may directly, indirectly, and cumulatively affect each element.

How were potential effects on ecosystems identified and evaluated?

The project team identified and analyzed the potential effects of the proposed project using the WSDOT Environmental Procedures Manual (WSDOT, 2008).

Biologists gathered existing information for the study area through literature and internet research; interviews with local, state, and federal agency personnel; and previously prepared WSDOT reports. Additional information on the ecosystem elements in the study area was gathered by conducting wetland delineations, culvert and stream surveys, and field verification of wildlife habitat data. The collected information was then compared to the project footprint, including all roadway and drainage improvements, to assess potential effects resulting from the project.

What effects will the project have on ecosystems?

The proposed project is expected to have temporary and permanent effects on wetland and stream buffers and wildlife habitat. The project will remove some vegetation and place fill material or structures in some existing wetland and stream buffers. Currently, approximately 65.2 acres of existing PGIS are present in the project corridor, of which approximately 5.4 acres are treated. This project will add approximately 4.6 acres of new PGIS to the project corridor and provide treatment for an additional approximate 13 acres of PGIS. Therefore, the project will provide a direct benefit to the ecosystem in the study area by treating the new impervious surfaces and retrofitting some of the existing impervious surfaces. A summary of effects to sensitive areas is listed in Exhibit S-1.

Exhibit S-1
Summary of Ecosystem Element Effects

Ecosystem Element	Temporary Effects	Permanent Effects
Wetland buffers (acres)	0.02	0
Stream buffers (acres)	0.12	0.27
Upland Vegetation (acres)	0.30	0.10

What are the key messages from this report?

The study area contains a number of ecosystem elements and ecological functions important to the region. The proposed project will directly affect ecosystem elements both temporarily and permanently. Some of these effects are potentially beneficial, like improving water quality treatment. Some are potentially negative, such as encroaching into wetland and steam buffers. This report provides a qualitative discussion of the potential effects on ecosystem elements and the proposed measures to minimize adverse effects to the ecosystem.

CHAPTER 1 INTRODUCTION

What is the proposed project and why is it needed?

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound high-occupancy toll (HOT) lane from the vicinity of 8th Street E in Pacific (MP 10.2) in Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington (Exhibit 1) . The construction of the HOT lane will require widening the roadway to the outside of the existing pavement between 6th Avenue N in Algona and 5th Avenue SW in Pacific. The rest of this project will be widened to the median. Ramp meters will be installed at the northbound on-ramps at the SR 167 interchanges with 8th Street E and Ellingson Road. All of the proposed widening work will occur within WSDOT right-of-way.

High-occupancy toll (HOT) lanes are managed lanes intended to increase mobility by allowing more vehicle use of the HOV lane. HOT lanes maintain free, priority status for transit and carpools, the same as a HOV lane, but also allow single-occupant vehicles to pay a toll to use the lane. Toll rates are variable, depending upon the level of congestion.

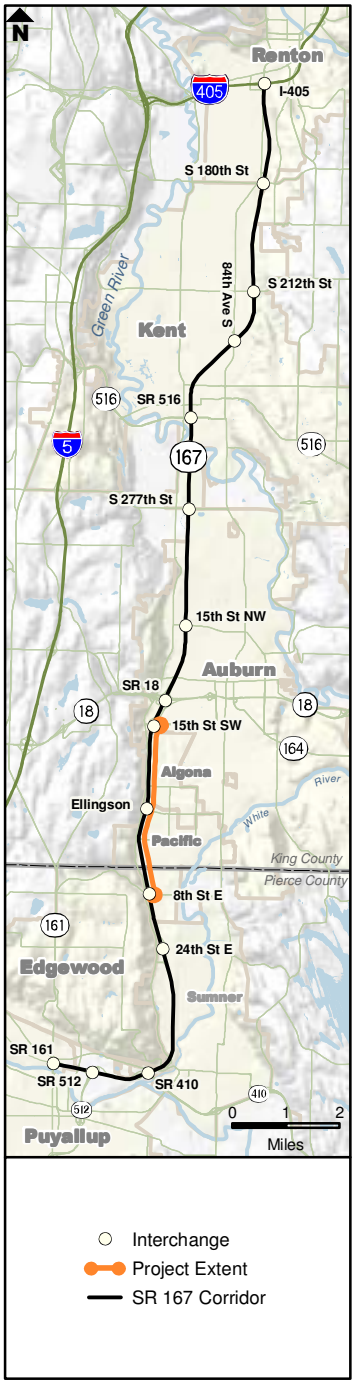
SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. The additional capacity that this project will provide to SR 167 will relieve congestion and improve safety for commuters traveling northbound.

Currently, approximately 65.2 acres of existing PGIS are present in the project corridor, of which approximately 5.4 acres are treated. This project will add approximately 4.6 acres of new PGIS to the project corridor and provide treatment for an additional approximate 13 acres of PGIS. Therefore, the project will provide a direct benefit to the ecosystem in the study area by treating the new impervious surfaces and retrofitting some of the existing impervious surfaces.

What is the purpose of this ecosystem report?

This technical report was prepared as part of a National Environmental Policy Act (NEPA) which requires all actions sponsored, funded, permitted, or approved by a federal agency to

Exhibit 1
Vicinity Map



consider the environmental effects of the Proposed Action. The Washington State Environmental Policy Act (SEPA) requires a similar evaluation of environmental effects of proposed actions for state and local projects. This project is required to comply with both NEPA and SEPA, which includes a review of potential effects and possible mitigation measures. When potential effects to ecosystems exist as a result of the proposed project, a review of those potential effects and possible mitigation measures is required by both NEPA and SEPA.

This report describes the existing conditions and potential range of effects to ecosystem elements that may be attributed to the construction and operation of the proposed project. These ecosystem elements include:

- Surface water quality and quantity
- Aquatic resources (wetlands, streams, fisheries)
- Terrestrial wildlife and vegetation

The project team analyzed the proposed project to determine how each ecosystem element may directly, indirectly, and cumulatively be affected.

What policies or regulations are related to effects on ecosystem elements?

Each ecosystem element is protected by federal, state, and local laws because of their ecological functions and social value. The laws, regulations, and associated government agencies that govern the ecosystem elements in the study area are detailed in this section.

Surface Water Quality and Quantity

The state and federal regulations or statutes that protect aquatic habitats and the species in the study area include:

- US Clean Water Act (CWA) Section 401 for water quality
- CWA Section 404 for discharge of materials to waters of the U.S. including wetlands
- Coastal Zone Management Act (CZMA)
- Water Quality Standards for Surface Waters of the State of Washington

Water courses within the project area are located within the WSDOT SR 167 right-of-way and fall under their respective local jurisdiction for sensitive area management. This project will comply with the WSDOT Highway Runoff Manual (HRM) for water quality and quantity. Local requirements for flow quantity control, water quality treatment, and temporary erosion and sediment control during construction, are similar to the requirements contained in the HRM.

Aquatic Resources

Local, state and federal regulations govern development and other activities in or near wetlands. In Washington, wetlands are regulated by local jurisdiction critical area ordinances as required by the state Growth Management Act (GMA). The proposed project is regulated in part by local critical area ordinances. The proposed project crosses through five local jurisdictions: King County, Pierce County, the City of Auburn, the City of Algona, and the City of Pacific.

What are critical areas ordinances?

The Washington State Growth Management Act (GMA) defines critical areas as environmentally sensitive areas that provide key functions to the ecosystem, such as:

- Wetlands
- Areas recharging aquifers
- Frequently flooded areas
- Geologically hazardous areas
- Fish and wildlife habitat conservation areas.

The act requires that local jurisdictions identify, designate, and protect critical areas.

The federal Clean Water Act (CWA) regulates activities that may affect wetlands and other waters of the US. The CWA is administered by the US Army Corps of Engineers (Corps) and Ecology, a designated state agency in Washington. The Corps also requires that project proponents initially determine the likely jurisdictional status of ditches. That status is based on whether or not the ditch flows into a regulated water body. The project proponent records indicators and patterns of flow. The Corps uses that information to make the final jurisdictional determination. WSDOT is now routinely applying this approach when requesting a jurisdictional determination from the Corps.

The primary federal and state regulations or statutes that apply to aquatic resources include the following:

- Endangered Species Act (ESA)
- CWA (Sections 303, 401, and 404)
- Shoreline Management Act (SMA)
- State Endangered Species Act
- Washington State Water Pollution Control Act - RCW 90.48

- Hydrologic Project Approval - RCW 77.55

Terrestrial Wildlife and Vegetation

The primary federal regulations or statutes that apply to fisheries, terrestrial wildlife, and vegetation are the following:

- Endangered Species Act (ESA)
- Fish and Wildlife Coordination Act
- Shoreline Management Act (SMA)
- Migratory Bird Treaty Act

Numerous state regulations also apply to these resources, including the following:

- State Endangered Species Act
- Washington State Fish and Game Code - RCW Titles 75 and 77
- Hydrologic Project Approval - RCW 77.55

Applicable local regulations include the sensitive and critical areas ordinances of King and Pierce Counties, and the cities of Algona, Auburn, and Pacific. The general goal of these regulations is to protect habitat, water quality, wetlands, and riparian areas, as well as the species. Each jurisdiction may have other sensitive areas or species that are also regulated, depending on the local resources.

Regulatory Terminology for Fish, Wildlife, and Plants

Endangered species - Endangered species are those plants and animals that are so rare they are in danger of becoming extinct.

Threatened species - Threatened species are plants and animals whose numbers are very low or decreasing rapidly. Threatened species are not endangered yet, but are likely to become endangered in the future.

Candidate species - Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is being considered for listing as endangered or threatened but is not yet the subject of a proposed rule.

Rare plant - A native plant species that is uncommon or scarce. Small population size puts the species at risk of extinction from a single event. These populations may be stable, but are low because of: the plant's unique biological characteristics and/or needs; the fact that it exists in small numbers naturally; or it is at the limit of its normal range.

What functions do study area ecosystem elements provide?

Surface Water Quality and Quantity

Surface waters such as rivers and streams provide habitat for fish, wildlife, and vegetation that support the entire ecosystem. Surface water bodies provide detention of storm water and help to convey water to large water bodies such as the Puget Sound. It is important to preserve the habitat in and around surface water bodies and to ensure that water quality is maintained to support those systems. In addition, stormwater must be managed effectively to prohibit flooding of water bodies and floodplains, pollutants from entering natural systems, and misdirected conveyance of excessive stormwater.

Aquatic Resources

Rivers and streams, along with their associated tributaries and stream buffers, provide a variety of functions. These functions include:

- Transporting water, sediment, nutrients, and other materials
- Providing habitat for plants, animals, and humans
- Recharging groundwater
- Storing floodwater
- Filtering contaminants

The rivers and streams in the study area perform these functions to varying degrees.

In addition to providing wildlife habitat, riparian areas also provide shade to help reduce stream temperatures, organic litter that supplies food and other nutrients to the water body, and a buffer zone that helps to reduce sediment and other contaminant inputs. Riparian vegetation that falls into these water bodies can also provide cover for fish or provide basking areas for amphibians and reptiles.

In general, wetlands provide many functions including fish and wildlife habitat, water quality improvements, floodwater storage, and groundwater recharge. Large wetlands have more capacity for capturing stormwater flows, improving water quality, and providing a variety of habitats for wildlife, and are thus, more likely to provide greater functional benefits than smaller wetlands.

Terrestrial Wildlife and Vegetation

Wildlife and habitat are important components of an ecosystem's health and function. The presence of wildlife in urban landscapes depends on the availability of suitable habitat, and vegetation is an integral component of that habitat.

Vegetation provides food and shelter for wildlife including birds, small mammals, and amphibians. Loss of vegetation and the subsequent fragmentation of habitat caused by urban development can result in the decline of wildlife in both rural and urban areas.

In general, forested areas provide habitat for birds, mammals, reptiles, amphibians, and a variety of insect species. Primary and secondary cavity nesting bird species have opportunities to nest in areas where dead or dying trees and limbs exist.

Shrubs and grasses are one type of cover that provides habitat for a variety of smaller birds and animals, reptiles, amphibians, and a variety of insect species. Shrubs and grasses provide food sources for insects, songbirds, upland game birds, and many mammals. Shrubs can also provide shelter from predators or extreme weather, or to nest and raise young. Predator species, such as raptors and coyotes, use shrub and grassy areas to hunt.

Maintained vegetation does not typically provide habitat for a large diversity of species due to the regular disturbance regime associated with these areas. These areas are often frequented by small birds and mammals that are adapted to human presence. Small birds and mammals that use these areas can attract predators.

THIS PAGE LEFT BLANK INTENTIONALLY

CHAPTER 2 EXISTING CONDITIONS

What is the study area of the proposed project?

The study area surrounds the project footprint (Exhibit 2). It originates with the anticipated construction footprint and includes areas where temporary or permanent effects to ecosystem elements from the project may occur.

The affected ecosystem elements are located in the Lower White River basin Water Resource Inventory Area (WRIA) 10. Milwaukee Ditch (WRIA 10.0032) is in the Puyallup/White watershed located in Hydrologic Unit Code (HUC) 171100120204. The study area is broken down into individual study limits for each ecosystem element described below. Although there are other streams within the project limits, these streams are not discussed because the project did not affect them.

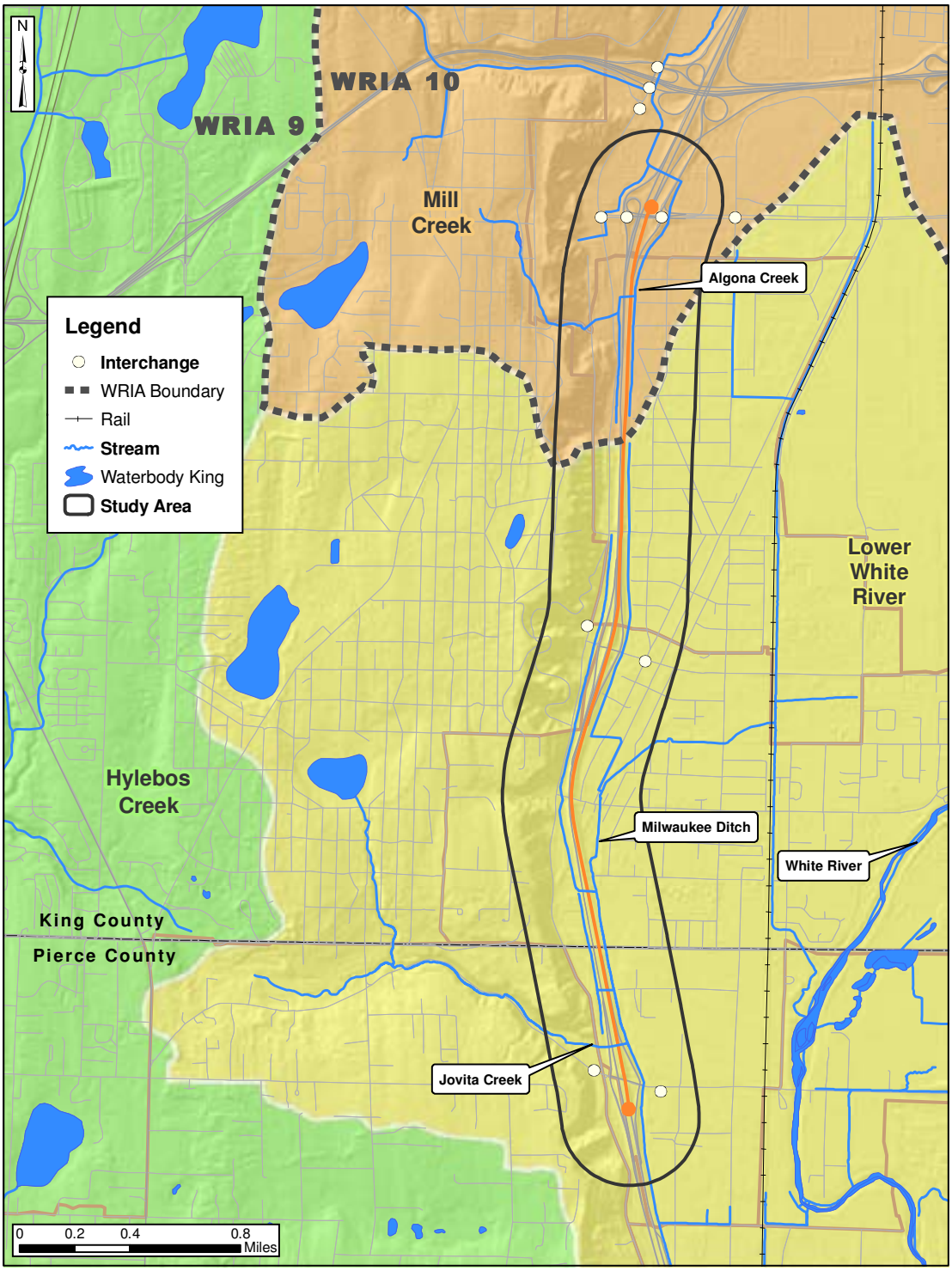
The study limits for streams, wetlands, and ditches includes the portions of the WSDOT right-of-way along the project alignment between 15th Street SW and approximately 8th Street East.

The study limits for shorelines and wildlife habitat extends 0.25 miles from the centerline of the proposed project limits.

What is a WRIA?

A Water Resource Inventory Area (WRIA) is a geographic boundary created by the State to assist in the management of water resources. In 1971, the Washington State Legislature passed Chapter 90.54 RCW, the Water Resources Act of 1971. This Act directed the Department of Ecology to develop a "comprehensive state water resource program" and said that "the department may develop the program in segments" in order to focus on specific areas or issues. In 1976, Ecology adopted Chapter 173-500 WAC, which split the State into 62 Water Resource Inventory Areas.

Exhibit 2
Study Area



How was data collected for the ecosystem elements?

The project team conducted a number of studies to develop the data needed for a previous SR 167 project: SR 167 – 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane (SR 167 Southbound HOT Lane Project). These studies and fieldwork covered the area for this current project in anticipation that it would be proceeding next, therefore biologists relied heavily on those previous studies and data for this report. As part of those previous studies, biologists, scientists, and engineers gathered existing information for the study area through literature and internet research; interviews with local, state, and federal agency personnel; and previously prepared WSDOT reports. Additional site specific information on the ecosystem elements in the study area was collected by site surveys and field verifying wildlife habitat data. The collected information was then compared to the project footprint, including all roadway and drainage improvements, to assess potential effects resulting from the project.

The studies resulted in a number of reports that were referenced to prepare this report including:

- *Draft Hydraulic Report for State Route 167 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane Project*. RW Beck, 2008.
- *Biological Assessment for the State Route 167 8th Street E. to 15th Street SW. Northbound HOT Lane Project*. WSDOT, 2008a.
- *Ecosystem Report, SR 167 – 8th Street E Vic. To S 277th Street Vic., Southbound HOT Lane.* WSDOT, 2008b
- *Wetland Delineation Report, State Route 167 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane,* Perteet Inc., September 2007.
- *Draft Wetland and Stream Mitigation Report, State Route 167, 8th Street E Vic. to S 277th Street Vic. Southbound HOT Lane,* Perteet Inc., August 2008.

A brief description of the methods used to collect data for each ecosystem element is described below.

Surface Water Quality and Quantity

The project team consulted with various public utilities and jurisdictions regarding the stormwater management issues in the study area, including; staff from the cities of Auburn, Pacific, and Sumner; a commissioner from Drainage District 24; and the US Army Corps of Engineers (Corps). The local Drainage District is responsible for maintaining the drainage conveyances through Pacific and south through Sumner.

The project team reviewed numerous sources of information regarding water bodies, water quality, and water quantity in the study area, including:

- Washington State Conservation Commission Salmon and Steelhead Habitat Limiting Factors reports for the Puyallup and the Green/Duwamish Watersheds
- Ecology's White River Spring Chinook Habitat Guidance document

In addition, the project team contacted local, state, and federal agencies to obtain information on the condition of the surface water conveyance systems in the project area. The team also talked to WSDOT construction and maintenance personnel.

The project team relied on field data as well. Biologists conducted stream site assessments on October 27, 2006, November 9, 2006, and February 2, 2007 for the SR 167 Southbound HOT Lane Project. The study area for this field work was 0.25 miles downstream of the north and south termini of the project and included a few intermediate locations where the creeks leave the WSDOT right-of-way.

Aquatic Resources

The project team conducted an inventory and qualitative assessment of streams as part of the SR 167 Southbound HOT Lane Project to determine the general quality of the streams and their habitat. The data collected from these surveys included:

- Existing Stream Geomorphology
- In-stream Habitat Type
- Riparian Vegetation

What are riparian areas?

Streams or river banks are riparian areas, and the plants that grow there are called riparian vegetation.

- Substrate Composition
- Abundance of Large Woody Debris (LWD)
- Quality of Pools

In addition, project team members surveyed culverts throughout the length of the project corridor to distinguish between streams and stormwater ditches, and to identify potential problems with fish passage.

Team biologists also reviewed information from the Washington State Department of Fish and Wildlife (WDFW), National Oceanic and Atmospheric Administration (NOAA) Fisheries and the US Fish and Wildlife Service (USFWS), and other literature about federally-listed species and species of concern that are known or expected to live in King and Pierce counties. They also spoke with local, state, and tribal biologists to obtain information on fish species that could be present in the project vicinity.

Exhibit 3
Wetland in Study Area

Team biologists delineated, classified, and rated the wetlands (Exhibit 3) within the study area. The team implemented the following methodologies:

Delineation - *Washington State Wetland Identification and Delineation Manual* (Ecology, 1997) and the *Corps of Engineers Wetland Delineation Manual* (Corps, 1987)

Classification - USFWS classification system (Cowardin et al., 1979)

Function - *Wetland Functions Characterization Tool for Linear Projects* (2000) developed by WSDOT

Rating - Local Critical Areas Ordinances and *Washington State Wetland Rating System for Western Washington* developed by the Ecology (Ecology, 2004)

The team did not evaluate areas within the existing road infrastructure, or median, for wetlands per the *WSDOT Guidance on Delineating Wetlands and Buffers Adjacent to Roads and Road Prisms* (2006).

The team also delineated natural and anthropogenic ditches that convey water to creeks, rivers, and wetlands, which are typically regulated as waters of the US. The team followed the Corps guidance for identification of regulated ditches.

Wetland Methodologies Defined

Delineation – Identification of the boundary or edge of a wetland.

Classification – Determination of the type of wetland including the landscape, vegetation cover and habitat type, and hydrological regime.

Function – Evaluation of a wetland's ability to improve water quality, store floodwater, provide fish and wildlife habitat, and be biologically productive.

Rating – Determination of a wetland's sensitivity to disturbance, its significance, or ability to replace it, and the functions it provides.

Terrestrial Wildlife and Vegetation

To supplement the existing data, the team investigated field conditions and reviewed aerial photographs of portions of the SR 167 project corridor that could potentially be affected by the project.

The team also met with engineers who are designing stormwater facilities for the project to discuss how stormwater will be treated and detained in order to prevent effects to habitat in the study area.

What are the current characteristics of ecosystem elements located in the study area?

In this section, the current conditions for each resource; Surface Water Quality and Quantity; Aquatic Resources; and Terrestrial Wildlife and Vegetation will be discussed in order to understand the current or baseline conditions. This is necessary to evaluate the potential effects of the project.

Surface Water Quality and Quantity

The primary surface waters in the study area are streams and ditches. SR 167 crosses Milwaukee Ditch that flows south into the White River. Cities such as Auburn, Algona, Pacific, and Sumner, which are located adjacent to SR 167, use Milwaukee Ditch as a discharge point for some of their storm drainage systems. However, no known instances of surface water in the project area are being used for drinking water, agriculture, industrial processes, or other uses.

Milwaukee Ditch receives surface water runoff from SR 167. Runoff from the roadway reaches Milwaukee Ditch by overland flow or via the roadway drainage system that consists of roadside drainage swales, ditches, and culverts. Roadside drainage swales convey roadway runoff that collects in the median and routes it to various catch basins. The catch basins collect the flow from the swales and send it via pipes under the roadway to Milwaukee Ditch, and other ditches, which run parallel to the roadway.

The current WSDOT water quality treatment facilities within the project area include media filter drains and compost-amended vegetated filter strips (CAVFS), both of which provide enhanced runoff treatment within the roadside

What is a ditch?

A ditch is a man-made channel used to collect and convey runoff. It is different than a swale because it may continue to contain flow after a storm event.

What is a drainage swale?

A drainage swale is a man-made channel used to collect and convey runoff during storm events.

Media Filter Drains have four basic components:

- A gravel no-vegetation zone, which disperses water and traps pollutants,
- A vegetated filter strip, which also removes pollutants,
- The ecology-mix bed consisting of crushed rock, dolomite, gypsum, and perlite that treats pollutants, and
- A gravel-filled underdrain trench, that allows the water to drain away from the area.

embankment. Wetlands along the roadway provide some filtration of stormwater pollutants.

Aquatic Resources

Historically the rivers and streams in the study area flooded, meandered, migrated, and abandoned their old channels throughout the valley floors. Stream channel morphology was influenced by spring floods, significant amounts of large wood, and, to a lesser extent, the activity of beavers. Channel migration in the valley created many relic river channels and a mosaic of forest, river, streams, riverine wetlands, beaver ponds, depressional floodplain wetlands, and small lakes (Perteet, 2007).

Hydrology in the valley was progressively altered through channelization and drainage of tributaries and wetlands in the valley. The current river channel and valley is highly altered and not a 'natural' system. In 1906 the White River was diverted from its original course. It used to flow into the Green River, but now flows to the Puyallup. In 1962 Howard Hanson Dam was built further altering the valley hydrology. These significant hydrologic alterations have changed flow dynamics, flow volumes, and the conditions of the valley floor, which may no longer be able to support habitat types that existed prior to non-native settlement (pre-1850). The surficial geology of the study area contains relics of these former floodplain processes as well as anthropogenic alterations resulting from past and present land use practices.

Modern development of our roadways and commercial, industrial, and residential building within each subbasin constrain these systems by constricting the potential for lateral stream channel migration and reducing floodplain connectivity. Most of these streams are ditched channels choked with invasive species. The streams on the valley floor often do not contain classic stream characteristics, such as pools and riffles. The bottom substrate is predominantly fine silt and sands and not suitable for spawning. Vegetation along the stream banks is primarily reed canarygrass. Very few habitat-forming structures, such as tree trunks or fallen branches, exist except in some areas where habitat enhancement has been attempted.

Milwaukee Ditch

The Milwaukee Ditch is designated and regulated as a stream because it carries natural waters as opposed to stormwater runoff only. Like many streams in urban areas, it has been straightened, modified and utilized for stormwater conveyance. It flows south and runs parallel to SR 167 through a series of ditches and culverts. From 5th Avenue N, the creek generally runs along the east side of the roadway to south of 16th Street E in Pacific where the flow is conveyed under SR 167 to the west side. The creek continues south on the west side of the roadway to about milepost 8, just north of Sumner. At this point, it crosses back to the east under SR 167 and continues to flow east under a rail line before entering a short channel extending to the White River. Flow from the White River backs up into Milwaukee Ditch when the White River is at flood stage.

Typically, runoff from SR 167 is collected in large ditches that run parallel to the roadway on the opposite side of the road from the Milwaukee Ditch. These ditches eventually join and contribute flow to the Milwaukee Ditch. In addition, several large drainages from the valley slopes enter the Milwaukee Ditch along SR 167, including the drainage from Trout Lake near 3rd Avenue SW in Pacific, and Jovita Boulevard E. just south of the King-Pierce County line. One of the tributaries to Milwaukee Ditch that lies within the study area is Jovita Creek. It is located within the Milwaukee Ditch subbasin.

Fisheries

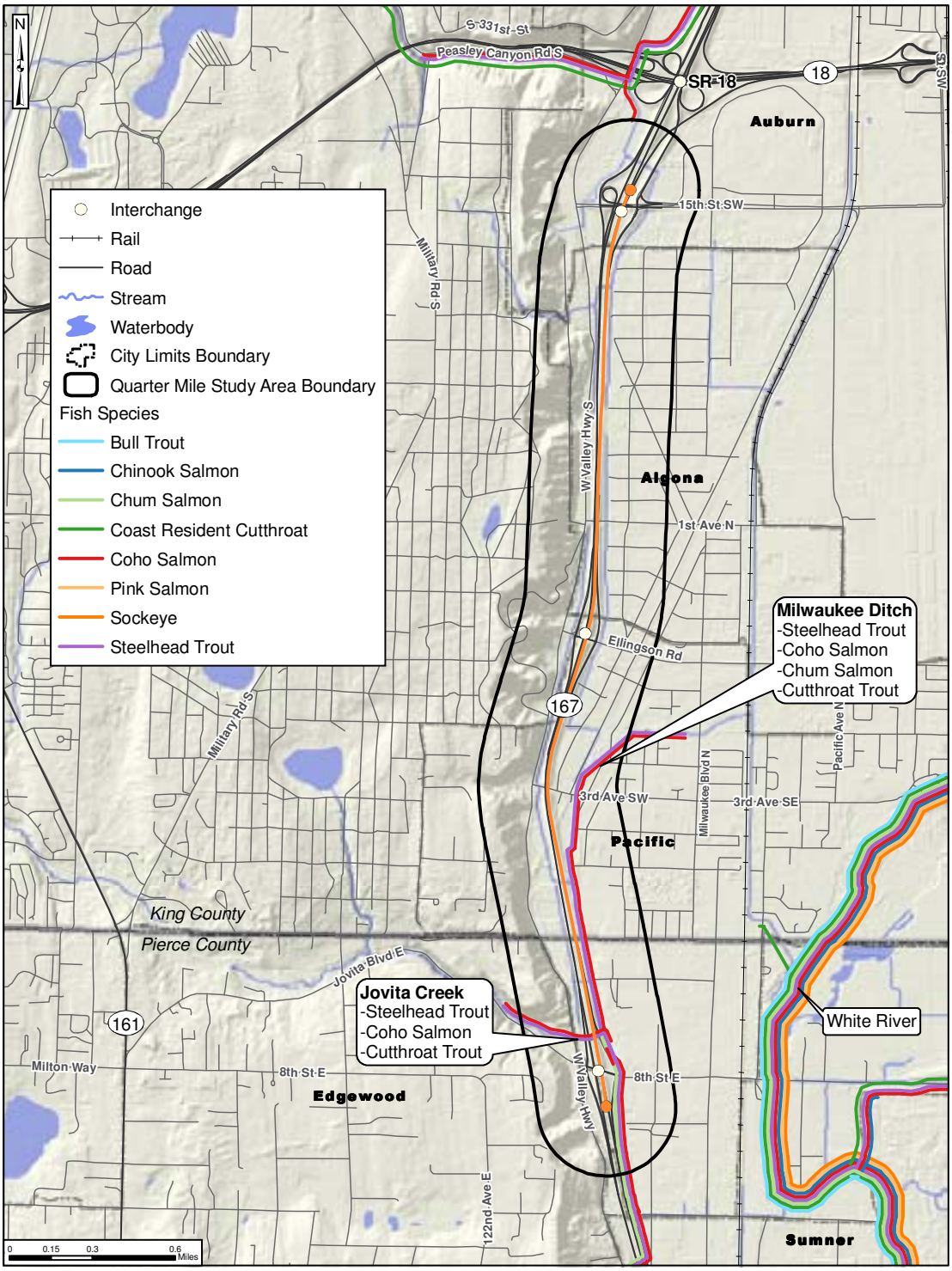
Several fish species inhabit the study area. The species that have been positively identified in the major water bodies within the study area and are considered protected species are listed in Exhibit 4.

Exhibit 4
Priority Fish Species in the Study Area

Common Name	Scientific Name	Status	Present in Jovita Creek	Present in Milwaukee Ditch
Coho salmon	*O. kisutch*	Federal species of concern, State priority species	✔	✔
Chum salmon	*O. keta*	State priority species		✔
Steelhead trout	*O mykiss*	Federally threatened; State priority species	✔	✔
Cutthroat trout	*O. clarki clarki*	State priority species	✔	✔

Priority fish species include all state endangered, threatened, sensitive, and candidate species, and species of recreational, commercial, or tribal importance that are considered vulnerable. All fish species with state candidate status that occur in the study area also hold a federal designation and have been discussed above. No other state sensitive, threatened, or endangered fish species occur within the study area. Exhibit 5 illustrates the location of priority fish within the study area.

Exhibit 5
Location of Protected Fish Species within the Study Area



Other fish that may be present in Milwaukee Ditch due to their identification in these water bodies or their known existence in adjacent water bodies include:

- Channel catfish (*Ictalurus spp.*)
- Yellow perch (*Perca fluviatilus*)
- Pumpkinseed sunfish (*Lepomis gibbosus*)
- Goldfish (*Carassius auratus*)
- Black crappie (*Pomoxis nigromaculatus*)
- Largemouth bass (*Micropterus salmoides*)
- Smallmouth bass (*M. dolomieui*)
- Threespine stickleback (*Gasterosteus aculeatus*)

Wetlands

Wetlands in the study area are typically comprised of:

Emergent communities - reed-canarygrass

Shrub communities - willow, spiraea, or red-osier dogwood

Forested communities - red alder and black cottonwood

Reed-canarygrass is also prevalent throughout the study area in upland locations.

Project team biologists delineated 31 wetlands within the study area. Exhibits 6a through 6d illustrate the location of all the wetlands delineated by the field team, as well as their associated buffers, streams, stream buffers, and areas of potential impact. Note that not all wetlands and streams show associated buffers because the adjacent road infrastructure is not regulated as buffer.

Exhibit 6a
Wetlands and Streams

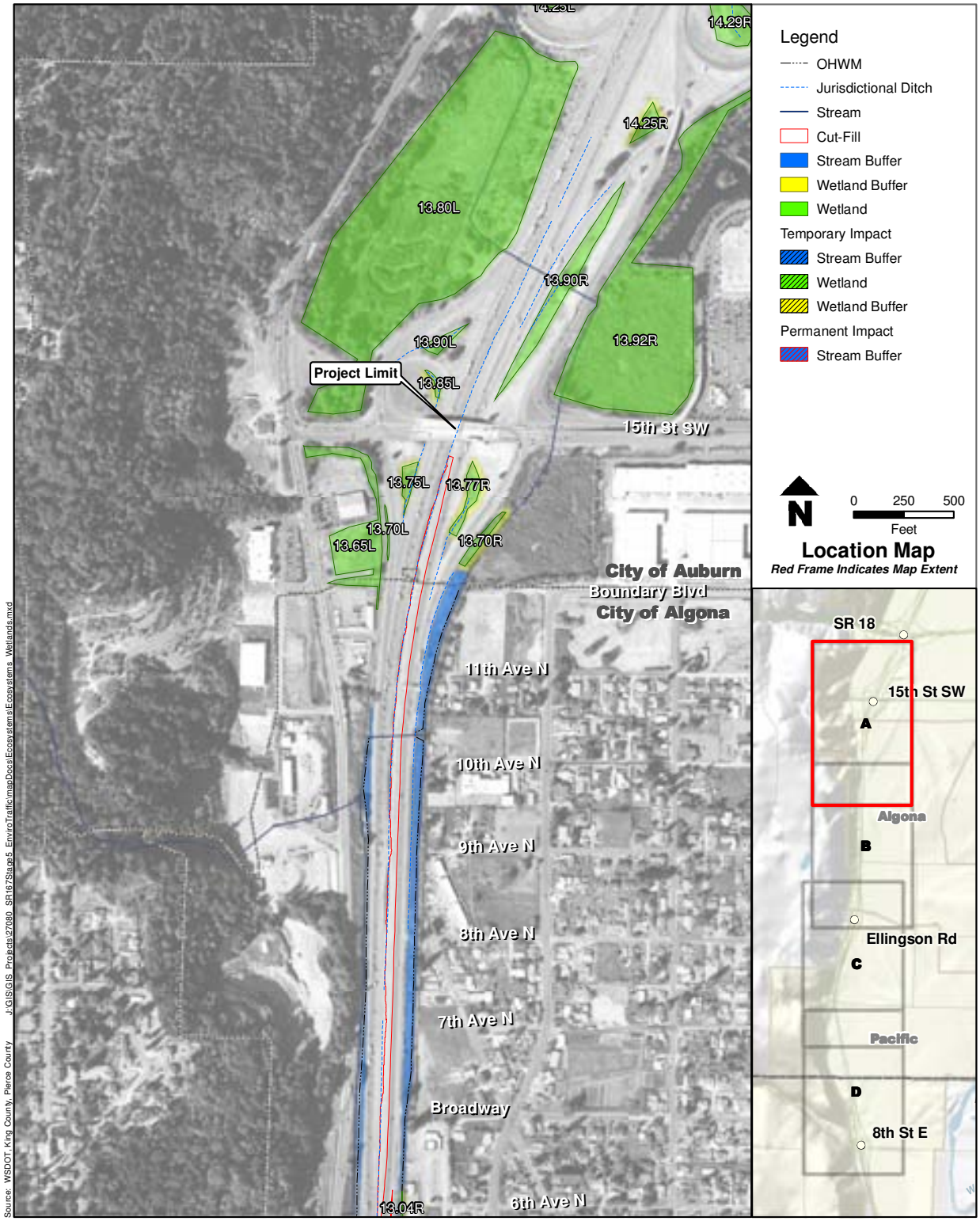


Exhibit 6b
Wetlands and Streams

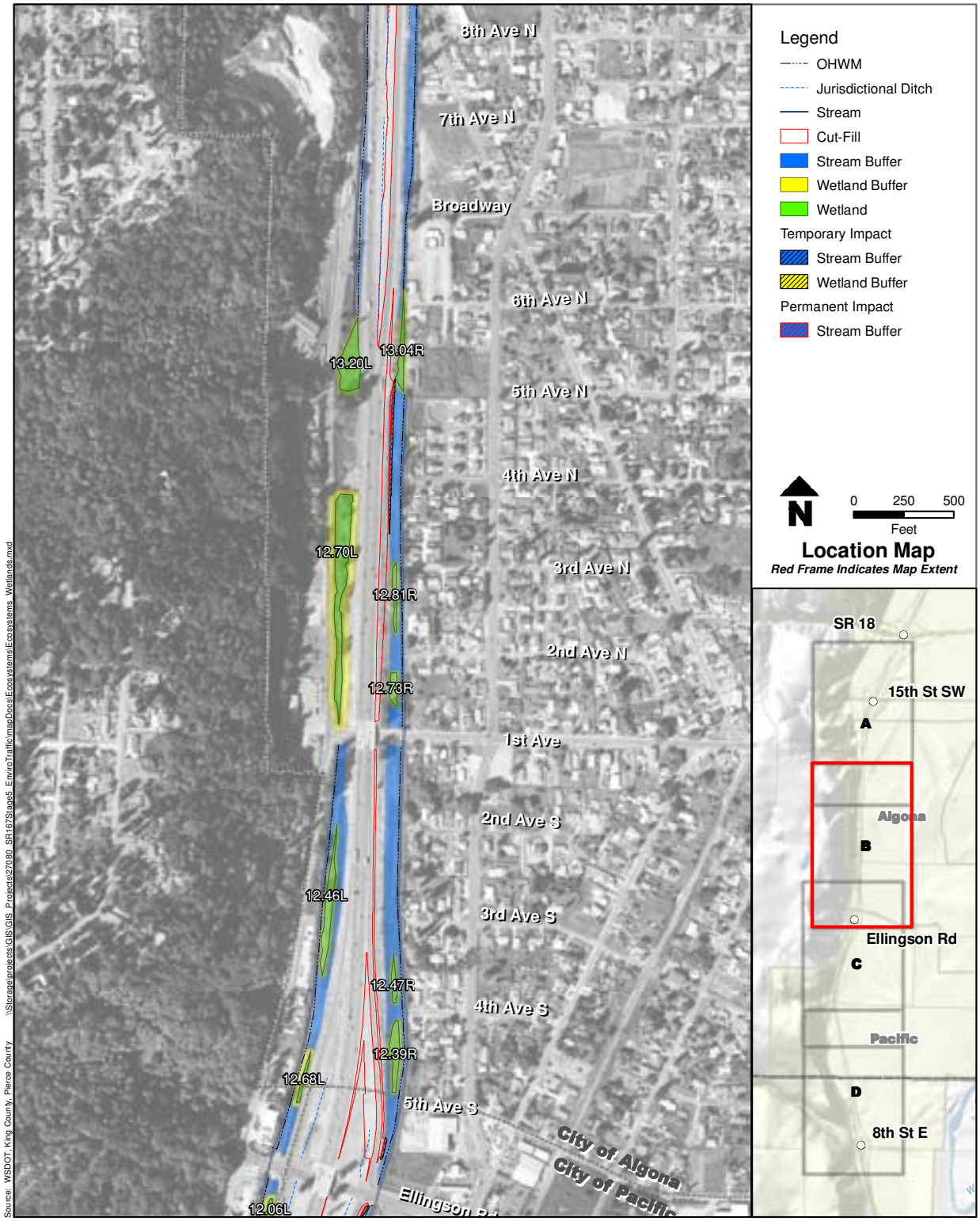


Exhibit 6c
Wetlands and Streams

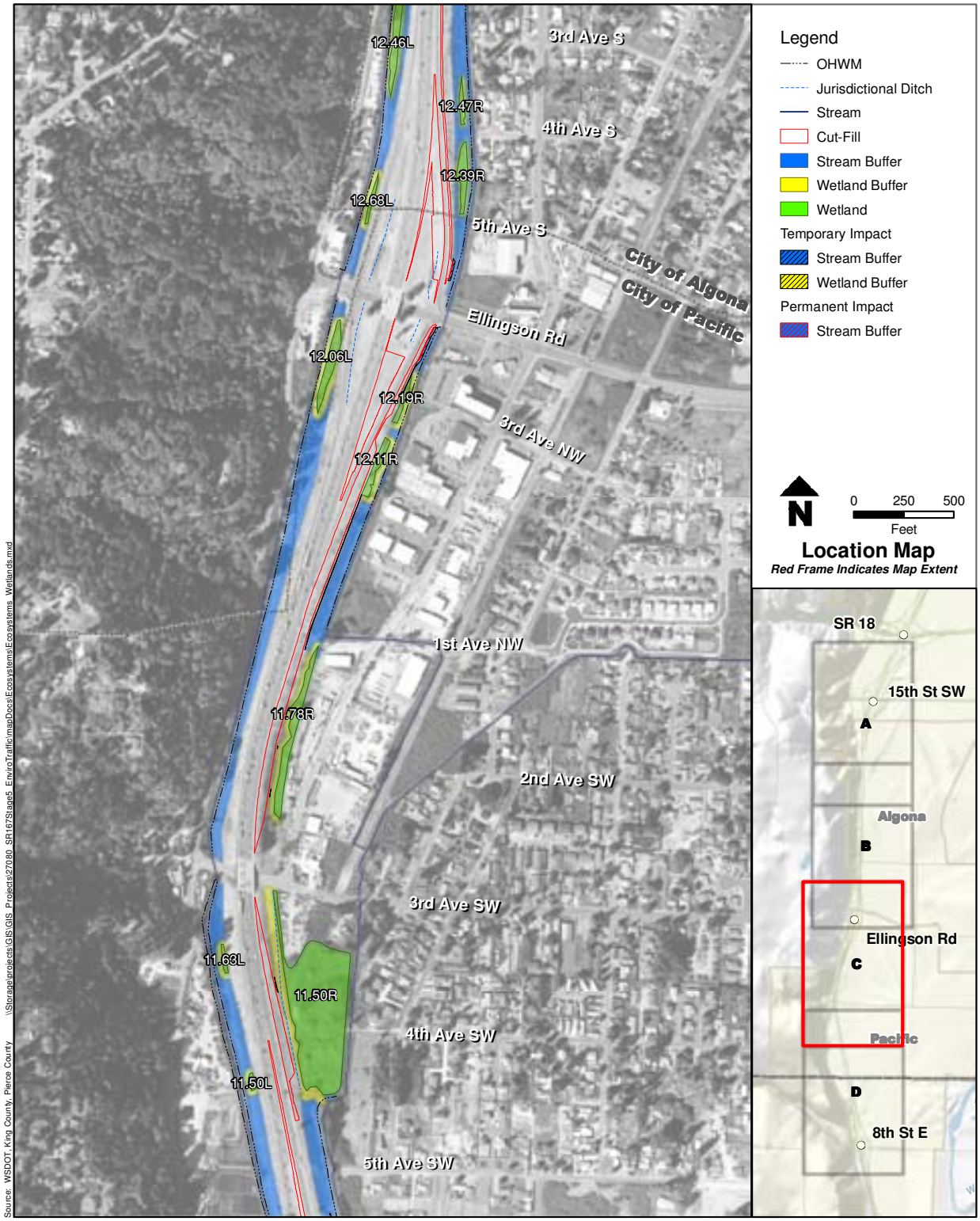
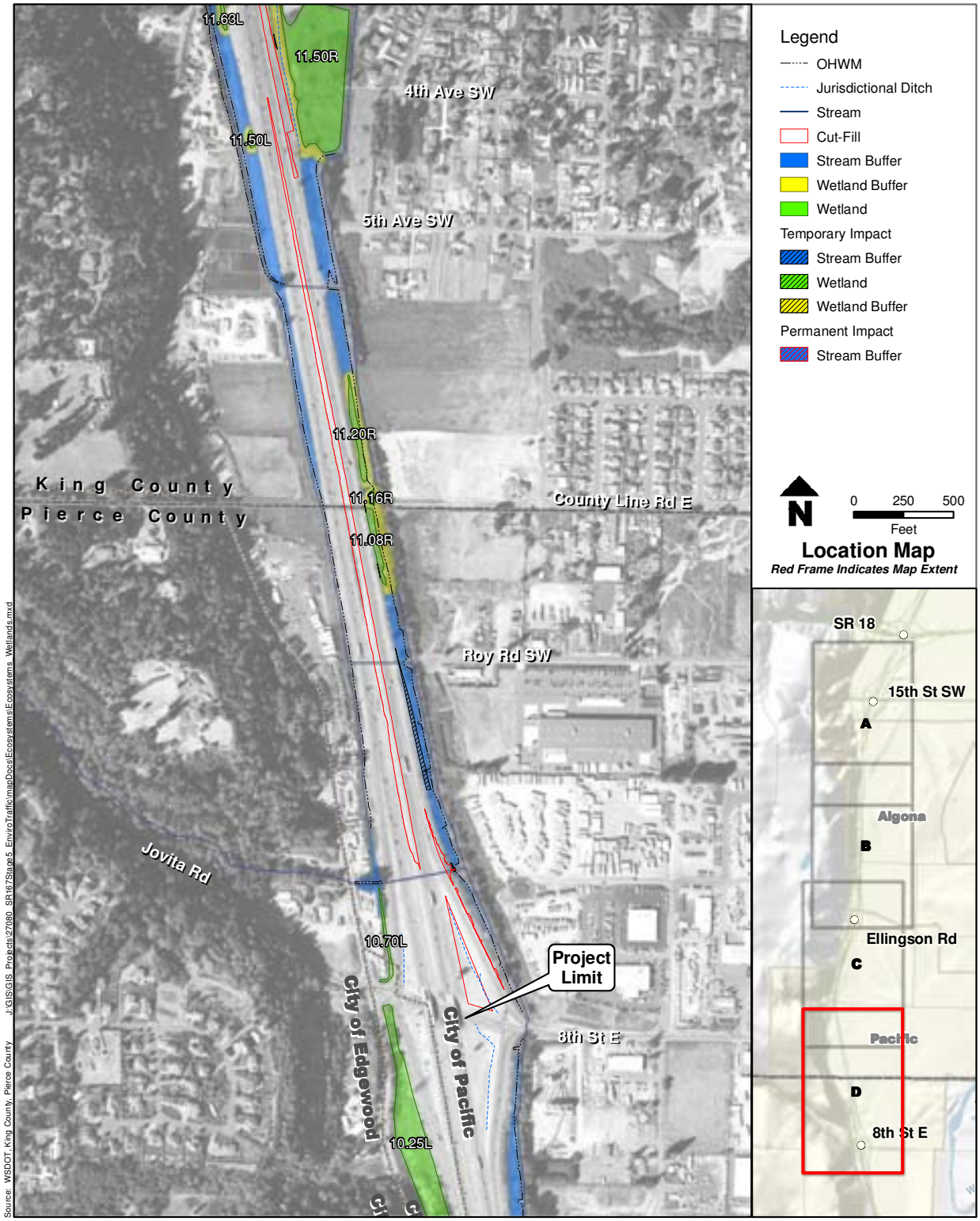


Exhibit 6d
Wetlands and Streams



Terrestrial Wildlife and Vegetation

Limited wildlife-supporting habitat exists in the study area. Nearby wetlands provide most of this habitat. The US Fish and Wildlife Service identified a number of listed species potentially found in King and Pierce counties (USFWS, 2007 and 2008). The species and their designation are listed in Exhibit 7.

Exhibit 7
King and Pierce County Protected and Sensitive Species

Designation by USFWS	King County	Pierce County
Listed		
Bull trout (*Salvelinus confluentus*)	x	x
Canada lynx (*Lynx canadensis*)	x	x
Gray wolf (*Canis lupus*)	x	x
Grizzly bear (*Ursus arctos = U. a. horribilis*)	x	x
Marbled murrelet (*Brachyramphus marmoratus*)	x	x
Northern spotted owl (*Strix occidentalis caurina*)	x	x
Arenaria paludicola (*marsh sandwort*) [historic]		x
Castilleja levisecta (*golden paintbrush*) [historic]	x	x
Howellia aquatilis (*water howellia*)		x
Designated		
Critical habitat for bull trout	x	x
Critical habitat for the marbled murrelet	x	x
Critical habitat for the northern spotted owl	x	x
Proposed		
None		
Candidate		
Mardon skipper (*Polites mardon*)		x
Oregon spotted frog (*Rana pretiosa*)	x	x
Taylor's checkerspot (*Euphydryas editha taylori*)		x
Yellow-billed cuckoo (*Coccyzus americanus*)	x	x

Exhibit 7 (Cont.)
King and Pierce County Protected and Sensitive Species

Designation by USFWS	King County	Pierce County
Species of Concern		
Bald eagle (*Haliaeetus leucocephalus*)	x	x
Beller's ground beetle (*Agonum belleri*)	x	
California wolverine (*Gulo gulo luteus*)	x	x
Cascades frog (*Rana cascadae*)	x	x
Fender's soliperlan stonefly (*Soliperla fenderi*)		x
Hatch's click beetle (*Eanus hatchi*)	x	
Larch Mountain salamander (*Plethodon larselli*)	x	x
Long-eared myotis (*Myotis evotis*)	x	x
Long-legged myotis (*Myotis volans*)	x	x
Northern goshawk (Accipiter gentilis)	x	x
Northern sea otter (*Enhydra lutris kenyoni*)	x	x
Northwestern pond turtle (*Emys (= Clemmys*) *marmorata marmorata*)	x	x
Olive-sided flycatcher (*Contopus cooperi*)	x	x
Oregon vesper sparrow (*Pooectetes gramineus affinis*)		x
Pacific lamprey (*Lampetra tridentata*)	x	x
Pacific Townsend=s big-eared bat (*Corynorhinus townsendii townsendii*)	x	x
Peregrine falcon (*Falco peregrinus*)	x	x
River lamprey (*Lampetra ayresi*)	x	x
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)		x
Tailed frog (*Ascaphus truei*)	x	x
Valley silverspot (*Speyeria zerene bremeri*)	x	x
Western gray squirrel (*Scirius griseus griseus*)		x
Western toad (*Bufo boreas*)	x	
Van Dyke’s salamander (*Plethodon vandykei*)		x
Aster curtus (white-top aster)	x	x
Botrychium pedunculosum (stalked moonwort)	x	x
Castilleja cryptantha (obscure paintbrush)		x
Cimicifuga elata (tall bugbane)	x	x
Cypripedium fasiculatum (clustered lady’s slipper)		x
Lathyrus torreyi (Torrey's peavine)		x

A number of animal species protected or otherwise, exist within the study area. While conducting field investigations as part of this project and the SR 167 - 8th Street E Vicinity to S 277th Street Vicinity Southbound HOT Lane Project, biologists documented the species identified. Exhibit 8 summarizes the species both observed in the field and expected to occur within the study area.

Exhibit 8
Wildlife Species Occurrence within the Study Area

Species	Observed[1]	Expected[2]	Notes
Birds			
American goldfinch (*Carduelis tristis*)	X		
American robin (*Turdus migratorius*)	X		
Bald Eagle (*Haliaeetus leucocephalus)*	X		Pair seen flying over study area
Barn swallows (*Hirundo rustica*)	X		
Belted kingfisher (*Megaceryle alcyon*)	X		
Bewick's wren (*Thryomanes bewickii*)	X		
Black-capped chickadee (*Poecile atricapillus*)	X		
Brewer's blackbird (*Euphagus cyanocephalus*)		X	
Brown creeper (*Certhia americana*)	X		
Bushtit (*Psaltriparus minimus*)	X		
Cedar waxwing (*Bombycilla cedrorum*)		X	
Cliff swallows (*Petrochelidon pyrrhonota*)	X		
Cooper's hawk (*Accipiter cooperii*)	X		
Dark-eyed junco (*Junco hyemalis*)		X	
Downy woodpecker (*Picoides pubescens*)	X		
European starling (*Sturnus vulgaris*)	X		
Great blue heron (*Ardea herodias*)	X		
House finch (*Carpodacus mexicanus*)		X	
Mallard (*Anas platyrhynchos*)		X	
Mourning dove (*Zenaida macroura*)		X	
Northern flicker (*Colaptes auratus*)	X		
Northern rough-winged swallow (*Stelgidopteryx serripennis*)	X		
Northwestern crow (*Corvus caurinus*)	X		
Osprey (*Pandion haliaetus*)	X		Male, female, and juvenile seen at one location
Pileated woodpecker (*Dryocopus pileatus*)	X		
Red-breasted merganser (*Mergus serrator*)		X	

Exhibit 8 (cont.)
Wildlife Species Occurrence within the Study Area

Red-tailed hawk (*Buteo jamaicensis*)	X		
Red-winged blackbird (*Agelaius phoeniceus*)		X	
Rock dove (*Columba livia*)	X		
Rufous hummingbird (*Selasphorus rufus*)		X	
Song sparrow (*Melospiza melodia*)	X		
Steller's jay (*Cyanocitta stelleri*)	X		
Tree swallow (*Tachycineta bicolor*)	X		
Violet-green swallow (*Tachycineta thalassina*)	X		
Western scrub jay (*Aphelocoma californica*)	X		Adults feeding three juveniles
White-crowned sparrow (*Zonotrichia leucophrys*)		X	
Winter wren (*Troglodytes troglodytes*)		X	
Yellow-rumped warbler (*Dendroica coronata*)	X		
Mammals			
Various bat species (*Myotis spp.*)		X	
Coyote (*Canis latrans*)		X	Scat and tracks observed
Deer (*Odocoileus spp.*)	X		
Field mice		X	
Feral cats (*Felis cattus*)		X	
Feral dogs (*canis lupus familiaris*)		X	
Gray squirrel (*Sciurus carolinensis*)	X		
Douglas squirrel (*Tamiasciurus douglasii*)	X		
Opossum (*Didelphis virginiana*)		X	
Mountain beaver (*Aplodontia rufa*)		X	Burrow observed
Rabbit	X		
Raccoon (*Procyon lotor*)	X		Sleeping in crotch of maple tree
River otter (*Lontra Canadensis*)	X		Adult observed in Mill Creek
Vole (*Microtus longicaudus*)		X	
Insects			
Dragonfly	X		
Gardner spider	X		
Mosquitoes	X		
Paper wasps (*Polistes fuscatus pallipes*)	X		
Swallow-tailed butterfly (*Papilio spp.*)	X		
Water striders (*Gerris remigis*)	X		

Exhibit 8 (cont.)
Wildlife Species Occurrence within the Study Area

Western white butterfly (*Pontia occidentalis*)	X		
Woodland skipper butterfly (*Ochlodes sylvanoides*)	X		
Yellow jackets (*Vespula spp.*)	X		
Honey bee (*Apis mellifera*)	X		
Reptiles/Amphibians			
Garter snake (*Thamnophis spp.*)	X		
Pacific chorus frog (*Pseudacris regilla*)		X	

1 - Species in the observed column were observed during site visits, wetland delineations, and stream surveys performed for this project and other projects in the immediate vicinity

2 - Species in the expected column are common species typical to the project area, but not observed during fieldwork performed for the project

The study area includes three distinct types of landscape cover. They are categorized based on similarities in landscape features (such as the presence of vegetation, buildings, and/or roads), and expected wildlife presence and use. The three general cover types in the study area are:

1. Urban Growth – Agricultural Complex
2. Wetland – Riparian Areas
3. Upland Slope

Within these general types of landscape cover, various specific habitats are present, as listed in Exhibit 9.

Exhibit 9
Study Area Landscape Cover Types, Habitats, and Associated Wildlife

Cover Type	Description	Habitat and Associated Wildlife	Other Notes
Urban Growth - Agricultural Complex	Light to medium commercial, residential, and industrial use areas with asphalt, lawns, and ornamental plantings interspersed with agricultural lands and fragmented natural habitat, including small stands of deciduous and coniferous forest.	Provides habitat for species associated with human use, such as small rodents and birds (house mouse, house sparrow, European starling, rock dove); species associated with human-altered landscapes consisting of predominantly edge and fragmented habitat (coyote, Virginia opossum, raccoon, American crow, red-tailed hawk, great horned owl); species associated with agricultural fields (gulls, killdeer, Brewer's blackbird, Canada goose, coyote).	This is the most abundant cover type in the project area. Although humans are present in these areas, wildlife use is abundant for certain species due to their association with humans and specific habitat areas (e.g., fallow agricultural fields or undeveloped parcels).
Wetland - Riparian Areas	Seasonally flooded wetlands and riparian habitat associated with the banks and buffers of rivers, creeks, streams, and ditches.	Provides deciduous tree cover (e.g., red alder, black cottonwood) and wetland habitat. Wildlife species include marsh wren, song sparrow, northern flicker, belted kingfisher, mallard, red-winged blackbird, red-tailed hawk, various small rodents, beaver, raccoon, coyote, frogs, and salamanders.	This cover type dominates the natural landscape portions of the project area that are not in human use.
Upland Slope	Gradual to steep slope zone where the Kent Valley meets the surrounding uplands. Mixed coniferous and hardwood forest.	Provides forested areas of red alder, big-leaf maple, Douglas fir, black cottonwood, and western red cedar. Understory and disturbed areas include mostly non-native English ivy, Himalayan blackberry, and grasses. Wildlife include the Norway rat, song sparrow, black-capped chickadee, Bewick's wren, downy woodpecker, northern flicker, red-tailed hawk, great horned owl, frogs, and salamanders.	This is the least abundant cover type in the project area, although it is more common farther away (more than 0.25 miles) from the SR 167 corridor. It is found occasionally where the road approaches upland areas, such as in the southern portion of the project area.

The entire project lies within the Puget-Willamette Lowlands of western Washington where conifers are most common. Vegetation is dominated by needle-leaved, evergreen tree species and large deciduous trees such as:

- Douglas-fir (*Pseudotsuga menziesii*)
- Western red cedar (*Thuja plicata*)
- Big-leaf maple (*Acer macrophyllum*)
- Black cottonwood (*Populus trichocarpa*)
- Red Alder (*Alnus rubra)*

Scattered patches of forest habitats occur throughout the vicinity of the project.

Shrub communities are dominated by:

- Shrub willows (*S. scouleriana, S. sitchensis*)
- Douglas spiraea (*Spiraea douglasii*)
- Red-osier dogwood (*Cornus stolonifera*)

Herbaceous communities tend to be either wetland or highly disturbed and in areas of compacted soils. They generally consist of:

- Reed-canarygrass (*Phalaris arundinacea*)
- Bentgrass (*Agrostis spp.*)
- Cattail (*Typha latifolia*)

Highly disturbed areas associated with industrial lands and past land-clearing activities have been heavily colonized by:

- Himalayan blackberry (*Rubus discolor*)
- Scot's broom (*Cytisus scoparius*)
- Stinging nettle (*Urtica dioica*)

Wetlands in the study area are typically comprised of reed-canarygrass in the emergent communities; willow, spiraea, or red-osier dogwood in the shrub communities, and red alder and black cottonwood if they occur in forested communities. Reed-canarygrass is also prevalent throughout the study area in upland locations.

The study area has been identified as a habitat for the threatened species Golden paintbrush (*Castilleja levisecta*). This species once occurred from Oregon to Vancouver Island in British Columbia. Eleven populations now exist in open grasslands ranging from Thurston County, Washington, north through the Puget Trough, to southwest British Columbia, Canada (62 FR 31740-31748). However, anthropogenic changes that have occurred at the site (i.e., filling of historic wetlands with off-site material) have resulted in areas that are likely unsuitable habitat for golden paintbrush. No golden paintbrush was observed in the field.

Is the project within a recognized tribal treaty fishing area?

The Muckleshoot Indian Tribe, the Puyallup Tribe of Indians, and the Confederated Tribes and Bands of the Yakama Nation have Usual and Accustomed Fishing Grounds and Stations within the SR 167 project area.

The right to take fish in the project area by the Confederated Tribes and Bands of the Yakama Nation is by consent of the tribes in that region.

CHAPTER 3 POTENTIAL EFFECTS OF THE PROJECT

The following sections describe possible direct, indirect, and cumulative effects of the project. These effects are related to both the construction and/or operation of the facilities associated with the project, which includes fill embankments, retaining walls, and stormwater facilities. These effects can also be temporary or permanent in nature.

Direct effects are defined as effects that have a direct, cause-and-effect relationship to the proposed action.

Indirect effects are defined as effects that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (Federal Regulation on the Protection of the Environment - 40 Code of Federal Regulations [CFR] 1508.8). These effects, which usually result from the initial action, include changes in land use, water quality, social issues, and population density.

Cumulative effects are defined as effects that "result from incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions." The cumulative effects of a project may be undetectable when viewed in the individual context of direct or indirect effects. However, cumulative effects can add to other disturbances and eventually lead to a measurable environmental change. Cumulative effects include effects from a proposed project that, when combined with neighboring projects, may lead to a cumulative effect on the environment.

How were effects on ecosystem elements evaluated?

The project team reviewed existing conditions from the data souces described above, then evaluated how the project will likely affect those resources. The team also determined what the applicable regulations require for mitigation of any potential effects.

Surface Water Quality and Quantity

Surface water modeling was conducted to size detention ponds, determine flows for the existing culverts, and evaluate the media filter drains and CAVFS. The modeling results provided the following data to assist the project team in evaluating the effects of the proposed project on surface water quality and quantity:

- Volume of runoff from rainfall and stormwater to be treated
- A simulation of the performance of stormwater retention/detention facilities or reservoirs
- Magnitude, frequency and duration of stream flow
- Pollutant loading and concentrations

Aquatic Resources

In particular, the team looked at whether any work will be done in, around, or near water bodies. Construction work could cause adverse effects to water quality, water flow or quantity, and aquatic resources or habitat. The team used the results of the stream assessment field investigation and the surface water modeling to estimate the effects of the project on the physical integrity of streams and stream habitat, including the effects to:

- Channel stability
- Channel scouring/sediment deposition
- Stream habitat
- Water quality
- Average velocity
- Erosion and deposition
- Riparian habitat conditions
- Biological indicators (macroinvertebrates)

The team evaluated the effects of the proposed project on wetlands by identifying direct and indirect project actions on both wetlands and their buffers. The team ascertained the likelihood of any alteration of ecological functions and the long-term consequences to water quality, hydrology, and habitat.

Terrestrial Wildlife and Vegetation

Biologists evaluated the potential project effects on terrestrial wildlife and vegetation by reviewing existing information and the results of field reconnaissance to determine whether suitable habitat for listed or proposed species is present in the study area. The team also reviewed the preliminary roadway and stormwater designs as well as anticipated construction and highway traffic effects on terrestrial habitats.

How will project construction affect ecosystem elements?

The effects of the proposed project will include those of both a temporary and permanent nature. Temporary effects are categorized as those that will dissipate over a typically short period of time, such as increased turbidity in surface waters due to ground disturbance. Permanent effects are those that will remain in perpetuity after the project is constructed, such as permanent areas of new roadway. Temporary and permanent effects can be either direct or indirect. Direct effects are caused by the project and occur at the same time and location. Indirect effects are sometimes called secondary effects and usually occur later in time, after project construction. Project effects can be positive or negative.

Project team members identified where the project improvements will likely affect the ecosystem resources. Prior to finalizing the project footprint, the team modified the design, where feasible, to reduce or avoid effects to wetlands, streams, their associated buffers, and upland habitat. When one of these ecosystem elements was located within the construction footprint, engineers changed the footprint to avoid the element or, if the element could not be avoided, team members determined to what degree project construction will affect ecosystem elements.

What temporary direct effects will occur as part of construction of the proposed project?

The temporary direct effects of the proposed project include effects associated with ground disturbance and earthwork, building structures, water quality and quantity, and vegetation and habitat modification. These activities are described below in the discussions of direct temporary effects that are related

primarily to project construction. Direct permanent effects that are related primarily to project operation are discussed in the next section.

Surface Water Quality and Quantity

Temporary effects to surface water quality and quantity are related to the removal of vegetation and exposing bare soil. Denuded soils have a greater potential for erosion and sedimentation of downstream receiving waters and increased peak flow volumes. Removal of riparian vegetation can reduce shading of surface waters, potentially increasing temperature. Construction equipment has associated petro-chemicals such as fuels and hydraulic fluids that could enter surface waters if spilled. Introduction of sediments and chemical contaminants can result in a variety of water quality effects, including increased turbidity, increased temperature, alteration of pH, lowered dissolved oxygen, and a general alteration of normal biochemical processes. These water quality effects could in turn have consequences for the organisms reliant upon the surface waters, such as impaired respiration of fish, smothering of aquatic insects, or generally increased toxicity of organisms.

WSDOT will employ BMPs to minimize ecosystem effects. With the implementation of appropriate erosion control BMPs, WSDOT anticipates that any temporary water quality and quantity effects will be minor and of a short duration. Equipment maintenance and spill response BMPs would also be implemented, and WSDOT expects that the potential for hazardous material contamination effects to be low.

Aquatic Resources

Temporary effects to aquatic resources are related primarily to potential changes in water quality and quantity (as discussed above).

Potential erosion due to the construction of stormwater facilities and other ground-disturbing activities could introduce fine sediments into the streams and surface waters of the study area. Excessive fine sediment input into streams has the potential to smother salmon eggs in the gravel, limit available food for fish due to potential damage to micro- and macroinvertebrates, and create conditions where visual predators (such as coho salmon) have reduced capacity to

capture prey. In addition, certain types of sediments can cause damage to the gills of fish, increasing the risk of anoxia (the absence or reduced supply of oxygen in arterial blood or tissues) and stress that can lead to fish mortality. However, it is important to note that BMPs will be followed, so that construction of stormwater facilities and other ground disturbing activities are not expected to result in significant increases to turbidity above background conditions in the Milwaukee Ditch system.

The proposed project has been designed to avoid or minimize direct loss of aquatic resources and their buffers to the extent feasible. The project was able to avoid direct impacts to wetlands and streams. However, some unavoidable effects to the buffers of streams and wetlands as a result of widening the highway and construction of the associated stormwater facilities were unavoidable. A summary of these temporary effects is listed in Exhibit 10.

Exhibit 10
Temporary Effects of the Project on Wetlands and Streams

Resource	Temporary Effect (acre)
Wetland Buffer	0.02
Stream Buffer	0.12

The primary effects on wetland buffers will be associated with widening the roadway. The primary temporary effect is vegetation removal, which may result in the alteration of some water quality and habitat functions for a period of years.

In conclusion, WSDOT expects that effects to soil stability and erosion potential will be avoided or minimized by the use of BMPs, and will no longer be a factor once vegetation becomes established within one or two growing seasons. Other ecosystem functions such as nutrient cycling and habitat will continually be restored to at least pre-project conditions as vegetation communities mature and soil microorganisms re-colonize the site.

Functional losses to habitat are not anticipated. No loss of wetland or stream area is proposed and only minor temporary

reduction in water quality and hydrology functions are expected until groundcover is re-established. All temporarily cleared or disturbed areas will be replanted with appropriate native vegetation. Proper implementation of erosion control BMPs may completely avoid the loss of water quality and hydrology functions.

Additional potential short-term effects from the project could include hazardous material spills (for example, oil and gasoline), chemical contaminants, nutrients, or other materials entering the soil and water bodies in the study area. Control of hazardous materials is a standard provision in construction contracts and permits, and WSDOT will address this with BMPs and standard contract provisions. For instance, where practicable, WSDOT will prohibit the servicing and refueling of vehicles within 150 feet of streams and wetlands to reduce potential spills of petroleum and hydraulic fluids in sensitive areas. Additionally, WSDOT will create a Spill Prevention, Control and Countermeasures (SPCC) plan prior to commencing work. As discussed earlier, effects from hazardous materials are expected to be unlikely.

Terrestrial Wildlife and Vegetation

Project construction could potentially affect terrestrial wildlife and vegetation in several ways. Some construction will likely occur during hours of darkness or reduced light. Therefore, artificial lighting will be required for some work areas. Lighting can negatively affect wildlife and fish. Species can be attracted to the light, thereby disrupting feeding and migration patterns. Also, predators may be attracted to lighted areas where the local species may congregate. For the proposed project, direct illumination of the fish and wildlife habitat will be avoided, thus limiting effects on behavior. These measures should minimize any adverse effects to fish or wildlife from project construction.

General construction noise in the vicinity of the study area habitats could disturb or displace wildlife. Displacement can disrupt regular feeding, breeding, or sheltering behaviors of various species. WSDOT does not expect the project to considerably displace or disturb wildlife because wildlife in the area already experience high ambient noise and disturbance

levels from SR 167, nearby roads and other human activities. Most construction work would occur during daylight hours and in close proximity of the existing highway so exposure of wildlife to increased noise should be limited.

Construction storage and staging areas will be used to stage all heavy equipment, for storage of construction materials, and to stockpile all construction debris that is not immediately transported from the project action area. The contractor will determine the specific location of construction storage and staging areas during project construction. The majority of construction storage and staging areas will likely be located in currently developed areas such as parking lots, interchange medians, or other managed areas. Appropriate BMPs will be used to prevent sedimentation and fuel spills from entering ditches, streams, and wetlands. Where practical, those areas are typically at least 150 feet from surface waters and wetlands. Therefore, no riparian vegetation or wetlands will be affected by the storage of construction materials or debris or staging of construction equipment. Upon completion of project construction, all construction staging areas will be returned to their preconstruction condition and use. As such, negative effects to wildlife or vegetation are not anticipated from construction staging.

As discussed in earlier sections, construction activities will result in temporary removal of upland vegetation and ground disturbance, possibly increasing erosion potential. These effects are expected to be minor due to the general lack of habitat structure adjacent to the roadway. They are also expected to be of a short duration and should be returned to a pre-project condition within one growing season.

What permanent direct effects will occur as part of the operation of the project?

Surface Water Quality and Quantity

Currently, approximately 65.2 acres of existing PGIS are present in the project corridor, of which approximately 5.4 acres are treated. This project will add approximately 4.6 acres of new PGIS to the project corridor and provide treatment for an additional approximate 13 acres of PGIS. Therefore, the project will provide a direct benefit to the ecosystem in the

study area by treating the new impervious surfaces and retrofitting some of the existing impervious surfaces. Stormwater treatment will be provided with a combination of media filter drains and CAVFS. These enhanced treatment BMPs will decrease pollutant loading and concentrations in stormwater discharged from the project corridor, including TSS, total copper, dissolved copper, total zinc, and dissolved zinc.

Stormwater detention facilities will ensure that flows in the Milwaukee Ditch subbasin associated with the increased PGIS match predevelopment (forested) conditions and are not likely to negatively affect fish or fish habitat. In the Milwaukee Ditch subbasin, WSDOT anticipates that the 2 detention ponds will ensure that the existing flow conditions are maintained and negative effects on flow associated with the increased PGIS are avoided. In summary, WSDOT anticipates that the permanent effects to surface water quality and quantity will be either maintained or improved compared to the existing condition.

Aquatic Resources

The proposed project has been designed to avoid or minimize direct loss of aquatic resources and buffers to the extent feasible. The project was able to completely avoid permanent impacts to wetland buffers, however, some permanent loss of stream buffers as a result of widening the highway and constructing the associated stormwater facilities will occur. A summary of buffer effects to wetlands and streams is listed in Exhibit 11.

Exhibit 11
Permanent Effects of the Project on Wetlands and Streams

Resource	Permanent Effect (acre)
Wetland Buffer	0
Stream Buffer	0.27

Direct effects to stream buffers are primarily related to the roadway widening and stormwater facilities within the SR 167 right-of-way between MP 10.20 and MP 14.26. The existing right–of-way (ROW) contains structurally simple buffer communities that are predominantly made up of either invasive

or weedy herbaceous plant species. Permanent effects to stream buffers will result in a loss of buffer area and a subsequent alteration of vegetation communities.

Permanent stream buffer effects will be mitigated at existing WSDOT-owned sites. Mitigation will be done per the Wetland and Stream Buffer Mitigation Report (WSDOT 2009b).

The information and analysis presented in the Biological Assessment (WSDOT 2009a) for Endangered Species Act consultation was the basis of the finding of effects determinations for Chinook salmon, steelhead, bull trout and their designated critical habitats. Based on the analysis of the potential effects of the proposed project on federally protected species that may occur within the project action area, it was determined that the project ***May Affect, but is Not Likely to Adversely Affect*** the following species:

- Chinook salmon of the Puget Sound Evolutional Significant Unit (ESU)
- Steelhead of the Puget Sound Distinct Population Segment (DPS)
- Bull trout of the Coastal/Puget Sound DPS

It was also determined that the proposed project ***May Affect, but is Not Likely to Adversely Affect*** critical habitat for Chinook salmon of the Puget Sound ESU. The two other federally protected species have not had critical habitat designated within the project action area; therefore, the proposed project will have ***No Effect*** on designated critical habitat for these species.

Terrestrial Wildlife and Vegetation

The project will add 4.60 acres of new impervious surface, which will result in the removal of 0.40 acres of upland vegetation adjacent to the existing roadway. Of the 0.40 acres, 0.30 acres will be temporary and will be revegetated while 0.10 acres will be permanently removed. The vegetation is mainly grasses or other herbaceous plants which has minimal habitat value because it lacks vegetative structure important to wildlife and also because is isolated from other habitat by the roadway.

No direct permanent effects to terrestrial wildlife are anticipated from the road widening.

As described in the previous subsections, proposed mitigation should provide improved wildlife habitat in the form of enhanced vegetation communities and improved water quality. WSDOT anticipates that the net result of this project will yield an improvement in wildlife habitat and vegetation communities.

What are the indirect effects of the proposed project?

Indirect effects are defined as effects that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (Federal Regulation on the Protection of the Environment - 40 CFR 1508.8). These effects, which usually result from the initial action, include potential changes in transportation and land use, modification of habitat and landscape processes.

Transportation and Land Use

Following interviews with lead planners of affected jurisdictions and a comprehensive document review for those local jurisdictions, no associated transportation or land use actions have been identified that are reasonably certain to occur as a result of the proposed project. Therefore, the potential for the proposed project to cause any indirect effects to local transportation projects or land use changes is highly unlikely. This determination is consistent with the protocol developed by WSDOT for assessing the indirect effects associated with transportation projects (WSDOT, 2008a).

Landscape and Habitat Processes

Because vegetation communities would be disturbed or otherwise altered by proposed mitigation plantings, there is a potential that ecological succession and the formation of wildlife habitat could be altered. Particularly, invasive or undesirable plant species could colonize disturbed and/or replanted areas and subsequently alter wildlife species assemblages.

To minimize the potential for adverse effects on ecological succession, native plants were selected based on their normal distribution in the project area and their survivability qualities.

WSDOT proposes to actively monitor and manage vegetation establishment to ensure performance objectives of the planting plans are met. As such, WSDOT expects no adverse effects to the formation of habitat or ecological communities, or changes to wildlife assemblages.

What are cumulative effects and why do we study them?

Cumulative effects measure the incremental impact of all effects of the project including past and present actions in the study area, and the effects of reasonably foreseeable, planned projects in the study area.

How were cumulative effects on ecosystems analyzed?

The procedures for identifying cumulative effects were used from the President's Council on Environmental Quality rules and handbook and the *WSDOT Environmental Procedures Handbook*, Chapter 412. In general, past and present actions within the study area were evaluated to determine how the proposed project will directly or indirectly affect the study area. Then the effects of the future planned, but not yet built, actions were considered. In the end, all of the predicted effects were summarized and the cumulative effects of the project on ecosystems were estimated.

The past actions, from the 1970s to the present, caused rapid development within the Green River Valley. This growth included the development of the transportation system, residential communities, and commercial and light industrial buildings and centers within the area. Much of this growth has occurred without the benefit of current environmental protection standards.

Continued development within the study area reduced the natural habitat for fish, wildlife, vegetation, and other natural resources and has had direct negative effects on some ecosystem processes. Particularly, increases in impervious surface have resulted in changes to surface water flows, water quality and channel erosion. Habitat fragmentation has inevitably reduced migratory and breeding opportunities for wildlife. Therefore, species requiring large ranges (i.e. black bears) are rare in the study area.

Future Planned Actions within Study Area
• The planned residential developments in the area, which will add thousands of new single-family homes and many new trips to SR 167 • The planned completion of SR 167 from Puyallup to Tacoma • The planned Auburn Environmental Park, which will enhance wetlands and natural habitat • Completing the SR 167 HOV/HOT lanes system in both the northbound and southbound directions from I-405 in Renton to SR 512 in Puyallup

New developments and roadways throughout the SR 167 corridor will continue to remove and/or degrade natural habitat from the project. However, mitigation measures will be proposed that will likely create long-term improvements similar to those that are part of this project. The proposed environmental park by the City of Auburn, for example, is a creative way for a local jurisdiction to provide a comprehensive approach to stormwater management, wetland enhancement, and habitat improvement.

To analyze cumulative effects on ecosystems, WSDOT examined past and present actions within the study area. WSDOT then considered the effects of the future planned, but not yet built, actions. In summary, the predicted cumulative effects of all past, present and future actions on ecosystems have resulted in loss of habitat area and alteration of ecosystem processes. However, because this project will adhere to current environmental standards, proposes retrofits of stormwater facilities and culverts, and mitigation measures, WSDOT concludes that cumulative effects on ecosystem elements will not be negatively affected by this project.

CHAPTER 4 MITIGATION MEASURES

What measures will be taken to mitigate effects before and during construction?

The measures taken to mitigate construction effects from the project include avoidance and minimization of project effects during the design process, and, where effects are unavoidable, developing compensatory mitigation to offset project effects. Prior to construction, project biologists worked with roadway and drainage engineers to identify portions of the project with the potential to affect ecosystem elements. Where possible, the project design was altered to minimize or eliminate effects to these elements. For example, designers shifted roadway alignments, relocated drainage features, and altered other project elements. Specifically, the following components were incorporated into the project:

- Roadway alignments were shifted to reduce effects to wetland buffers and eliminate effects to wetlands throughout the study area.
- Retaining walls and steeper slopes were incorporated to minimize impacts to sensitive areas.
- WSDOT will replant temporarily disturbed areas with appropriate native vegetation.

Additional best management practices (BMPs) that WSDOT could use during construction include:

- Using effective erosion control measures as specified in the TESC plan, such as filter fabric fence, straw mulch, straw bales, and plastic sheeting to prevent silt and soil from entering surface waters (including wetlands)
- Hydroseeding bare soil areas following grading
- Clearly labeling streams, wetlands and their buffers on the construction plans and in the field
- Demarcating clearing limits with orange barrier fencing wherever clearing is proposed in or near critical areas
- Locating staging areas and equipment storage areas away from sensitive areas (e.g., streams and wetlands)

- Refraining from vehicle refueling and maintenance activities within 150 feet of streams, rivers, and wetlands
- Prohibiting waste and excess materials from being disposed of or allowed to remain below the OHWM of streams and rivers, in critical areas, or in stream or critical area buffers
- Preparing and adhering to a Spill Prevention Control and Countermeasure (SPCC) plan for the project prior to beginning any construction, and maintaining a copy of the plan with any updates at the work site
- Regularly checking items such as fuel hoses, oil drums, and oil and fuel transfer valves and fittings for drips or leaks to prevent spills into surface water
- Keeping the illuminated area and intensity of nighttime lighting to the minimum that is necessary for the intended purpose; lights will be directed onto the work areas and away from the water

What measures will be taken to mitigate effects of operation?

Surface Water Quality and Quantity

The proposed project has been designed to avoid or minimize adverse effects to water quality and quantity. Mitigation measures to address project effects include:

- WSDOT expects that stormwater treatment BMPs will reduce the pollutant loads and concentrations in receiving waters from the project corridor due to treatment of all new impervious surfaces and additional retrofit of some existing impervious surfaces.

Aquatic Resources

The proposed project has been designed to avoid or minimize direct loss of aquatic resources to the extent feasible. However, some unavoidable effects to stream buffers will result from the proposed project. The following mitigation measures for aquatic resources and their buffers will be implemented:

- 0.27 acres of stream buffer enhancement, including riparian areas, by diversifying native vegetation.

The proposed buffer mitigation site will be monitored for five years. Monitoring, contingency, and site management plans are described in the wetland and stream mitigation report, which will be used to adaptively manage the mitigation sites.

Terrestrial Wildlife and Vegetation

In all cases where project effects on wildlife, fish, and habitat are unavoidable, mitigation will be implemented to compensate or replace the resources that are lost. Such mitigation will help to offset any negative long-term effects. Mitigation measures to offset effects to these ecosystem elements will include:

- Water quality and water bodies will be improved through implementation of stormwater BMPs that will protect wildlife by limiting pollutants entering water bodies
- All temporarily disturbed areas will be revegetated to improve habitat and wildlife, and generally improve the natural vegetation coverage
- Any permanent effects to wildlife habitat will be mitigated in accordance with applicable laws and regulations

THIS PAGE LEFT BLANK INTENTIONALLY

CHAPTER 5 REFERENCES

Cowardin, et al., 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. Document Number FWS/OBS-79/ 31 December 1979.

Perteet Inc., 2007. Wetland Delineation Report, State Route 167 Southbound HOT Lane 8th Street East Vicinity to South 277th Street Vicinity. September 2007.

Perteet Inc., 2008. Draft Wetland and Stream Mitigation Report, State Route 167 Southbound HOT Lane 8th Street East Vicinity to South 277th Street Vicinity. March 2008.

RW Beck, Inc. 2007. Draft Preliminary Type A Hydraulic Report: SR 167 Stage 4/Stage 5 Projects. WSDOT Urban Corridors Office. Seattle, Washington.

US Army Corps of Engineers (Corps), 1987. US Army Corps of Engineers Wetlands Delineation Manual. Revised by Environmental Technical Services Co., November 16, 1995. http://www.wetlands.com/coe/87manp1a.htm

Washington Department of Ecology (Ecology), 2004. Washington State Wetland Rating System for Western Washington.

WSDOT, 2000. Wetland Functions Characterization Tool for Linear Projects.

WSDOT, 2006. Guidance on Delineating Wetlands and Buffers Adjacent to Roads and Road Prisms.

WSDOT, 2008. Washington Department of Transportation, Environmental Procedures Manual, June 2008.

WSDOT, 2008b. Ecosystem Report, SR 167 8th Street E Vic. S 277th Street Vic., Southbound HOT Lane. September, 2008.

WSDOT, 2009a. Biological Assessment for State Route 167 8th Street East to 15th Street SW Northbound HOT Lane Project, March 2009.

WSDOT, 2009b. Wetland and Stream Mitigation Report, SR 167 8th Street E. to 15th Street SW Northbound HOT Lane Project (Stage 5), March 2009.

US Fish and Wildlife, 2007. Listed and Proposed Endangered and Threatened Species and Critical Habitat, Candidate Species, and Species of Concern in King County. Western Washington Fish and Wildlife Office, US Fish and Wildlife Service. Revised November 1, 2007.

US Fish and Wildlife, 2008. Endangered, Threatened, and Candidate Species
http://www.fws.gov/westwafwo/species_WA.html