



# Biology Discipline Report

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# SR 502 CORRIDOR WIDENING

IMPROVING SAFETY • INCREASING CAPACITY • REDUCING CONGESTION

I-5 TO BATTLE GROUND

**FINAL**

## **Biology Discipline Report**

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*This Project is also referred to as “SR 502/I-5 to Battle Ground – Add Lanes”.*

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# Errata Sheet

## Biology Discipline Report

March 2010

Throughout: The “Mill Creek North potential mitigation site” was selected as a mitigation site and purchased by Washington State Department of Transportation (WSDOT) in 2009, therefore the name of this site is now the “Mill Creek North mitigation site.”

*Note: Since this report was written, the project footprint has changed slightly. Updated information on wetland effects are estimates based on the current design.*

Page ES-5: “Approximately ~~9.2~~ 9 to 14 acres of wetland fill would occur to Category I, II, III, and IV wetlands (Exhibit 1).”

Page ES-6: Exhibit 1. Permanent Effects from the Build Alternative to Wetland Resources

Wetland Category	Effects (acres)
Category I	<del>2.3</del> <u>3-5</u>
Category II	<del>3.7</del> <u>3-4</u>
Category III	<del>2.0</del> <u>2-3</u>
Category IV	<del>1.2</del> <u>1-2</u>
<b>Total Effects</b>	<b><del>9.2</del> <u>9-14</u></b>

Page 43: “All work below the OHWM would be performed during the WDFW approved in-water work period for this project, which is ~~July 1~~ July 16–September 30.”

Page 45: Exhibit 1. Permanent and Temporary Effects from the Build Alternative to Wetland Resources

Wetland Category	Area of Permanent Effects (acres)	Area of Temporary Effects (acres)
Category I	<del>2.3</del> <u>3-5</u>	0.6
Category II	<del>3.7</del> <u>3-4</u>	0.7
Category III	<del>2.0</del> <u>2-3</u>	0.3
Category IV	<del>1.2</del> <u>1-2</u>	0.3
<b>Total Effects</b>	<b><del>9.2</del> <u>9-14</u></b>	<b>1.9</b>

Page 46: Exhibit 7. Area of Permanent Effects to Vegetation Resources by Habitat Type

Habitat Types to be Disturbed		Permanent Effects (acres)
<b><i>Upland Habitats</i></b>		
Grassland		32.7
Scrub-shrub		5.5
Forest		14.1
Riparian Upland		4.6
<b>Total</b>		<b>56.9</b>
<b><i>Wetland/In-stream Habitats</i></b>		
Listed-Fish Accessible	Riparian Wetland*	<del>2.2</del> <u>3-5</u>
	Non-Wetland, below OHWM ("in-stream")*	<del>0.3</del> <u>≤1</u>
Inaccessible to Listed Fish	Riparian Wetland*	<del>0.3</del> <u>≤0.5</u>
	Non-Wetland, below OHWM ("in-stream")*	<del>0.2</del> <u>≤0.5</u>
Non-Riparian Wetland*		<del>6.6</del> <u>6-7</u>
<b>Total</b>		<b><del>9.6</del> <u>9-14</u></b>

\* Note that some areas within designated riparian habitat are also delineated as wetland. In order to accurately portray effects by habitat type, wetland effects presented in Exhibit 6 are presented again in this table.

Pages 46-47: “Approximately ~~2.2~~ 3-5 acres of habitat within or adjacent to disturbed, remnant prairie would be removed through roadway widening and culvert replacement and/or extension in Mill Creek North. In addition, this area surrounding Mill Creek North is proposed as a potential mitigation site for stream restoration and wetland creation and enhancement. Although mapped as historic prairie, this habitat is highly disturbed from past and current agricultural practices, and few prairie indicators are present onsite. Although the project would affect disturbed habitat in which prairie plants were observed, under the Build Alternative, the Mill Creek North mitigation site would preserve a large mature stand of Oregon White Oak, and would enhance this area as an oak woodland/grassland mosaic that would include native prairie plants.”

Pages 47-48: “The project would result in approximately ~~2.8~~ 3-5 acres of permanent impact below the OHWM of potential ESA-listed fish-bearing waterbodies within the biological study area, although not all of this habitat is accessible to federal- or state-listed fish species (Exhibit 8). This habitat is designated EFH for Chinook and coho salmon. Effects to ~~2.5~~ 3-5 acres of

habitat below the OHWM of Mill Creek North and Mill Creek would result in a direct loss of habitat for ESA-listed fish species. Of this acreage, approximately ~~2.2 acres~~ 3-5 acres of Category 1 wetland habitat associated with Mill Creek North is potential rearing and wintering habitat for steelhead and coho salmon and although very unlikely, may be accessible to Chinook and chum salmon as off channel rearing habitat. While Mill Creek North is documented spawning habitat for steelhead, the portion of the creek that is within the biological study area is unsuitable for spawning. ~~Approximately~~ A small quantity (less than 0.1 acre) of in-stream habitat in Mill Creek North is critical habitat for steelhead and would be permanently removed by the Build Alternative. The permanent effects to the ~~2.5 acres~~ 3-5 acres would result from placement of fill material for roadway slopes, retaining walls, and culvert replacement/extension. Exhibit 8 below lists the quantities of effects to each ESA-listed fish-bearing waterbody within the biological study area.”

Page 48: “Mill Creek North – Approximately ~~2.3 acres~~ 3-5 acres below the OHWM of Mill Creek North will be permanently impacted during roadway construction and culvert extension/replacement activities. The majority of this impact (~~approximately 2.2 acres~~) will be the result of fill placement in seasonally accessible overwintering habitat located below the OHWM, but outside the main channel. A small amount (less than 0.1 acre) of impact will occur within the main channel of Mill Creek North during culvert extension/replacement activities, which will result in a simplification of the in-stream habitat in the location where the culvert extension occurs.”

Page 49: Exhibit 8. Area of Permanent and Temporary Effects to Riparian Habitat below OHWM

Watershed/ Waterbody	Area of Permanent Effect (acres)	Area of Temporary Effect (acres)
<b><i>Gee Creek</i></b>		
Unnamed Western Gee Creek Tributary	Less than 0.1	Less than 0.1
Unnamed Eastern Gee Creek Tributary	Less than 0.1	Less than 0.1
<b><i>East Fork Lewis River</i></b>		
Unnamed East Fork Lewis River Tributary	0.1	Less than 0.1
Mill Creek North	<del>2-3</del> <u>3-5</u>	Less than 0.1
<b><i>Salmon Creek</i></b>		
Mill Creek	0.4	0.2
<b><i>Total</i></b>	<b><i><del>2-8</del> <u>3.7-5.7</u></i></b>	<b><i>0.3</i></b>

Page 55: “To the extent practicable, fuel and maintain equipment at least 150 feet from wetlands marked for preservation and from the OHWM of streams or as approved by a Washington State Department of Transportation biologist.”

Page 55: “Locate staging areas ~~above~~ beyond the OHWM and outside of environmentally sensitive areas.”

Page 56: “Conduct in-water work during the appropriate in-water work window for each watershed, as determined by WDFW:  
East Fork Lewis River Watershed – ~~July 1~~ July 16-September 30  
Salmon Creek Watershed – ~~July 1~~ July 16-September 30  
Gee Creek Watershed – ~~July 1~~ July 16- September 30”

Appendix E, Page 5: “Potential impacts due to a temporary increase in sediment and turbidity will be minimized by appropriate BMPs and by conducting all work below the OHWM within the WDFW approved in-water work period (~~July 1~~ July 16-September 30).”

Additional information about the project:

Although the SR 502 corridor has a very low rate of vehicle collisions with large wildlife (such as deer and elk) and is not located in an area that is managed as priority wildlife habitat, Washington State Department of Transportation (WSDOT)

investigated ways to enhance wildlife connectivity within the project corridor.

Under the Build Alternative fish and wildlife would benefit from the replacement of four existing culverts with large “stream simulation” culverts which facilitate natural stream processes as well as fish passage and wildlife connectivity. These culverts are much wider than typical culverts, and the bottoms of the culverts are filled with rocks and other natural streambed material. The replacement culverts would allow wildlife ranging from amphibians to birds to rodents to pass under SR 502 under most streamflow conditions. Fish would be able to migrate through the stream simulation culverts, and some species have been known to use these types of culverts as spawning areas.

Fencing to “funnel” wildlife to designated crossing areas is not practical or feasible along the SR 502 corridor because of the many landowners and driveways that intersect the roadway, which would lead to many breaks in the fencing, thereby defeating the purpose of the fencing.

WSDOT considered and evaluated several variations on the standard median treatments for both safety and wildlife connectivity benefits. These variations included median barrier sections with gaps in between, median barrier with scupper openings, median guardrail and posts, and vegetated median with curb. Some of the known safety challenges with these various median treatments include: gaps or openings in barrier create areas with potential “snagging hazards” that passing vehicles could get caught on; larger scupper-type openings in barriers are not currently tested and proven to be crash-worthy; guardrail deflects more than barrier under impact into the opposite direction of traffic; and curb (which cannot be safely used on roadways above 40 mph) provides the potential for vehicles to easily cross the median head-on into oncoming traffic. All of these challenges present higher risks of serious accidents than those associated with continuous standard median barrier.

Based on the potential safety hazards of these median treatments, the lack of wildlife collision data along the SR 502 corridor, and the low probability of wildlife survival with the corridor's high volume of traffic, continuous median barrier remains the preferred median treatment. However, as the project goes through the final design process, WSDOT will continue to explore the use of various median treatments that meet safety standards and can reasonably accommodate wildlife connectivity and improve safety to the traveling public along the SR 502 corridor.

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# Executive Summary

The purpose of this Executive Summary is to summarize the findings of the Final Biology Discipline Report for the SR 502 Corridor Widening Project.

## What studies, methods, and coordination were used to identify existing wetland, vegetation, wildlife, and fish resources in the study area?

### Wetland Resources

Washington State Department of Transportation (WSDOT) wetland biologists performed field reconnaissance and wetland delineations from March through June of 2005 using the Routine Determination Method outlined in the Washington State Wetland Identification and Delineation Manual (Ecology, 1997). Wetlands were identified within 200 feet of the centerline of SR 502 between MP 2.53 and MP 6.56. The delineation assessed vegetation, soil, and hydrologic characteristics, evaluated constructed drainage features, and marked wetland boundaries.

The biologists classified wetlands according to the US Fish and Wildlife Service (USFWS) system and rated them according to the Washington State Wetland Rating System for Western Washington and the Clark County critical areas ordinance. The rating system also helped assess wetland functions.

### Vegetation and Wildlife Resources

In 2007 and 2008, biologists collected field information about the vegetation communities in the biological study area (upland grassland, scrub-shrub, and forest) as well as wetland and riparian vegetation. They characterized upland and riparian forest communities, reviewed agency databases to identify documented locations of federal- or state-listed plant species, visited the site to examine habitat, and determined the current existence of potential prairie habitat and/or plant species in the area and habitats that may have been used by Native Americans.

The fieldwork and the database examinations also helped biologists evaluate the suitability of habitat for wildlife and whether populations of federal- or state-listed, state candidate, state sensitive, or state monitor wildlife species were documented in the area.

### What is a wetland delineation?

To delineate a wetland means to identify its boundaries. Wetland biologists use a standard methodology to evaluate the soils, vegetation, and hydrology of an area that may be a wetland. Then they flag and survey the delineated boundary in the field.



*Disturbed remnant prairie habitat located south of SR 502 and west of NE 42nd Avenue.*

### What is a riparian area?

A riparian area is covered by vegetation and is adjacent to, and influenced by, streams, lakes, or open water wetlands.



*Red legged frog observed near Mill Creek in the vicinity of Dollars Corner.*

## Fish Resources

Biologists reviewed the biological study area to examine fish habitat and assess culverts for ease of fish passage. They evaluated stream characteristics for Gee Creek tributaries, East Fork Lewis River tributary, Mill Creek, and Mill Creek North and contacted resource agency staff members about the characteristics of culverts and fish habitat and for information on federal and state-listed species, or candidates for listing, in the biological study area. A stormwater pollutant modeling study was conducted in order to assess potential effects to fish resources, and, based on this work, biologists evaluated the project's potential effects to fish species and fish habitat.

## How were effects to wetland, vegetation, wildlife, and fish resources determined?

### Wetland Resources

In spring 2005, WSDOT biologists conducted extensive field investigations along the SR 502 corridor to determine the presence or absence of wetland areas, waters of the US, and other jurisdictional waters. After the fieldwork was completed, the wetland boundaries were surveyed and maps of existing conditions were created, over which the Build Alternative was overlaid so that WSDOT biologists could quantify potential effects to wetlands and buffers.

### Vegetation and Wildlife Resources

Biologists mapped vegetation types and habitat resources, and overlaid the Build Alternative so that ESRI ArcGIS could be used to quantify vegetation removal and determine potential effects to wildlife species. Biologists also quantified the effects to habitats that include plant species commonly associated with prairie habitats and/or habitats that may have been used by Native Americans.

### Fish Resources

Biologists assessed direct effects to suitable in-stream, riparian, and wetland habitat for overwintering fish, direct effects to riparian condition and function, and temporary effects associated with clearing vegetation, soil disturbance, and in-water work. Biologists also assessed potential effects to fish from stormwater pollutants.

### What is suitable habitat?

Suitable habitat is composed of environmental factors that in combination provide food, water, cover, and space that a species needs to survive and reproduce.

### What is a tributary?

A tributary is a stream that flows into a larger body of water.



*Eastern Gee Creek Tributary flowing through a field.*

### What agencies were contacted?

The US Fish and Wildlife Service, National Oceanic and Atmospheric Administration National Marine Fisheries Service, Washington State Department of Fish and Wildlife, and the Washington State Department of Natural Resources were contacted for this report.

Biologists delineated and WSDOT surveyed the ordinary high water mark (OHWM) for Mill Creek North and Mill Creek, which was overlaid on aerial images to determine in-stream effects from roadway widening and culvert replacements and extensions. The OHWM was digitized on aerial images and field verified for the tributaries. ESRI ArcGIS was used to quantify effects to in-stream and riparian habitat.

### **What types of wetland, vegetation, wildlife, and fish resources are found in the study area?**

#### **Wetland Resources**

The 74 wetlands identified in the study area consist of depositional and riverine hydrogeomorphological classes and numerous Cowardin classes that provide chemical and physical functions ranging very low to high, with the higher functioning wetlands more prevalent to the north of SR 502. While most are Category III and IV wetlands, there are Category I and II wetlands in the study area, mostly north of SR 502. The wetlands were rated according to the Washington State Wetland Rating System for Western Washington.

#### **Vegetation Resources**

Vegetation communities consist of upland grassland, scrub-shrub, and forest as well as wetland and riparian vegetation. Study area habitats have been highly modified through tilling and grazing and no federal- or state-listed plant species have been documented. Few prairie plants occur in the study area and some areas may represent disturbed, remnant prairie habitat.

#### **Wildlife Resources**

Wildlife resources in the study area are associated with the vegetation communities identified above, with grasslands used for grazing and hay production and no documented occurrences of federal- or state-listed wildlife species. However, wintering waterfowl concentrations are documented in the study area's central portion. Wildlife that may use these grasslands include species habituated to human presence. Wildlife that may use scrub-shrub and forest communities may include birds and small mammals.

The regulations of the US Army Corps of Engineers define the term "ordinary high water mark" for purposes of the lateral jurisdiction of the Clean Water Act at 33 CFR 328.3(e), which states: "The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas."



*Wrack debris observed in tree is used to estimate higher water levels when delineating the ordinary high water mark along Mill Creek.*



*Biologists conducting a riparian field assessment along Mill Creek.*

## Fish Resources

The Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, Mill Creek, the Mill Creek tributary, and Curtin Creek are the potential fish-bearing streams in the biological study area. With the exception of Curtin Creek, these small streams drain mostly agricultural areas in Clark County.

There are no fish passage barriers along SR 502 on Mill Creek or Mill Creek North. There are fish barriers on the Gee Creek tributaries and the unnamed tributary to the East Fork Lewis River, but fish could occur downstream from them. Some portions of the Gee Creek tributaries are not considered to be accessible to any listed fish species, but their downstream portions may be accessible to steelhead and coho salmon. The unnamed tributary to the East Fork Lewis River is considered accessible to listed fish species to where its channel largely disappears and some portions represent potential habitat for steelhead and coho salmon and may also be accessible by Chinook and chum salmon. Mill Creek North within the biological study area represents documented habitat for steelhead and coho salmon, and represents potential habitat for Chinook and chum salmon. Mill Creek North is also designated critical habitat for steelhead. Mill Creek is documented habitat for steelhead, coho, and Chinook salmon. Curtin Creek is presumed habitat for steelhead and coho salmon. A small unnamed tributary to Mill Creek is considered to be potentially accessible to all fish species present in Mill Creek during winter flows. Nonlisted fish species are likely present in streams accessible by listed fish.

## What temporary effects to wetland, vegetation, wildlife, and fish resources would occur?

### Wetland Resources

Construction activities may necessitate the removal of vegetation and the temporary placement of fill in wetlands and could result in an increase in erosion and associated sedimentation production. WSDOT would implement a Temporary Erosion and Sediment Control (TESC) plan. Construction activity could temporarily affect the behavior of wildlife associated with the wetlands with increased light, glare, noise, and dust.

### What is a TESC plan?

A temporary erosion and sediment control plan prescribes measures to prevent and minimize erosion during construction. For the SR 502 Corridor Widening project, these measures may include, but are not limited to, the following (as necessary, depending on site conditions): temporary plastic cover, coir fabric (and/or wattles), seeding and mulching, temporary vegetated filter strips (i.e. for construction site stormwater control), slope drains, silt fence, sand, or geotextile-encased triangular silt dikes.

### **Vegetation Resources**

Minor temporary effects would occur to upland and riparian habitats including grassland, scrub-shrub, and forest habitats. All construction access and equipment staging would occur within areas that are already developed or in areas where permanent vegetation removal or fill placement would occur. The exact quantity of potential temporary effects to upland and riparian habitat has not been calculated, but is anticipated to be insignificant.

### **Wildlife Resources**

All construction access and equipment staging would occur within areas that are already developed or are proposed to be permanently eliminated as habitat. Construction activities and noise associated with the proposed project would temporarily displace wildlife. Temporary construction could displace and/or inadvertently kill burrowing species. The internal combustion engine would be the most prevalent noise source. Pile-driving may occur in the location of Mill Creek North. No threatened or endangered wildlife species are expected to be affected by the noise, but common terrestrial and avian species could be temporarily displaced.

### **Fish Resources**

Vegetation removal, erosion, increased surface runoff, noise, and artificial light during construction could temporarily affect aquatic organisms and stream habitat. Temporary effects due to clearing and site access are expected to be minimal. Culvert replacement would be conducted during the established in-water work window and in full compliance with all permits. Accidental spills could enter the creeks but measures would be taken to avoid effects to sensitive areas. Temporary effects to fish-accessible streams would be associated with potential dewatering of work areas below the OHWM, and also from channel realignment/restoration activities and wetland mitigation construction.

### **What long-term effects to wetland, vegetation, wildlife, and fish resources would occur?**

#### **Wetland Resources**

The project may potentially affect 41 wetland systems of various categories and Cowardin classes. Approximately 9.2 acres of wetland fill would occur to Category I, II, III, and IV wetlands (Exhibit 1). Approximately 12.0 acres of wetland buffers would be filled. Additional direct and indirect effects may occur to wet-

lands and buffers as the project design evolves.

Most potential wetland effects would be linear in nature, and occur to wetland systems immediately adjacent to the existing SR 502 corridor. These wetland edges provide low habitat function and often show signs of degradation.

**Exhibit 1. Permanent Effects from the Build Alternative to Wetland Resources**

<b>Area of Permanent Effects</b>	
<b>Wetland Category</b>	<b>Effects (acres)</b>
Category I	2.3
Category II	3.7
Category III	2.0
Category IV	1.2
<b>Total Effects</b>	<b>9.2</b>

With the implementation of a comprehensive mitigation plan, no net loss of wetlands and wetland functions within the affected watersheds is anticipated.

At this time, as part of project development, the construction of two mitigation sites is proposed within the affected watersheds to replace and enhance functions. Additional mitigation sites would likely be identified at a later date. Implementation of the mitigation plan would provide approximately three times the surface area as the filled wetlands, and would replace and enhance numerous wetland functions.

### **Vegetation Resources**

The Build Alternative would permanently fill vegetation resources: upland grassland (approximately 32.7 acres), upland scrub-shrub (approximately 5.5 acres), and upland forest (approximately 14.1 acres). Effects to riparian habitat would occur within both wetland and upland riparian habitat types. The total area of permanent upland riparian effect associated with the Build Alternative would be approximately 4.6 acres, which occurs immediately adjacent to SR 502 and is already highly fragmented and disturbed.

There are no documented or observed occurrences of listed plant species and, therefore, no direct effects to listed plants are anticipated.

Some limited areas that support prairie plants may represent disturbed, remnant prairie habitat that was once used by Native Americans and these areas would be filled and converted to roadway.

### **Wildlife Resources**

Construction of the Build Alternative would result in permanent vegetation removal, and could result in fragmentation of habitat and migration corridors, alteration of visual character and quality, and loss of wildlife habitat as well as increased wildlife death.

The Build Alternative would result in direct effects to the land associated with the waterfowl concentrations near Mill Creek North and Mill Creek. However, the Mill Creek North potential mitigation site would be designed to enhance in-stream and floodplain and would maintain the winter lake conditions of this area. Therefore, wintering waterfowl concentrations are not anticipated to be affected by the Build Alternative.

### **Fish Resources**

The project would result in approximately 2.8 acres of permanent effects below the OHWM of potential listed fish-bearing waterbodies within the study area, although not all of this habitat is accessible to federal- or state-listed fish species. The removal of approximately 2.5 acres of habitat below the OHWM of Mill Creek North and Mill Creek would result in a direct loss of habitat for listed and unlisted fish species. Of this acreage, approximately 2.2 acres of habitat associated with Mill Creek North is potential rearing and wintering habitat for steelhead and coho salmon. Mill Creek North is critical habitat for steelhead and the Build Alternative would result in less than 0.1 acre of direct loss of designated critical habitat in the stream proper. The permanent effects to the approximately 2.5 acres would result from placement of fill material for roadway slopes, and culvert replacement/extension.

Benefits of the Build Alternative on area fish resources include the restoration of approximately 3,000 to 5,000 linear feet of in-stream habitat near the headwaters of Curtin Creek, and a portion of in-stream habitat on the Mill Creek North potential mitigation site which would reconstruct the stream channels, re-establish floodplain connectivity, and restore native riparian plant communities. Approximately 0.2 acre of riparian habitat would be restored near Dollars Corner.

Additionally, the Build Alternative would realign/restore sections of Mill Creek during culvert replacement activities near NE 92nd Avenue. Restoration activities would include riparian plantings, placement of large woody debris, removal of concrete bank armoring, and realignment of the stream channel.

The Build Alternative would result in stormwater treatment where no stormwater treatment is currently provided, which would reduce peak flows, improve base flows, and improve water quality.

### **What would be the effects to wetlands, vegetation, wildlife, and fish resources if the project is not built?**

If the project is not built, there would be no additional direct effects to wetland, vegetation, wildlife, or fish resources.

### **What measures are proposed to minimize or avoid negative effects to wetland, vegetation, wildlife, and fish resources?**

#### **Wetland Resources**

Governor's Executive Order 90-04, Protection of Wetlands, requires all state agencies to avoid long- and short-term adverse effects to and new construction in wetlands and that proposed activities must include all practicable measures to minimize harm to them. Compensatory mitigation will be implemented in accordance with the Governor's Executive Order 90-04 and WSDOT Directive 31-12. Additionally, WSDOT is required to avoid, minimize, and mitigate effects to wetland resources by the Federal Clean Water Act and the Washington Growth Management Act and others.

Effects to wetlands are avoided to the greatest extent possible and minimized through the project design process. The Build Alternative provides the smallest footprint in terms of direct effects to wetlands.

Construction activities in or near waterways and wetlands would be conducted in accordance with the requirements of the WSDOT Highway Runoff Manual. A comprehensive TESC Plan would be prepared and erosion control best management practices (BMPs) would be used.

Two proposed mitigation sites have been located and WSDOT would implement a comprehensive watershed/landscape based

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#### **What are BMPs?**

BMPs are physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce impacts to sensitive areas.

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mitigation plan for effects to area wetlands, wetland buffers, and aquatic resources in which vegetation removal or fill placement would occur as a result of the project. Additional mitigation sites would likely be identified at a later date. The wetland mitigation sites would be constructed within the affected watersheds to replace and enhance hydrologic, water quality, and wildlife functions affected by project development. Implementation of the mitigation plan would provide more than three times the surface area as the filled wetlands, and replace and enhance numerous wetland functions.

### **Vegetation and Wildlife Resources**

The Build Alternative was designed to minimize effects to sensitive resources and the alternative avoids quality habitat to the extent practicable. During construction, BMPs would be used to minimize erosion where ground-disturbing activities have occurred. Following grading activities, all temporarily disturbed areas would be revegetated with native vegetation. Exposed soils would be seeded and covered with mulch after construction is complete. Following construction, vegetation and environmental functions would be restored.

### **Fish Resources**

Construction activities in or near waterways and wetlands would be conducted in accordance with the requirements of the WSDOT Highway Runoff Manual. A TESC Plan would be prepared and erosion control BMPs would be implemented.

The project would fully comply with the terms and conditions of the Implementing Agreement between Washington State Department of Ecology and the WSDOT regarding compliance with the State of Washington Surface Water Quality Standards.

Beneficial effects of the Build Alternative on area fish resources include the restoration of approximately 3,000 to 5,000 linear feet of in-stream habitat near the headwaters of Curtin Creek, and in-stream habitat as part of the Mill Creek North potential mitigation site. These proposed habitat improvements would reconstruct the stream channels to restore natural channel morphology, re-establish floodplain connectivity, and restore native riparian plant communities, greatly improving habitat for listed fish species. Approximately 0.2 acres of riparian habitat on Mill Creek would be restored near Dollars Corner.

Additionally, the Build Alternative would realign/restore sections of Mill Creek and would include riparian plantings, placement of large woody debris, removal of concrete bank armoring, and realignment of the stream channel.

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## 1.0 Introduction

The SR 502 Corridor Widening Project is located in north Clark County, Washington along SR 502 (NE 219th Street) between NE 15th Avenue and NE 102nd Avenue. The western terminus of the project area is approximately one mile east of Interstate 5 (I-5) and the eastern terminus is NE 102nd Avenue. The project would widen an approximate five-mile segment of SR 502 from two travel lanes to four travel lanes and upgrade several intersections to improve mobility and safety. Currently, SR 502 is a rural, two-lane highway. There is one signalized intersection at SR 502 and NE 72nd Avenue. For a more detailed description of the project, see the separate *Revised Description of Alternatives* document (Parsons Brinckerhoff, 2008c).

The purpose of this document is to describe the existing biological conditions, discuss effects and benefits the project would have on those resources, and identify mitigation measures to address adverse effects as needed. The information contained in this discipline report will be used to support the project's Environmental Impact Statement (EIS).

## 2.0 Studies, Coordination, and Methods

This section describes the methods used to determine the existing biological conditions within the biological study area (see Section 2.1) of SR 502 in north Clark County and the potential effects of the No Build and Build Alternatives on wetland, vegetation, wildlife, and fish resources (Figure 1). (All figures are located in Appendix A.)

### 2.1 Primary and Secondary Biological Study Areas

The primary and secondary biological study areas are the areas in which the wetland, vegetation, wildlife, and fish resources are analyzed for potential direct and secondary effects from the project. Each resource has a slightly different area of effects.

The primary biological study area includes the area assessed for general wetland, vegetation, wildlife, and fish resources within approximately 200 feet north and south of SR 502, and 1,000 feet north and south at the arterials; it includes the location of potential mitigation sites and proposed stormwater facilities as shown on Figure 2. The secondary biological study area includes the wider zone of influence that was evaluated for potential effects to endangered species (Figure 2).

WSDOT staff delineated wetland resources in the primary biological study area. Direct effects to wetlands would occur primarily adjacent to existing roadway.

The primary biological study area for vegetation was identified as the area in which direct effects to vegetation (i.e., clearing vegetation) could occur. The primary biological study area for wildlife was based on the area in which direct effects to vegetation could occur. The survey area for the stream habitat evaluations was identified as the area in which direct effects to fish and aquatic resources could occur. This area is based on construction activities that primarily occur within 200 feet north and south of the existing edge of the SR 502 pavement, and the construction at the Sunset Oaks wetland mitigation site and the Mill Creek North potential mitigation site

The secondary biological study area is the wider zone of influence that was evaluated for potential impacts to endangered species. This area includes the extent to which stormwater pollutants could extend downstream, as identified on Figure 2. An analysis of potential noise-related impacts indicated that general construction noise would attenuate to background levels at a distance of 1,600 feet from the limits of construction, and that noise generated by potential pile driving activity associated with culvert replacement/extension in Mill Creek North would attenuate at a distance of approximately 12,800 feet from the location of the potential pile driving activity (Figure 2).

## **2.2 Methods for Wetland Resources Assessment and Delineation**

### **2.2.1 Agency Coordination and Pre-Field Review of Information related to Wetland Resources**

The following data sources were reviewed for information on vegetation patterns, topography, drainage, and potential or known wetlands in the project vicinity:

- National Wetland Inventory (NWI) maps
- US Geologic Survey (USGS) 7.5 minute topographic maps
- Natural Resources Conservation Service (NRCS) soils surveys and county hydric soils lists; (respectively available online at):
  - [http://www.or.nrcs.usda.gov/pnw\\_soil/wa\\_reports.html](http://www.or.nrcs.usda.gov/pnw_soil/wa_reports.html)
  - [http://www.wa.nrcs.usda.gov/technical/soils/county\\_hydric\\_lists.html](http://www.wa.nrcs.usda.gov/technical/soils/county_hydric_lists.html)
- Current and historic aerial photographs (WSDOT)
- Correspondence with US Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), Washington Department of Fish and Wildlife (WDFW), and Washington Department of Natural Resources (WDNR)

### **2.2.2 Field Assessments**

WSDOT Southwest Region and Olympia Service Center wetland staff performed extensive field reconnaissance and wetland delineations within the project corridor from March through June of 2005.

WSDOT Southwest Region and Olympia Service Center wetland staff used the Routine Determination Method outlined in the *Washington State Wetland Identification and Delineation Manual* (Washington State Department of Ecology [Ecology], 1997). Wetlands were identified in the primary biological study area within 200 feet of the centerline of SR 502 between MP 2.53 and MP 6.56, by walking and assessing both sides of the highway. The same procedure was followed for a distance of approximately 1,000 feet north and south of SR 502 along arterials (NE 29<sup>th</sup>, NE 50<sup>th</sup>, and NE 72<sup>nd</sup> avenues). In general, wetland delineation consisted of three main tasks: (1) assessing vegetation, soil, and hydrologic characteristics to identify areas meeting the

wetland identification criteria and recording the observations on field data forms; (2) evaluating constructed drainage features to determine if they would be regulated as wetlands; and (3) marking wetland boundaries.

WSDOT staff classified wetlands according to the USFWS system Cowardin classification system and rated them by categories according to the *Washington State Wetland Rating System for Western Washington* – Revised 2004, and by the rating system outlined in Section 40.450.020 of the Clark County (County) critical areas ordinance (CAO) (Clark County, 2008). The rating system also served to assess wetland functions. The *Wetland Delineation Report* includes a detailed assessment and analysis of wetland functions (WSDOT, 2006).

### 2.2.3 Calculate Effects

After the fieldwork was completed, the wetland delineation points were electronically collected using survey grade equipment, and wetland boundary maps were created using Microstation software, that included the location of the wetlands, existing roadway footprint, an aerial photograph, and other locations. The proposed corridor alignment was then overlaid on top of the existing conditions in order to determine the quantity of impact to wetlands and buffers.<sup>1</sup>

## 2.3 Methods for Vegetation and Wildlife Assessment

The vegetation and wildlife resource assessment included a review of agency websites and databases and available literature, field assessment for federal- and state-listed threatened and endangered plant and animal species within the biological study area, and calculation of vegetation impacts.

### 2.3.1 Agency Coordination and Pre-Field Review of Information related to Vegetation and Wildlife Resources

For the wildlife resource assessment, based on the developed rural setting and absence of documented federal- and state-listed threatened and endangered wildlife species in the biological study area, a detailed field survey was not necessary. Habitat was reviewed during the vegetation field assessment. Habitat associations were used to determine the potential presence of species of interest.

The following agency websites and databases of plants and animals were reviewed to identify documented populations of, and to determine whether suitable habitat exists within the biological study area for, federal- or state-listed species. This information was also used to determine if current or historical prairie habitat and/or plant species occur in the area:

- USFWS [http://westernwashington.fws.gov/se/SE\\_List/endangered\\_Species.asp](http://westernwashington.fws.gov/se/SE_List/endangered_Species.asp) (accessed July 28, 2008)
- WDFW Priority Habitats and Species (PHS) report for the vicinity of T03N R01E WM

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<sup>1</sup> All effect calculations are approximate and may change during final design.

Sections 1 and 2, T03N R02E WM Sections 4, 5, and 6, T04N R01E WM Section 35 and 26, and T04N R02E WM Sections 31, 32, and 33 (maps dated September 12, 2008)

- Rare plant database maintained by the WDNR Natural Heritage Program (NHP) (WDNR, 2008).
- WDNR NHP Southwestern Washington Prairies: Using GIS to Find Remnant Prairies and Rare Plant Habitat. Natural Heritage Report 2004-02.
- List of Wet Prairie and Wet Prairie Swale Indicator Species, prepared by Linda E. Storm, May 1, 2007.
- Soil Survey of Clark County, Washington. US Department of Agriculture, Soil Conservation Service.
- Draft Western Washington Core Prairie Soils Series List, for Southwestern and Coastal Washington Counties Soils, NRCS 2008.
- WSDOT's Ungulate-Motor Collision, Habitat Connectivity, and Wildlife Crossing information accessed at:  
[http://www.wsdot.wa.gov/Environment/Biology/bio\\_esa.htm#HabitatConn](http://www.wsdot.wa.gov/Environment/Biology/bio_esa.htm#HabitatConn) (2008).
- Previous environmental documentation (e.g., the SR 502 Interchange Project Biological Assessment and Final Biology Discipline Report (Parsons Brinckerhoff, 2008a)) within the vicinity of the project area.

Additionally, project biologists contacted local resource agencies familiar with the project area, including WDFW, the County habitat biologist, and Cowlitz Tribe biologist for updates to the databases and to confirm expected species' use of the project area.

### 2.3.2 Field Assessments

Project biologists conducted fieldwork of vegetation and wildlife habitat resources within the biological study area. Project biologists completed fieldwork of the biological study area to review vegetation and wildlife resources on the following dates: May 7, 14, 29, and 31; June 3, 4, 6, 7, 11, and 12, 2007; and July 18, 26, and 27, August 6, 13, and 23, October 15, and December 21, 2007; and May 8, 13, and 14, June 9 and 10, and July 2 and 3, 2008. Fieldwork was performed during the identification window for federal- (Endangered Species Act (ESA)) and state-listed plant species identified as occurring in the county with particular focus on plants that occur or historically occurred in the vicinity of the biological study area. A team of 1 to 4 project biologists reviewed the area for the presence of federal- or state-listed species. They field-documented species observed by descriptive areas (e.g., grassland, scrub-shrub, or forest community). They then classified vegetative communities into broad descriptors (e.g., grassland, forest, scrub-shrub). They completed County Riparian Habitat Evaluation forms for area streams that were used to determine baseline conditions for wildlife habitat functions in riparian areas.

To assess whether current or historical prairie habitat occurs in the project area, biologists determined which soil types within the biological study area were indicators of prairie habitat,

and if prairie indicator plants were documented during fieldwork for this report and/or the wetland delineation. Reconnaissance surveys were initially conducted to determine which areas of the corridor needed to be surveyed in more detail. Areas heavily shaded, regularly tilled for agriculture, densely covered by non-native plants, or that lack prairie soils as identified on NRCS, 2008 (except for one area identified by WDNR as potential historic prairie) were excluded from additional surveys, but were walked to assess the habitat in general. More detailed field visits were conducted in selected locations deemed as potential for current or historic prairie. Early-, mid-, and late-season field visits were conducted to review selected locations for prairie habitat and/or plants. Selected locations were randomly surveyed using randomly distributed 10-foot circular plots. The percent cover of the dominant herbaceous plants and trees in each plot was determined.

The fieldwork conducted while assessing potential impacts to vegetation presented an opportunity to evaluate habitat conditions and assess what wildlife species occur, or are likely to occur, in the biological study area, and to document unique habitat features, particularly those that might support or provide suitable habitat for federal or state listed, state candidate, state sensitive, or state monitor wildlife species.

### 2.3.3 Calculate Effects

Vegetation types and habitat resources were mapped on aerial images of the biological study area. The Build Alternative was overlaid on the aerial image in order to quantify vegetation impacts. Project biologists used ESRI ArcGIS Version 9.2 software to quantify vegetation habitat impacts to determine potential impacts to wildlife species within the biological study area.<sup>2</sup>

Effects to vegetation were quantified by overlaying the clearing and grubbing limits (based on the cut-and-fill line with a 10-foot offset on both sides of the alignment) on aerial photographs and maps of habitat types within the project area. Dominant vegetation resources were mapped based on site visits and use of aerial photographs. Effects to specific locations and/or habitats where prairie plant species were observed were calculated.

Potential effects on wildlife were determined based on removal of habitat that would be associated with the Build Alternative. There are no documented or observed listed wildlife in the biological study area, therefore, potential direct effects to federal and state threatened and endangered species and suitable habitats were not calculated.

A qualitative tree assessment was performed along the Build Alternative footprint, in riparian and upland forests along two tributaries to Gee Creek, an unnamed tributary to the East Fork Lewis River, Mill Creek North, and Mill Creek. The assessment was intended to provide an estimate of the quantity of trees that would be removed by the Build Alternative. Forest communities in non-riparian areas were also generally assessed during site visits and representative information was collected on species, general size class, and average stand height.

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<sup>2</sup> All effect calculations are approximate and may change during final design.

## 2.4 Methods for Fish and Aquatic Resource Assessment

### 2.4.1 Agency Coordination and Pre-Field Review of Information related to Fish Resources

Information regarding listed species was obtained from the USFWS website (USFWS, 2008), the NOAA Fisheries website (NOAA Fisheries, 2008), WDFW PHS maps (WDFW, 2008a) and the WDFW PHS website (WDFW, 2008b). The possible presence of listed species was evaluated by reviewing WDFW SalmonScape data (WDFW, 2008c) and WDFW PHS data (WDFW, 2008a). The Washington State Department of Transportation (WSDOT), County, and WDFW agency experts were consulted for updated information and to validate expected species use of the biological study area.

- NOAA Fisheries website (accessed on July 28, 2008) <http://www.nwr.noaa.gov/ESA-Salmon-Listings>.
- USFWS website (accessed on July 28, 2008; last revised November 1, 2007).
- WDFW PHS (Maps dated September 12, 2008)
- WDFW Species of Concern, Threatened and Endangered, State Candidate, and State Monitor lists (accessed on January 3, 2008) <http://www.wdfw.wa.gov/wlm/diversty/soc/concern.htm>
- Clark County GIS fish presence map (printed July 18, 2007).
- Conversations with Dave Howe, County habitat biologist (October 30, 2007 and February 26, 2008); Anne Friesz, WDFW habitat biologist (October 9 and 25, 2007); and Eva Wilder, WDFW (October 8, 2007). Also comments regarding fish presence by Anne Friesz, WDFW, and Brent Davis, County wetland biologist, as contained in the minutes of the agency scoping meeting (February 22, 2007) and discussions with Pat Klavas, Tim Rymer, and Anne Friesz (February 6, 2008), as well as comments from Nathan Reynolds, Cowlitz Tribe (May 13, 2008).
- Email conversation via Glen Mejia, WSDOT, with Nathan Reynolds, Cowlitz Tribe, regarding culturally significant plant, wildlife, and fish species in the biological study area (February 28, 2008).
- WDFW/WSDOT Fish Passage Inventory, October 8, 2007. Olympia, Washington.
- WDFW Salmonscape database. Accessed online at <http://wdfw.wa.gov/mapping/salmonscape/index.html> Accessed January 9, 2008.
- Steelhead Habitat Inventory and Assessment Program (SSHIAP)
- Salmonid Stock Inventory (SASSI) (<http://wdfw.wa.gov/fish/sassi/intro.htm>)

### 2.4.2 Field Assessments

Staff biologists conducted field assessments in riparian areas in which permanent vegetation removal or fill placement would occur as a result of the Build Alternative. Functionally, riparian areas are zones that extend outward from the OHWM of rivers, streams, and creeks. These areas provide essential functions such as shading for the stream, sediment and nutrient filtration, and soil stabilization. They also represent habitat for a number of wildlife species. For purposes of this report, riparian areas have been defined as the area below the OHWM, plus an area extending to the edge of the riparian habitat buffer on either side of the waterbody.<sup>3</sup>

Stream habitat assessments were conducted on stream reaches upstream and downstream of highway or local street crossings. Generally, to account for potential effects associated with construction and operation of the project (i.e., erosion and stormwater runoff), the survey reach was approximately 200 feet up-and downstream of the roadway crossing; it also included a review of stream crossings at NE 10<sup>th</sup> Avenue and NE 92<sup>nd</sup> Avenue. County Riparian Habitat Field Rating Forms were completed for the Gee Creek tributaries, the East Fork Lewis River tributary, Mill Creek North, and Mill Creek.

Project area wetlands were reviewed to determine if documented or potential fish habitat occurs within the biological study area. Project biologists did not conduct direct fish surveys (e.g., electroshocking, snorkeling, or seining) for this study.

As federal- and state-listed threatened and endangered fish species and critical habitat are documented in the biological study area and surrounding vicinity, the fish and aquatic resource review included field assessments for aquatic habitat within the biological study area. Project biologists reviewed biological study area culverts and fish passage information (WDFW/WSDOT Fish Passage Inventory) for Mill Creek, Mill Creek North, the western and eastern Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, and the Mill Creek tributary on November 8, 2007 and February 6, 2008 with WDFW biologists and culvert engineers. Project biologists completed the Clark County Riparian Habitat Field Rating forms in the field and office on October 15 and December 21, 2007. They delineated the OHWM on September 27 and October 11, and 23, 2007. Along Mill Creek and Mill Creek North, the OHWM was determined based on published procedure by Ecology (Chapter 90.58 RCW, Shoreline Management Act of 1971) and the latest guidance.<sup>4</sup> The OHWM was digitized and field-confirmed for the western and eastern Gee Creek tributaries and the unnamed tributary to

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<sup>3</sup> Riparian habitat buffer widths were determined based on the Clark County Habitat Conservation Ordinance (Chapter 40.440) (Clark County 2007b) regarding the WDNR stream types (based on WAC 222-16-031) and a discussion with David Howe, Clark County habitat biologist. According to Mr. Howe, Mill Creek, which flows to Salmon Creek, Mill Creek North, which flows to the East Fork Lewis River, and the Mill Creek tributary are WDNR Type F waters and would require 200-foot riparian habitat buffers as measured from the OHWM. The western and eastern tributaries to Gee Creek and the unnamed tributary to the East Fork Lewis River in the biological study area are WDNR Type Ns waters and would require 75-foot riparian habitat buffers extending horizontally from the OHWM (pers. comm. October 30, 2007 and February 26, 2008).

<sup>4</sup> Washington Department of Ecology Coastal Training Program training workshop, "How to Determine the Ordinary High Water Mark," April 22, 2004, Kelso, Washington.

the East Fork Lewis River. WSDOT staff would delineate the OHWM on these tributaries using the published procedure before design of the culverts.

### 2.4.3 Calculate Effects

The effects calculated are approximate and may change during final design. Potential effects on fish resources were assessed for:

- Direct effects to suitable in-stream and riparian habitats (and contiguous wetland habitats used by fish)
- Temporary, construction-related impacts associated with clearing vegetation, soil disturbance, or in-water work

The OHWM for Mill Creek and Mill Creek North was surveyed by WSDOT and mapped on aerial photographs. The digitized OHWM for the Gee Creek tributaries and the unnamed tributary to the East Fork Lewis River was mapped on aerial photographs by project biologists. ESRI ArcGIS Version 9.2 software was used to quantify impacts to riparian habitat below the OHWM and within the riparian habitat buffer.

Project biologists conducted Levels One, Two, and Three stormwater analyses to assess stormwater pollutant loading into waterbodies, stormwater pollutant concentrations in each Threshold Discharge Area (TDA), and to determine the downstream extent of potential effects to fish species. (See Fish Resources in Section 4.2.2 below for additional information on these analyses.)

While the stormwater analyses were prepared as part of the Biological Assessment to assess the extent of potential stormwater effects to listed fish, the information also applies to non-listed fish areas within the secondary biological study area.

## 2.5 Agency Coordination

The Federal Highway Administration (FHWA) is the lead agency for the proposed project. WSDOT, on behalf of FHWA, and the following agencies, organizations, and tribes were contacted for information related to biological resources in the study area: USFWS, NOAA Fisheries, the Environmental Protection Agency (EPA), the US Army Corps of Engineers (Corps), WDFW, WDNR, Ecology, the County, and the Cowlitz, and Chinook tribes.

## 2.6 Regulatory Authorities/Governing Plans

FHWA would acquire the environmental permits and clearances needed for construction activities. A list follows of the aquatic, wildlife, and vegetation resource-related permits or approvals that would be required and the federal, state, and local agency with jurisdiction.

### 2.6.1 Federal

National Environmental Policy Act (NEPA) (administered by the Executive Office of the President's Council on Environmental Quality) ensures that the environmental impacts of any proposed decisions are fully considered and that appropriate steps are taken to mitigate potential environmental impacts.

Section 7 ESA consultation (administered by NOAA Fisheries and USFWS) protects plants, animals, and fish listed as endangered or threatened under federal rules.

The Clean Water Act (CWA) (33 USC 1251-1376) Sections 404 (Fill Authorizations) (administered by the Corps) and 401 (Water Quality Certification) and 402 (Discharge Authorizations) (administered by the EPA or its designees [i.e., Ecology]). The CWA implements pollution protection, wetlands protection, and dredging provisions in waters of the United States. The purpose of the Section 401 is to ensure federally permitted activities comply with the CWA and state water quality laws. Section 401, an individual Water Quality Certification from Ecology, is required for Section 404 permit activities authorized by the Corps, which, along with the EPA, governs the discharge of dredged materials into US waters under the Section 404 regulation.

The Fish and Wildlife Coordination Act (16 USC 661-667e) authorizes the Secretaries of Agriculture and Commerce to assist and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. Amendments in 1946 require consultation with USFWS and WDFW where the “waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted...or otherwise controlled or modified” by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of “preventing loss of and damage to wildlife resources.”

Sole Source Aquifer is administered by the EPA. Certain aquifers are designated as the “sole or principal” source of drinking water in an area and the EPA regulates federally financed projects in the area that may contaminate the aquifer.

Title 40 CFR Part 122, National Pollutant Discharge Elimination System (NPDES) Stormwater Permit for Construction Sites, is administered by EPA or its designees (i.e., Ecology). This legislation regulates all soil disturbing activities where construction activity would disturb 1 or more acres and would result in discharge of stormwater to receiving water, and/or storm drains that discharge to a receiving water.

The Migratory Bird Treaty Act (MBTA) 16 USC 703-712) is administered by USFWS. This domestic law affirms, or implements, the United States’ commitment to four international conventions for the protection of shared migratory bird resources. Executive Order 13186 outlines federal agency responsibilities for protecting migratory birds under the MBTA and other statutes.

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c), enacted in 1940, administered by the USFWS, and amended several times, prohibits anyone without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” On June 5, 2007, the USFWS clarified its regulations implementing the Act and published the National Bald Eagle Management Guidelines. These actions are designed to give landowners and

others guidance on how to ensure that actions they take on their property are consistent with the Act and the MBTA (above).

The Magnuson-Stevens Fishery Conservation and Management Act (FCMA) of 1970 (16 USC 1801) administered by NOAA Fisheries provides for the conservation and management of fishery resources. The Sustainable Fisheries Act (Public Law 104-297) (re-named from the Magnuson-Stevens Act) (MSA) amended the habitat provisions of the MSA. It calls for direct action to stop or reverse the continued loss of fish habitats. The Act requires Federal agencies to protect, conserve, and enhance “essential fish habitat” (EFH) for federally managed fish species; “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”

### 2.6.2 State

The Washington State Environmental Policy Act (SEPA) Washington Administrative Code (WAC 197-11) is administered by Ecology and requires that all state and local governmental agencies determine the environmental impact of land use decisions and promote efforts that would prevent or eliminate damage to the environment.

WDFW Priority Habitat information and recommendations are developed by WDFW to meet the goals of maintaining and enhancing the structural and functional integrity of priority habitat. It is expected that these management recommendations will contribute to the scientific component of planning, protection, and restoration efforts for fish and wildlife. Chapter 77.55 Revised Code of Washington (RCW), Washington State Hydraulic Code administered by WDFW through rules under Chapter 220-110, WAC, requires a permit for work that would use, divert, obstruct, or change the natural flow or bed of any state waters (e.g., culvert work, realignment, bridge replacement). The state Hydraulic Code contains rules that protect all fish life, which includes the habitat that fish live in.

Chapter 79.70.030 RCW authorizes the WDNR to establish and maintain a Natural Heritage Program that includes special plant species.

The Washington Growth Management Act (GMA) (RCW Chapter 36.70a) is administered by cities and counties with oversight from Ecology. Local jurisdictions formulate CAOs using GMA guidelines. These regulations protect the critical habitat areas for plants, wildlife, and fish within each respective jurisdiction.

WSDOT Executive Order 1031 Protection and Connection for High Quality Natural Habitats mandates consideration of habitat values and wildlife movement needs in all transportation activities. WSDOT and the WDFW are co-leading development of a Statewide Habitat Connectivity Plan that will identify important wildlife corridors between wildland blocks statewide.

### 2.6.3 Local

The County regulates stormwater through its stormwater and erosion control ordinance (Clark County Code [CCC] 40.380), which sets standards for protecting and minimizing impacts to surface water (i.e., creeks, streams, ponds, lakes, and wetlands,) and groundwater via stormwater quality and quantity control and erosion control.

Its habitat conservation ordinance (CCC 40.440) sets standards of no net loss of habitat functions and values to conserve the functional integrity of the habitats needed to perpetually support fish and wildlife populations within designated habitat areas by protecting environmentally distinct, fragile, and valuable fish and wildlife habitat areas. These habitat areas include riparian priority habitat, other priority habitats and species, and locally important habitats and species.

Finally, the County's wetland protection ordinance (CCC 40.450) provides standards for classification, protection, and mitigation of impacts to wetlands, and the habitat conservation ordinance (CCC 40.440) regulates development within sensitive habitats, to provide no net loss in overall function within sensitive areas.

The Lower Columbia Salmon Recovery and Fish and Wildlife Plan, administered by the Lower Columbia River Fish Recovery Board (LCFRB, 2004), is a recovery plan for Washington lower Columbia salmon and steelhead populations and a Northwest Power and Conservation Council Fish and Wildlife Plan for 11 lower Columbia subbasins.

### **3.0 Affected Environment**

This section describes the affected environment, or existing conditions, within the study area.

#### **3.1 Project Setting**

Rural residential, rural commercial, and open spaces are the dominant land uses in the study area vicinity. A proposed mitigation site, Sunset Oaks, is located roughly six miles south of the SR 502 corridor. Sunset Oaks is a 35-acre undeveloped site located northeast of the I-205/Padden Parkway Expressway intersection between NE 88<sup>th</sup> Street and NE 99<sup>th</sup> Street.

Within the biological study area, SR 502 passes through a semi-rural area of unincorporated Clark County. Land uses in this area include a variety of low-density residential homes, agricultural uses, churches, and rural commercial properties. Dollars Corner, a rural commercial center, is at the intersection of SR 502 and NE 72nd Street, and includes a cluster of rural commercial businesses.

#### **3.2 Watersheds**

Due to the position of the biological study area on the landscape, the project occurs within portions of three major watersheds within two subbasins: the East Fork Lewis River Subbasin (Water Resource Inventory Area [WRIA] #27) and the Salmon Creek Subbasin (WRIA #28). The waterbodies that are located within the East Fork Lewis River Subbasin are in the Lower East Fork Lewis River Hydrologic Unit (6<sup>th</sup> field Hydrologic Unit Code [HUC] #170800020506). The waterbodies that are located within the Salmon Creek Subbasin are in the Vancouver Hydrologic Unit (6<sup>th</sup> field HUC #170800010901) (Figure 3).

Unnamed tributaries to Gee Creek are the surface water bodies that are within the western portion of the biological study area and are associated with the East Fork Lewis River Subbasin. Gee Creek discharges to the Columbia River immediately upstream of the confluence of the Lewis and Columbia Rivers. Two tributaries of the East Fork Lewis River drain the north side of SR 502 in the central portion of the biological study area. Of the two tributaries to the East Fork Lewis River, the western is unnamed while the eastern one is known as Mill Creek North. Anecdotal evidence suggests that Mill Creek North was once a seasonal waterbody referred to as

Round Lake, which drained south to Mill Creek rather than north as it does today. In the early 1900s, landowners ditched and drained the wetlands.

Mill Creek, a tributary to Salmon Creek, is the surface water body within the eastern and central portion of the biological study area and is associated with the Salmon Creek Subbasin. The Mill Creek tributary drains a large wetland complex before flowing into Mill Creek west of NE 92<sup>nd</sup> Avenue. Mill Creek discharges into Salmon Creek, which in turn discharges into Lake River within the Ridgefield National Wildlife Refuge before flowing into the Columbia River.

Curtin Creek, a perennial tributary of Salmon Creek, bisects the Sunset Oaks mitigation site through a 2,500-linear foot ditch that has been rerouted through the site from its historic channel further to the northwest. The site is currently a wetland dominated primarily by reed canarygrass (*Phalaris arundinacea*).

### **3.3 Geology**

The biological study area is located in the Puget-Willamette Lowlands physiographic province, which extends from the United States-Canadian border south to Eugene, Oregon, between the Coast Range and the Cascade Mountains. The biological study area lies in a portion of the Puget-Willamette Lowlands known as the Portland Basin, a structural trough formed by volcanic bedrock and filled with thick sequences of glacial flood and alluvial deposits dating to the Miocene epoch. The Columbia River and its tributaries have contributed to the formation of landforms in the Portland Basin, most notably alluvial terraces and valleys.

### **3.4 Historical Landscape**

Pre-Lewis and Clark settlement, portions of the biological study area may have been maintained as open prairie by Native Americans. Early settlers logged much of the land and used it for farming, tilling it for crops and hay and using it to raise farm animals.

### **3.5 Wetland Resources**

Seventy-four wetlands were identified and delineated in the biological study area (Figures 4A and 4B). The wetlands consist of depressionnal and riverine hydrogeomorphic classes, and numerous Cowardin classes are present, including palustrine, forested (PFO); palustrine, emergent (PEM); and palustrine, scrub shrub (PSS). The biological, chemical, and physical functions provided by these wetlands range from very low to high, with the higher functioning wetlands more prevalent to the north of SR 502. There are 33 wetlands on the north side of SR 502 and 41 on the south side (Exhibit 1). Complete descriptions of each wetland and Ecology's field rating forms for each wetland are provided in the *Wetland Delineation Report* (WSDOT, 2006). A wetland summary table of each delineated wetland is located in Appendix B and includes the rating form scores.

Riparian forest habitat is primarily composed of Douglas fir (*Pseudotsuga menziesii*), big-leaf maple (*Acer macrophyllum*), western red cedar (*Thuja plicata*), and red alder (*Alnus rubra*). The conifers range in size from 12 to 24 inches diameter-at-breast-height (DBH) and are approximately 50 to 100 feet in height. The big-leaf maple and western red cedar range from 10 to 20 inches DBH and are 40 to 80 feet in height. Red alder is common in the 6 to 12 inches DBH class and are 20 to 40 feet in height. Understory shrubs typically include Indian plum, beaked hazelnut, and vine maple.

Exhibit 1. Wetland Resources North and South of SR 502

Wetland Category	Wetland Resources	
	North	South
Category I	2	1
Category II	9	2
Category III	13	15
Category IV	9	23
<b>Total</b>	<b>33</b>	<b>41</b>

### 3.6 Vegetation Resources

This section documents vegetation communities that could be affected by the proposed SR 502 Corridor Widening project. Wetland and upland vegetation resources mapped within the biological study area include grassland, scrub-shrub, and forest (Figures 5A and 5B). Some riparian habitat exists within each of these habitat types, and it has been classified separately for purposes of this report.

#### 3.6.1 Wetland

##### *Emergent Wetlands*

Emergent wetlands within the biological study area are largely disturbed and tend to be dominated by invasive grass species such as reed canarygrass, or non-native pasture grasses including fescues (*Festuca* spp), bluegrasses (*Poa* spp), timothy, bentgrasses, and velvet grass. Disturbed remnant wet prairie habitat occurs sporadically in the primary biological study area and is discussed in greater detail in Section 3.6.8. Reed canarygrass covers nearly 100 percent of the Sunset Oaks mitigation site. The large Category I wetland associated with Mill Creek North is also largely reed canarygrass-dominated and also includes soft rush (*Juncus effusus*); it also has dense populations of the invasive yellow iris (*Iris pseudacorus*).

##### *Scrub-Shrub Wetlands*

Scrub-shrub wetlands within the biological study area typically include shrub species such as red-osier dogwood (*Cornus sericea*), Douglas' spiraea (*Spiraea douglasii*), and several willow (*Salix* spp.) and rose (*Rosa* spp.) species. In some areas a tree cohort is developing consisting of Oregon ash (*Fraxinus latifolia*), western red cedar, and red alder. Emergent vegetation is varied and consists of skunk cabbage (*Lysichiton americanus*), largeleaf avens (*Geum macrophyllum*), soft rush, slough sedge (*Carex obnupta*), creeping buttercup (*Ranunculus repens*), celery-leaved buttercup (*R. sceleratus*), and false hellebore (*Veratrum californicum*).

##### *Forested Wetlands*

Forested wetlands within the biological study area are primarily forested with Oregon ash, and also include mature black cottonwood (*Populus balsamifera*) and western red cedar. Understory vegetation is relatively sparse within these wetlands, consisting primarily of sparse cover of native shrubs such as red-osier dogwood, and cottonwood and ash saplings. Most of these forested wetlands also have a component of Himalayan blackberry along their margins. Pockets of understory vegetation consists of native emergent vegetation such as soft rush, slough sedge,

and skunk cabbage, while reed canarygrass dominates in many locations. Upland species such as sword fern also exist on drier hummocks within these wetlands.

#### *Non-Wetland—Below OHWM (In-Stream)*

In some cases, the identified OHWM of streams within the biological study area is entirely within the boundaries of a delineated wetland. In these cases, impacts have been reported in the discussion of wetland impacts. In other cases, the areas below the OHWM of streams in which vegetation removal or fill placement would occur are not associated with any delineated wetlands. For purposes of this report, impacts to those areas are discussed as non-wetland, below OHWM (in-stream) impacts.

#### *Riparian Habitat*

Riparian habitat encompasses the area beginning at the OHWM and extends to that portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic ecosystem. For purposes of this report, the limits of riparian habitat have been defined according to the County habitat conservation ordinance (Clark County, 2008) and conversations with David Howe, County habitat biologist. According to Mr. Howe, Mill Creek North, Mill Creek, and the Mill Creek tributary are WDNR Type F waters and require 200-foot riparian habitat buffers as measured from the OHWM, while the unnamed Gee Creek tributaries and the unnamed tributary to the East Fork Lewis River in the biological study area are WDNR Type Ns waters and require 75-foot riparian habitat buffers extending horizontally from the OHWM (pers. comm. October 30, 2007 and February 26, 2008).

The riparian buffers associated with biological study area streams represent a mix of upland and wetland vegetation. For purposes of this report, impacts to riparian habitat have been separated into effects to 1) upland riparian habitat and 2) wetland riparian habitat. A discussion of effects to riparian habitat is important as it relates to habitat for listed fish species, and structuring the discussion in this way prevents the need to count wetland effects twice.

Emergent riparian habitat, both upland grassland and emergent wetland, occurs in association with the two Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, and Mill Creek. In the case of the western Gee Creek tributary, the entire riparian buffer is emergent wetland. The eastern Gee Creek tributary and the unnamed tributary to the East Fork Lewis River both have emergent wetland, forested wetland, and upland grassland components. Nearly the entire riparian buffer for Mill Creek North is composed of emergent wetland, with a small component of upland grassland. The Mill Creek riparian buffer is a mosaic of wetland and upland habitat types. At the NE 72nd Avenue crossing, the riparian buffer has a small scrub-shrub wetland, and some upland forest and scrub-shrub habitat. At the SR 502 crossing east of NE 72nd Avenue, the buffer consists of upland forest, scrub-shrub, and emergent habitat. The SR 502 crossing west of NE 92nd Avenue is primarily upland grassland north of SR 502, and a mosaic of upland and wetland habitat to the south of SR 502.

### 3.6.2 Grassland

Upland grassland habitat in the biological study area is dominated by both native and non-native agricultural grasses and weeds. Most grassland habitat within the biological study area has been converted to residential lawns or to pasture for livestock or hayfields and include nonnative species. Characteristic or dominant species found in grasslands in the biological study area are

fescues (*Festuca* spp.), sweet vernalgrass (*Anthoxanthum odoratum*), blue grass (*Poa* spp.), timothy (*Phleum pratense*), bentgrass (*Agrostis* spp.), meadow barley (*Hordeum brachyantherum*), quackgrass (*Agropyron repens*), perennial ryegrass (*Lolium perenne*), velvet grass (*Holcus lanatus*), orchard grass (*Dactylis glomerata*), and clover (*Trifolium* spp.).

### 3.6.3 Scrub-shrub

Upland scrub-shrub habitat within the biological study area is characterized by trees, bushes, and shrubs that are less than 20 feet in height. Upland scrub-shrub habitat exists sporadically throughout the biological study area, primarily on the fringes of riparian areas. Characteristic or dominant species found in the scrub-shrub vegetation include beaked hazelnut (*Corylus cornuta*), red alder, Indian plum (*Oemleria cerasiformis*), cascara (*Rhamnus purshiana*), bitter cherry (*Prunus emarginata*), red elderberry (*Sambucus racemosa*), trailing blackberry (*Rubus ursinus*), evergreen blackberry (*R. laciniatus*), Himalayan blackberry (*R. discolor*), baldhip rose (*Rosa gymnocarpa*), and fireweed (*Chamerion angustifolium* ssp. *angustifolium* = *Epilobium angustifolium*).

### 3.6.4 Forest

Upland forests include trees mature and dense enough to support shade-tolerant understory species. Upland forests in the study area are primarily mixed deciduous coniferous forest, with a lesser amount of oak woodlands scattered throughout. Characteristic or dominant tree species found in the upland mixed deciduous/coniferous forest include Douglas fir, western hemlock (*Tsuga heterophylla*), Oregon white oak (*Quercus garryana*), big-leaf maple, and western red cedar. Typical middle story species include beaked hazelnut, vine maple (*A. circinatum*), Indian plum, and red alder. Herbaceous species include salal (*Gaultheria shallon*), wild ginger (*Asarum caudatum*), false lily-of-the-valley (*Maianthemum dilatatum*), trillium species (*Trillium* spp.), Pacific waterleaf (*Hydrophyllum tenuipes*), snowberry (*Symphoricarpos albus*), swordfern (*Polystichum munitum*), Dewey's sedge (*Carex deweyana*), vanilla leaf (*Achlys triphylla*), stinging nettle (*Urtica dioica*), piggy-back plant (*Tolmiea menziesii*), Hooker's fairybells (*Disporum hookeri*), and fringecup (*Tellima grandiflora*). Most of these forests also have a component of Himalayan blackberry along their margins. Oak woodlands in the area are dominated by Oregon white oak with an understory of Indian plum and herbaceous species include red huckleberry (*Vaccinium parvifolium*), camas, and small flowered trillium.

Forest resources occur throughout the corridor. Forest communities are characterized as second growth forest composed primarily of conifers and deciduous tree species such as those listed above. The conifers range from 10 to 20 inches DBH and are approximately 40 to 100 feet in height. The understory is a mix of conifers and various shrubs that are approximately 4 to 10 inches DBH and 20 feet in height. Red alders are numerous in the 6 to 10 inches DBH class and are typically 10 to 30 feet in height.

### 3.6.5 Noxious Weeds and Non-native and Nuisance Species

The Washington State Noxious Weed Control Board (WSNWCB, [2007]) maintains a list of plant species considered to be noxious. Noxious weeds are non-native, invasive species that contribute to the loss of agricultural production or ecological diversity. Weeds are classified as A, B, or C. Class A weeds have limited distribution statewide and should be eradicated according to state law. Class B weeds are species that are abundant only in some parts of the state. In areas

of limited abundance (i.e., B designate), control of seed production is required; otherwise, control is a local option. Class C weeds are species present throughout the state or of agricultural importance and control is left to the local entities.

**Photo 1: Photograph illustrates typical roadside vegetation along SR 502 including grassland, scrub-shrub, and forest in the distance.**



Noxious weeds are found throughout the biological study area. Noxious weeds among the most abundant in the biological study area included oxeye daisy (*Leucanthemum vulgare*), tansy ragwort, and Canada thistle (*Cirsium arvense*). These are classified as Class B and C weeds. Reed canarygrass and Scots broom are invasive nuisance species and occur throughout the biological study area.

### 3.6.6 Special Status Plant Species

The following section and describe rare plant species with federal or state status that occur in Clark County or in the vicinity of the proposed project.

Exhibit 2. Rare Plant Species (with Federal or State Status) Potentially Occurring in Clark County & Vicinity of Project

Common Name	Scientific Name	Federal Status	State Status	Typical Habitat	Potential Occurrence
Bradshaw's Lomatium	<i>Lomatium bradshawii</i>	Endangered	Endangered	Native wet prairie	Unlikely
Golden Indian paintbrush	<i>Castilleja levisecta</i>	Threatened	Endangered	Prairie	Unlikely
Nelson's Checkermallow	<i>Sidalcea nelsoniana</i>	Threatened	Endangered	Native prairie	Unlikely
Water Howellia	<i>Howellia aquatilis</i>	Threatened	Threatened	Glacial pothole ponds	Unlikely
Tall Bugbane	<i>Cimicifuga elata</i>	Species of Concern	Sensitive	Mixed forest	Unlikely
Torrey's Peavine	<i>Lathyrus torreyi</i>	Species of Concern	Threatened	Open forest habitat	Unlikely
Dense Sedge	<i>Carex densa</i>	None	Threatened	Wetland and riparian habitat	Unlikely
Oregon Coyote-thistle	<i>Eryngium petiolatum</i>	None	Threatened	Native wet prairie	Unlikely
Western Wahoo	<i>Euonymus occidentalis</i>	None	Threatened	Riparian habitat	Unlikely
Small-flowered Trillium	<i>Trillium parviflorum</i>	None	Sensitive	Wetland/riparian forest habitat	Present
Columbia Water-meal	<i>Wolffia columbiana</i>	None	Review*	Ponds	Unlikely

\* This species is labeled 'R1' by WDNR and is of potential concern, requiring additional field information, but for which no status has yet been assigned.

### Federal Threatened and Endangered Plant Species

Information provided by the USFWS and WDNR regarding federal and state threatened, endangered, candidate, and plant species of concern that are known to occur in Clark County is summarized in Exhibit 2. Based on information obtained from USFWS and WDFW, there are no documented federal threatened or endangered plant species in the project area. Formal protocol surveys for federal- and state-listed threatened and endangered species were not conducted as part of this assessment and no formal surveys are planned because no evidence of these plant species was observed during the fieldwork done for this technical report.

The WDFW PHS database indicates that two oak woodlands are located just north of the biological study area (WDFW, 2008).

#### *Bradshaw's Lomatium (Lomatium bradshawii)*

Bradshaw's lomatium (*Lomatium bradshawii*) is a federal and state endangered species (USFWS, 2008) and is found in the Willamette Valley near streams and small rivers. Flowering time is mid-April to mid-May, depending on location (WDNR, 2008). The nearest documented occurrence is approximately 12 miles southeast of the project area. Typical plant associates of Bradshaw's lomatium are tufted hairgrass (*Deschampsia cespitosa*), slender rush (*Juncus tenuis*), sawbeak sedge (*Carex stipata*), and one-sided sedge (*C. unilateralis*) (WDNR, 2008). Of these species, only slender rush was observed. Habitat adjacent to Gee Creek tributaries, Mill Creek North, and Mill Creek is degraded and heavily grazed, and undisturbed wet prairies do not occur

in the project area. Therefore, suitable habitat for this species (i.e., undisturbed, seasonally flooded prairie and grassland remnants) is not present in the project area.

*Golden Indian paintbrush (Castilleja levisecta)*

Golden Indian paintbrush (*Castilleja levisecta*) is a federal threatened and state endangered species and occurs in Clark County (USFWS, 2008). The taxon is a regional endemic with a historic range west of the Cascade Mountain Range from the southern tip of Vancouver Island, Canada to Linn County, Oregon. Currently, the southernmost documented occurrence of golden Indian paintbrush is in Thurston County, Washington (WDNR, 2008). Historical information indicates that, before 1900, this species occurred approximately 5 miles from the biological study area (NHP). This species occurs in open grasslands in the Puget Trough, and grows at low elevations in substrates composed of glacial outwash. Fire is thought to have played a key role historically in the maintenance of the open prairie habitats occupied by this species. Conversion of historical grasslands and prairies to agriculture, residential, and commercial development has resulted in this species' extirpation from most of its range. Flowering time is late-April to mid-July, depending on location. Biologists who conducted site visits during flowering time did not observe this species in the project area. Plant associates are red fescue and Idaho fescue (*F. idahoensis*). Red fescue is common throughout the project area. Grasslands within the biological study area are heavily grazed and are dominated by non-native pasture grasses and weedy annual species. Fragments of suitable habitat are present in the project area. However, much of this habitat has been actively managed for agriculture, making it unlikely that this species occurs in the project area.

*Nelson's Checkermallow (Sidalcea nelsoniana)*

Nelson's checkermallow (*Sidalcea nelsoniana*) is a federal threatened and state endangered species and is documented in Cowlitz County, more than 30 miles from the biological study area (USFWS, 2008). Although this species is not documented in Clark County, it is considered because suitable habitat and plant associates occur in the project area. This species occurs in native prairie or grassland remnants, such as along fencerows, drainage swales, and at the edges of plowed fields adjacent to wooded areas (WDNR, 2008). Plant species typically associated with Nelson's checkermallow are common in the project area. These are tall fescue, common velvet grass, soft rush, oxeye daisy, sweet vernal grass, and Canada thistle. This species flowers as early as mid-May and may extend into September (WDNR, 2008). Although undisturbed prairies do not occur in this project area, the woody, rhizomatous stem of Nelson's checkermallow may help this species to persist under disturbed conditions. Therefore, it is unlikely but possible that this species occurs in the project area, and this species was not detected on site visits during flowering time.

*Water Howellia (Howellia aquatilis)*

Water howellia (*Howellia aquatilis*) is a federal and state threatened species (USFWS, 2008). This species historically occurred over a large area of the Pacific Northwest, but currently has a limited occurrence. Water howellia grows in firm consolidated clay and organic sediments that occur in wetlands associated with ephemeral glacial pothole ponds and former river oxbows. This species flowers from late May to July, depending on location (WDNR, 2008). The closest documented occurrence of this species is approximately 5 miles northwest of the project area. Lack of suitable habitat makes it unlikely that this species occurs in study area wetlands. It was

not observed during fieldwork. It is possible that this species occurs in farm ponds in the project area. These farm ponds would not be affected by the proposed project.

### **State Threatened or Endangered, State Sensitive or Review Plant Species**

The USFWS and WDNR were consulted regarding federal and state threatened, endangered, candidates, and plant species of concern that are known to occur in Clark County. There are no documented occurrences of state-listed plant species in the project area, but there is a documented occurrence of a state sensitive plant, small-flowered trillium. This information is summarized in Exhibit 2 and the species lists are in Appendix C.

The WDFW PHS database indicates that two oak woodlands are located west of NE 72<sup>nd</sup> Avenue and north of the biological study area (WDFW, 2008).

#### *Columbia Water-meal (Wolffia columbiana)*

Columbia water-meal (*Wolffia columbiana*) occurs in Clark County and is considered a species under state review (WDNR, 2008). It is the smallest of all flowering plants, and occurs in open, still water in non-forested wetlands. Flowering is very rare for this plant, which typically reproduces by vegetative budding; flowering time is summer to early fall. This species occurs in North and South America. The closest documented occurrence is approximately 2 miles north of the project area. It is possible that this species occurs in farm ponds in the project area. These farm ponds would not be affected by the proposed project.

#### *Dense Sedge (Carex densa)*

Dense sedge (*Carex densa*) is a state threatened species. It occurs on eroding hummocks in intertidal marshland. The species has been reported from small cutbanks along rivers and shaded springs at high elevations, but these reports need further verification. Dense sedge is identifiable June to August. This species has been observed approximately 5 miles south of the biological study area in emergent wetland, but is not documented nor observed in the project area. It is possible this species occurs along creeks and in wetlands in the project area.

#### *Oregon Coyote-thistle (Eryngium petiolatum)*

Oregon coyote-thistle (*Eryngium petiolatum*) is a state threatened species that occurs in Clark County (WDNR, 2008). It occurs from the Willamette Valley of Oregon to the eastern end of the Columbia Gorge in Washington and Oregon. In Washington, it is restricted to a very small area within western Klickitat and Clark counties. Oregon coyote-thistle is found in wet prairies, especially in places submerged in the spring and drier in the summer. It is identifiable from June to August. This species is not documented nor was it observed in the project area. It is unlikely this species occurs in the heavily grazed wet meadows of the project area.

#### *Small-flowered Trillium (Trillium parviflorum)*

Small-flowered trillium (*Trillium parviflorum*) is a state sensitive species and its location is documented by WDNR within the biological study area (WDNR, 2008). Five other locations of this species were observed during field visits. This species occurs in oak habitat, and in association with moist areas dominated by hardwoods and Oregon ash, but sometimes with red alder. Staff biologists searched the documented location for the small-flowered trillium during the identification window, but did not observe individuals of this species. The WDNR

documented location was recently disturbed and tire tracks forming deep grooves in the soil were visible. Therefore, it is possible that this population had already been affected by vehicles that moved through the area and disturbed the soil. Depending on location, this species flowers in late-March to mid-May. The shiny skinned, dark-maroon fruit, broadly ovoid in shape and prominently displayed by wide sepals, may be found July to August. It is possible that this species occurs in forested areas, on wetland edges, and in riparian areas in the remainder of the biological study area.

**Photo 2: Photograph illustrates a small patch of small-flowered trilliums in the understory along SR 502. Most have just finished blooming.**



*Tall Bugbane (Cimicifuga elata)*

Tall bugbane (*Cimicifuga elata*) is a federal species of concern and state sensitive species (USFWS, 2008). This species typically inhabits mixed conifer/ hardwood forests. Flowering time is late-May to early August. The closest documented occurrences of the species are located 3 miles north and 3 miles east of the biological study area (WDNR, 2008). Associated species occur commonly in the project area. These include Douglas fir, western red cedar, bigleaf maple, red alder, vine maple, oceanspray (*Holodiscus discolor*), hazelnut, sword fern, and snowberry. This species has not been documented in the project area, but could occur in forests and riparian areas.

*Torrey's Peavine (Lathyrus torreyi)*

Torrey's peavine (*Lathyrus torreyi*) is a federal species of concern and state threatened species and has been documented in Clark County (USFWS, 2008). The closest documented occurrences of the species are located more than 10 miles from the biological study area (WDNR, 2008). Historically, this species occurred 3 miles south of the project area. The only known extant occurrences in Washington are within somewhat open areas within Douglas fir-dominated sites. It is likely that natural disturbances, such as fire and wind-throw, helped create habitats historically. The species appears to like forest openings, especially trail edges. It forms dense patches where competition from other species is low. However, it does not appear to do well where there is significant cover of other species. As recently as 1994, it was thought to have been extirpated from Washington. This species is identifiable from May to July. It is very unlikely that this species occurs in forests in the study area due to heavy canopy and herbaceous cover.

*Western Wahoo (Euonymus occidentalis)*

Western wahoo (*Euonymus occidentalis*) is a state threatened species that occurs in Clark County (WDNR, 2008). It grows in woods on the west side of the Cascade Mountains and is often found in shaded, moist draws and ravines. In the Puget Sound Trough area, it is associated with remnant oak savannah. Western wahoo flowers from May to June. It is not documented nor was it observed in the biological study area during field surveys, but it is possible this species occurs in the project area.

### 3.6.7 Native American Plants and Habitats of Concern

Before Europeans arrived in the region (pre-contact), a wide variety of plant resources was collected by Cowlitz speakers. Hajda (1990:507) reports that the Cowlitz harvested a surplus of camas so that they could trade with neighboring groups in regions where this prized food was less plentiful. The Cowlitz utilized the common edible plants found across the landscape including camas, horsetail shoots, water parsley, bracken fern, and cattail roots as well as edible berries. These resources were gathered and processed in the upland areas typical of the project location. Large winter villages were generally located near major waterways such as the Cowlitz River, but smaller Cowlitz camps were located along minor creeks and streams, in good hunting areas, and where there were abundant plant resources. Camas bulbs and acorns were important Native American food sources, so plants and habitats in the study area of particular interest to the Cowlitz include camas (*Camassia quamash*) and oak woodlands (Reynolds, 2008). Other Native Americans, such as the Chinook also occurred in the area.

Data indicates that regional temperatures and dominant vegetation may have been different pre-contact. Approximately 6,500 years before present (BP), pollen cores contained an abundance of bracken fern spores and charcoal concentrations, suggestive of higher mean temperatures and frequent low-intensity fires. The regional vegetation may have been of a dry oak savannah. The evidence of frequent low-intensity fires has been interpreted to reflect, in part, Native American maintenance of the vegetation by burning, although there is no direct evidence of this cultural practice at that date. Significantly, camas pollen peaks between approximately 8,000 BP and 5,300 BP, dropping dramatically from that period to background levels up to the present (Barnosky, 1985). Barnosky (1985:269) suggests that the combined pollen and macrofossil data of this period is evidence for a landscape of open meadows in a savannah of Garry oak and

scattered Douglas fir. Both mesic and wet prairie habitat may have occurred in the biological study area.

Field visits and WDFW PHS information confirm the presence of oak woodlands approximately 0.5 mile north of SR 502, with scattered oaks still remaining in maintained yards near the roadway. A meadow of camas, a reliable plant food used extensively by Native Americans, was observed north of SR 502 east of NE 29th Avenue in a horse pasture, and a smaller number of camas lilies were observed in several locations along the corridor. Camas is able to withstand considerable disturbance from grazing (WDNR, 2004). It is possible that camas occurred elsewhere in the biological study area and was used as a source of food by Native Americans.

Remnants of Oregon ash communities persist in the biological study area, despite the intense cultivation of the lands since the late 19th century. The understory communities may have been managed by Native Americans to maintain herbaceous species of interest. The understory communities would have been dominated more by forbs, grasses, and sedges used for foods, fibers, and medicine plants by Native Americans. Even though sections of the biological study area are presently dominated by reed canarygrass and Oregon ash, other species such as camas and native grasses and sedges may persist within these communities (WNHP, 2007b). A more detailed discussion of prairie habitat and prairie plants is presented below.

During a site visit with a Cowlitz Tribe ecologist and WSDOT biologists on May 13, 2008 to view oak woodlands and discuss the biological study area, several camas lilies and red huckleberry, food sources of Native Americans, were observed in the oak woodlands. These woodlands represent disturbed, remnant oak savannah/prairie habitat. The Tribe ecologist also identified locations of camas lily flowering along the corridor.

### 3.6.8 Prairie Plants and Habitat

Prairies, i.e., native grasslands on gentle topography and deep soils, were a component of pre-settlement vegetation in western Washington. These grasslands were underlain by a variety of soil types. A review of the *Clark County Soil Survey* (McGee, 1972) shows that some soil types in the biological study area occur on the *Western Washington Core Prairie Soils Series List* (NRCS, 2008). Historically, plant communities present on these soil types were maintained by the controlled burning practices of Native Americans (Norton, 1979).

Studies of native grasslands in southwestern Washington found fairly large areas of prairie soil, but no extant untilled grasslands larger than 5 acres (Chappell et al., 2001). This indicates a greater than 99 percent loss of native grasslands (prairies) in southwestern Washington.

Soils in the biological study area that are indicative of current or historical prairie habitat include the following: Cove silty clay loam, Gee silt loam, Hillsboro silt loam, Hockinson loam, Lauren loam, and Washougal gravelly loam. Soils in the biological study area that are not identified as associated with prairie habitat are Odne silt loam, Hesson clay loam, and Tisch silt loam. However, many prairie sites with existing native prairie vegetation are found on soils that are not listed on NRCS, 2008 because of the scale of soil survey mapping and inclusions of other soils which may occur within a Map Unit. The general order of where each soil occurs within the biological study area from west to east is: Gee silt loam, Odne silt loam, Hesson clay loam, Washougal gravelly loam, Tisch silt loam, Washougal gravelly loam, Lauren loam, Hockinson

loam, Cove silty loam, and Dollar loam. These soils reflect the underlying topography and sediments.

A review of WNHP, 2004 reveals that historic prairie habitat is mapped in the biological study area in the grasslands and oak habitat surrounding Mill Creek North. This area is called King Corner Wetlands in WNHP, 2004. The soil mapped for King Corner Wetlands, Tisch silt loam, is not identified as being associated with prairie habitat. Tisch soil series consists of deep, poorly drained soils, highly organic soils where the original vegetation was sedges, reeds, hardhack, and shrubs and grasses (McGee, 1972). The mapped historic prairie habitat is located adjacent to Washougal soil which is identified as a core prairie soil. Historically, this area was a seasonal lake, but prairie habitat could have occurred on the fringes. Much of this area has been farmed and was used for grazing during the 20<sup>th</sup> century. Currently, north of SR 502 the dominant vegetation for this area is reed canarygrass and pasture grasses. Much of this parcel is farmed and regularly tilled, plowed, planted, and harvested when the soil is dry enough for farm equipment to access the site. South of SR 502, the dominant vegetation is soft rush, pasture grasses, and reed canarygrass.

Locations within the biological study area that may or do contain remnant prairie habitat are illustrated on Figure 6. These areas, that are or were, potential prairie habitat, in general include numerous nonnative species. Some of these areas include one or more plants indicative of prairie habitat. Plant surveys on the dominant plant species observed during May, June, and July of 2008 in six selected locations along the corridor that exhibit past or current potential for prairie habitat are located in Appendix D. Habitat along the corridor is fairly disturbed by historical and ongoing agricultural activities. Some of the potential prairie areas were examined only once because fields are regularly tilled, mowed, and harvested throughout the summer. One area, identified as potential prairie habitat after an initial site visit based on soils and a review of aerial photographs, had been extensively disturbed subsequently and was no longer a viable site. Of the prairie indicator species identified in WDNR, 2004 or the draft prairie plant list, only common blue camas, large leaf lupine, red fescue, small flowered trillium, false hellebore, spike rush (*Eleocharis* spp.), Willamette Valley bittercress (*Cardamine penduliflora*), red huckleberry, Oregon ash, quaking aspen (*Populus tremuloides*), and oak woodlands were observed in the biological study area, some only outside the area of potential effect, and false hellebore occurred in scrub-shrub wetlands. Reed canarygrass occurs in most of the areas surveyed, and later in the season, when it constitutes a greater percent cover, likely shades out many other plant species. Therefore, where prairie plants do occur, they are more likely to occur earlier in the summer before being outcompeted by reed canarygrass.

### **3.7 Wildlife Resources**

This section documents wildlife species that occur and are likely to occur in the project area. Wildlife habitat is described in terms of the dominant vegetation communities found in the project area: grassland, scrub-shrub, forest, wetland, and riparian. Each vegetation type has unique physical characteristics that make it suitable as habitat for certain species of wildlife. Additionally, there are both wetland and upland habitats within each major vegetation type which offer further niches for wildlife. Exhibit 3 lists wildlife species with federal or state status that have the potential to occur within Clark County and the biological study area.

Exhibit 3. Wildlife Species (with Federal or State Status) Potentially Occurring in Clark County and Vicinity of Proposed Project

Common Name	Scientific Name	Federal Status	State Status	Typical Habitat	Potential Occurrence
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Species of Concern	Threatened	Habitat adjacent to open water	Unlikely
Gray Wolf	<i>Canis lupus</i>	Endangered	Endangered	East and West of Cascade Mountains	Unlikely
Northern Spotted Owl	<i>Strix occidentalis caurina</i>	Threatened	Endangered	Old growth forests	Unlikely
Oregon Spotted Frog	<i>Rana pretiosa</i>	Candidate	Endangered	Seasonal wetlands	Unlikely
(Brush Prairie) Mazama Pocket Gopher	<i>Thomomys mazama ssp. oregonus</i>	Candidate	Candidate	Pasture/ grassland	Unlikely
Long-eared Myotis	<i>Myotis evotis</i>	Species of Concern	State Monitor <sup>5</sup>	Forest habitat	Unlikely
Long-legged Myotis	<i>Myotis volans</i>	Species of Concern	State Monitor	Forest habitat	Unlikely
Pacific Townsend's Big-eared Bat	<i>Corynorhinus townsendii townsendii</i>	Species of Concern	Candidate	Forest habitat	Unlikely
Tailed Frog	<i>Ascaphus truei</i>	Species of Concern	None	Streams	Unlikely
Cascades Frog	<i>Rana cascadae</i>	Species of Concern	State Monitor	Riparian habitat	Unlikely
Northwestern Pond Turtle	<i>Emys (=Clemmys) marmorata marmorata</i>	Species of Concern	Endangered	Open water habitat	Unlikely
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Species of Concern	None	Coniferous forest	Unlikely
Peregrine Falcon	<i>Falco peregrinus</i>	Species of Concern	Sensitive	River valleys and coastlines	Unlikely
Slender-billed White Breasted Nuthatch	<i>Sitta carolinensis aculeata</i>	Species of Concern	Candidate	Oak habitat	Unlikely
Northern Goshawk	<i>Accipiter gentilis</i>	Species of Concern	Candidate	Old growth forests	Unlikely
Pileated Woodpecker	<i>Dryocopus pileatus</i>	None	Candidate	Forests	Possible
Western Gray Squirrel	<i>Sciurus griseus</i>	Species of Concern	Threatened	Forests and oak woodlands	Unlikely
Western Toad	<i>Bufo boreas</i>	Species of Concern	Candidate	Lowlands	Unlikely
Larch Mountain Salamander	<i>Plethodon larselli</i>	Species of Concern	State Sensitive	Riparian habitat	Unlikely
Van Dyke's Salamander	<i>Plethodon vandykei</i>	Species of Concern	Candidate	Riparian habitat	Unlikely

<sup>5</sup> State monitor species are not considered species of concern, but are monitored for status and distribution.

Extensive fieldwork was conducted to evaluate habitat conditions and assess what wildlife species occur, or are likely to occur, in the project area. This included an effort to document unique habitat features, particularly those that might support or provide suitable habitat for federal or state listed, state candidate, state sensitive, or state monitor wildlife species. Species lists given below are not intended to be exhaustive but to represent common species. Information from the USFWS and WDFW was reviewed to determine if federal or state threatened, endangered, candidates, and wildlife species of concern are documented in the project area.

The WDFW PHS database indicates that waterfowl overwintering areas are located in the central portion of the biological study area and are associated with seasonal flooding of lands surrounding Mill Creek and Mill Creek North (WDFW, 2008).

**Photo 3: Photograph faces north of SR 502 at Mill Creek North and illustrates winter lake conditions suitable for wintering waterfowl concentrations. Canada geese appear in the background. Photograph taken December 4, 2007 following heavy rain.**



### 3.7.1 Common Species

Wildlife that occur in riparian and wetland areas typically use grassland, scrub-shrub, and forest habitats. Salmonid species that occur or may occur within the vicinity of the project include federal- and state-protected species and are covered in the fish resources section of this report.

### Grassland

Typical avian species associated with grasslands in the biological study area include American robin (*Turdus migratorius*), killdeer (*Charadrius vociferus*), European starling (*Sturnus vulgaris*), European house sparrow (*Passer domesticus*), mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), and great horned owl (*Bubo virginianus*). Other wildlife that use the study area include western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis* spp.), deer mouse (*Peromyscus maniculatus*), eastern cottontail (*Sylvilagus floridanus*), coyote (*Canis latrans*), and Columbia black-tail deer (*Odocoileus hemionus columbianus*).

### Scrub-shrub

Typical avian species associated with scrub-shrub habitat in the biological study area include black-capped chickadee (*Poecile atricapillus*), house wren (*Troglodytes aedon*), winter wren (*T. troglodytes*), dark-eyed junco (*Junco hyemalis*), red-tailed hawk, great horned owl, Anna's hummingbird (*Calypte anna*), and cedar waxwing (*Bombycilla cedrorum*). Mammal species include brush rabbit (*Symvillus bachmani*), deer, cougar (*Felis concolor*), coyote, striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*).

### Forest

Typical wildlife species associated with upland forest in the biological study area include violet-green swallow (*Tachycineta thalassina*), tree swallow (*T. bicolor*), red-breasted nuthatch (*Sitta canadensis*), great horned owl, coyote, striped skunk, raccoon, Virginia opossum, and three bat species that are federal species of concern: long-eared myotis (*Myotis evotis*), long-legged myotis (*M. volans*), and Pacific Townsend's big-eared bat (*C. townsendii townsendii*).

### Wetland

Wildlife that use biological study area wetlands include many of the same species observed in surrounding upland habitats such as killdeer, cedar waxwing, winter wren, house wren, and black-capped chickadee. In addition, chorus frog (*Pseudacris triseriata*), bullfrog (*Rana catesbeiana*), red-legged frog (*R. aurora*), rough-skinned newt (*Taricha granulosa*), chestnut-backed chickadee (*P. rufescens*), belted kingfisher (*Ceryle alcyon*), great blue heron (*Ardea herodias*), Canada geese (*Branta canadensis*), and mallards (*Anas platyrhynchos*) and other migratory waterfowl that use open water and emergent wetland along the Pacific Flyway use study area wetlands. Small and large mammals including coyote, striped skunk, raccoon, and deer may use wetlands within the study area.

### Riparian

Wildlife species that commonly occur in surrounding upland habitats also use riparian areas. In general, the riparian habitats are already highly fragmented and disturbed, and are located immediately adjacent to the existing SR 502 roadway. Results of the Clark County Habitat Evaluation Forms indicate that terrestrial wildlife habitat in riparian areas is degraded. Out of a total of 23 points for riparian wildlife functions, area streams scored between 2.01 and 10.5 (Appendix F). The low scores indicate a lack of structural and biological complexity based on such characteristics as low native woody plant species number, few to no snags or downed logs,

and the presence of nonnative plant species thereby reducing foraging. However, the red-legged frog was observed in a wetland near Mill Creek on December 5, 2007

**. Photos 4a and 4b: Red-legged frog observed near Mill Creek in the vicinity of Dollars Corner.**



Fish species and aquatic invertebrates also use riparian areas. Fish species are discussed in the Fish Resources section below.

### 3.7.2 Wildlife Movement

Many of the species discussed above rely on natural habitat corridors to move between habitats. Within the biological study area, the creeks are likely used for animal movement corridors.

Wildlife corridors in the biological study area are already fragmented by the existing SR 502 roadway and cross streets. The fragmentation of habitat in the biological study area reduces the value of habitat to wildlife by interrupting wildlife movement within and through the project area. Animals such as deer, raccoons, coyotes, opossums, squirrels, snakes, and possibly crows and waterfowl may cross the roadway and animal mortalities can result from vehicle collisions.

### 3.7.3 Federal Threatened and Endangered Wildlife Species

#### *Gray Wolf (Canis lupus)*

The gray wolf (*Canis lupus*) is a federal threatened and state endangered species known or expected to occur in Clark County (USFWS, 2008). However, gray wolves are not expected to occur in the biological study area due to lack of suitable prey species and the presence of the human population. The nearest reported occurrences (PHS) are to the east of the biological study area and have been attributed to call-responses of wolf hybrids bred by a county resident. The nearest documented occurrences are greater than 30 miles to the east within the Gifford-Pinchot National Forest. Therefore, based on available information, it is reasonable to assume that the gray wolf does not occur in the project area.

#### *Northern Spotted Owl (Strix occidentalis caurina)*

The northern spotted owl (*Strix occidentalis caurina*), is a federal threatened and state endangered species known or expected to occur in Clark County (USFWS, 2008). Roosting habitat for the northern spotted owl is defined by the (USFWS, 1992) as including stands having

closed canopies, high structural diversity, high complexity, large diameter trees (>30 inches DBH), and suitable naturally occurring cavities or platforms for nesting. Foraging habitat includes old growth and mature stands that may or may not provide the structural complexity generally associated with nesting habitat, and may include some managed second growth stands. Stands that support foraging must provide room for flight below the canopy. Dispersal habitat may include younger aged stands that do not exhibit the characteristics of either suitable foraging or nesting habitat. Forests in the biological study area are typically second growth and do not include habitat that is suitable for roosting or foraging for the northern spotted owl. The nearest documented occurrences (PHS) are greater than 15 miles east and northeast of the project area. Suitable habitat does not occur and it is reasonable to assume that this species does not occur in the project area.

### 3.7.4 State Threatened or Endangered, State Candidate, Sensitive, or Monitor Wildlife Species

#### *Bald Eagle (Haliaeetus leucocephalus)*

Information provided by the USFWS indicates that bald eagle (*Haliaeetus leucocephalus*) nesting territories exist within Clark County. The bald eagle was recently delisted at the federal level to a species of concern, and remains on the state threatened species list. WDFW recommended to the Fish and Wildlife Commission on December 8, 2007 that the bald eagle be down-listed to sensitive status and a decision is pending. However, other federal and state laws still provide protection to eagles. WDFW PHS information does not indicate the presence of bald eagles within the project area. The closest known nest is located approximately 2 miles southwest of the western end of the project area. Additional nests are located approximately 3 miles northeast and approximately 3 miles southwest of the project area. The closest known wintering roost is greater than 3.5 miles southwest of the project area. The closest known wintering concentration is greater than 4 miles west of the project area. However, waterfowl concentrations that may be prey for bald eagles are located within the project area. The absence of documented nesting territories and roost sites within the project area, combined with the absence of high quality foraging habitats and moderate ambient levels of disturbance and human activity, suggest that bald eagles are unlikely to occur within the project area.

#### *Brush Prairie Mazama Pocket Gopher (Thomomys mazama ssp. oregonus)*

The USFWS (2008) indicates that the Mazama pocket gopher (*Thomomys mazama ssp. oregonus*) is a federal candidate for listing and occurs in Clark County. Information from WDFW indicates the Brush Prairie pocket gopher is a state candidate; however, the species name (*Thomomys talpoides douglasi*) differs from the USFWS listing name. Pocket gophers are typically found in lawns, gardens, and pastures and may occur in the project area. There are no documented occurrences of the Brush Prairie pocket gopher in the project area, but soil mounds were observed in pasture within the biological study area and could be created by gophers or moles.

#### *Long-eared Myotis (Myotis evotis), Long-Legged Myotis (Myotis volans), & Pacific Townsend's Big-eared Bat (C. townsendii townsendii)*

The following federal species of concern are not documented but may exist in suitable forest habitat in the project area: long-eared myotis, long-legged myotis, and Pacific Townsend's big-eared bat. These bat species are typically found in forested habitats, as well as along forested

riparian corridors. However, these species may be found wherever suitable roost sites exist, including forests, cliffs, caves, buildings, and bridges. The nearest occurrence of Pacific Townsend's big-eared bat is located greater than 10 miles north of the project area. The nearest documented occurrences of the long-eared and long-legged myotis are located greater than 12 miles from the project area. There are no known roost sites within the project area, but suitable habitat, particularly forest habitat, exists for hibernaculum or nursery colonies. Therefore, it is possible that some of these bat species roost and feed within the project area. These bat species are also either state monitor or candidates for state listing.

#### *Oregon Spotted Frog (Rana pretiosa)*

The Oregon spotted frog (*Rana pretiosa*), a federal candidate for listing and state endangered species, occurs in Clark County (USFWS, 2008). The Oregon spotted frog originally occupied warm wetlands from southern British Columbia to northern California. Because this species is far more aquatic than other native frogs, it is unlikely that this species occurs in the biological study area seasonal wetlands. There are several farm ponds in the biological study area but the presence of the non-native bull frog likely precludes the presence of the Oregon spotted frog. Although limited suitable habitat is present in the project area, the majority of the pasture with seasonal wetlands has been smoothed and filled for agricultural activity, making it less likely that this species occurs here. The nearest documented occurrence of the Oregon spotted frog in Washington is located in Skamania County, more than 50 miles from the project area. This species was not observed in the study area by biologists and is not expected to occur in the project area.

#### *Tailed Frog (Ascaphus truei)*

The tailed frog (*Ascaphus truei*) also occurs in Clark County, and is a federal species of concern (USFWS, 2008). This species is found in cold, fast-moving streams with boulders and stony bottoms. Gee Creek tributaries, Mill Creek North, and Mill Creek do not provide suitable habitat for the tailed frog. Suitable habitat does not occur and it is reasonable to assume that the tailed frog does not occur in the project area.

#### *Cascades Frog (Rana cascadae)*

The Cascades frog (*Rana cascadae*) is a federal species of concern and a state monitor species that occurs in Clark County (USFWS, 2008). The Cascades frog is a mountain frog and is found in a small band from the Cascade Mountains in northern Washington down through Oregon to the edge of California. Suitable habitat does not occur and it is reasonable to assume that this species does not occur in the project area.

#### *Northwestern Pond Turtle (Emys (=Clemmys) marmorata marmorata)*

The northwestern pond turtle (*Emys (=Clemmys) marmorata marmorata*) is a federal species of concern and state endangered species (USFWS, 2008). Pond turtles are found near a wide variety of wetlands, including ponds, marshes, lakes, streams, irrigation ditches, and vernal pools. Aquatic habitats with adequate vegetative cover and exposed basking sites are utilized. They prefer habitats with large areas for cover (logs, algae, and vegetation) and basking (logs and boulders). This species is documented in very few areas; Gee Creek tributaries, Mill Creek North, and Mill Creek do not provide suitable habitat for the northwestern pond turtle. Biological study area wetlands and Gee Creek tributaries are primarily seasonal, and Mill Creek North and

Mill Creek have very little to no flow in the summer. Therefore, suitable habitat does not occur and it is reasonable to assume that this species does not occur in the project area.

*Olive-sided Flycatcher (Contopus cooperi)*

The olive-sided flycatcher (*Contopus cooperi*) occurs in Clark County, and is a federal species of concern (USFWS, 2008). It inhabits montane, coniferous forests up to 10,000 feet in elevation. This species prefers forests of tall spruces, firs, balsams, and pines, mixed woodlands near edges and clearings, and wooded streams. The olive-sided flycatcher typically inhabits forests that regularly burn and have a low percentage of canopy cover, with tall, exposed perches such as snags or high, conspicuous dead branches. Forest canopy cover in this biological study area is fairly dense and has not been subject to frequent burns. Due to lack of suitable habitat, it is reasonable to assume that this species does not occur in the project area.

*Peregrine Falcon (Falco peregrinus)*

The peregrine falcon (*Falco peregrinus*) is a federal species of concern and state sensitive species (USFWS, 2008). Peregrine falcons live mostly along mountain ranges, river valleys, and coastlines. Historically, peregrines inhabited mountain ranges and islands along the Pacific Coast from Mexico north to Alaska and in the Arctic tundra, as well as elsewhere in the United States. They typically nest on a cliff ledge, and rarely in tree cavities. Suitable habitat does not occur, and it is reasonable to assume that the peregrine falcon does not occur, in the project area.

*Slender-billed White Breasted Nuthatch (Sitta carolinensis aculeata)*

The slender-billed white breasted nuthatch (*Sitta carolinensis aculeata*) occurs in Clark County and is a federal species of concern and state candidate species (USFWS, 2008). This species lives in oak valleys west of the Cascades from Canada to California. In summer, this species gleans insects from trees; in winter these birds eat nuts, such as acorns, filberts, or pine nuts. In the Willamette Valley, they are typically associated with oak groves. The biological study area includes numerous oak trees and documented oak woodlands (WDFW, 2008a). It is possible that this species occurs in the project area, but it is not documented nor has it been observed by project biologists.

*Northern Goshawk (Accipiter gentilis)*

The northern goshawk (*Accipiter gentilis*), a federal species of concern and state candidate (USFWS, 2008), inhabits old-growth forests throughout the United States, Canada, and northern Mexico. Nest sites are usually located in mountain forests and are commonly found in riparian zones. Typically the nest is in a large, mature tree (especially aspen) as far up as 30 to 35 feet high. Old-growth forests do not occur in the project area; aspen occur in the project area, but are not yet mature and do not occur in large numbers. Suitable habitat does not occur, and it is reasonable to assume that this species does not occur in the project area.

*Pileated Woodpecker (Dryocopus pileatus)*

The pileated woodpecker (*Dryocopus pileatus*), a state candidate species, occurs in Clark County (WDFW, 2008a). Pileated woodpeckers occur in forest habitats and prefer large trees for nesting. It gleans food from branches, trunks, and logs and makes deep rectangular excavations in trees and logs. It primarily feeds on various insects, primarily carpenter ants and wood-boring beetle

larvae, fruits, and nuts. This species could be present in forest habitats in the project area, but is not documented nor was it observed by project biologists.

*Western Gray Squirrel (Sciurus griseus griseus)*

The western gray squirrel (*Sciurus griseus griseus*), a federal species of concern and state threatened species occurs in Clark County (USFWS, 2008). Western gray squirrels are forest dwellers, and can be found at elevations up to approximately 2,000 feet. The western gray squirrel is strictly diurnal (active during the day) and feeds in trees and on the ground, mainly on seeds and nuts, particularly pine seeds and acorns, although they also take berries, fungus, and other soft food. The nearest documented occurrences of the species are located greater than 6 miles south and 10 miles east of the project area. This species could be present in forest habitats and the oak woodlands in the project area, but is not documented nor was it observed by project biologists.

*Western Toad (Bufo boreas)*

The western toad (*Bufo boreas*) occurs in Clark County and is a federal species of concern and state candidate species (USFWS, 2008). Western toads are mostly terrestrial and have a historical range in the lowlands of western Washington and meadows of the North Cascades. The nearest documented occurrences of the species are located greater than 15 miles from the project area. This species was not observed by project biologists. It is unlikely that the western toad occurs in the project area.

*Larch Mountain Salamander (Plethodon larselli) & Van Dyke's Salamander (P. vandykei)*

The Larch Mountain salamander (*Plethodon larselli*) and Van Dyke's salamander (*P. vandykei*), are federal species of concern and state candidates for listing (USFWS, 2008). These species are known to inhabit portions of Clark County. The Larch Mountain salamander is quite rare in both Oregon and Washington. It is usually found on either side of the Columbia Gorge on slopes covered with moss and talus and is typically not associated with water. Suitable habitat for this species does not exist in the project area. Van Dyke's salamander is aquatic and is closely associated with vegetated cover in the splash zone of creeks and waterfalls, in rather harsh and cold mountain environments. Suitable habitat for these species does not occur in the project area; therefore, it is reasonable to assume that these species do not occur in the project area.

### **3.8 Fish Resources**

#### **3.8.1 Surface Waterbodies and Fish Passage in the Biological Study Area**

The Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, Mill Creek, the Mill Creek tributary, and Curtin Creek are the potential anadromous fish-bearing surface water bodies in the project area. With the exception of Curtin Creek, these small streams drain mostly agricultural areas in Clark County, although the headwaters of Mill Creek form in a residential area of Battle Ground. The Mill Creek tributary is dependent on seasonal wetlands. Curtin Creek flows into Salmon Creek and occurs in a developed area of Clark County.

Culvert information acquired from WDFW indicates there are no fish passage barriers along SR 502 on Mill Creek or Mill Creek North (Figure 7). Fish barriers occur on the Gee Creek

tributaries and the unnamed tributary to the East Fork Lewis River, but fish could occur downstream of these barriers.

Exhibit 4 summarizes the federally listed fish species that could potentially occur within the biological study area. The portions of the Gee Creek tributaries that are upstream of two artificial farm ponds within the biological study area are not considered to be accessible to any listed fish species. Portions of the Gee Creek tributaries that are downstream of the ponds may potentially be accessible to Lower Columbia River DPS (Distinct Population Segment) steelhead, and Lower Columbia River ESU (Evolutionarily Significant Unit) coho salmon. The unnamed tributary to the East Fork Lewis River is considered to be accessible to listed fish species up to a point where the channel largely disappears in a residential field located just north of SR 502. Portions of this tributary represent potential habitat for Lower Columbia River DPS steelhead, and Lower Columbia River ESU coho salmon, and may also be accessible by Lower Columbia River ESU Chinook salmon and Columbia River ESU chum salmon. The portion of Mill Creek North that is within the biological study area represents documented habitat for Lower Columbia River DPS steelhead and Lower Columbia River ESU coho salmon, and may also be accessible to Lower Columbia River ESU Chinook salmon and Columbia River ESU chum salmon. Additionally, Mill Creek North is designated critical habitat for Lower Columbia River DPS steelhead. Mill Creek is documented habitat for Lower Columbia River DPS steelhead, Lower Columbia River ESU coho salmon, and Lower Columbia River ESU Chinook salmon. Curtin Creek is presumed habitat for Lower Columbia River ESU coho salmon, and Columbia River DPS steelhead. The Mill Creek tributary is considered to be potentially accessible to all fish species present in Mill Creek during winter flows.

Exhibit 4. Federally-Listed Fish Species Potentially Present in Biological Study Area

ESU/ Common Name	Scientific Name	Federal Status	State Status	Critical Habitat	Mill Creek	Mill Creek North	Tributaries	Curtin Creek
LCR fall Chinook	<i>Oncorhynchus tshawytscha</i>	Threatened	Candidate	No	No	Winterly rearing (unlikely)	Winterly, rearing (unlikely)	No
LCR chum salmon	<i>Oncorhynchus keta</i>	Threatened	Candidate	No	No	Rearing (unlikely)	Rearing (unlikely)	No
LCR coho salmon	<i>Oncorhynchus kisutch</i>	Threatened	Candidate	ND	Spawning, Rearing, Wintering, Migration	Wintering, Rearing	Wintering, Rearing	Wintering, Rearing
LCR steelhead	<i>Oncorhynchus mykiss</i>	Threatened	Candidate	Yes – Mill Creek North	Spawning, Rearing, Wintering, Migration	Wintering, rearing	Wintering, rearing	Wintering, Rearing
Bull trout	<i>Salvelinus confluentus</i>	Threatened	Candidate	No	No	No	No	No
Coastal cutthroat trout	<i>Oncorhynchus clarki clarki</i>	Species of Concern	None	ND	Rearing, Migration	Rearing, migration	Potential for resident trout	Rearing, Migration
Lamprey	( <i>Lampetra spp.</i> )	Species of Concern	Monitor and Candidate	ND	Rearing, Migration	Rearing, migration	No	Rearing, Migration

\*ND=not designated

Based on discussions with WDFW and the County habitat biologist, Mill Creek and Mill Creek North provide suitable over-wintering habitat for coho salmon and suitable spawning habitat for

sea-run/resident cutthroat trout and steelhead. WDFW staff indicates bull trout (*Salvelinus confluentus*) do not occur in Mill Creek or Mill Creek North. Anadromous fish do not occur in the Gee Creek tributaries immediately adjacent to the existing roadway because of barriers at numerous farm ponds. However, anadromous fish may occur downstream of these barriers within the biological study area. Although not documented, lamprey (*Lampetra* spp.) species may also occur in these streams.

The Gee Creek tributaries, the East Fork Lewis River unnamed tributary, Mill Creek North, and Mill Creek are moderately degraded. Much of the substrate consists of mud, silt, and sand, but reaches with spawning gravel are scattered throughout the streams and tributaries.

No constructed stormwater treatment is provided for any of the approximately 22.61 acres of impervious surface within the biological study area. Untreated stormwater enters waterbodies through pavement runoff and overland flow to an existing system of culverts and roadside ditches. The biological study area is divided into eight TDAs that are delineated based on stormwater flows into waterbodies (Figure 8A and 8B).

### 3.8.2 Environmental Baseline Conditions

The environmental baseline conditions (i.e., in-stream habitat conditions and watershed conditions) for the project biological study area have been evaluated for the Gee Creek watershed (Gee Creek tributaries), East Fork Lewis watershed (unnamed tributary to the East Fork Lewis River and Mill Creek North), and Salmon Creek watershed (Mill Creek, Mill Creek tributary and Curtin Creek) (Exhibit 5). Findings are summarized here and discussed in greater detail in Appendix E. The County Riparian Habitat Evaluation Forms were completed to assess riparian conditions in the biological study area, and this information was used to complete selected sections of the environmental baseline conditions. These forms are included in Appendix F. This evaluation assessed several baseline indicators and determined whether the Build Alternative would restore, maintain, or degrade existing baseline conditions at both the biological study area scale and the subwatershed scale. The evaluation that follows is based on numerous field visits to assess the condition of the biological study area and complete the County Riparian Habitat Evaluation Forms, best professional judgment, and a review of the literature.

Due to the unique position of the biological study area on the landscape, this environmental baseline discussion addresses three watersheds: the East Fork Lewis River, Gee Creek, and Salmon Creek watersheds (Figure 3). An evaluation of the baseline watershed and in-stream habitat conditions within the biological study area was conducted according to the guidance outlined in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale (NOAA Fisheries, 1996). This evaluation assesses several baseline indicators of habitat quality and discusses whether the Build Alternative would restore, maintain, or degrade existing baseline conditions within each of the three watersheds and also at the biological study area scale. A table summarizing the environmental baseline conditions at both the watershed and biological study area scales and the potential effects of the Build Alternative on those baseline indicators is provided as Exhibit 5 and in Appendix E.

In general, the environmental baseline condition within the biological study area is degraded. As indicated in Exhibit 5, most all indicators of environmental condition are not properly

functioning or are functioning at risk at the biological study area scale. Within the East Fork Lewis River, Gee Creek, and Salmon Creek watersheds, all indicators would be maintained as a result of the Build Alternative. Results of the County Riparian Habitat Field Evaluation Forms indicate that the baseline conditions in the biological study area are not functioning properly. Out of a total score of 48 points for fish habitat functions, area streams scored between 15 and 27 indicating a degraded system (Appendix E).

### 3.8.3 Common Species

Various non-salmonid native aquatic species that may be present in the biological study area include sculpin (*Cottus* spp.), long nose dace (*Rhinichthys cataractae*), speckled dace (*Rhinichthys osculus*), three-spined stickleback (*Gasterostus aculeatus*), red-sided shiner (*Richardsonius balteatus*), bridge lip sucker (*Catasomus columbianus*), other sucker species (*Catastomus* sp.), smelt (*Spirinchus* sp.), chiselmouth (*Acrocheilus alutaceus*), mountain whitefish (*Prosopium williamsoni*), peamouth (*Mylocheillus caurinus*), northern pikeminnow (*Ptychocheilus oregonensis*), and other minnows (*Cyprinidae*), crawfish (*Procambarus* sp.), and freshwater mussels (*Anodonta* sp.).

Various non-native aquatic species, such as smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), brown bullhead (*Letalurus nebulosus*), bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), goldfish (*Carassius auratus*), cyprinids (i.e., carp), percids (perch and walleye), and non-native clams (*Corbiculidae* sp.) and pollutant-tolerant snail species have been introduced to the local streams and rivers. The regulatory agencies manage these non-native species for recreational harvest only.

### 3.8.4 Federally Listed Fish Species

This section discusses the potential for federally listed fish species to be present within waterbodies within the biological study area. Exhibit 4 summarizes the federally listed fish species that are known or expected to occur, or that could potentially occur, within the biological study area.

#### *Steelhead, Lower Columbia River ESU (Threatened)*

According to WDFW (2008c) winter steelhead are present within Mill Creek, Mill Creek North, and the fish-accessible portions of the Gee Creek tributaries. Summer steelhead are presumed present in the lower reaches of Mill Creek North and the unnamed tributary to the East Fork Lewis River. Winter steelhead are migrating within area streams between December and April, while summer steelhead are migrating between approximately March and November (LCFRB, 2004). Critical habitat designated for steelhead includes the portion of Mill Creek North that is on the north side of SR 502. Freshwater rearing habitat is the only Primary Constituent Elements (PCE) that occurs in the portion of Mill Creek North that is within the biological study area. The portion of Curtin Creek that flows through the location of the proposed Sunset Oaks mitigation site is potentially accessible to steelhead, and provides low quality wintering and/or rearing habitat.

#### *Chinook Salmon, Lower Columbia River ESU (Threatened)*

Chinook salmon are generally associated with large mainstem tributaries. SSHIAP data indicate that Chinook salmon do not occur in Gee Creek. Spawning Chinook salmon have not been

Exhibit 5. Baseline Environmental Conditions (Matrix of Pathways and Indicators) and Effects of Project Action at Biological Study Area and Watershed Scales

Diagnostic/Pathway Indicators	Baseline Environmental Conditions				Effect of Project Action			
	Biological Study Area	East Fork Lewis River Watershed	Gee Creek Watershed	Salmon Creek Watershed	Biological Study Area	East Fork Lewis River Watershed	Gee Creek Watershed	Salmon Creek Watershed
<b>Water Quality</b>								
Temperature	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Temporarily Degrade • Gee Creek tributaries • Unnamed tributary to the East Fork Lewis River • Mill Creek	Maintain	Maintain	Maintain
Sediment/Turbidity	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Temporarily Degrade • Gee Creek tributaries • Unnamed tributary to the East Fork Lewis River • Mill Creek North • Mill Creek • Curtin Creek	Maintain	Maintain	Maintain
Chemical Contamination/Nutrients	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
<b>Habitat Access</b>								
Physical Barriers	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
<b>Habitat Elements</b>								
Substrate Embeddedness	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Large Woody Debris	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Pool Frequency	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Pool Quality	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Off-Channel Habitat	Functioning at Risk	Functioning at Risk	Functioning at Risk	Functioning at Risk	Maintain	Maintain	Maintain	Maintain
Refugia	Functioning at Risk	Functioning at Risk	Functioning at Risk	Functioning at Risk	Maintain	Maintain	Maintain	Maintain
<b>Channel Conditions/Dynamics</b>								
Width/Depth Ratio	Functioning at Risk	Functioning at Risk	Functioning at Risk	Functioning at Risk	Maintain	Maintain	Maintain	Maintain
Streambank Condition	Functioning at Risk	Functioning at Risk	Functioning at Risk	Functioning at Risk	Maintain	Maintain	Maintain	Maintain
Floodplain Connectivity	Functioning at Risk	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
<b>Flow/Hydrology</b>								
Change in Peak/Base Flows	Not Properly Functioning	Functioning at Risk	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Increase in Drainage Network	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain

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Watershed Conditions								
Road Density and Location	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Disturbance History	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Maintain	Maintain	Maintain	Maintain
Riparian Conservation Areas	Functioning at Risk	Not Properly Functioning	Not Properly Functioning	Not Properly Functioning	Temporarily Degrade	Maintain	Maintain	Maintain

\*For each indicator, indicate whether it is properly functioning, functioning at risk, or not properly functioning.

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documented on Salmon Creek or within Mill Creek, and it is very unlikely that they occur in the primary or secondary biological study areas. It is possible that juvenile Chinook salmon may be present within the East Fork Lewis River and Mill Creek North in the early spring (LCFRB, 2004). The East Fork Lewis River is documented spawning habitat for Chinook salmon, and Chinook primarily spawn in the mainstem of the lower river. Juvenile rearing occurs primarily in the immediate vicinity and downstream of the spawning areas, primarily on the mainstem of the river. Chinook could conceivably access the biological study area via the unnamed tributary to the East Fork Lewis River or through Mill Creek North, though it is not likely that juvenile Chinook salmon could rear in these waterbodies throughout the summer, due to low water levels and elevated water temperatures. For the reasons listed above, it is unlikely, but possible that juvenile Chinook salmon may be present within the unnamed tributary to the East Fork Lewis River or Mill Creek North in the winter or early spring. Chinook are not documented or expected to occur in Curtin Creek. Critical habitat for Chinook salmon has not been mapped within the biological study area.

**Photo 5: Photograph facing north along SR 502 at Mill Creek North illustrates designated critical habitat for steelhead.**



*Chum Salmon, Columbia River ESU (Threatened)*

According to WDFW salmonid and steelhead stock inventory data (WDFW, 2008a), Columbia River ESU chum salmon have not been documented as occurring within the biological study

area, but are present within the East Fork Lewis River, and are presumed present in the lower reaches of Mill Creek North and the unnamed tributary to the East Fork Lewis River. Chum salmon spawn in the lower reaches of the mainstem East Fork Lewis River, and rear for only a short period in the spring before emigrating (LCFRB, 2004). It is unlikely that chum salmon are present in the primary or secondary biological study areas, but may be present downstream within Mill Creek North or the unnamed tributary to the East Fork Lewis River between February and mid-May (LCFRB, 2004).

*Bull Trout, Columbia River DPS (Threatened)*

According to WDFW salmonid and steelhead stock inventory data (WDFW, 2008a), Columbia River DPS bull trout have not been documented as occurring within the biological study area. The nearest documented bull trout are in the mainstem of the Columbia River, though bull trout presence is presumed in the North Fork Lewis River (WDFW, 2008a). Bull trout are not known to spawn in any East Fork Lewis River tributaries. Similarly, bull trout are not documented as occurring in Salmon Creek, and have not been documented as spawning in any Salmon Creek tributaries. It is assumed, therefore, that bull trout are not present within the biological study area.

*Coho Salmon, Lower Columbia River ESU (Threatened)*

According to WDFW salmonid and steelhead stock inventory data (WDFW 2008a), Lower Columbia River ESU coho salmon have been documented within the biological study area in Mill Creek, Mill Creek North, the unnamed tributary to the East Fork Lewis River, and Curtin Creek. Additionally, it is possible that coho salmon could access the portions of the Gee Creek tributaries that are downstream of the farm ponds within the secondary biological study area. Coho salmon in the East Fork Lewis River and Salmon Creek watersheds are generally migrating between August and January (LCFRB, 2004). Fish species presumed to be adult coho were observed by WSDOT staff in Mill Creek near NE 72nd Avenue in early December 2007.

*Coastal Cutthroat Trout (Species of Concern)*

Coastal cutthroat trout (*Oncorhynchus clarki clarki*) are listed as a species of concern with USFWS. WDFW describes cutthroat populations as depressed in all rivers entering the Columbia River from its mouth to the Kalama River. Coastal cutthroat abundance in Mill Creek has not been quantified; however, both the anadromous and resident forms of cutthroat are present in the Salmon Creek subbasin (LCFRB, 2004) and East Fork Lewis River subbasin. Anadromous cutthroat enter streams within the biological study area from September through December and spawn from December through June. Resident fish spawn between approximately February and June.

*Lamprey (Species of Concern)*

Pacific lamprey (*Lampetra tridentatus*) and river lamprey (*L. ayresi*) may occur within the biological study area. Both Pacific and river lamprey are federal species of concern (USFWS, 2007); Pacific lamprey is a state monitor species and river lamprey is a candidate for state listing. Lamprey historically occurred in large numbers in Pacific Northwest creeks, but populations are reduced. (Beamish and Levings, 1991). Habitat conditions within the biological study area are consistent with habitat requirements of lamprey (silt, mud, and sand, shallow eddies, and backwaters). The nearest documented occurrence of either species is located greater than 10

miles from the project area. Lamprey could be present within the biological study area, but their presence has not been documented.

### 3.8.5 Essential Fish Habitat

The Pacific Fishery Management Council (PFMC), implementing amendments to the federal 1996 Sustainable Fisheries Act, has designated EFH for Pacific salmon. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Federal agencies must consult with NOAA Fisheries on all activities or proposed activities authorized, funded, or undertaken by the agency that may adversely affect EFH (WSDOT, 2008).

Mill Creek North, which is a tributary of the East Fork Lewis River, and Mill Creek, which is a tributary of Salmon Creek, both represent EFH for Chinook and coho salmon within the Pacific salmon guild. Mill Creek North and Mill Creek are documented habitat for Lower Columbia River ESU coho salmon.

### 3.8.6 Cowlitz Tribe Fish Species of Concern

Pre-contact, Native Americans may have fished streams and creeks in the biological study area for the anadromous fish listed above. In addition, Native Americans may also have accessed waters for resident fish and aquatic invertebrates.

## 4.0 Effects and Benefits

This section identifies potential effects and benefits to biological resources associated with the No Build Alternative and the Build Alternative. Effects and benefits are discussed in terms of temporary effects associated with construction activities, and long-term effects associated with the operation and maintenance of the facility or permanent changes resulting from the project. Indirect and cumulative effects of the project are documented in a separate report, *Indirect Effects and Cumulative Effects Discipline Report* (Parsons Brinckerhoff, 2008b).

### 4.1 Temporary Effects and Benefits

Temporary effects and benefits are defined as those effects and benefits that would occur during construction. The exact quantity of temporary effects to upland and riparian habitat has not been calculated, but it is anticipated that it would be a small amount, and that the extent of effect to common and ESA-listed species as a result of any temporary effects would be insignificant.

#### 4.1.1 No Build Alternative

Under the No Build Alternative, no temporary effects or benefits would occur to wetland, vegetation, wildlife, or fish resources.

#### 4.1.2 Build Alternative

##### *Wetland Resources*

Under the Build Alternative, it is estimated that approximately 1.9 acres of wetland habitat would be temporarily affected (Exhibit 6). The Build Alternative would not require any significant temporary effects to wetland habitats (such as vegetation removal, soil compaction or fill placement) resulting from activities such as establishing temporary construction access roads

or material staging areas. Although a specific staging plan has not yet been developed, all construction access and equipment staging would occur within areas that are already developed or in which vegetation removal or fill placement would occur as a result of the Build Alternative.

These activities could result in temporary effects through an increase in erosion and associated sediment production, which could enter wetlands and impair water quality. WSDOT would implement a temporary erosion and sediment control TESC plan that would protect the wetland resources and negate most sediment-related temporary effects.

#### *Vegetation Resources*

It is possible that some temporary effects would occur to upland and riparian habitats including grassland, scrub-shrub, and forest habitats. Temporary effects are anticipated to be minor, and would be limited to incidental equipment maneuvering beyond the proposed clear and grub limits. The Build Alternative would not require any significant temporary effects to upland habitats (such as vegetation removal, soil compaction or fill placement) resulting from activities such as establishing temporary construction access roads or material staging areas. Although a specific staging plan has not yet been developed for this project, all construction access and equipment staging would occur within areas that are already developed or in which vegetation removal or fill placement would occur as a result of the Build Alternative.

#### *Wildlife Resources*

Construction of the project would result in temporary vegetation removal for staging areas, which may temporarily remove habitat for local wildlife species. Temporary vegetation removal could result in temporary fragmentation of habitat and migration corridors. However, these areas would be replanted with native vegetation.

Construction activities and noise associated with the proposed project would temporarily displace wildlife from suitable habitat in the immediate vicinity of the Build Alternative. If any one of the three bat species of concern use the forested areas for foraging or roosting in the spring and summer months, temporary disturbances due to construction activity could occur and displace individuals. Similarly, if the pocket gopher uses adjacent pasture, temporary construction could displace and/or inadvertently kill burrowing species (e.g., gophers, rabbits, mice, snakes).

The internal combustion engine would be the most prevalent noise source at construction sites. Other construction noise sources would include impact equipment such as vibratory hammers and rollers and back-up alarms. Pile-driving for the Build Alternative may occur in the location of Mill Creek North. No threatened or endangered terrestrial wildlife species are documented in the biological study area, and therefore none are expected to be affected by the noise from these activities, but common terrestrial and avian species could be temporarily displaced by construction activities, noise, and equipment.

#### *Fish Resources*

Vegetation removal, erosion, increased surface runoff, noise, and artificial light during construction could temporarily affect aquatic organisms and stream habitat negatively in the Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, and Mill Creek. Temporary effects to fish resources expected from the Build Alternative would

include surface runoff from disturbed soil. Sediment may be conveyed to the streams by construction stormwater runoff, although pre-constructed stormwater facilities, where practicable, would be used to treat stormwater during construction prior to discharge to a creek. Increased sediment can negatively affect the migration, feeding, and spawning behavior of fish and the supply of aquatic organisms on which they feed. Sediment can fill in pools, embed spawning gravels, and affect habitat downstream from the project area.

Temporary effects due to clearing and site access for in-water work associated with culvert replacements and extensions are expected to be minimal. Culvert replacement would be conducted in accordance with the terms and conditions of an HPA during the established in-water work window, and in full compliance with the Implementing Agreement and all permits issued for the project by the Corps, Ecology, and Clark County. Replacement culverts would be of sufficient size and would be designed and installed according to WAC guidelines.

Accidental spills of fuel, hydraulic fluid, oils, chemicals, and concrete used during construction could enter the creeks, potentially harming aquatic organisms. However, measures would be taken to avoid effects to sensitive areas.

Temporary effects to listed fish-accessible waterbodies would be associated with potential dewatering of work areas below the OHWM of biological study area waterbodies (Exhibit 8), and also from channel realignment/restoration activities and wetland mitigation construction. All work below the OHWM would be performed during the WDFW approved in-water work period for this project, which is July 1–September 30. It is anticipated that some of the streams within the biological study area would be dry during this period, and dewatering may not be necessary. However, it is likely that Mill Creek would have some amount of water present during the in-water work period, and, depending upon weather conditions, it is possible that other streams within the biological study area may also have water present. Therefore, in order to minimize potential effects to common and listed fish species, a work area would be temporarily dewatered below the OHWM of each fish-accessible waterbody as necessary.

- Unnamed Western Gee Creek Tributary – Less than 0.1 acre may need to be temporarily dewatered during roadway construction and culvert extension activities. It is anticipated, although, that this entire portion of the wetland would be dry at the time of proposed work below OHWM. The area that would be temporarily dewatered is upstream of a total barrier to fish passage, and is considered inaccessible to fish species.
- Unnamed Eastern Gee Creek Tributary – Less than 0.1 acre may need to be temporarily dewatered during roadway construction and culvert extension activities. It is anticipated, although, that this entire portion of the wetland would be dry at the time of proposed work below OHWM. The area that would be temporarily dewatered is upstream of a total barrier to fish passage, and is considered inaccessible to fish species.
- Unnamed East Fork Lewis River Tributary – Less than 0.1 acre may need to be temporarily dewatered during roadway construction and culvert extension activities. It is anticipated, although, that this entire portion of the wetland would be dry at the time of proposed work below OHWM. The area that would be temporarily dewatered is upstream of a total barrier to fish passage, and is considered inaccessible to fish species.

- Mill Creek North – Less than 0.1 acre may need to be temporarily dewatered during roadway construction, and culvert replacement/extension activities. Additionally, it is possible that some portion of Mill Creek North may need to be dewatered during wetland mitigation construction activities, although it is anticipated that only the shallow incised channel would have standing water at the time of proposed work below OHWM.
- Mill Creek – A total of approximately 0.2 acre may need to be temporarily dewatered during roadway culvert replacement, and channel realignment/restoration activities on Mill Creek. It is anticipated that Mill Creek would be under very low flow conditions at the time of proposed work below the OHWM, and it is unlikely that any listed fish species would be present within the biological study area during the in-water work period.
- Curtin Creek – It is assumed that a portion of Curtin Creek will need to be dewatered during mitigation construction activities. Most of the excavation work associated with channel reconstruction will occur above the OHWM of Curtin Creek, but some work below the OHWM of Curtin Creek will be necessary to connect the newly constructed channel with the existing channel. As the mitigation design has not been finalized, the exact extent of potential dewatering that may be necessary is unknown, but it is anticipated that the incised channel of Curtin Creek would be under low-flow conditions at the time of proposed work below the OHWM. Coho salmon have been documented downstream of the mitigation site during the summer months, and it is possible that they could be present during dewatering activities.

## **4.2 Long-Term Effects and Benefits**

### **4.2.1 No Build Alternative**

Under the No Build Alternative, no long-term effects or benefits to vegetation, wildlife, or wetland resources are anticipated. Under the No Build Alternative, no stormwater treatment for the roadway would occur and therefore, fish resources would continue to be negatively affected by reduced water quality.

### **4.2.2 Build Alternative**

#### *Wetland Resources*

Proposed effects to area wetlands are shown in Figures 4A and 4B. Although the total volume of fill material has not been calculated at this time, Exhibit 6 lists the area of each wetland category that would be permanently disturbed as a result of the Build Alternative. Figures 4A and 4B show the project clear and grub limits and the effects to wetlands and the areas below the OHWM of biological study area waterbodies that would result from the Build Alternative.

## Exhibit 6. Permanent and Temporary Effects from the Build Alternative to Wetland Resources

Wetland Category	Area of Permanent Effects (acres)	Area of Temporary Effects (acres)
Category I	2.3	0.6
Category II	3.7	0.7
Category III	2.0	0.3
Category IV	1.2	0.3
<b>Total Effects</b>	<b>9.2</b>	<b>1.9</b>

Note: The Category 1 wetland noted in this exhibit includes documented overwintering fish habitat and critical habitat for steelhead.

Most of the proposed effects to wetland habitat associated with the Build Alternative would be permanent in nature. Effects to wetland vegetation would occur within emergent, scrub shrub, and forested wetland habitat types, primarily in those disturbed habitats that are located immediately adjacent to the SR 502 roadway. The portions of these wetlands that would be filled are, in general, the highly fragmented and disturbed areas located immediately adjacent to the existing SR 502 roadway. The Category 1 wetland effect would occur in overwintering fish habitat associated with Mill Creek North, which is discussed in more detail in the Fish Resources section below. Some emergent wetland within the biological study area represents potential low-quality habitat for water howellia, although the habitat is not well suited, and the species is not anticipated or known to occur within the biological study area, nor was it identified during field surveys performed during its blooming period. Upland scrub-shrub and forested wetland habitat does not represent habitat for any ESA-listed species, and effects to these habitats are not likely to represent a direct loss of habitat for any listed species. No direct benefits to delineated wetlands are anticipated as a result of the Build Alternative. However, watershed-based mitigation strategies will be developed and implemented for the project that will provide overall improved wetland function throughout the watershed.

#### *Vegetation Resources*

As shown in Exhibit 7, the Build Alternative would permanently affect upland grassland, upland scrub-shrub, and upland forest through conversion to paved surfaces, ditches, roadway clear zones, stormwater facilities, or other associated project elements (e.g., signage, guardrails). These habitat types are, in general, already highly fragmented and disturbed, and are located immediately adjacent to the existing SR 502 roadway. The Build Alternative would also affect wetland habitat, as discussed above.

No federal- or state-listed plant species have been documented or are known to occur within the biological study area. Upland grassland within the biological study area represents potential low-quality habitat for golden paintbrush and Bradshaw's lomatium, though the habitat is not well suited to either species and these species were not observed and are not anticipated to occur within the biological study area. Therefore, it is anticipated that the Build Alternative would not affect populations of listed species.

## Exhibit 7. Area of Permanent Effects to Vegetation Resources by Habitat Type

Habitat Types to be Disturbed		Permanent Effects (acres)
<b>Upland Habitats</b>		
Grassland		32.7
Scrub-shrub		5.5
Forest		14.1
Riparian Upland		4.6
<b>Total</b>		<b>56.9</b>
<b>Wetland/In-stream Habitats</b>		
Listed-Fish Accessible	Riparian Wetland*	2.2
	Non-Wetland, below OHWM ("in-stream")*	0.3
Inaccessible to Listed Fish	Riparian Wetland*	0.3
	Non-Wetland, below OHWM ("in-stream")*	0.2
Non-Riparian Wetland*		6.6
<b>Total</b>		<b>9.6</b>

\* Note that some areas within designated riparian habitat are also delineated as wetland. In order to accurately portray effects by habitat type, wetland effects presented in Exhibit 6 are presented again in this table.

The project would eradicate some noxious weeds through vegetative and seed bank removal. Conversely, there is a potential to introduce additional noxious and invasive species with the proposed improvements. This could occur through movement of seeds on construction equipment or vehicles.

The small-flowered trillium, a state sensitive plant, is documented by WDNR in one location and was observed in five additional locations along the corridor. The project would affect approximately 2.0 acres of the habitat in which this species was documented or observed.

A field of camas is located adjacent to SR 502 in a horse pasture. The project would affect approximately 1.1 acres of this field. Small numbers of camas lilies were observed in several other areas of the biological study area in which vegetation removal or fill placement would occur as a result of the Build Alternative, and that may represent disturbed, remnant prairie habitat.

False hellebore and spike rush were observed in several locations throughout the biological study area. Less than 0.1 acre of habitats in which false hellebore and spike rush were observed would be removed respectively. The Build Alternative proposes vegetation removal and fill placement in mapped historic prairie habitat in the vicinity of Mill Creek North (WDNR identifies this as potential historic prairie habitat as King Corner Wetlands). Approximately 2.2 acres of habitat within or adjacent to disturbed, remnant prairie would be removed through roadway widening and culvert replacement and/or extension in Mill Creek North. In addition, this area surrounding Mill Creek North is proposed as a potential mitigation site for stream restoration and wetland

creation and enhancement. Although mapped as historic prairie, this habitat is highly disturbed from past and current agricultural practices, and few prairie indicators are present onsite.

Oregon ash occurs throughout the biological study area in riparian areas, swales, and wetlands. Vegetation removal and fill placement would occur in habitat in which Oregon ash occurs, but because this is a common species, effects have not been calculated.

Quaking aspen was observed in the biological study area a substantial distance away from the existing roadway. Direct effects to this habitat are not anticipated.

Oak woodlands are documented north of SR 502 in the Mill Creek North potential mitigation site. These oak woodlands are likely remnant habitat of larger oak savannah. Preparation of the potential mitigation site is not anticipated to affect these oak woodlands.

#### *Wildlife Resources*

Construction of the Build Alternative would result in permanent vegetation removal, thereby removing habitat for local wildlife species. Vegetation removal could result in fragmentation of habitat and migration corridors.

Direct effects to wildlife habitat include removal of upland and aquatic vegetation that represents wildlife habitat along the corridor.

Wintering waterfowl concentrations are documented in the central portion of the biological study area and are associated with Mill Creek North and Mill Creek (WDFW, 2007). The Build Alternative would result in direct effects to the land associated with the waterfowl concentrations. However, the proposed Mill Creek North mitigation would be designed to enhance in-stream habitat and floodplain associated with Mill Creek North and would be intended to maintain the winter lake conditions of this area. Therefore, wintering waterfowl concentrations are not anticipated to be negatively affected by the Build Alternative and proposed wetland and stream mitigation would benefit wildlife habitat as well.

Direct effects to wildlife as a result of the Build Alternative would be incidental deaths due to a wider roadway for wildlife to cross. Even though much of the wildlife corridor is already non-functional due to existing road crossings, widening the SR 502 roadway could increase the number of wildlife deaths because wildlife would have to cross a wider highway.

Existing visual elements include vegetation, landforms, buildings, and roadways and associated vehicles. The Build Alternative would affect the visual character and quality within the biological study area as it would result in a wider roadway, increased impervious surface, and vegetation removal along the corridor and could disturb wildlife activities in the area.

#### *Fish Resources*

The project would result in approximately 2.8 acres of permanent impact below the OHWM of potential ESA-listed fish-bearing waterbodies within the biological study area, although not all of this habitat is accessible to federal- or state-listed fish species (Exhibit 8). This habitat is designated EFH for Chinook and coho salmon. Effects to 2.5 acres of habitat below the OHWM of Mill Creek North and Mill Creek would result in a direct loss of habitat for ESA-listed fish

species. Of this acreage, approximately 2.2 acres of Category 1 wetland habitat associated with Mill Creek North is potential rearing and wintering habitat for steelhead and coho salmon and although very unlikely, may be accessible to Chinook and chum salmon as off channel rearing habitat. While Mill Creek North is documented spawning habitat for steelhead, the portion of the creek that is within the biological study area is unsuitable for spawning. Approximately 0.1 acre of in-stream habitat in Mill Creek North is critical habitat for steelhead and would be permanently removed by the Build Alternative. The permanent effects to the 2.5 acres would result from placement of fill material for roadway slopes, retaining walls, and culvert replacement/extension. Exhibit 8 below lists the quantities of effects to each ESA-listed fish-bearing waterbody within the biological study area.

- Western Gee Creek Tributary – Less than 0.1 acre below the OHWM of the western Gee Creek tributary will be permanently impacted during culvert extension activities. The extent of this impact will be a simplification of the in-stream channel habitat in the location where the culvert extension occurs. Excavation associated with creation of the wetland enhancement/flow control facility for TDA 2 will result in a total of approximately 830 square feet of impact below the OHWM. The area that will be impacted is upstream of a total barrier to fish passage, and is considered inaccessible to ESA-listed fish species, however, work below the OHWM of this tributary has the potential to temporarily affect water quality within the tributary.
- Eastern Gee Creek Tributary – Less than 0.1 acre below the OHWM of the eastern Gee Creek tributary will be permanently impacted during culvert extension activities. The extent of this impact will be a simplification of the in-stream channel habitat in the location where the culvert extension occurs. Outfall and splash pad construction will result in approximately 30 square feet of impact below the OHWM. The area that will be impacted is upstream of a total barrier to fish passage, and is considered inaccessible to ESA-listed fish species, however, work below the OHWM of this tributary has the potential to temporarily affect water quality within the tributary.
- Unnamed Tributary to the East Fork Lewis River – Approximately 0.1 acre below the OHWM of the unnamed tributary to the East Fork Lewis River will be permanently impacted during culvert extension activities. The extent of this impact will be a simplification of the in-stream channel habitat in the location where the culvert extension occurs. Outfall and splash pad construction will result in approximately 30 square feet of impact below the OHWM. The area that will be impacted is upstream of a total barrier to fish passage, and is considered inaccessible to ESA-listed fish species, however, work below the OHWM of this tributary has the potential to temporarily affect water quality within the tributary.
- Mill Creek North – Approximately 2.3 acres below the OHWM of Mill Creek North will be permanently impacted during roadway construction and culvert extension/replacement activities. The majority of this impact (approximately 2.2 acres) will be the result of fill placement in seasonally accessible overwintering habitat located below the OHWM, but outside the main channel. Less than 0.1 acre of impact will occur within the main channel of Mill Creek North during culvert extension/replacement activities, which will result in a simplification of the in-stream habitat in the location where the culvert extension occurs.

Outfall and splash pad construction will result in approximately 60 square feet of impact below the OHWM. The area that will be impacted represents documented wintering and rearing habitat for steelhead and coho salmon, and although very unlikely, may be accessible to Chinook and chum salmon as off channel rearing habitat. Additionally, the portion of Mill Creek North that will be impacted represents designated critical habitat for Lower Columbia River DPS steelhead.

- Mill Creek – A total of approximately 0.4 acre below the OHWM of Mill Creek will be permanently impacted during culvert replacement activities. The extent of this impact will be a simplification of the in-stream channel habitat in the location where the culvert replacement occurs. Outfall and splash pad construction will result in approximately 60 square feet of impact below the OHWM. The area that will be impacted represents documented spawning, rearing, migration, and wintering habitat for steelhead and coho salmon.
- Curtin Creek – The wetland mitigation at Sunset Oaks will result in impacts below the OHWM of Curtin Creek. While the exact quantity has not been calculated at this time, it is estimated that the mitigation will result in the enhancement of between 3,000 and 5,000 linear feet of Curtin Creek, and that construction of the mitigation will result in less than 0.1 acre of impact below the OHWM of Curtin Creek. The area that will be impacted represents documented rearing and wintering habitat for steelhead and coho salmon.

The Build Alternative would result in the creation of approximately 29 acres of impervious surface within the project biological study area. Approximately 28 acres of this newly created impervious surface would be pollution generating impervious surface (PGIS) and approximately 1.1 acres would be non-pollution generating impervious surface (NPGIS) (e.g., sidewalks). Additionally, the project would retrofit approximately 6 acres of existing impervious surface.

Exhibit 8. Area of Permanent and Temporary Effects to Riparian Habitat

Watershed/ Waterbody	Area of Permanent Effect (acres)	Area of Temporary Effect (acres)
<b>Gee Creek</b>		
Unnamed Western Gee Creek Tributary	Less than 0.1	Less than 0.1
Unnamed Eastern Gee Creek Tributary	Less than 0.1	Less than 0.1
<b>East Fork Lewis River</b>		
Unnamed East Fork Lewis River Tributary	0.1	Less than 0.1
Mill Creek North	2.3	Less than 0.1
<b>Salmon Creek</b>		
Mill Creek	0.4	0.2
<b>Total</b>	<b>2.8</b>	<b>0.3</b>

All new PGIS will receive treatment and flow control treatment will meet the requirements of the Highway Runoff Manual (HRM). The Build Alternative includes a proposed stormwater management plan that would provide water quality treatment and flow control, primarily through open conveyance in roadside ditches and culverts to approximately 10 newly constructed combined stormwater treatment wetland/detention ponds, from which treated stormwater would outfall via an 18-inch outfall pipe, into adjacent upland and wetland habitats (Figures 8A and 8B). Basic and enhanced treatment will be provided for all newly created impervious surface in total drainage areas (TDAs) 2-7. Treatment is not required for TDAs 1 and 8 because of the small amount of new impervious surface created in them and no formal treatment is provided for them.

### *Level One Analysis*

The anticipated pollutant loading (Exhibit 9) was based on the proposed stormwater treatment levels. Based on these calculations, it was determined that a Level One analysis was not sufficient because the proposed project would have a net increase in the loading of some pollutants within some TDAs. Although the project would result in an overall reduction in loading of total suspended solids (TSS) at the biological study area scale (Exhibit 9), it would result in increases in annual effluent load of total zinc, dissolved zinc, total copper, and dissolved copper at the biological study area scale.

Exhibit 9. Pre- & Post-Project Pollutant Loading (lbs)

		TSS	Total Zinc	Dissolved Zinc	Total Copper	Dissolved Copper
TDA 1	Pre-project	180.80	0.35	0.13	0.06	0.02
	Post-project	145.75	0.30	0.12	0.06	0.02
TDA 2	Pre-project	1,011.35	1.97	0.72	0.36	0.09
	Post-project	786.45	1.99	0.96	0.40	0.15
TDA 3	Pre-project	1,853.20	3.61	1.31	0.66	0.17
	Post-project	1,659.95	4.34	2.14	0.87	0.33
TDA 4	Pre-project	1,017.00	1.98	0.72	0.36	0.10
	Post-project	958.30	2.46	1.20	0.49	0.19
TDA 5	Pre-project	4,938.10	9.61	3.50	1.75	0.46
	Post-project	4,436.70	11.16	5.34	2.21	0.82
TDA 6	Pre-project	1,808.00	3.52	1.28	0.64	0.17
	Post-project	1,469.50	3.68	1.76	0.73	0.27
TDA 7	Pre-project	1,915.35	3.73	1.36	0.68	0.18
	Post-project	1,390.05	3.65	1.81	0.73	0.28
TDA 8	Pre-project	50.85	0.10	0.04	0.02	0.00
	Post-project	33.20	0.09	0.04	0.02	0.01
Total	Post-project	10,879.90	27.67	13.37	5.51	2.06

### Level Two Analysis

Because the project poses a moderate risk of producing runoff with high pollutant concentrations, expected pollutant concentrations were calculated for conditions before and after completion of the Build Alternative (Exhibit 10).<sup>6</sup> The proposed project would result in a net reduction of pollutant concentrations for all pollutants analyzed in each individual TDA and at the biological study area scale (Exhibit 10). Project-wide, pollutant concentrations would be decreased by approximately 62.4 percent for TSS, 51.6 percent for total zinc, 37.9 percent for dissolved zinc, 51.9 percent for total copper, and 22.8 percent for dissolved copper.

Exhibit 10. Expected Pollutant Concentrations Pre- & Post-Project (Moderate Risk)

		TSS (mg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)
TDA 1	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	68.26	135.71	52.00	24.14	6.86
TDA 2	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	35.19	84.54	38.63	14.98	5.86
TDA 3	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	32.50	80.38	37.55	14.23	5.78
TDA 4	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	34.06	82.80	38.18	14.67	5.83
TDA 5	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	36.04	85.86	38.98	15.21	5.89
TDA 6	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	36.33	86.31	39.09	15.29	5.90
TDA 7	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	32.12	79.80	37.39	14.13	5.77
TDA 8	Pre-project	93.00	174.00	62.00	31.00	7.60
	Post-project	33.46	81.88	37.94	14.50	5.81
Total	Post-project	34.93	84.14	38.53	14.91	5.86

### Level Three (Mixing Zone) Analysis

For the Level Three (mixing zone) analysis, existing stream parameters (effluent discharge rate, receiving stream discharge rate, stream geometry, background pollutant concentration, and effluent concentration) were input into Ecology's RIVPLUM5 and TSDCALC models to

<sup>6</sup> The year 2033 Average Daily Traffic (ADT) count developed for the project is 41,862.

estimate the downstream extent of a measurable increase in pollutant concentrations above the biological effect threshold over background concentrations (2.0 µg/L for copper and 5.6 µg/L for zinc).

TDA 2-4 discharge to the Gee Creek and East Fork Lewis River tributaries, headwater streams with low- to non-existent flow conditions (Figures 8A and 8B). The dilution model indicates that insufficient flow is available to provide dilution to threshold copper and zinc concentrations at the point of discharge. Therefore, it was determined that treated stormwater entering the Gee Creek tributaries in TDAs 1-3 would dilute to concentrations below the effects thresholds above background concentrations upstream of NE 10th Avenue. Stormwater from TDA 1 will be infiltrated into fields adjacent to the roadway. Stormwater from this TDA will not outfall directly to any waterbody. Additionally, conveyance through vegetated roadside ditches in moderately well-drained soils will allow for significant additional infiltration of stormwater prior to dispersion, above and beyond the amounts predicted by the pollutant loading and concentration analyses (Exhibits 9 and 10). Treated stormwater entering the unnamed tributary to the East Fork Lewis River in TDA 4 would dilute to concentrations below the effects thresholds above background concentrations in the East Fork Lewis River tributary considerably upstream of NE 239th Street.

Treated stormwater from TDA 5 discharges to Mill Creek North (Figures 8A and 8B). Under fall and winter flow conditions, the results of the dilution model indicate that treated stormwater would dilute to concentrations below the effects thresholds above background concentrations virtually at the discharge point of the outfall. Because the ponded portion of Mill Creek North evaporates and infiltrates until mostly dry under summer low flow conditions, it was assumed that any late summer runoff would be completely contained in the low-lying area that ponds in the winter, or would infiltrate or evaporate, and would not flow downstream to Mill Creek North. The zone of impact for stormwater-related effects in Mill Creek North, therefore, has been established at the north end of the area that ponds, the northern extent of the biological study area.

Treated stormwater from TDAs 6-7 discharge to Mill Creek (Figures 8A and 8B) and the results of the dilution analysis indicate that dilution to threshold copper and zinc concentrations would occur virtually at the discharge point of each outfall.

Stormwater from TDA 8 will be conveyed in roadside ditches outside the biological study area to the east and ultimately treated by an existing detention pond within the City of Battle Ground.

In TDAs 2-8, stormwater will be conveyed to stormwater facilities through vegetated roadside ditches through moderately to excessively well drained soils which will allow for significant amount of infiltration beyond the numbers predicted in Exhibits 9 and 10, and in some cases, in small storm events, stormwater may infiltrate completely within roadside ditches. This additional infiltration is not calculated into the pollutant loading and concentration analyses, and therefore the overall quantity and concentration of pollutants is expected to be significantly less than indicated in Exhibits 9 and 10.

Fish species may be adversely affected by the net increase in PGIS, which has the potential to affect pollutant loading within waterbodies that are potential habitat for listed and resident fish.

However, given the existing degraded baseline conditions, the increase in annual pollutant loading is not expected to significantly affect fish. Fish may also continue to be affected by pollutant concentrations above the effect threshold during discharge events. In the unnamed tributary to the East Fork Lewis River and the Mill Creek tributary, under fall, winter, and spring flow conditions, pollutant concentrations in treated stormwater discharged to these waterbodies would likely be elevated above the biological effect threshold. Within Mill Creek North and Mill Creek, under fall, winter, and spring flow conditions, pollutant concentrations would be diluted below the biological effect threshold virtually at the point of discharge. In summer conditions, stormwater treatment facilities would generally have capacity to contain rainfall events, and it is unlikely that stormwater would be discharged. The additional stormwater infiltration expected to occur via ditch conveyance and through vegetation should result in reduced quantity and concentration of pollutants than indicated in Exhibits 9 and 10.

Base flows would be expected to decrease due to loss of infiltration area. However, implementation of the mitigation plan would provide approximately three times the surface area as the filled wetlands, and replace and enhance numerous wetland functions, including headwater storage and opportunities for recharge. Peak flows would be expected to increase due to loss of infiltration area due to conversion of vegetated areas to roadway. However, flow control should reduce peak flows over the current condition by detaining waters that would otherwise flow downstream very quickly, resulting in downstream erosion and habitat degradation caused by high erosive forces.

Critical habitat for steelhead is designated on the north side of SR 502 within Mill Creek North. Freshwater rearing habitat is the PCE that occurs in this critical habitat. The direct effect to approximately 0.1 acre of in-stream habitat and 2.2 acres of seasonally accessible habitat below the OHWM and increased stormwater concentrations in this location would likely adversely affect overwintering and critical habitat for steelhead.

Beneficial effects of the Build Alternative on area fish resources include a proposed wetland mitigation at the 35-acre Sunset Oaks mitigation site which would likely consist of reconstruction of a presumed fish-bearing section of Curtin Creek, rehabilitation of floodplain hydrology, and the establishment of native emergent, scrub-shrub and forested wetland communities. A similar potential wetland mitigation/restoration project that would create and enhance wetland and restore in-stream habitat on Mill Creek North has also been proposed, but the property for this restoration has not been acquired at this time.

Beneficial effects to fish resources also include restoring approximately 0.1 acre of riparian habitat on the west side of NE 72<sup>nd</sup> Avenue and south of SR 502, where a tattoo business directly adjacent to Mill Creek would be demolished. In addition, on the southeast side of SR 502 at Dollars Corner, a realty business would be demolished and the land adjacent to Mill Creek (approximately 0.2 acre) would be planted with riparian plant species and restored to riparian habitat. (Currently, there is little to no riparian habitat buffer in the vicinity of Dollars Corner.)

The Build Alternative would replace three currently fish-passable culverts on Mill Creek and would either replace or extend a currently fish-passable culvert on Mill Creek North. While these culverts are currently considered to be fish-passable, their replacement and/or extension would result in improved fish mobility within the biological study area. The Build Alternative would

realign/restore sections of Mill Creek during culvert replacement activities near NE 92<sup>nd</sup> Avenue. Restoration activities would include riparian plantings, placement of large woody debris (LWD) that is removed in riparian areas elsewhere along the corridor, removal of concrete bank armoring where present, and realignment of the stream channel.

The Build Alternative would result in stormwater treatment along the corridor. The proposed stormwater treatment design would provide both basic and enhanced water quality treatment for all 27.69 acres of new pollution generating impervious surface (PGIS). Additionally, approximately 6.04 acres of existing PGIS would be retrofit for treatment with discharge. No stormwater treatment is currently provided in the biological study area. The addition of stormwater treatment is expected to reduce peak flows, improve base flows, and improve water quality in area streams.

## **5.0 Mitigation**

This section discusses potential mitigation measures that could be used to avoid or minimize effects to biological resources as required by federal, state, and local permits. For example, fill slopes in wetland and riparian areas were steepened to the extent practicable and the location of the alignment was adjusted to avoid and minimize impacts to high quality wetlands and mature forest habitat. Potential mitigation measures are discussed for the temporary effects and the long-term effects of the Build Alternative only.

### **5.1 Mitigation for Temporary Effects**

The following measures could be taken to avoid and minimize temporary effects to biological resources.

#### Temporary Erosion Sediment Control, Spill Control, and Water Quality

- Implement a site-specific TESC plan to minimize erosion and sedimentation.
- Implement a site-specific Spill Prevention, Control and Countermeasures plan to minimize spills and ensure all harmful materials are properly stored, contained, and disposed.
- Comply fully with state water quality standards.
- Materials will be clean, covered where appropriate, and placed in a manner to prevent erosion.
- Treat any sediment-laden wastewater (in an upland area) produced by the project prior to discharge.
- Ensure that equipment operating below the OHWM use only vegetable-based oils in hydraulic lines.
- Equipment, such as generators, within 50 feet of the OHWM will be diapered or provided another type of containment as approved by WSDOT.

- Protect all inlets and catchments from fresh concrete, tackifier, paving or paint striping, as necessary, in case inclement weather unexpectedly occurs.
- Avoid conducting paving or stripe painting operations during rainy weather.
- Fresh concrete and/or concrete by-products shall be prevented from entering surface waters during construction. Any water having direct contact with uncured concrete shall be contained and treated or removed from the site (as appropriate) to prevent discharge to surface waters and/or wetlands.
- Establish concrete chute cleanout areas to properly contain wet concrete and wash water outside of environmentally sensitive areas.
- Inspect equipment daily for leaks and proper function. Ensure that equipment is clean and free of external petroleum-based products.
- To the extent practicable, fuel and maintain equipment at least 150 feet from wetlands marked for preservation and from the OHWM of streams.
- Any waste resulting from the project shall become the responsibility of the Contractor and will be disposed at a properly permitted site of their choosing.

#### Temporary Access

- Locate staging areas above the OHWM and outside of environmentally sensitive areas.
- Staging and temporary access areas will occur on existing roadways whenever possible.

#### Footprint Minimization

- Install high visibility fencing around preservation areas before construction to avoid unintended impacts to vegetation, wetlands, historical or archaeology resource sites, riparian zones, or other sensitive areas.
- Limit vegetation removal and retain large trees to the extent practicable. Protect root zones of the trees that will be retained.

#### Revegetation

- Restore vegetation and roadside/environmental function to areas of permanent and temporary disturbance in accordance with the WSDOT Roadside Classification Plan.

#### In-Water Work

- Comply fully with the terms and conditions of the Hydraulic Project Approval (HPA) issued for the project by WDFW.

- Comply with the terms and conditions of the Biological Opinion issued by the National Marine Fisheries Services and/or the U.S. Fish and Wildlife Service.
- Any temporary dewatering of the in-water work zones shall be preceded by work area isolation and fish removal/relocation (as necessary). Fish handling shall be conducted by a trained and qualified biologist.
- Dewater identified in-water work areas and relocate fish outside of the project area before in-water work begins. NOAA Fisheries and WDFW will be notified in case of accidental fish kills.
- Conduct in-water work during the appropriate in-water work window for each watershed, as determined by WDFW:
  - East Fork Lewis River Watershed – July 1-September 30
  - Salmon Creek Watershed – July 1-September 30
  - Gee Creek Watershed – July 1- September 30
- The project will, to the extent practicable, complete all necessary bank protection prior to releasing water back into the in-water work zone.
- Reintroduction of water to the in-water work zone shall be done gradually and in stages so as to minimize the mobilization of sediments.

#### Wetlands

- The project will fully comply with all terms and conditions included in the Section 404 and Section 401 permits issued for the project by the Corps and Ecology. The project will perform compensatory wetland mitigation to fully replace lost and degraded wetland functions.
- When designing stormwater treatment facilities, maintain the existing drainage courses to the full extent practicable.

## 5.2 Mitigation for Long-Term Effects

The following measures could be taken to avoid and minimize long-term effects to biological resources. Measures are identified by specific resource.

### 5.2.1 Wetland Resources

Permitting requirements (e.g., Clark County Code 40.450 and Corps Section 404) require that projects avoid and minimize impacts to wetland resources, and mitigate for unavoidable effects.

Governor's Executive Order 90-04, Protection of Wetlands, requires all state agencies to avoid to the extent practicable, long- and short-term adverse effects associated with the destruction or modification of wetlands. More specifically, the order directs agencies to avoid new construction in wetlands unless there is no practicable alternative and states that where the wetlands cannot be

avoided, the Build Alternative must include all practicable measures to minimize harm to wetlands. For the Build Alternative, impacts to high quality wetlands would be avoided and minimized by steepening fill slopes and adjusting the location of the alignment reduced impacts. To mitigate for the unavoidable effects, compensatory mitigation would be implemented in accordance with the Governor's Executive Order 90-04 and WSDOT Directive 31-12.

WSDOT would implement a comprehensive watershed/landscape based mitigation plan for wetland, wetland buffer, and aquatic resources affected by the project. Wetland mitigation sites would be constructed within the affected watersheds to replace and enhance hydrologic, water quality, and wildlife functions affected as part of project development and following all applicable federal, state, and local mitigation requirements.

WSDOT would adopt a soils and landscape-based approach to selecting potential wetland mitigation sites within the Gee Creek, East Fork Lewis River, and Salmon Creek watersheds to provide maximum watershed and ecological benefits. Data obtained from the Soil Survey of Clark County will be used to research a suite of soil characteristics including; hydrologic soil groupings, infiltration rate, hydraulic conductivity (Ksat), estimated depth to seasonal high water tables, suitability for agricultural ponds, shallow slopes, soil texture, woodland suitability, and forestland productivity.

WSDOT would create multiple mitigation sites within the Gee Creek, East Fork Lewis River, and Salmon Creek watersheds. The Sunset Oaks and Mill Creek North potential mitigation sites have been identified as proposed locations for compensatory wetland mitigation and fish habitat restoration for the project. Planting of woody vegetation species would be part of the mitigation. Additional mitigation sites would likely be identified later.

Mitigation sites are selected to provide the greatest ecological benefit to the affected watersheds, and are typically designed to address one or more of the limiting factors documented for each stream system. Implementation of the mitigation plan would provide approximately three times the surface area as the filled wetlands, and replace and enhance numerous wetland functions. The mitigation would also provide a significantly greater acreage of wetland buffer and would greatly enhance buffer function upon implementation.

Detailed goals, performance criteria, and contingency plans for all mitigation sites would be developed as part of the final wetland mitigation plan consistent with local, state, and federal wetland permits and requirements.

WSDOT would apply rigorous monitoring methods, integrated plant establishment techniques, and principles of adaptive management during the 10 year establishment phase of the mitigation sites to assure compliance with documented performance criteria. If monitored performance criteria are not met, the contingency plan would be implemented to correct any potential problems.

### 5.2.2 Vegetation and Wildlife Resources

The Build Alternative was aligned to minimize removal of forest habitat to the extent practicable. Planting trees of size comparable to the mature trees proposed for removal in riparian zones is not practicable. Revegetate and restore disturbed areas, including clear and grub

slopes, areas within or adjacent to riparian zones, and wetlands with dense native vegetation as appropriate. Native woody and herbaceous vegetation would be used to restore and enhance functions (including wildlife habitat) lost to construction in the project area.

### 5.2.3 Fish Resources

When possible, trees removed from riparian areas would be used to enhance habitat at Mill Creek North potential mitigation site, Sunset Oaks wetland mitigation site and other environmental mitigation areas. Disturbed riparian areas would be seeded and planted with a preference for woody vegetation to provide in-stream shading and prevent sediment loading to streams.

South of SR 502 and on the west side of NE 72nd Avenue, a tattoo business would be demolished and the land adjacent to Mill Creek (less than 0.1 acre) would be planted with riparian plant species and restored to riparian habitat. On the southeast side of SR 502 at Dollars Corner, a realty business would be demolished and the land adjacent to Mill Creek (approximately 0.2 acres) would be planted with riparian plant species and restored to riparian habitat. (Currently, there is little to no riparian habitat buffer in the vicinity of Dollars Corner.)

At the Sunset Oaks mitigation site, Curtin Creek would be restored to a more natural, functioning stream. The Curtin Creek channel would be reconstructed to provide gradual winding across the site with the new channel ranging between 3,000 and 5,000 linear feet and would be approximately 3 feet deep and 10 feet wide. In-stream work would occur within the designated in-water work window.

The wetland mitigation/restoration activities would improve habitat at the Mill Creek North potential mitigation site. A section of the creek would be reconstructed to restore natural channel morphology, re-establish floodplain connectivity, and restore native riparian plant communities. These improvements would greatly improve available habitat within the portion of Mill Creek North for steelhead, and would more than replace any lost function provided by the portion of the creek directly filled in association with the roadway widening. In-stream work would occur in the designated in-water work window.

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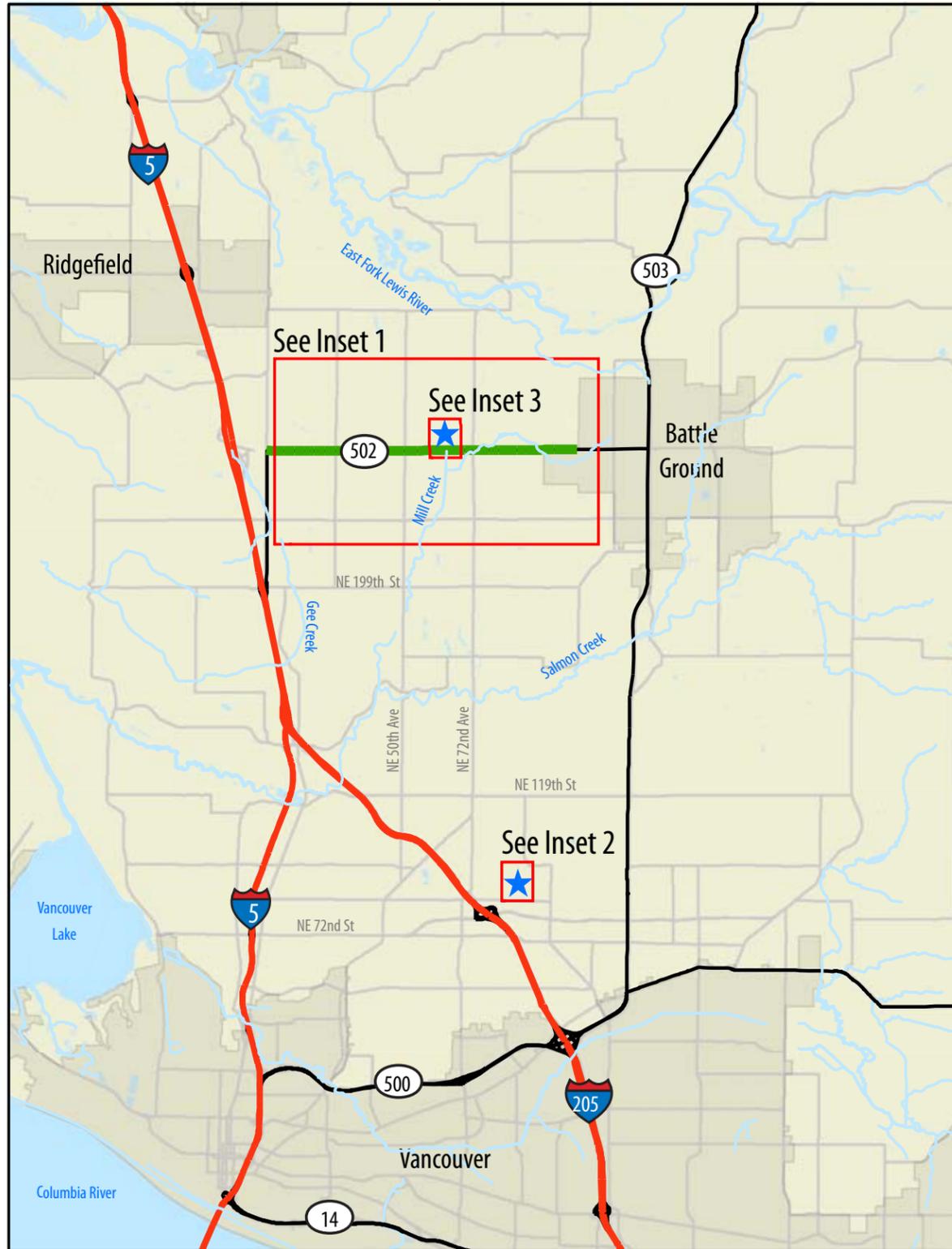
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## **Appendix A**

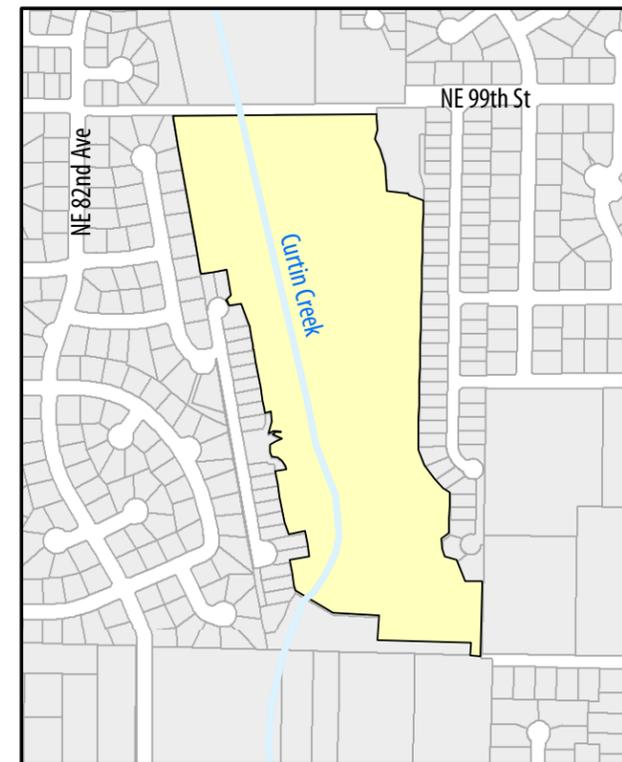
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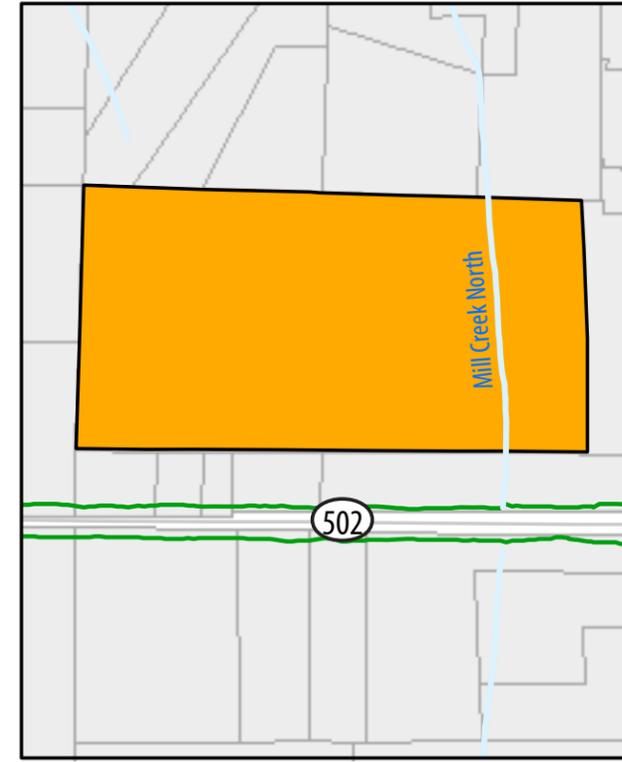
Figure 1. Project Area & Vicinity



Inset 1: Project Area



Inset 2: Sunset Oaks Wetland Mitigation Site



Inset 3: Mill Creek North Potential Mitigation Site

LEGEND

- SR 502 Project Area Corridor
- Sunset Oaks Wetland Mitigation Site
- Mill Creek North Potential Mitigation Site

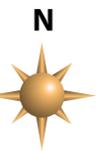
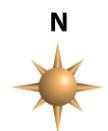
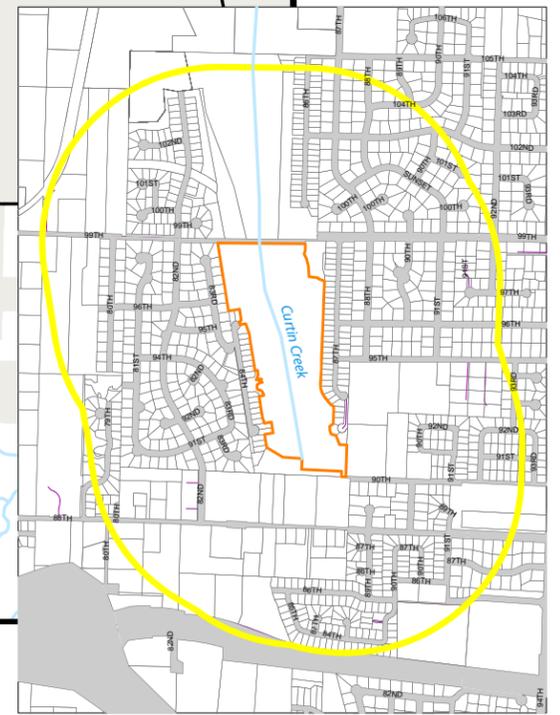
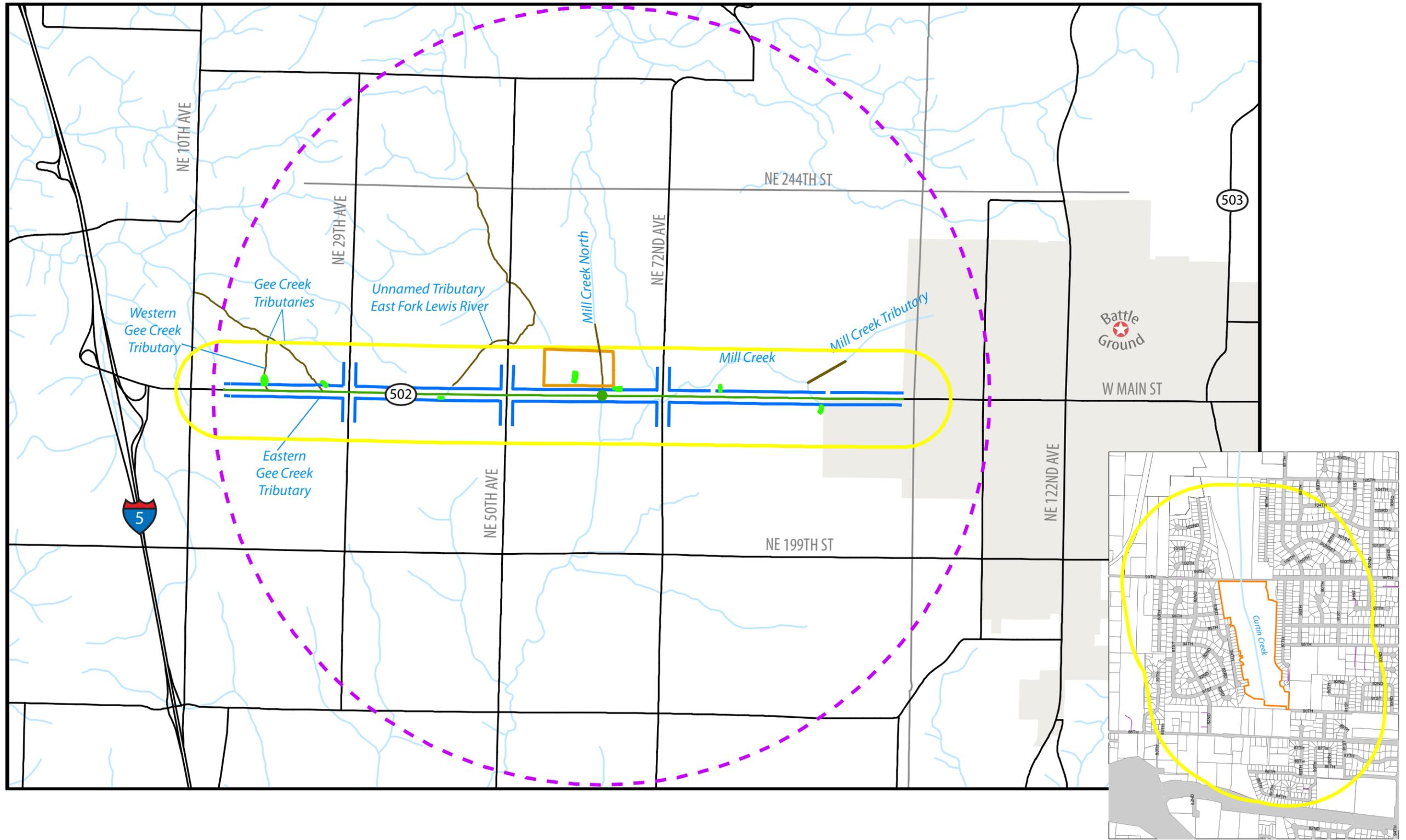


Figure 2. Primary & Secondary Biological Study Area



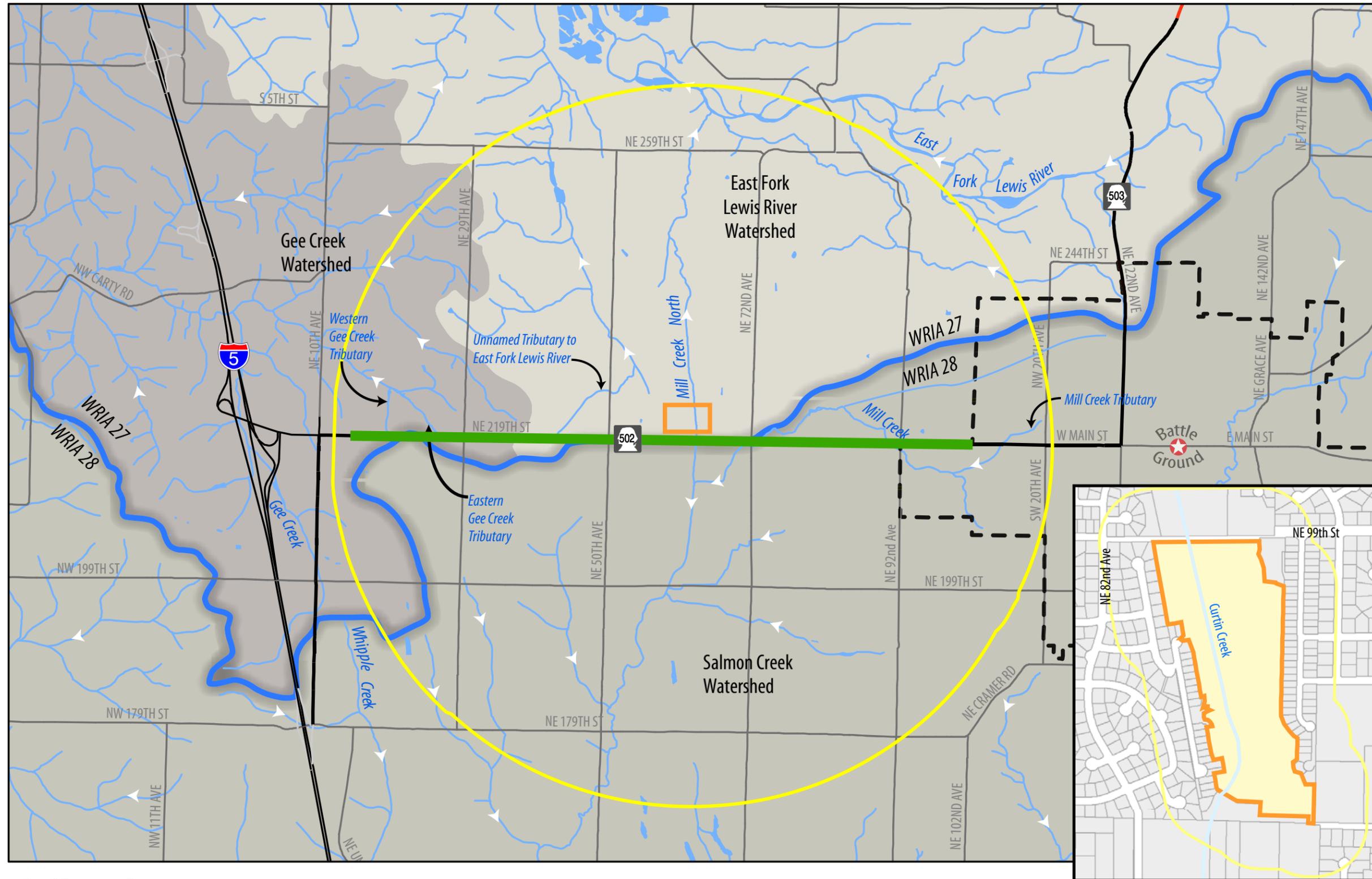
0 2,000 4,000  
SCALE (feet)

# SR 502 CORRIDOR WIDENING

REDUCING CONGESTION • BUILDING FOR THE FUTURE  
I-5 TO BATTLE GROUND

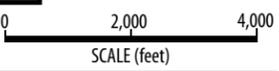
LEGEND		Primary Biological Study Area	Secondary Biological Study Area
	SR 502 Corridor Widening Project		
	Creeks/Rivers		

Figure 3. Watershed & Subbasin Boundaries



WRIA 27 - Lewis River  
 WRIA 28 - Salmon Creek/Washougal River

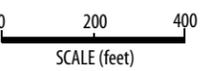
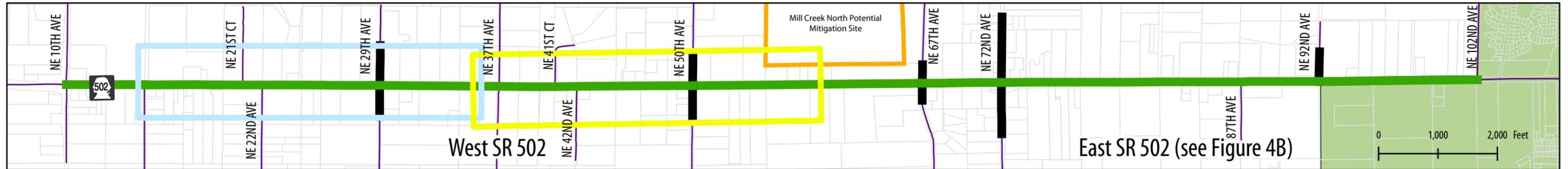
Sunset Oaks Wetland Mitigation Site (WRIA 28)



**LEGEND**

East Fork Watershed	Salmon Creek Watershed	Creeks/Rivers (1:24,000)	City Limits	SR 502 Corridor Widening Project	Mill Creek North Potential/Sunset Oaks Wetland Mitigation Sites
Gee Creek Watershed	Water Resource Inventory Area (WRIA)	Waterbodies (1:24,000)	Secondary Biological Study Area	Flow Direction	

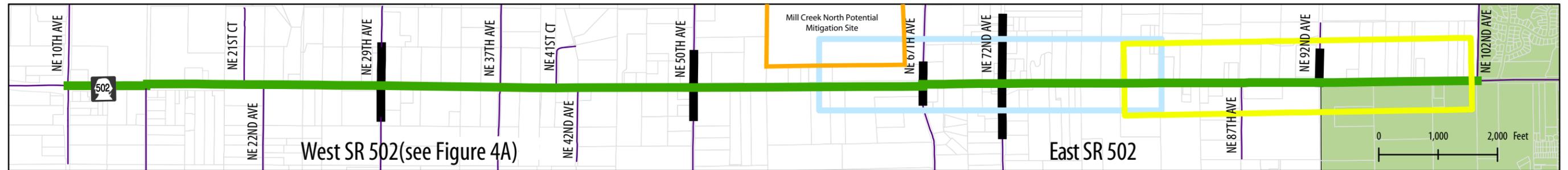
Figure 4A. Wetland/In-Stream Effect



**LEGEND**

Proposed Stormwater Treatment Wetland Detention Ponds	Wetland Enhancement/Flow Control Facility	<b>Wetland Category</b>	Wetland Impact	Creeks/Rivers (1:24,000)
Road Widening Limits	SR 502 Corridor Widening Project	1		Mill Creek North Potential Mitigation Site
		2	3	
			4	

Figure 4B. Wetland/In-Stream Effect



**LEGEND**

- Proposed Stormwater Treatment Wetland Detention Ponds
- SR 502 Corridor Widening Project
- Road Widening Limits

**Wetland Category**

- 1
- 2
- 3
- 4

- Wetland Impact
- Mill Creek North Potential Mitigation Site
- ~ Creeks/Rivers (1:24,000)

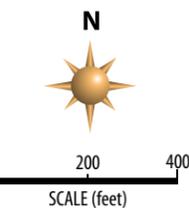


Figure 5A. Upland & Riparian Vegetation/Habitat Effects Map

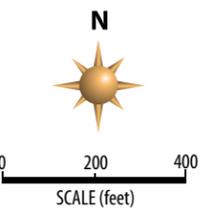
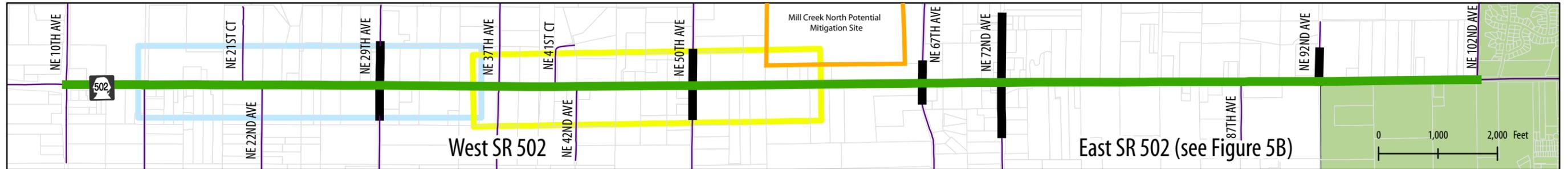


Figure 5B. Upland & Riparian Vegetation/Habitat Effects Map

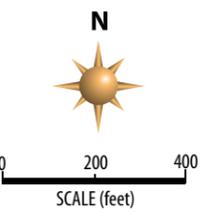
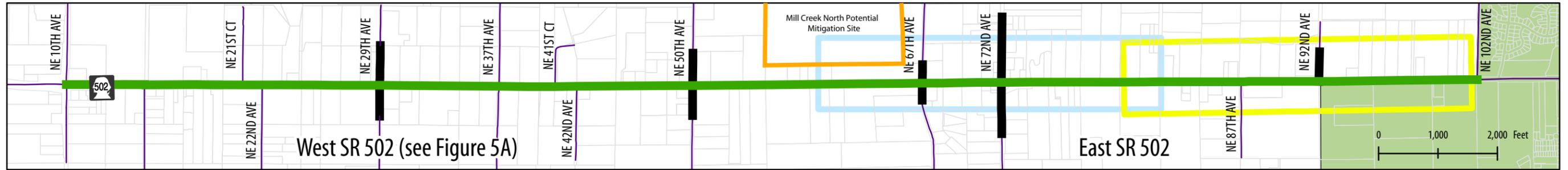
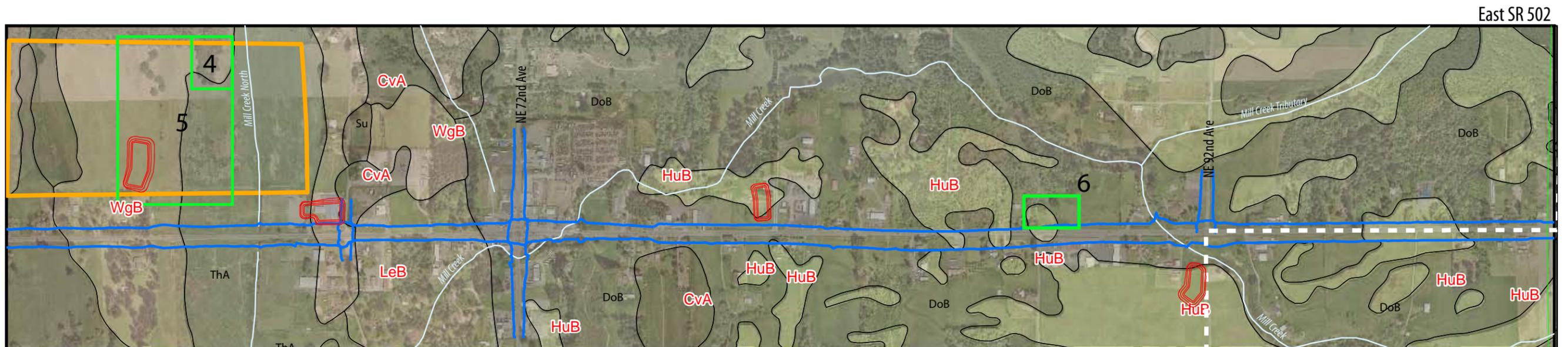
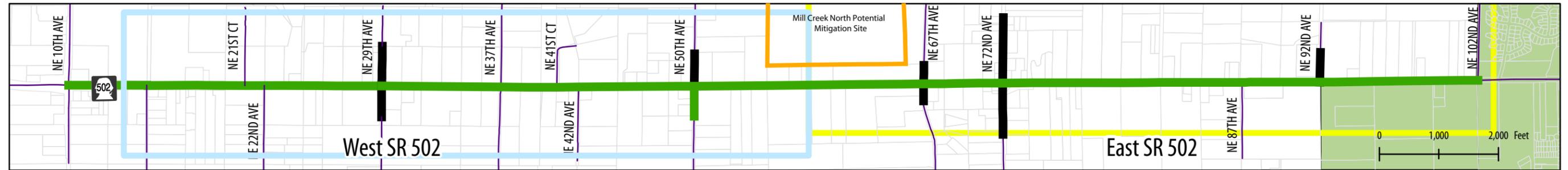
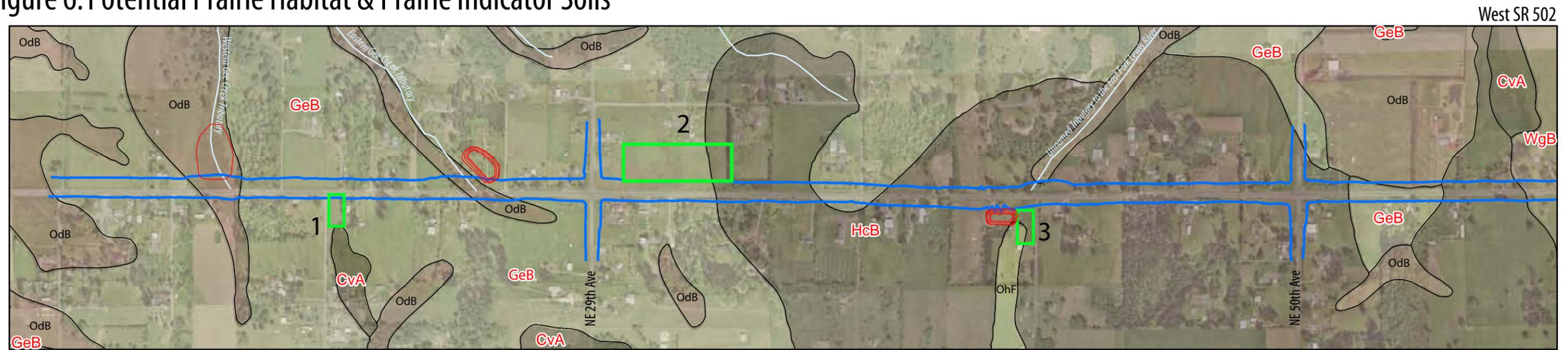


Figure 6: Potential Prairie Habitat & Prairie Indicator Soils

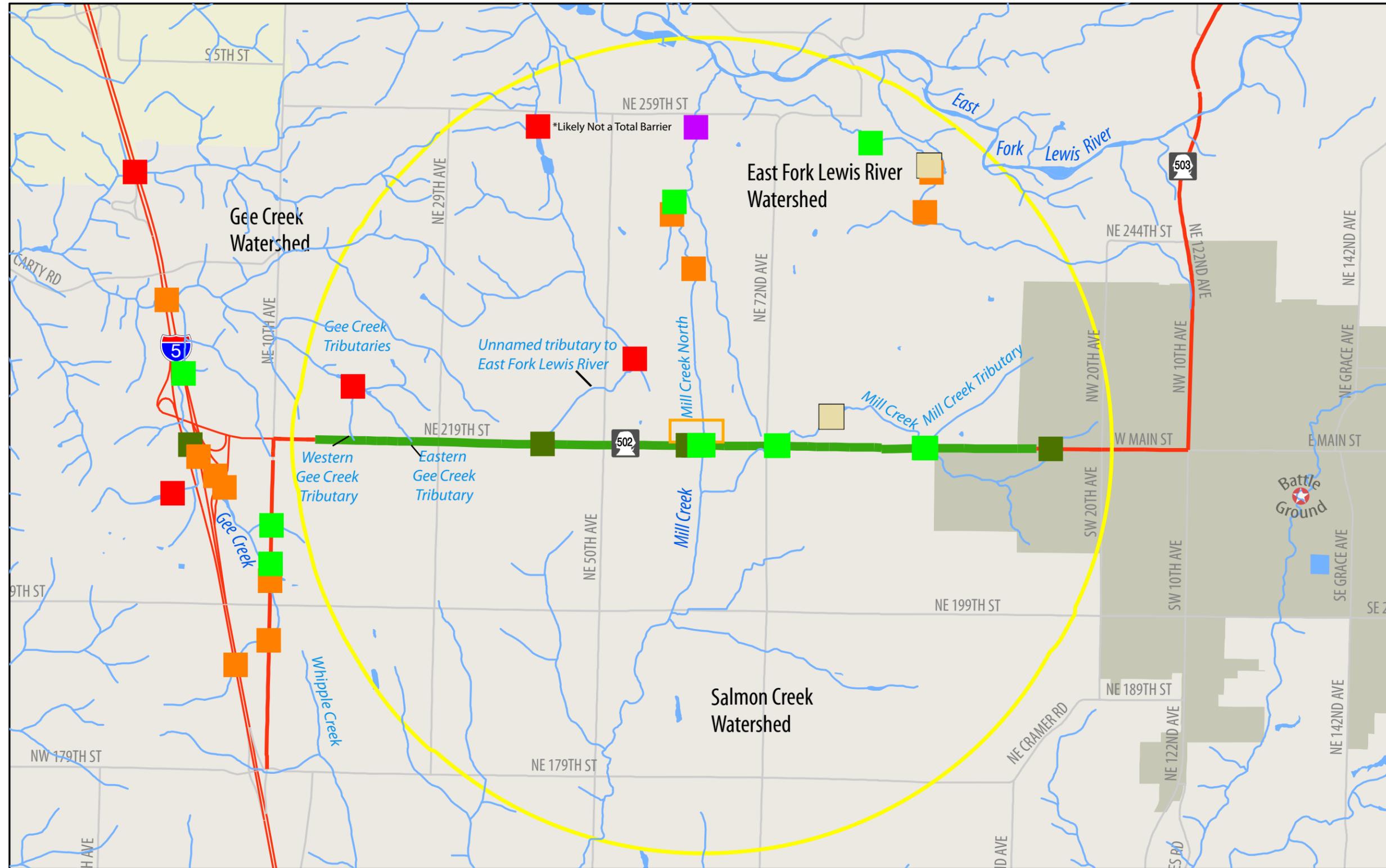


**CvA:** Cove silty clay loam, 0 to 3% slopes     **HcB:** Hesson clay loam, 0 to 8% slopes     **HuB:** Hockinson loam, moderately well drained, 0 to 8% slopes     **OhF:** Olequa silty clay loam, heavy variant, 20 to 45% slopes     **WgB:** Washougal gravelly loam, 0 to 8% slopes  
**DoB:** Dollar loam, 0 to 5% slopes     **HoB:** Hillsboro silt loam, 3 to 8% slopes     **LeB:** Lauren loam, 0 to 8% slopes     **Su:** Semiahmoo muck, shallow variant  
**GeB:** Gee silt loam, 0 to 8% slopes     **HoC:** Hillsboro silt loam, 8 to 15% slopes     **OdB:** Odne silt loam, 0 to 5% slopes     **ThA:** Tisch silt loam, 0 to 3 percent slopes     **RED TEXT INDICATES PRAIRIE SOILS**

LEGEND

- Project Area
- Mill Creek North Potential Mitigation Site
- Creeks/Rivers(1:24,000)
- Stormwater Ponds
- Prairie Sample Areas 1-6
- SR 502 Corridor Widening Project

Figure 7. Fish Passage

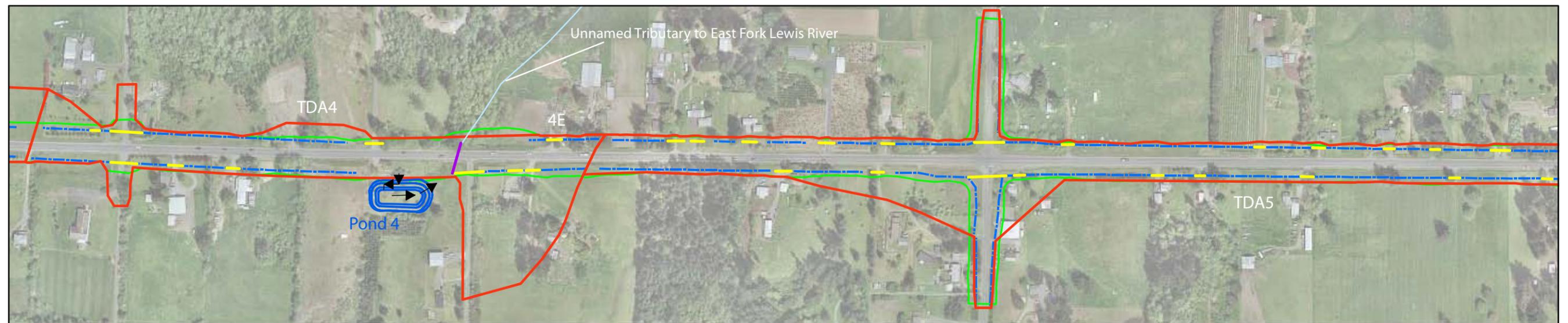
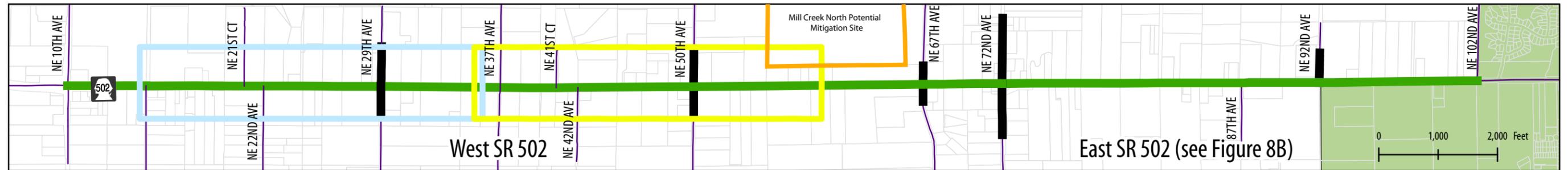
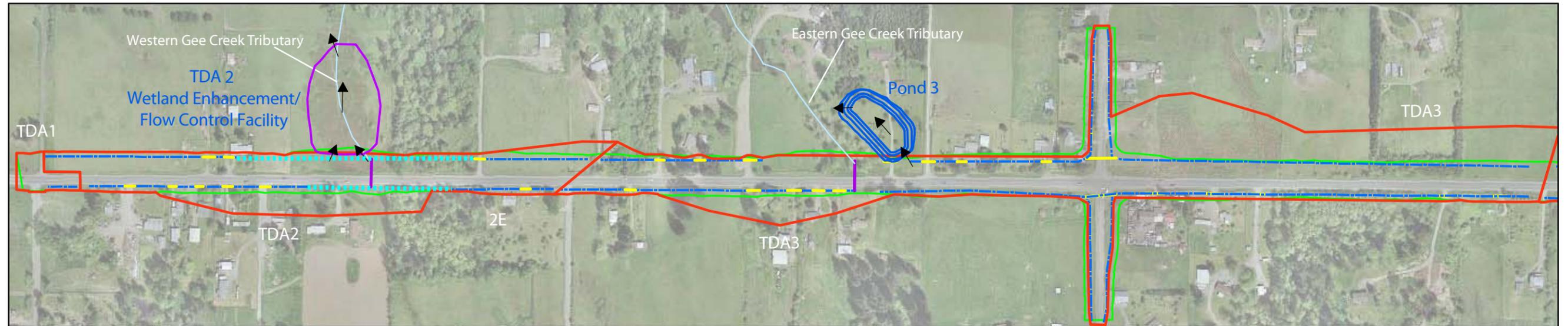


\* Likely not a total barrier per discussion with WDFW biologists

LEGEND

- Secondary Biological Study Area
- Non-Barrier
- Partial Barrier
- Total Barrier
- Creeks/Rivers (1:24,000)
- Mill Creek North Potential Mitigation Site
- Non-Fish Bearing
- Fishway
- Unknown
- Waterbodies (1:24,000)
- SR 502 Corridor Widening Project

Figure 8A. Stormwater Treatment



LEGEND	
Proposed Stormwater Treatment Wetland Detention Ponds	Replaced Non-Fish-Accessible Culvert
Wetland Enhancement/Flow Control Facility	TDA Boundary
New Ditch	Extended Culvert
Media Filter Drain	SR 502 Corridor Widening Project
Proposed Inlet/Outfall Locations	Road Widening Limits
Creek/Rivers (1:24,000)	Mill Creek North Potential Mitigation Site

Figure 8B. Stormwater Treatment

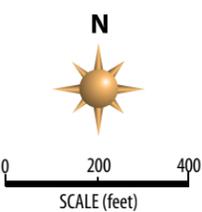
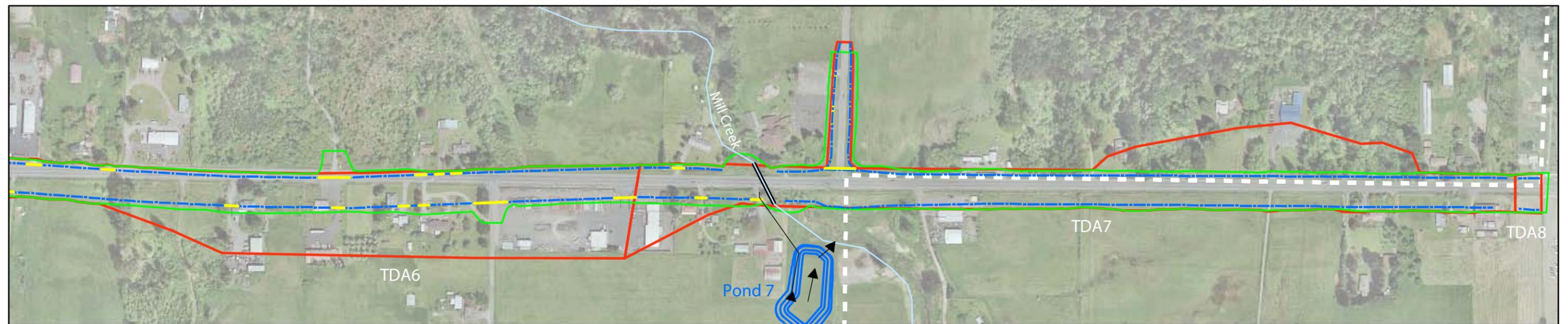
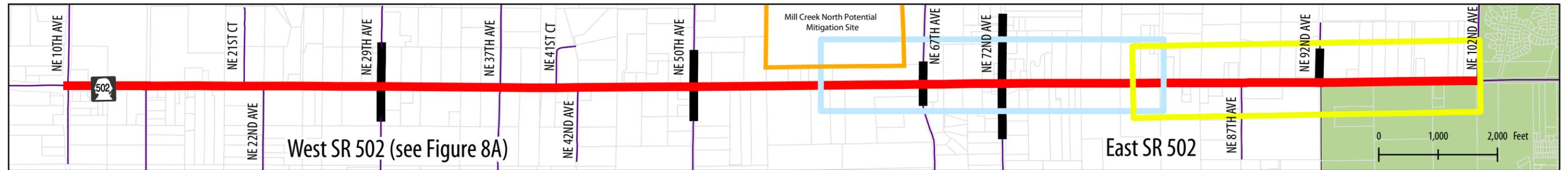
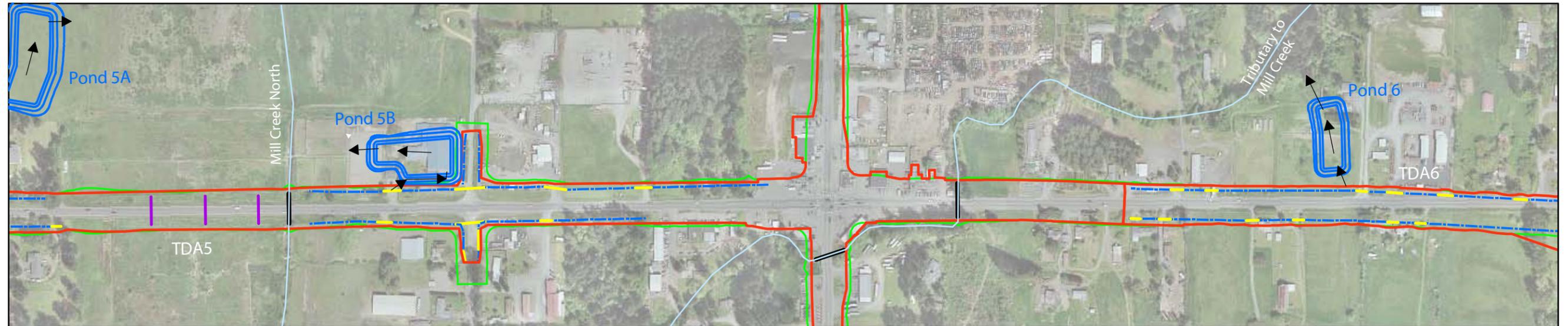
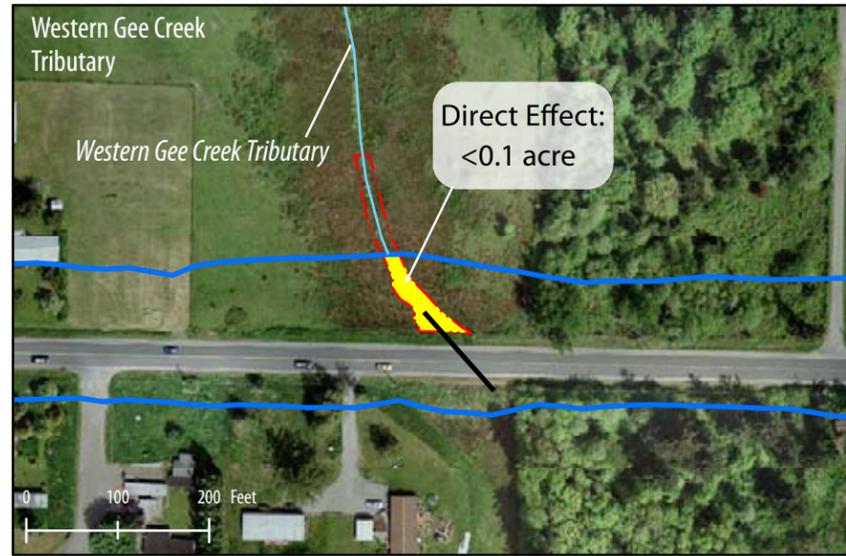
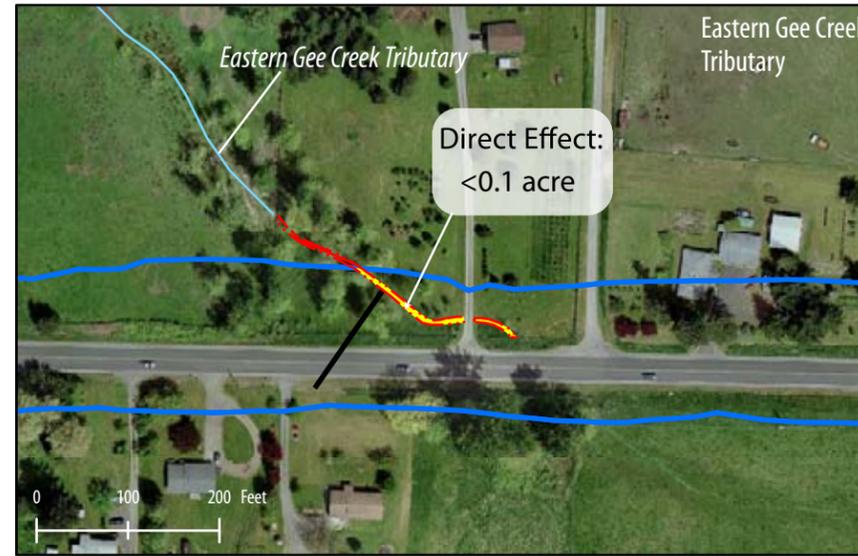


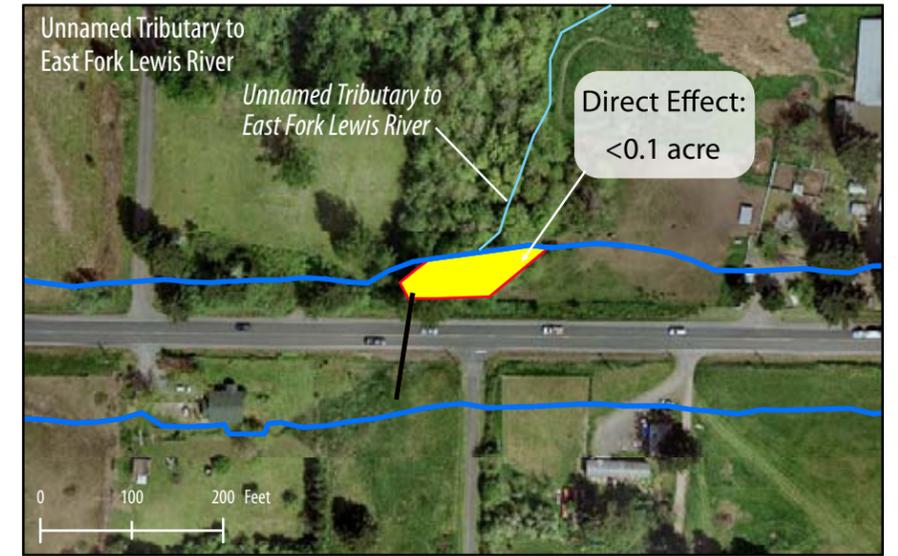
Figure 9. Effects Below OHWM in Fish-Bearing Streams



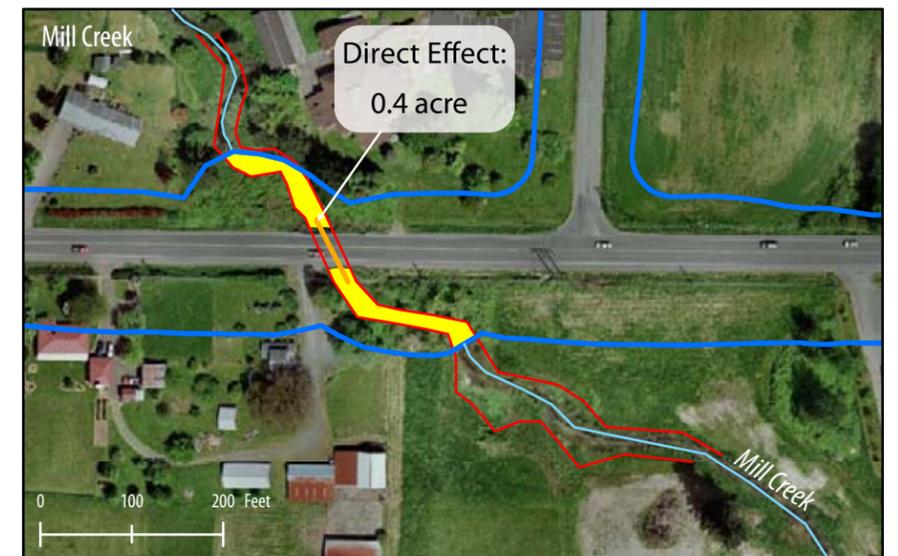
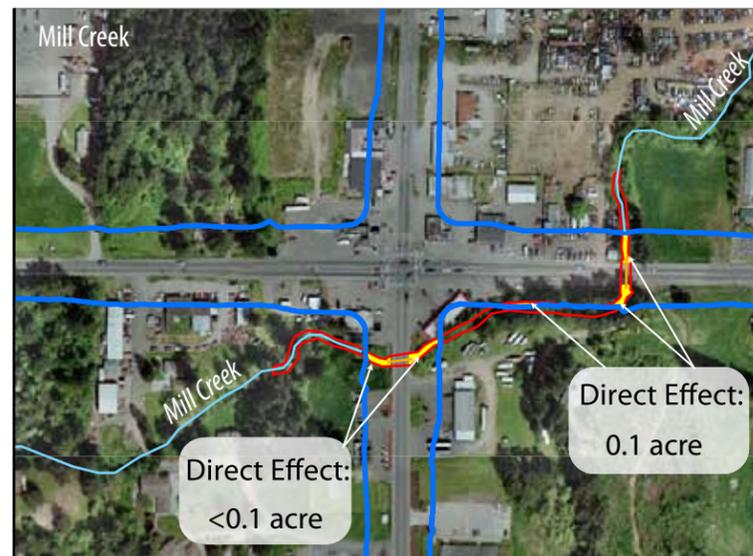
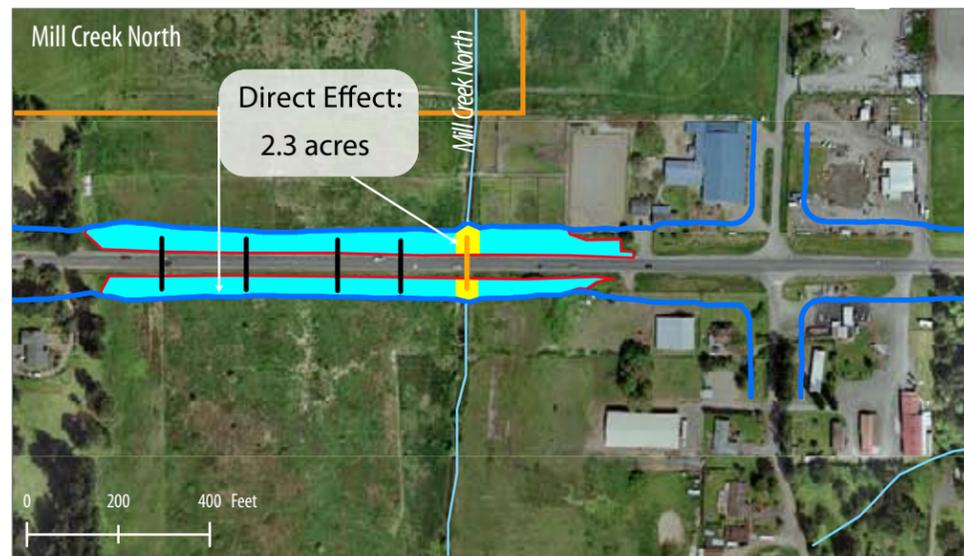
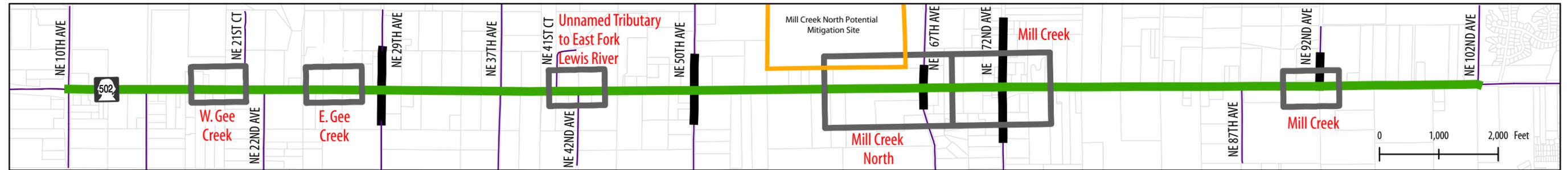
\* No ESA Listed Fish Adjacent to Roadway



\* No ESA Listed Fish Adjacent to Roadway



\* No ESA Listed Fish Adjacent to Roadway



**Appendix B**  
**Wetland Summary Table**

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Wetland	Wetland Classification		Ecology Rating				
	Cowardin Class	HGM Class	Category	Total Score	Water Quality Score	Hydrologic Score	Habitat Score
NA	PEM	RIV	II	58	4	32	22
NB	PFO	DEP	III	38	8	18	12
NC	PSS	DEP	IV	24	12	4	8
ND & NE	PEM, PFO	RIV	II	55	16	22	17
NF & SI	PEM, PFO	DEP	III	49	16	16	17
NG & NH	PFO	DEP	II	53	18	20	15
NGG	PEM	DEP	IV	27	16	4	7
NI & NJ	PEM, PFO	DEP	III	47	8	22	17
NK	PEM, PFO	DEP	III	47	12	18	17
NL	PEM	DEP	III	41	18	10	13
NN & SU	PEM	RIV	I	75	22	32	21
NO	PEM	DEP	IV	26	12	7	7
NQ	PEM	DEP	IV	19	8	4	7
NR	PSS	DEP	I	72	30	20	22
NS	PEM, PSS	DEP	II	57	22	16	19
NT	PEM, PFO	DEP	II	55	22	16	17
NU	PEM	DEP	III	49	18	16	15
NX	PEM, PFO	DEP	II	52	20	14	18
NY	PEM, PFO	DEP	III	44	24	4	16
NZ	PEM	DEP	IV	10	2	1	7

Wetland	Wetland Classification		Ecology Rating				
	Cowardin Class	HGM Class	Category	Total Score	Water Quality Score	Hydrologic Score	Habitat Score
NAA	PFO	DEP	II	66	26	16	24
NAB	PEM,PFO	DEP	IV	22	8	4	10
NAC	PFO	DEP	III	32	12	8	12
NAD	PFO	DEP	IV	28	12	4	12
NAE	PFO	DEP	III	33	11	8	14
NAF	PFO	DEP	III	41	18	10	13
NAG	PEM	DEP	III	45	18	16	11
SA	PEM,PFO	DEP	II	54	14	20	20
SB	PEM, PFO	DEP	III	49	16	18	15
SC	PEM	DEP	IV	27	6	12	9
SD	PEM	DEP	IV	17	6	4	7
SE & SF	PEM, PFO	DEP	III	34	4	18	12
SJ	PEM	DEP	IV	24	8	7	9
SKK	PEM	DEP	IV	24	8	7	9
SL							
SLL							
SN	PEM	DEP	III	31	4	18	9
SO	PFO	DEP	III	47	24	7	16
SP	PEM	DEP	III	40	16	10	14
SQ	PEM	DEP	IV	17	6	4	7
SR	PEM	DEP	IV	27	10	7	10
ST	PEM	DEP	IV	12	2	4	6
SV	PFO	DEP	III	47	20	14	13

Wetland	Wetland Classification		Ecology Rating				
	Cowardin Class	HGM Class	Category	Total Score	Water Quality Score	Hydrologic Score	Habitat Score
SVV	PEM	DEP	IV	24	2	12	10
SVW	PEM	DEP	IV	18	2	6	10
SX	PEM,PSS	DEP	II	51	12	20	19
SY	PEM	RIV	III	46	16	18	12
SZ	PEM	DEP	IV	22	2	12	8
SAA	PEM	DEP	III	40	14	14	12
SAB, NV, NW	PEM	RIV	IV	28	10	10	8
SAD	PEM	DEP	III	33	12	8	13
SAE	PEM	DEP	III	33	6	16	11
SAF & SAG	PFO, PSS, PEM	DEP	III	44	10	14	20
SAH	PEM	DEP	IV	20	8	4	8
SAI	PEM	DEP	IV	26	12	4	10
SAJ	PEM	DEP	IV	26	12	4	10
SAK	PEM	DEP	IV	30	12	8	10
SAM	PEM	DEP	IV	26	8	8	10
SAN	PEM	DEP	IV	16	4	5	7
SAO	PEM	DEP	IV	28	12	8	8
SAP	PEM	DEP	IV	27	16	4	7
SWD1 SWD2 SWD3 SWD4	PEM	DEP	IV	18	8	4	6

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## **Appendix C**

### **Species Lists**

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**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN CLARK COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WESTERN WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised November 1, 2007)**

**LISTED**

Bull trout (*Salvelinus confluentus*)

Gray wolf (*Canis lupus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Castilleja levisecta* (golden paintbrush) [historic]

*Howellia aquatilis* (water howellia)

*Lomatium bradshawii* (Bradshaw's lomatium)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for bull trout

**PROPOSED**

None

**CANDIDATE**

(Brush Prairie) Mazama pocket gopher (*Thomomys mazama* ssp. *oregonus*)  
Oregon spotted frog (*Rana pretiosa*)

**SPECIES OF CONCERN**

Aleutian Canada goose (*Branta canadensis leucopareia*)  
Bald eagle (*Haliaeetus leucocephalus*)  
California wolverine (*Gulo gulo luteus*)  
Cascades frog (*Rana ascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Larch Mountain salamander (*Plethodon larselli*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend=s big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)  
Tailed frog (*Ascaphus truei*)  
Van Dyke=s salamander (*Plethodon vandykei*)  
Western gray squirrel (*Sciurus griseus griseus*)

Western toad (*Bufo boreas*)  
*Cimicifuga elata* (tall bugbane)  
*Corydalis aquae-gelidae* (Clackamas corydalis)  
*Lathyrus torreyi* (Torrey's peavine) [historic]

## Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated Feb. 26, 2008)

		Species <sup>1</sup>	Endangered Species Act Listing Status <sup>2</sup>	ESA Listing Actions Under Review
Sockeye Salmon ( <i>Oncorhynchus nerka</i> )	1	Snake River	Endangered	
	2	Ozette Lake	Threatened	
	3	Baker River	Not Warranted	
	4	Okanogan River	Not Warranted	
	5	Lake Wenatchee	Not Warranted	
	6	Quinalt Lake	Not Warranted	
	7	Lake Pleasant	Not Warranted	
Chinook Salmon ( <i>O. tshawytscha</i> )	8	Sacramento River Winter-run	Endangered	
	9	Upper Columbia River Spring-run	Endangered	
	10	Snake River Spring/Summer-run	Threatened	
	11	Snake River Fall-run	Threatened	
	12	Puget Sound	Threatened	
	13	Lower Columbia River	Threatened	
	14	Upper Willamette River	Threatened	
	15	Central Valley Spring-run	Threatened	
	16	California Coastal	Threatened	
	17	Central Valley Fall and Late Fall-run	Species of Concern	
	18	Upper Klamath-Trinity Rivers	Not Warranted	
	19	Oregon Coast	Not Warranted	
	20	Washington Coast	Not Warranted	
	21	Middle Columbia River spring-run	Not Warranted	
	22	Upper Columbia River summer/fall-run	Not Warranted	
	23	Southern Oregon and Northern California Coast	Not Warranted	
	24	Deschutes River summer/fall-run	Not Warranted	
Coho Salmon ( <i>O. kisutch</i> )	25	Central California Coast	Endangered	
	26	Southern Oregon/Northern California	Threatened	
	27	Lower Columbia River	Threatened	• Critical habitat
	28	Oregon Coast <sup>2</sup>	Threatened	
	29	Southwest Washington	Undetermined	
	30	Puget Sound Strait of Georgia	Species of Concern	
Chum Salmon ( <i>O. keta</i> )	31	Olympic Peninsula	Not Warranted	
	32	Hood Canal Summer-run	Threatened	
	33	Columbia River	Threatened	
	34	Puget Sound Strait of Georgia	Not Warranted	
	35	Pacific Coast	Not Warranted	
Steelhead ( <i>O. mykiss</i> )	36	Southern California	Endangered	
	37	Upper Columbia River	Endangered	
	38	Central California Coast	Threatened	
	39	South Central California Coast	Threatened	
	40	Snake River Basin	Threatened	
	41	Lower Columbia River	Threatened	
	42	California Central Valley	Threatened	
	43	Upper Willamette River	Threatened	
	44	Middle Columbia River	Threatened	
	45	Northern California	Threatened	
	46	Oregon Coast	Species of Concern	
	47	Southwest Washington	Not Warranted	
	48	Olympic Peninsula	Not Warranted	
	49	Puget Sound	Threatened	• Critical habitat • Protective Regulations
	50	Klamath Mountains Province	Not Warranted	
Pink Salmon ( <i>O. gorbuscha</i> )	51	Even-year	Not Warranted	
	52	Odd-year	Not Warranted	

<sup>1</sup> The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA Fisheries has delineated distinct population segments (DPSs) for consideration as "species" under the ESA.

<sup>2</sup> On Feb. 11, 2008, NOAA Fisheries published a final determination listing Oregon coast coho as threatened (73FR7816). This final rule also designated critical habitat and issued final protective regulations. The listing, critical habitat and protective regulations are effective on **May 12, 2008**.

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## **Appendix D**

### **Prairie Plant Surveys**

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## PRAIRIE PLANT SUMMARY TABLE

<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>
<i>Agrostis capillaris</i>	Colonial bentgrass
<i>Alopecurus geniculatus</i>	Water foxtail
<i>Anthoxanthum odoratum</i>	Sweet vernalgrass
<i>Camassia quamash</i>	Common camas
<i>Cardamine penduliflora</i>	Willamette Valley bittercress
<i>Carex obnupta</i>	Slough sedge
<i>Festuca arundinacea</i>	Tall fescue
<i>Festuca rubra</i>	Red fescue
<i>Holcus lanatus</i>	Common velvet grass
<i>Juncus effusus</i>	Soft rush
<i>Leucanthemum vulgare</i>	Oxeye daisy
<i>Lotus corniculatus</i>	Bird's foot trefoil
<i>Lupinus polyphyllus</i>	Large leaved lupine
<i>Mahonia nervosa</i>	Oregon grape
<i>Oemleria cerasiformis</i>	Indian plum
<i>Phalaris arundinacea</i>	Reed canarygrass
<i>Poa</i> spp.	Bluegrass
<i>Polygonum lapathifolium</i>	Willow weed
<i>Prunella vulgaris</i>	Self-heal
<i>Pteridium aquilinum</i>	Bracken fern
<i>Quercus garryana</i>	Garry oak
<i>Ranunculus repens</i>	Creeping buttercup
<i>Ranunculus sceleratus</i>	Celery-leaved buttercup
<i>Rosa</i> spp.	Rose species
<i>Rubus discolor</i>	Himalayan blackberry
<i>Rubus ursinus</i>	Trailing blackberry
<i>Symphoricarpos albus</i>	Common snowberry
<i>Taraxacum officinale</i>	Common dandelion
<i>Trillium parviflorum</i>	Small-flowered trillium
<i>Vaccinium parvifolium</i>	Red huckleberry
<i>Vicia</i> spp.	Vetch

## SR 502 CORRIDOR WIDENING PROJECT

## PRAIRIE SAMPLE AREA 1

SITE VISIT: MAY 13, 2008

Area 1 is emergent wetland. The area is bordered on the north by SR 502, NE 22th Avenue to the west, and a residence to the east. The wetland extends to the south, outside of the survey area. The surface of the site is hummocky and depressional areas exhibit evidence of seasonal ponding such as water stained leaves and drainage patterns. No standing water was present during the May site visit. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site. This site was mowed repeatedly in the following months, and therefore, this is the sole data set for this plant survey.

**PLOT 1:**HERBACEOUS: 100%*Jun. eff.*, 30%*Car. obn.*, 30%*Tar. off.*, 40%**PLOT 2:**HERBACEOUS: 100%*Pha. aru.*, 10%*Jun. eff.*, 10%*Car. obn.*, 20%*Tar. off.*, 40%*Poa spp.*, 20%**PLOT 3:**HERBACEOUS: 100%*Pha. aru.*, 5%*Jun. eff.*, 5%*Car. obn.*, 10%*Tar. off.*, 20%*Poa spp.*, 20%*Ran. rep.*, 15%.*Hol. lan.*, 25%**PLOT 4:**HERBACEOUS: 100%*Car. obn.*, 20%*Ran. rep.*, 25%.*Jun. eff.*, 10%*Poa spp.* 15%*Hol. lan.*, 20%**PLOT 5:**HERBACEOUS: 100%*Car. obn.*, 20%*Tar. off.*, 20%*Poa spp.*, 20%*Ran. rep.*, 20%.*Hol. lan.*, 20%

## SR 502 CORRIDOR WIDENING PROJECT

## PRAIRIE SAMPLE AREA 2

SITE VISIT: MAY 13, 2008

Area 2 is emergent wetland. The area is bordered on the south by SR 502, NE 29th Avenue to the west, and pasture/open fields to the east. The wetland extends to the north, outside of the survey area. The surface of the site is hummocky and depressional areas exhibit evidence of seasonal ponding such as water stained leaves and drainage patterns. Some standing water was present during the May site visit in a swale in the middle of the site. Area 2 is extensively grazed. Oregon ash is sprouting in some areas of the wetland. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%*Jun. eff.*, 20%*Agr. cap.*, 30%*Car. obn.*, 10%*Cam. qua.*, 10%*Ran. rep.*, 20%.*Lot. cor.*, 10%**PLOT 2:**HERBACEOUS: 100%*Jun. eff.*, 5%*Car. obn.*, 20%*Agr. cap.*, 20%*Ran. rep.*, 15%.*Lot. cor.*, 20%*Cam. qua.*, 10%*Hol. lan.*, 20%**PLOT 3:**HERBACEOUS: 100%*Tar. off.*, 10%*Agr. cap.*, 20%*Ran. rep.*, 15%.*Hol. lan.*, 25%*Lot. Cor.*, 30%**PLOT 4:**HERBACEOUS: 100%*Ran. rep.*, 10%.*Jun. eff.*, 10%*Agr. cap.*, 15%*Hol. lan.*, 20%*Fes. aru.*, 5%*Cam. qua.*, 20%*Lot. cor.*, 20%**PLOT 5:**HERBACEOUS: 100%*Jun. eff.*, 15%*Car. obn.*, 20%*Agr. cap.*, 20%*Lot. cor.*, 25%*Hol. lan.*, 20%

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 3**  
**SITE VISIT: MAY 13, 2008**

Area 3 is emergent wetland with adjacent upland. The area is bordered on the north by SR 502, and is directly west of NE 42nd Avenue. Some woody vegetation is emerging in portions of the site (Douglas' spirea). The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**SR 502 CORRIDOR WIDENING PROJECT  
PRAIRIE SAMPLE AREA 4  
SITE VISIT: MAY 13, 2008**

Area 4 is upland oak woodland located adjacent to emergent wetland. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. The smaller oak woodland located due west of Area 4 is highly disturbed by agriculture; therefore, this area was not sampled. The following vegetation data was collected at four sample plots, which characterize the variability of the vegetation community of the site. The plant community in this area is consistent across the site.

**PLOT 1:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 10%	<i>Oem. cer.</i> , 20%	<i>Que. gar.</i> , 100%
Unknown pasture grass 60%	<i>Vac. par.</i> , 10%	
<i>Vic. sp.</i> 20%	<i>Ros. sp.</i> , 10%	
<i>Pru. Vul.</i> , 10%	<i>Sym. alb.</i> , 5%	
	<i>Rub.urs.</i> 20%	

**PLOT 2:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 40%	<i>Oem. cer.</i> , 50%	<i>Que. gar.</i> , 100%
Unknown pasture grass 20%	<i>Ros. sp.</i> , 10%	
<i>Vic. sp.</i> 30%	<i>Sym. alb.</i> , 15%	
<i>Pru. Vul.</i> , 10%	<i>Rub.urs.</i> 25%	
<i>Cam. qua.</i> , trace		

**PLOT 3:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 10%	<i>Ros. sp.</i> , 30%	<i>Que. gar.</i> , 100%
Unknown pasture grass 60%	<i>Sym. alb.</i> , 40%	
<i>Vic. sp.</i> 20%	<i>Rub.urs.</i> 30%	
<i>Pru. Vul.</i> , 10%		

**PLOT 4:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 40%	<i>Oem. cer.</i> , 30%	<i>Que. gar.</i> , 100%
Unknown pasture grass 55%	<i>Vac. par.</i> , 5%	
<i>Pru. vul.</i> , 5%	<i>Ros. sp.</i> , 10%	
	<i>Sym. alb.</i> , 35%	
	<i>Rub.urs.</i> 20%	

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 5**  
**SITE VISIT: MAY 13, 2008**

Area 5 is riparian wetland associated with Mill Creek North. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. Although this area is identified as potential historic prairie, access by property owners was not granted, and therefore, data plots were not sampled. This area is planted and harvested as soon as the area is dry enough to access. Later in the summer, pasture grasses and reed canarygrass are likely plants present on site.

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 6**  
**SITE VISIT: MAY 14, 2008**

Area 6 is emergent wetland, and forested wetland occurs to the west. The area is bordered on the south by SR 502, and is west of NE 92nd Avenue, across the street from Northwest Pipeline. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 10%  
*Pha. aru.*, 25%  
*Lup. pol.*, trace  
*Car. Pen.*, trace  
*Leu.vul.*, 5%  
*Ant. odo.*, 5%  
*Fes. rub.*, 10%  
*Ran. sce.*, 10%  
*Hol. lan.*, 20%  
*Pru. vul.*, 5%

**PLOT 2:**HERBACEOUS: 100%

*Jun. eff.*, 25%  
*Lot. cor.*, 5%  
*Pha. aru.*, 10%  
*Fes. rub.*, 20%  
*Ant. odo.*, 10%  
*Ran. sce.*, 10%  
*Hol. lan.*, 20%

**PLOT 3:**HERBACEOUS: 100%

*Lot. cor.*, 10%  
*Fes. rub.*, 20%  
*Lup. pol.*, 5%  
*Leu.vul.*, 5%

**PLOT 3, cont.:**

*Ant. odo.*, 10%  
*Fes. rub.*, 20%  
*Ran. sce.*, 10%  
*Hol. lan.*, 10%  
*Pru. vul.*, 10%

**PLOT 4:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 10%  
*Pha. aru.*, 5%  
*Leu.vul.*, 5%  
*Ant. odo.*, 10%  
*Fes. rub.*, 30%  
*Ran. sce.*, 5%  
*Hol. lan.*, 20%  
*Pru. vul.*, 5%

**PLOT 5:**HERBACEOUS: 100%

*Lot. cor.*, 10%  
*Pha. aru.*, 10%  
*Fes. rub.*, 10%  
*Lup. pol.*, 10%  
*Leu.vul.*, 10%  
*Ant. odo.*, 10%  
*Fes. rub.*, 20%  
*Hol. lan.*, 20%

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 1**  
**SITE VISIT: NO SITE VISIT POSSIBLE DUE TO DISTURBANCE**

Area 1 is emergent wetland. This site was mowed repeatedly in during June and July. Please see the May 2008 data for information on this site.

## SR 502 CORRIDOR WIDENING PROJECT

## PRAIRIE SAMPLE AREA 2

SITE VISIT: JUNE 9, 2008

Area 2 is emergent wetland. The area is bordered on the south by SR 502, NE 29th Avenue to the west, and pasture/open fields to the east. The wetland extends to the north, outside of the survey area. The surface of the site is hummocky and depressional areas exhibit evidence of seasonal ponding such as water stained leaves and drainage patterns. No standing water was present during the June site visit, but it was very moist in the center swale. Area 2 is extensively grazed. Oregon ash is sprouting in some areas of the wetland. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Jun. eff.*, 20%  
*Agr. cap.*, 30%  
*Car. obn.*, 10%  
*Cam. qua.*, 10%  
*Ran. rep.*, 10%.  
*Lot. cor.*, 20%

**PLOT 2:**HERBACEOUS: 100%

*Jun. eff.*, 5%  
*Agr. cap.*, 30%  
*Ran. rep.*, 5%.  
*Lot. cor.*, 30%  
*Cam. qua.*, 10%  
*Hol. lan.*, 20%

**PLOT 3:**HERBACEOUS: 100%

*Tar. off.*, 5%  
*Agr. cap.*, 25%  
*Ran. rep.*, 10%.  
*Hol. lan.*, 30%  
*Lot. Cor.*, 20%  
*Jun. eff.*, 10%

**PLOT 4:**HERBACEOUS: 100%

*Ran. rep.*, 20%.  
*Agr. cap.*, 20%  
*Hol. lan.*, 20%  
*Cam. qua.*, trace  
*Lot. cor.*, 40%

**PLOT 5:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Agr. cap.*, 30%  
*Lot. Cor.*, 10%  
*Hol. lan.*, 30%  
*Cam. qua.*, 20%

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 3**  
**SITE VISIT: JUNE 9, 2008**

Area 3 is emergent wetland with adjacent upland. The area is bordered on the north by SR 502, and is directly west of NE 42nd Avenue. Some woody vegetation is emerging in portions of the site (Douglas' spirea). The following vegetation data was collected at five sample plots, which characterize the variability of the dominant vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Jun. eff.*, 5%  
*Lot. cor.*, 10%  
*Fes. rub.*, 5%  
*Pha. aru.*, 10%  
*Alo. gen.*, 10%  
*Lup. pol.*, 20%  
*Fes. rub.*, 20%  
*Hol. lan.*, 20%

**PLOT 2:**HERBACEOUS: 100%

*Car. obn.*, 10%  
*Lot. cor.*, 30%  
*Fes. rub.*, 10%  
*Hol. lan.*, 20%  
*Pte. aqu.*, 10%  
*Pha. aru.*, 10%  
*Lup. pol.*, 10%  
*Cam. qua.*, trace

**PLOT 3:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 20%  
*Fes. rub.*, 5%  
*Pha. aru.*, 30%  
*Alo. gen.*, 5%  
*Lup. pol.*, 20%  
*Pte. aqu.*, 10%

**PLOT 4:**HERBACEOUS: 100%

*Car. obn.*, 10%  
*Lot. cor.*, 20%  
*Fes. rub.*, 10%  
*Pte. aqu.*, 10%  
*Pha. aru.*, 20%  
*Alo. gen.*, 10%  
*Lup. pol.*, 20%

**PLOT 5:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 20%  
*Fes. rub.*, 10%  
*Pha. aru.*, 20%  
*Hol. lan.*, 20%  
*Pte. aqu.*, 10%  
*Fes. aru.*, 10%

**SR 502 CORRIDOR WIDENING PROJECT  
PRAIRIE SAMPLE AREA 4  
SITE VISIT: JUNE 10, 2008**

Area 4 is upland oak woodland located adjacent to emergent wetland. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. The smaller oak woodland located due west of Area 4 is highly disturbed by agriculture; therefore, this area was not sampled. The following vegetation data was collected at four sample plots, which characterize the variability of the vegetation community of the site. The plant community in this area is consistent across the site.

**PLOT 1:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 20%	<i>Oem. cer.</i> , 30%	<i>Que. gar.</i> , 100%
Unknown pasture grass 60%	<i>Vac. par.</i> , 5%	
<i>Vic. sp.</i> 10%	<i>Sym. alb.</i> , 25%	
<i>Pru. Vul.</i> , 10%	<i>Rub.urs.</i> 40%	

**PLOT 2:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 20%	<i>Oem. cer.</i> , 40%	<i>Que. gar.</i> , 100%
Unknown pasture grass 40%		
<i>Vic. sp.</i> 30%	<i>Ros. sp.</i> , 10%	
<i>Pru. Vul.</i> , 10%	<i>Sym. alb.</i> , 25%	
<i>Cam. qua.</i> , trace	<i>Rub.urs.</i> 25%	

**PLOT 3:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 20%		<i>Que. gar.</i> , 100%
Unknown pasture grass 50%	<i>Oem. Cer.</i> , 10%	
<i>Vic. sp.</i> 20%	<i>Ros. sp.</i> , 10%	
<i>Pru. Vul.</i> , 10%	<i>Sym. alb.</i> , 40%	
	<i>Rub.urs.</i> 40%	

**PLOT 4:**

<u>HERBACEOUS: 60%</u>	<u>SHRUBS: 40%</u>	<u>Trees: 30%</u>
<i>Fes. aru</i> , 40%	<i>Oem. cer.</i> , 30%	<i>Que. gar.</i> , 100%
Unknown pasture grass 60%	<i>Vac. par.</i> , 5%	
	<i>Ros. sp.</i> , 10%	
	<i>Sym. alb.</i> , 35%	
	<i>Rub.urs.</i> 20%	

**SR 502 CORRIDOR WIDENING PROJECT  
PRAIRIE SAMPLE AREA 5  
SITE VISIT: ACCESS WAS NOT GRANTED**

Area 5 is riparian wetland associated with Mill Creek North. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. Although this area is identified as potential historic prairie, access by property owners was not granted, and therefore, data plots were not sampled. This area is planted and harvested as soon as the area is dry enough to access. Later in the summer, pasture grasses and reed canarygrass are likely plants present on site.

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 6**  
**SITE VISIT: JUNE 10, 2008**

Area 6 is emergent wetland, and forested wetland occurs to the west. The area is bordered on the south by SR 502, and is west of NE 92nd Avenue, across the street from Northwest Pipeline. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Jun. eff.*, 5%  
*Lot. cor.*, 20%  
*Pha. aru.*, 20%  
*Lup. pol.*, 10%  
*Leu.vul.*, 10%  
*Ant. odo.*, 10%  
*Fes. rub.*, 5%  
*Hol. lan.*, 20%

**PLOT 2:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 25%  
*Pha. aru.*, 25%  
*Fes. rub.*, 10%  
*Ant. odo.*, 5%  
*Ran. sce.*, 5%  
*Hol. lan.*, 20%

**PLOT 3:**HERBACEOUS: 100%

*Lot. cor.*, 20%  
*Lup. pol.*, 10%  
*Leu.vul.*, 10%  
*Ant. odo.*, 10%  
*Fes. rub.*, 20%  
*Ran. sce.*, 10%  
*Hol. lan.*, 10%  
*Pru. vul.*, 10%

**PLOT 4:**HERBACEOUS: 100%

*Lot. cor.*, 20%  
*Pha. aru.*, 20%  
*Fes. rub.*, 5%  
*Lup. pol.*, 15%  
*Leu.vul.*, 10%  
*Ant. odo.*, 10%  
*Hol. lan.*, 10%  
*Pru. vul.*, 10%

**PLOT 5:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 10%  
*Pha. aru.*, 20%  
*Lup. pol.*, 5%  
*Leu.vul.*, 10%  
*Ant. odo.*, 10%  
*Fes. rub.*, 5%  
*Ran. sce.*, 10%  
*Hol. lan.*, 10%  
*Pru. vul.*, 10%

**SR 502 CORRIDOR WIDENING PROJECT**

**PRAIRIE SAMPLE AREA 1**

**SITE VISIT: NO SITE VISIT POSSIBLE DUE TO DISTURBANCE**

Area 1 is emergent wetland. The area is bordered on the north by SR 502, NE 22th Avenue to the west, and a residence to the east. The wetland extends to the south, outside of the survey area. The surface of the site is hummocky and depressional areas exhibit evidence of seasonal ponding such as water stained leaves and drainage patterns. No standing water was present during the July site visit. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site. This site was mowed repeatedly during June and July of 2008, and the May 2008 is therefore the sole data set for this plant survey.

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 2**  
**SITE VISIT: JULY 2, 2008**

Area 2 is emergent wetland. The area is bordered on the south by SR 502, NE 29th Avenue to the west, and pasture/open fields to the east. The wetland extends to the north, outside of the survey area. The surface of the site is hummocky and depressional areas exhibit evidence of seasonal ponding such as water stained leaves and drainage patterns. No standing water was observed onsite during this site visit. Area 2 is extensively grazed. Oregon ash is sprouting in some areas of the wetland. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Agr. cap.*, 20%  
*Car. obn.*, 10%  
*Ran. rep.*, 20%  
*Lot. Cor.*, 40%

**PLOT 2:**HERBACEOUS: 100%

*Agr. cap.*, 20%  
*Ran. rep.*, 20%  
*Lot. Cor.*, 30%  
*Pol. lap.*, 30%

**PLOT 3:**HERBACEOUS: 100%

*Agr. cap.*, 25%  
*Ran. rep.*, 25%  
*Hol. lan.*, 10%  
*Lot. Cor.*, 30%  
*Mah. ner.*, 10%

**PLOT 4:**HERBACEOUS: 100%

*Ran. rep.*, 25%  
*Agr. cap.*, 30%  
*Hol. lan.*, 5%  
*Lot. cor.*, 40%

**PLOT 5:**HERBACEOUS: 100%

*Jun. eff.*, 25%  
*Car. obn.*, 30%  
*Agr. cap.*, 20%  
*Lot. Cor.*, 25%

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 3**  
**SITE VISIT: JULY 3, 2008**

Area 3 is emergent wetland with adjacent upland. The area is bordered on the north by SR 502, and is directly west of NE 42nd Avenue. Some woody vegetation is emerging in portions of the site (Douglas' spirea). The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%

*Lot. cor.*, 20%  
*Pte. aqu.*, 15%  
*Pha. aru.*, 30%  
*Lup. pol.*, 15%  
*Hol. lan.*, 20%

**PLOT 2:**HERBACEOUS: 100%

*Jun. eff.*, 5%  
*Car. obn.*, 5%  
*Lot. cor.*, 20%  
*Pte. aqu.*, 10%  
*Pha. aru.*, 30%  
*Lup. pol.*, 10%  
*Leu. vul.*, 20%

**PLOT 3:**HERBACEOUS: 100%

*Jun. eff.*, 10%  
*Lot. cor.*, 30%  
*Fes. rub.*, 5%  
*Pha. aru.*, 30%  
*Alo. gen.*, 5%  
*Lup. pol.*, 20%

**PLOT 4:**HERBACEOUS: 100%

*Car. obn.*, 5%  
*Lot. cor.*, 30%  
*Pte. aqu.*, 15%  
*Pha. aru.*, 30%  
*Leu. vul.*, 20%

**PLOT 5:**HERBACEOUS: 100%

*Lot. cor.*, 20%  
*Pha. aru.*, 30%  
*Lup. pol.*, 20%  
*Hol. lan.*, 5%  
*Pru. vul.*, 5%  
*Leu. vul.*, 20%

**SR 502 CORRIDOR WIDENING PROJECT  
PRAIRIE SAMPLE AREA 4  
SITE VISIT: NO ACCESS GRANTED**

Area 4 is upland oak woodland located adjacent to emergent wetland. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. The smaller oak woodland located due west of Area 4 is highly disturbed by agriculture; therefore, this area was not sampled. Access was not granted by the landowner and, therefore, no site visit was made in July 2008.

**SR 502 CORRIDOR WIDENING PROJECT  
PRAIRIE SAMPLE AREA 5  
SITE VISIT: NO ACCESS GRANTED**

Area 5 is riparian wetland associated with Mill Creek North. The area is bordered on the south by SR 502, and is west of NE 67th Avenue. Although this area is identified as potential historic prairie, access by property owners was not granted, and therefore, data plots were not sampled. This area is planted and harvested as soon as the area is dry enough to access. Later in the summer, pasture grasses and reed canarygrass are likely plants present on site.

**SR 502 CORRIDOR WIDENING PROJECT**  
**PRAIRIE SAMPLE AREA 6**  
**SITE VISIT: JULY 3, 2008**

Area 6 is emergent wetland, and forested wetland occurs to the west. The area is bordered on the south by SR 502, and is west of NE 92nd Avenue, across the street from Northwest Pipeline. The following vegetation data was collected at five sample plots, which characterize the variability of the vegetation community of the site.

**PLOT 1:**HERBACEOUS: 100%*Jun. eff.*, 10%*Lot. cor.*, 50%*Pha. aru.*, 35%*Fes. rub.*, 5%**PLOT 2:**HERBACEOUS: 100%*Lot. cor.*, 35%*Fes. rub.*, 5%*Ant. odo.*, 10%*Ran. sce.*, 5%*Hol. lan.*, 10%*Leu. vul.*, 30%*Lup. pol.*, 5%**PLOT 3:**HERBACEOUS: 100%*Lot. cor.*, 30%*Lup. pol.*, 20%*Leu. vul.*, 30%*Ant. odo.*, 10%*Hol. lan.*, 10%*Pru. vul.*, trace**PLOT 4:**HERBACEOUS: 100%*Lot. cor.*, 30%*Lup. pol.*, 10%*Leu. vul.*, 30%*Ant. odo.*, 10%*Hol. lan.*, 10%*Pru. vul.*, 10%**PLOT 5:**HERBACEOUS: 100%*Jun. eff.*, 10%*Lot. cor.*, 20%*Pha. aru.*, 20%*Leu. vul.*, 30%*Ant. odo.*, 5%*Hol. lan.*, 10%*Pru. vul.*, 5%

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## **Appendix E**

### **Environmental Baseline for Aquatic Habitats**

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## Water Quality

Refer to 303(d) List (<http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html>)

### Water Temperature:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, water temperatures frequently exceed the 64° F (18° C) state standard, and have been occasionally documented in excess of 73.4° F (23° C) (LCFRB 2004b). The East Fork Lewis River had six reaches identified as exceeding state standards for water temperature on the 2004 Washington State 303(d) list of Impaired and Threatened Waterbodies (Ecology 2004). Elevated water temperatures have been identified as a major problem within the East Fork watershed, especially in tributaries that are lower in the watershed (Wade 2000). Within the East Fork Lewis River watershed, the baseline condition for water temperature is **not properly functioning**.

In large part, the Gee Creek watershed is degraded because of agricultural development within the watershed. Much of the Gee Creek watershed is ditched and lacks canopy cover because of deforestation for agriculture. Water temperatures are particularly high during August and September. The upper critical temperature for salmonids is generally in the 73-76° F range. Approximately 1.5 miles downstream of the project area, temperatures recorded in Gee Creek were above 64° F for 68 days and above 70° F for 4 days during summer 2004 temperature monitoring (JDW 2005). The creek also has numerous farm ponds, where water temperatures are significantly elevated. Within the Gee Creek watershed, the baseline condition for water temperature is **not properly functioning**.

Within the Salmon Creek watershed, development, septic systems, and agricultural activities have contributed significantly to increased water temperatures. One reach low in the Salmon Creek watershed (RM 2.058) was listed on the 2004 Ecology 303(d) list of Impaired and Threatened Waterbodies for chronic temperatures in excess of the state standard (Ecology 2004). A 2003 temperature study of the Salmon Creek watershed conducted by Clark County reported that temperatures exceeded the 64° F standard for protecting salmon and sensitive aquatic life at 12 of 15 study sites on at least 35 days, and that maximum temperatures at the seven warmest study sites exceeded 70° F each day for periods lasting from 1 to 6 weeks (Clark County 2003). Elevated water temperatures have been identified as the most serious limiting factor in terms of water quality within the watershed (Wade 2001). Within the Salmon Creek watershed, the baseline condition for water temperature is **not properly functioning**.

Within the biological study area, riparian vegetation is of poor quality along Mill Creek, Mill Creek North, and Gee Creek. The majority of the portions of the Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, the Mill Creek tributary, and Curtin Creek within the biological study area that are accessible to anadromous fish lack a riparian canopy. Riparian vegetation frequently consists of dense reed canarygrass or a sparse shrub layer. Along Mill Creek within the biological study area, the section that is north of SR

502 is moderately forested, and likely has buffered water temperatures. Sections of Mill Creek within the biological study area, however, lack a riparian canopy. Flows in all biological study area waterbodies tend to be very low to non-existent in the summer months. Where water exists during the summer, temperatures are elevated. Within the project biological study area, baseline conditions for water temperature are **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project will result in the removal of some riparian vegetation in association with culvert replacement and roadway widening activities. Some mature Douglas fir and black cottonwood will be removed from the areas that will be permanently impacted by culvert replacement or roadway fill. Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will greatly offset any impacts to water temperature as a result of riparian vegetation removal. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would further replace any lost function provided by impacted riparian habitat. The results of the proposed action will likely temporarily degrade the water temperature conditions within the biological study area. The results of the proposed action on water temperature will likely not be measurable at the watershed scale.

#### **Sediment/Turbidity:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, most sediment delivery in the lower portion of the river is from natural in-channel bed and bank erosion associated with channel migration and avulsions. Results of watershed modeling in 2004 indicated that 28 of 36 subwatersheds within the East Fork Lewis River subbasin were “moderately impaired” with respect to conditions that influence sediment supply (LCFRB 2004b). These impaired watersheds are predominantly located lower in the watershed, and increased sedimentation is attributed primarily to relatively high road densities within the watershed. Within the East Fork Lewis River watershed, the baseline condition for sediment/turbidity is **not properly functioning**.

While no specific data exists for the Gee Creek watershed, agriculture, development, and a lack of stormwater treatment have contributed to elevated turbidity and siltation throughout the watershed. Within the Gee Creek watershed, the baseline condition for sediment/turbidity is **not properly functioning**.

Within the Salmon Creek watershed, most stream systems receive excessive inputs of sediment, largely because of urbanization, agriculture, road density, and loss of riparian vegetation. Most stream channels within the watershed, including the upper reaches of Mill Creek, are largely silt-

covered with only minimal amounts of substrates suitable for spawning (Wade 2001). Within the Salmon Creek watershed, the baseline condition for sediment/turbidity is **not properly functioning**.

The ESA-listed fish-bearing waterbodies within the biological study area are low gradient low flow systems. Throughout the portions of the Gee Creek tributaries, the unnamed tributary to the East Fork Lewis River, Mill Creek North, the Mill Creek tributary, and Curtin Creek that are located within the biological study area, substrate consists almost exclusively of fine-grained sediments. The portion of Mill Creek that flows within the biological study area has somewhat less dominance of fine-grained sediments, although the predominant land uses within and upstream of the watershed deliver a significant amount of sediment to the system. Substrate embeddedness throughout the biological study area is consequently quite high, and turbidity is high during periods of input to the system. Within the project biological study area, baseline conditions for sediment and turbidity are **not properly functioning**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

Installation and removal of temporary dewatering structures below the OHWM of biological study area waterbodies have the potential to increase sediment and turbidity temporarily within the biological study area. Potential impacts due to a temporary increase in sediment and turbidity will be minimized by appropriate BMPs and by conducting all work below the OHWM within the WDFW approved in-water work period (July 1–September 30). At the biological study area scale, the proposed action will likely temporarily degrade the baseline condition for sediment and turbidity. The proposed stormwater treatment system, in conjunction with proposed and potential wetland mitigation and riparian restoration activities, will likely improve sedimentation and turbidity conditions in the long term, although this improvement likely will not be significant enough to restore the baseline condition. At the watershed scale, the proposed action likely will not have measurable short- or long-term impacts on either sedimentation or turbidity.

#### **Chemical Contamination/Nutrients:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, three reaches are listed on the 2004 Ecology 303(d) list of Impaired and Threatened Waterbodies for elevated levels of fecal coliform (Ecology 2004). Agricultural activity and urbanization within the watershed likely contribute significant amounts of chemical contamination and excessive nutrient loads to the East Fork Lewis River and its tributaries. Within the East Fork Lewis River watershed, the baseline condition for chemical contamination/nutrients is determined to be **not properly functioning**.

The Gee Creek watershed has two reaches listed on the 2004 Ecology 303(d) list of Impaired and Threatened Waterbodies for elevated levels of fecal coliform (Ecology 2004). Clark County's

2004 Stream Health Report listed Gee Creek in poor health, due largely to runoff from agricultural use and development (Clark County 2004). The use by livestock of a significant number of artificially created ponds along the length of Gee Creek contributes to increased levels of bacteria, including fecal coliform. Within the Gee Creek watershed, the baseline condition for chemical contamination/nutrients is **not properly functioning**.

Within the Salmon Creek watershed, no reaches are identified on the 2004 Ecology 303(d) list of Impaired and Threatened Waterbodies for any water quality issues related to nutrient or chemical contamination. Tributaries that are higher in the watershed, such as Rock Creek, exhibit higher water quality conditions and are in relatively good health. Tributaries such as Cougar Creek, which is lower in the watershed and flows through heavily developed portions of Vancouver, exhibit poor water quality. Due to overall high levels of development and agriculture within the watershed, nutrient contamination is still seen as a primary limiting factor to salmon and steelhead reproduction and survival (Wade 2000). Within the Salmon Creek watershed, the baseline condition for chemical contamination/nutrients is **not properly functioning**.

Although no data is available for any of the streams within the biological study area, it is likely that chemical contamination and excessive nutrient loads are a problem. Due to the low gradient of the streams within the biological study area, and the combination of agricultural land uses and urbanization, it is likely that nutrient levels are elevated throughout the biological study area. Mill Creek, which flows through the biological study area, was identified as being in fair health. Although no stream reaches are specifically identified on Ecology's 303(d) list, this is likely because data was not collected for the tributaries that exist within the biological study area. Within the biological study area therefore, baseline conditions for chemical contamination/nutrients are **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The proposed action includes a proposed stormwater management plan that will provide water quality treatment and flow control primarily through open conveyance in roadside ditches and culverts to media filter drains, a wetland/enhancement flow control facility, and approximately six newly constructed combined stormwater treatment wetland/detention ponds. In the vicinity of Dollars Corner and on 72nd Avenue, stormwater will be collected in catch basins and conveyed through a closed system via storm sewer to a combined stormwater treatment wetland/detention pond.

Although all stormwater from this new impervious surface will be treated and the overall concentration of pollutants in stormwater reduced, the project will increase the annual effluent loading of pollutants (zinc and copper in particular) within most TDAs and at the biological study area scale. Increased pollutant loads have the potential to decrease habitat suitability within biological study area waterbodies, although this potential has been minimized to the extent possible by the proposed stormwater treatment design. In addition to the constructed stormwater treatment, additional opportunity for stormwater infiltration and biological uptake of pollutants

will be provided by open conveyance in roadside ditches and from point of outfall from treatment facilities to a diffuse point of entry into the receiving waterbody, potentially further reducing the quantity and concentration of pollutants delivered to receiving waters.

Currently, no stormwater treatment is provided for impervious surface within the biological study area. Suspended and dissolved metals and other pollutants are being delivered directly to biological study area waterbodies. Given the baseline condition of receiving waterbodies and current lack of stormwater treatment within the biological study area, the increase in annual pollutant loading that will result from the proposed action is not likely to result in a measurable degradation of the baseline habitat condition at the biological study area scale, when compared to the reduction in pollutant concentrations outfalling to streams.

The project will likely have no measurable long-term impacts on chemical contamination or nutrient levels within the East Fork Lewis River, Gee Creek, or Salmon Creek watersheds. The results of the proposed action will maintain this indicator at each of the watershed scales.

## **Habitat Access**

### **Physical Barriers:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, there are no major barriers to fish migration along the mainstem of the East Fork of the Lewis River (WDFW 2007a, 2007b). However, partial and total barriers to fish passage are documented on several tributaries within the watershed. These barriers block access to more than 10 miles of habitat (LCFRB 2004b). The presence of these barriers that restrict fish passage at both high and low flows indicates that, within the East Fork Lewis River watershed, the baseline condition for physical barriers is **not properly functioning**.

Within the Gee Creek watershed, several culverts and dams represent both total and partial barriers to fish passage (WDFW 2007a). These documented barriers occur both on the main stem of Gee Creek and on tributaries. Beaver dams have also been identified on Gee Creek and its tributaries, which represent potential fish passage barriers (JDW 2005). Within the Gee Creek watershed, therefore, the baseline condition for physical barriers is **not properly functioning**.

Within the Salmon Creek watershed, fish passage is naturally blocked at RM 24.1 by Salmon Falls (LCFRB 2004a). Man-made barriers within the watershed include culverts, areas of shallow flow over agricultural land, and railroad and road crossings along some Columbia River tributaries (Wade 2001). These man-made barriers likely restrict fish passage at a range of flow conditions, and for this reason, the baseline condition for physical barriers within the Salmon Creek watershed is **not properly functioning**.

Within the biological study area, WDFW identifies two partial barriers to fish passage on Mill Creek North downstream of the biological study area. There is a documented total barrier to fish passage on the unnamed tributary to the East Fork Lewis River immediately north of NE 239th

Street, although WDFW biologists have indicated that they do not consider it to be a total barrier. Total and partial fish barriers have been documented on Gee Creek tributaries downstream of the biological study area. Within the biological study area, WDFW does not identify any specific barriers to fish passage on Gee Creek tributaries, as the tributaries are considered non fish-bearing within the biological study area due to downstream barriers. Fish passage on the unnamed tributary to the East Fork Lewis River attends at a point where the channel largely disappears in a residential field located just north of SR 502 (Figure 9). This location is not identified on WDFW's database of fish barriers, but WDFW biologists have confirmed that this is a total barrier to fish passage (WDFW 2007b). No documented barriers to fish passage have been identified in Mill Creek or points downstream along lower Salmon Creek. Due to the presence of man-made barriers that represent either total or partial barriers to fish passage during both high and low flow conditions within the project biological study area, baseline conditions for physical barriers are **not properly functioning**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The proposed action will replace three currently fish-passable culverts on Mill Creek and will either replace or extend another currently fish passable culvert on Mill Creek North. While these culverts are currently considered to be fish passable, their replacement and/or extension will likely result in improved fish mobility within and through the biological study area, although likely not enough to restore the baseline condition.

The portions of the biological study area waterbodies in which culverts will be replaced or extended are all in the uppermost portions of their respective sub-watersheds. Culvert replacement is not anticipated to open any new access to habitat for listed fish species at either the biological study area or watershed scale. For these reasons, it is anticipated that the proposed action will **maintain** this indicator at both scales.

## Habitat Elements

### Substrate:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, sedimentation levels are naturally elevated due to avulsions and channel migrations (LCFRB 2004a). Basin-wide, watershed process modeling indicate that 28 of 36 sub-watersheds within the East Fork Lewis River watershed are "moderately impaired," with eight sub-watersheds listed as "functional" (LCFRB 2004a). The mainstem of the East Fork Lewis River has adequate spawning substrate, despite the naturally elevated sedimentation levels, but spawning habitat in most tributaries is generally of low- to moderate-quality Gravels and cobbles are largely lacking in tributaries, except in the upper reaches of the watershed (Rock Creek basin). The predominance of fine-grained sedimentation

indicates that, within the East Fork Lewis River watershed, the baseline condition for substrate is **not properly functioning**.

Within the Gee Creek watershed, past and present siltation has led to increased embeddedness of substrate and a predominance of fine-grained material. Portions of the mainstem of Gee Creek contain cobbles and gravel that are suitable for salmonid spawning habitat, but most tributaries are predominantly silt- and sand-dominant. Within the Gee Creek watershed, therefore, the baseline condition for substrate is **not properly functioning**.

Within the Salmon Creek watershed, sedimentation and compaction of spawning substrate is considered a major limiting factor to salmonid reproduction and survival (LCFRB 2004a). Fine sediments are dominant throughout the watershed due to stormwater runoff, development in riparian areas, stream-adjacent roads and trails, utility corridors, cattle-related impacts, and recreational activities (Wade 2001). The natural erodibility of soils within the watershed also contributes to the high potential for delivery of fine-grained sediments (LCFRB 2004a). Due to this predominance of fine-grained sediments, the baseline condition for substrate within the Salmon Creek watershed is **not properly functioning**.

Within the biological study area, Mill Creek is the only waterbody with any substrate that is suitable for salmonid spawning habitat. Substrate in the portion of Mill Creek that is within the biological study area generally consists of small to medium size cobbles and gravels, with only moderate embeddedness. Substrate within the Gee Creek tributaries consists almost entirely of silts and fine-grained sediments. Mill Creek North and the unnamed tributary to the East Fork lack a defined channel for much of their length within the biological study area, and substrate is uniformly fine-grained. Due to the predominance of fine-grained sediments and the overall lack of spawning gravels and cobbles, within the project biological study area, baseline conditions for substrate are **not properly functioning**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project may increase sediment locally due to general construction activities, particularly during installation of temporary dewatering structures, which may have a temporary negative impact on substrate. Substrate within biological study area wetlands and waterbodies consists primarily of fine-grained silts and sands. Some suitable spawning gravel and cobble is present within Mill Creek, and Mill Creek is documented spawning habitat for coho salmon and steelhead. Stormwater treatment proposed as part of the proposed action will likely improve the overall sedimentation conditions within the biological study area in the long term, although not likely to the extent of reducing substrate embeddedness or restoring a dominance of larger substrate to biological study area waterbodies. No measurable long-term impacts on substrate are expected either within the project biological study area or at the watershed scale. For these reasons, it is anticipated that the proposed action will **maintain** this indicator.

**Large Woody Debris:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Throughout the East Fork Lewis River watershed, recruitment of LWD is considered a concern due to the impacts of past forest fires and forest management within riparian areas (LCFRB 2004a). Surveys performed in the 1990s found that 92 percent of surveyed streams had less than 40 pieces of LWD per mile, and that 98 percent of streams surveyed had less than 80 pieces per mile (LCFRB 2004a). The low quantity of LWD, coupled with the low potential for recruitment, indicate that, within the East Fork Lewis River watershed, the baseline condition for LWD is **not properly functioning**.

No data is available about quantities of LWD within the Gee Creek watershed. However, very little riparian vegetation remains intact within the watershed, and the potential for recruitment of LWD is low. It is estimated based on field review and aerial photographic interpretation that due to the lack of riparian vegetation and extensive degree to which the mainstem and tributaries have been channelized and disturbed, the number of pieces of woody debris per mile is very likely below the proper functioning criteria of 80 pieces per mile. Within the Gee Creek watershed, therefore, the baseline condition for LWD is **not properly functioning**.

Within the Salmon Creek watershed, urban development, agriculture, and forest management practices have led to a significant reduction in the potential for recruitment of LWD. It is estimated based on field review and aerial photographic interpretation that due to the lack of riparian vegetation and extensive degree to which the mainstem and tributaries have been channelized and disturbed, the number of pieces of woody debris per mile is very likely below the proper functioning criteria of 80 pieces per mile. One stream system that may be meeting the proper functioning condition standard within the Salmon Creek watershed is the upper reaches of Rock Creek, which remains a viable source of potential LWD recruitment. However, at a watershed scale, the baseline condition for LWD is **not properly functioning**.

Within the biological study area, LWD is almost entirely lacking. The portion of Mill Creek that is within the biological study area has some LWD that meets the 24-inch diameter and 50 feet long criteria, primarily in the portion north of SR 502, where there is a forested riparian canopy for much of the length of the creek. Mill Creek North and the unnamed tributary to the East Fork Lewis River are devoid of LWD that meets these criteria, as are the Gee Creek tributaries. Riparian vegetation throughout the biological study area is largely dominated by emergent and shrub species. Where forested riparian habitat does exist, it is generally limited to small forested stands. Because of the fragmentation of riparian habitat associated with biological study area waterbodies, these small forested stands represent the only potential source of LWD recruitment. Within the project biological study area, therefore, baseline conditions for LWD are **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project will result in the removal of riparian vegetation within wetlands and waterways within the biological study area. Most of the riparian vegetation that will be impacted consists of emergent or scrub-shrub habitat. However, the impact to forested riparian areas along the unnamed tributary to the East Fork Lewis River and Mill Creek will result in the removal of mature Douglas fir and black cottonwood trees from those areas that will be permanently impacted by culvert replacement or roadway fill, and this represents a loss of potential future habitat for listed fish species.

Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will greatly offset any impacts to water temperature as a result of riparian vegetation removal. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would further replace any lost function provided by impacted riparian habitat. Mill Creek channel realignment/restoration activities would likely include removing a small amount of concrete bank armoring, realigning the stream channel, placement of LWD, and revegetating riparian areas with native plantings. At the biological study area scale, due to the removal of riparian vegetation, the indicator for LWD will be temporarily degraded, but will be maintained in the long term due to revegetation and restoration activities. The results of the proposed action on recruitment of LWD will not likely be noticeable at the watershed scale, and this indicator will be maintained at that scale.

#### **Pool Frequency:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Throughout the lower East Fork Lewis River watershed, pool abundance and quality are a concern (LCFRB 2004a). A 2000 Limiting Factors Analysis identified specific concerns with the availability of pool habitat on the East Fork Lewis River mainstem between RM16.2 and RM32.7 (LCFRB 2004a). In the upper basin, a 1995 USFS watershed analysis identified 58 percent of surveyed streams as being substandard in pool frequency (USFS 1995). The low quantity of pools, coupled with the low potential for recruitment of woody debris within the watershed, indicate that, within the East Fork Lewis River watershed, the baseline condition for pool frequency is **not properly functioning**.

While no specific data is available for pool quantity within the Gee Creek watershed, estimates are that it does not meet the pool frequency standards for proper functioning condition. Additionally, very little mature riparian vegetation remains intact within the watershed, and the potential for recruitment of LWD is low. Within the Gee Creek watershed, therefore, the baseline condition for pool frequency is **not properly functioning**.

Within the Salmon Creek watershed, pool habitat is lacking in almost all of the stream systems due to alterations of flow regimes, channelization, and removal of mature riparian vegetation (LCFRB 2004a). Surveys conducted by the Clark County Conservation District (CCCD) showed

that only 10-15 percent of the Salmon Creek mainstem consisted of pool habitat, and that conditions in tributaries were the same or slightly worse (Wade 2001). Within the Salmon Creek watershed, therefore, the baseline condition for pool frequency is **not properly functioning**.

Within the biological study area, pool habitat is almost entirely lacking. Within Mill Creek, some shallow pool habitat is present within the biological study area, but these pools do not meet the minimum standard for proper functional condition. Within the project biological study area, therefore, baseline condition for pool frequency is **not properly functioning**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project may increase sediment locally during installation of temporary dewatering structures, but this is not likely to have any measurable long-term impacts on pool frequency within either the project biological study area or the watershed. For this reason, it is anticipated that the proposed action will **maintain** this indicator.

#### **Pool Quality:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

As mentioned above, pool abundance and quality are a concern throughout the East Fork Lewis River watershed (LCFRB 2004a). Riparian vegetation has been reduced in quantity and quality throughout the watershed as a result of development and agricultural and forest management practices. A relative abundance of fine-grained sediments has also reduced the overall volume and quality of existing pools. For these reasons, within the East Fork Lewis River watershed, the baseline condition for pool quality is **not properly functioning**.

No data is available for pool quality within the Gee Creek watershed, but estimates are that it does not meet the pool quality standards for proper functioning condition. Riparian vegetation has been reduced in quantity and quality throughout the watershed as a result of development and agricultural and forest management practices. What little deep pool habitat does exist is likely burdened by elevated water temperatures due to a lack of riparian cover. A relative abundance of fine-grained sediments has also reduced the overall volume and quality of existing pools. Within the Gee Creek watershed, therefore, the baseline condition for pool quality is **not properly functioning**.

Within the Salmon Creek watershed, pool habitat is also largely lacking and, where present, is likely of low quality, due to alterations of flow regimes, channelization, and removal of mature riparian vegetation (LCFRB 2004a). Especially in the lower reaches of the watershed, riparian vegetation has been reduced drastically in quantity and quality, and streambed substrates are predominantly fine-grained. Within the Salmon Creek watershed, therefore, the baseline condition for pool quality is **not properly functioning**.

Within the biological study area, pool habitat is almost entirely lacking. Within Mill Creek, some shallow pool habitat is present within the biological study area, but these pools do not meet the minimum standard for proper functional condition. Additionally, emergent and shrub species largely dominate riparian vegetation throughout the biological study area and provide little shade. Water temperatures are elevated throughout the biological study area. Within the project biological study area, therefore, baseline conditions for pool quality are **not properly functioning**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project may increase sediment locally during installation of temporary dewatering structures. This is not likely to have any measurable long-term impacts on pool quality within either the project biological study area or the watershed. For this reason, it is anticipated that the proposed action will **maintain** this indicator.

#### **Off-Channel Habitat:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Off-channel fish habitat is lacking throughout much of the East Fork Lewis River watershed (LCFRB 2004a). In the lower portion of the watershed, draining of wetlands and/or channelization have reduced historically available side-channel habitat (LCFRB2004a). In the upper watershed, off-channel habitat is scarce and, where present, is generally available only during periods of high flow (LCFRB 2004a). For these reasons, within the East Fork Lewis River watershed, the baseline condition for off-channel habitat is **functioning at risk**.

Off-channel habitat within the Gee Creek watershed is scarce, and does not meet the minimum standards for proper functioning condition. Development and agricultural practices have significantly altered wetlands and side-channel habitat, although some wetlands and low velocity side channels still occur within the watershed. Within the Gee Creek watershed, therefore, the baseline condition for off-channel habitat is **functioning at risk**.

Within the Salmon Creek watershed, much off-channel habitat has been significantly altered, drained, and channelized (LCFRB 2004a). Especially in the lower reaches of the watershed, what was once a network of braided channels has in many cases been reduced to a single, relatively higher energy drainage channel. Side-channel habitat has also been degraded or eliminated in many Salmon Creek tributaries (LCFRB 2004a). Within the Salmon Creek watershed, therefore, the baseline condition for off-channel habitat is **functioning at risk**.

Within the biological study area, off-channel habitat exists within wetlands associated with the unnamed tributary to the East Fork Lewis River, Mill Creek North, and Mill Creek. Most of these wetlands are inundated only seasonally and accessible likely only during periods of high

flow. The Mill Creek tributary represents potential off-channel habitat during periods of high winter flow. Within the project biological study area, therefore, baseline conditions for off-channel habitat are **functioning at risk**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project will not result in any direct removal of any off-channel fish habitat, but may affect water quality and quantity conditions temporarily within some of the off-channel wetland habitat. Fish habitat in general is of low quality within off-channel wetland habitat in the biological study area, and is accessible likely only during periods of high winter flows. The project is not anticipated to have a measurable effect on off-channel habitat at either the watershed or the project biological study area scale. For this reason, it is anticipated that the proposed action will **maintain** this indicator.

#### **Refugia:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Habitat refugia exist sparingly within the East Fork Lewis River watershed (LCFRB 2004a). Within the watershed, refugia generally consist of small, localized sections of off-channel habitat located within state or city parks or are parts of established mitigation or restoration projects. In the lower portion of the watershed, very little habitat is preserved and adequately buffered from development. In the upper watershed, off-channel habitat that serves as refugia is scarce and, where present, is generally available only during periods of high flow (LCFRB 2004a). In general, within the East Fork Lewis River watershed, the baseline condition for refugia is **functioning at risk**.

Refugia within the Gee Creek watershed are scarce. As with the East Fork Lewis River watershed, refugia within the Gee Creek watershed exist largely in the form of wetlands and side-channel habitat within city and County parks or protected as part of an established mitigation or restoration site. Generally, these types of sites are not buffered adequately to be able to sustain viable populations or subpopulations of listed fish species. Within the Gee Creek watershed, therefore, the baseline condition for refugia is **functioning at risk**.

Within the Salmon Creek watershed as well, refugia are largely wetlands and side-channel habitat that is located within city and County parks or protected as part of an established mitigation or restoration site. Generally, these types of sites are not buffered adequately to be able to sustain viable populations or subpopulations of listed fish species. The upper reaches of Salmon Creek and Rock Creek, while providing higher quality habitat, are generally not protected or buffered enough to function as refugia for populations of listed species. Within the Salmon Creek watershed, therefore, the baseline condition for refugia is **functioning at risk**.

Wetlands associated with the unnamed tributary to the East Fork Lewis River, Mill Creek North, and Mill Creek within the biological study area provide low-quality, seasonally accessible off-channel habitat, and may serve as refugia for listed fish species. None of these areas is protected or buffered adequately to be able to sustain viable populations or subpopulations of listed fish species. Within the biological study area, therefore, baseline conditions for refugia are **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

Within the biological study area, the project will result in approximately 2.6 acres of permanent impact below the OHWM of ESA-listed fish-accessible waterbodies which represent potential unprotected refugia.

Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will greatly offset any impacts to water temperature resulting from riparian vegetation removal. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would further replace any lost function provided by impacted riparian habitat. Mill Creek channel realignment/restoration activities would likely include removing a small amount of concrete bank armoring, realigning the stream channel, placement of LWD, and revegetating riparian areas with native plantings, which would greatly improve the quality of potential refugia for ESA-listed fish species. It is not anticipated, however, that these proposed improvements will restore the condition of the indicator to proper functioning condition. For this reason, it is anticipated that the proposed action will **maintain** this indicator.

## Channel Conditions & Dynamics

### Width/Depth Ratio:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Information is not available at the watershed scale regarding width/depth ratio in the East Fork Lewis River, Gee Creek, or Salmon Creek watersheds. Proper functioning condition is defined as a width/depth ratio of less than 10. While the mainstem of each of these waterbodies is likely close to meeting this requirement, because of channelization and isolation from the floodplain many of their tributaries likely do not. Lacking any specific information, it is presumed that at the watershed scale for the East Fork Lewis River, Gee Creek, and Salmon Creek watersheds, this indicator is **functioning at risk**.

The Gee Creek tributaries and the unnamed tributary to the East Fork Lewis River lack well-defined channels for most of their lengths within the biological study area. As a result, their width/depth ratios are significantly larger than 12. Mill Creek North has an artificial deeply

incised channel, which is connected to a larger floodplain wetland. The portion of Mill Creek that flows within the biological study area is confined to an incised channel, although flows are flashy, and water depths are highly variable. For these reasons, the baseline condition for width/depth ratio within the biological study area is **functioning at risk**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The planned mitigation at the Sunset Oaks mitigation, and the potential mitigation/restoration activities in Mill Creek North will restore the width/depth ratios of those two waterbodies to some degree, although not to the extent of restoring the baseline condition. The results of the proposed action on channel width/depth ratio will not likely be measurable at either the watershed or project biological study area scale, and the proposed action will **maintain** this indicator.

#### **Streambank Condition:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Within the East Fork Lewis River watershed, bank stability is a major concern, especially along the lower mainstem, which has seen significant alteration due to agricultural, residential, and mining development (LCFRB 2004b). Current rates of channel adjustment are thought to be altered from their historic rates due to confinement of the river by levees and removal of riparian forest within the watershed (LCFRB 2004a). Bank stability problems in East Fork tributaries include streambank erosion on Mason Creek, cattle-related impacts on Rock Creek, and chronic mass wasting sites on upper Rock Creek and upper Lockwood Creek (Wade 2001). Within the East Fork Lewis River watershed, the baseline condition for streambank condition is **functioning at risk**.

Within the Gee Creek watershed, streambank stabilization has occurred along much of the mainstem and tributaries in order to protect urban and rural development (LCFRB 2004a). Bank hardening has protected many of the banks from erosion but in some cases has exacerbated erosion in adjacent areas (LCFRB 2004a). Within the Gee Creek watershed, the baseline condition for streambank condition is **functioning at risk**.

Within the Salmon Creek watershed, a recent avulsion on Salmon Creek has created an upstream migrating headcut between I-5 and 182nd Avenue. As a result, a 800- to 900-foot long section of the bank is actively eroding. There are also several documented bank stability problems on Salmon Creek tributaries (LCFRB 2004a). Within the Salmon Creek watershed, the baseline condition for streambank condition is **functioning at risk**.

The creeks and waterways within the biological study area are low gradient low flow systems. Throughout the portions of the Gee Creek tributaries, the unnamed tributary to the East Fork

Lewis River, and Mill Creek North within the biological study area, riparian vegetation consists primarily of emergent or scrub-shrub vegetation. The Gee Creek tributaries and the unnamed tributary to the East Fork Lewis River lack defined banks for much of their lengths within the biological study area. Mill Creek North is confined to an artificial, incised channel, which is actively eroding. Portions of the banks of Mill Creek are also actively eroding, predominantly in areas where riparian vegetation is lacking in the southern portion of the biological study area. Within the project biological study area, baseline conditions for streambank condition are **functioning at risk**.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The proposed action will impact riparian vegetation on the banks of waterways within the biological study area, which could lead to a temporary increase in streambank instability. Most of the riparian habitat that will be impacted is dominated by invasive vegetation such as reed canarygrass and Himalayan blackberry, although some forested riparian habitat will also be impacted. The riparian and streambank habitat that will be impacted is limited to those areas that will be permanently impacted by the culvert replacement and placement of roadway fill. Any temporarily impacted areas will be promptly revegetated with native vegetation after construction, resulting in a long-term increase in bank stability. Additionally the TESC plan will greatly minimize the potential for any impacts to overall streambank condition at the biological study area scale.

Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will greatly benefit streambank condition within Curtin Creek. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would greatly improve the local streambank condition in those locations.

The results of the proposed action will likely measurably improve streambank stability within the biological study area, although likely not enough to restore the indicator to its proper functioning condition. At the watershed scale, the effects of the action will likely not be measurable. Therefore, the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

### **Floodplain Connectivity:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Floodplain connectivity has been drastically reduced within the East Fork Lewis River watershed (LCFRB 2004a). In the lower portion of the watershed, over 50 percent of historic off-channel habitat and wetlands have been disconnected from the river as the mainstem has been

channelized (LCFRB2004a). For these reasons, within the East Fork Lewis River watershed, the baseline condition for floodplain connectivity is **not properly functioning**.

Floodplain connectivity has also been significantly reduced in the Gee Creek watershed. The mainstem of Gee Creek has been largely channelized as it flows through residential, agricultural, and industrial portions of Clark County. Within the Gee Creek watershed, therefore, the baseline condition for floodplain connectivity is **not properly functioning**.

Floodplain connectivity has also been significantly reduced within the Salmon Creek watershed. Salmon Creek and many of its tributaries have been extensively diked, drained, or rerouted. Especially in the lower reaches of the watershed, what was once a network of braided channels has in many cases been reduced to a single, relatively higher energy drainage channel. Within the Salmon Creek watershed, therefore, the baseline condition for floodplain connectivity is **not properly functioning**.

Within the biological study area, urban and agricultural development has resulted in significant draining and channelization of biological study area wetlands and waterways. Some off-channel habitat exists within wetlands associated with Mill Creek, Mill Creek North, and the unnamed tributary to the East Fork Lewis River, though many of these wetlands are inundated only seasonally. Mill Creek has been confined to an incised channel for much of its length within the biological study area, except within the vicinity of its confluence with Mill Creek North, where a narrow band of shallow floodplain exists. During high rainfall events, both Mill Creek and Mill Creek North are hydrologically connected to this floodplain. Within the project biological study area, therefore, baseline conditions for floodplain connectivity are **functioning at risk**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will improve floodplain connectivity within Curtin Creek. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would further improve floodplain connectivity within those waterbodies. Although these restoration activities will likely improve floodplain connectivity within the biological study area measurably, they will not likely restore the indicator to its proper functioning condition. At the watershed scale, the effects of the action will not likely be measureable. Therefore, the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

## Flow/Hydrology

### Change in Peak/Base Flows:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Hydrology in the East Fork Lewis River watershed is predominantly the result of direct precipitation, with significant influence of rain-on-snow events in the upper watershed influencing peak flows. Peak stream flows are generated by rain events in fall, winter, and spring, and are augmented by snowmelt in the spring and early summer (LCFRB 2004a). Results of a 1999 instream flow study on the East Fork Lewis River and 13 tributaries indicated that, at certain times of the year, instream flows may be below optimal for fish at various life stages (LCFRB 2004a). Flows for Chinook spawning, which starts in October, were only 25 percent of the optimal flow in October, but reached 80 percent of optimal flow by November 1. Flows necessary for Chinook and juvenile steelhead rearing were only about 30 percent of optimal in August and September (Caldwell 1999). A 1995 USFS assessment indicated that many basins within the watershed have seen significant increases in the drainage network due to creation of roads and ditches and this has likely led to increases in peak flows (USFS 1995). For these reasons, within the East Fork Lewis River watershed, the baseline condition for peak/base flows is **functioning at risk**.

Within the Gee Creek watershed, peak and base flow conditions are typical of urban streams that have been extensively ditched and channelized. Gee Creek and its tributaries have been significantly ditched or otherwise disconnected from their historic floodplains, and compared to historic conditions, the amount of impervious surface within the basin has been significantly increased. Within the Gee Creek watershed, therefore, the baseline condition for peak/base flows is **not properly functioning**.

Peak and base flow conditions have also been significantly altered within the Salmon Creek watershed. Flows within Salmon Creek are largely tied to direct precipitation and there is little snowmelt influence within the watershed (LCFRB 2004a). Watershed development and water withdrawals have likely reduced streamflows significantly below historic levels. Mean monthly flows in Salmon Creek fell below 12 cubic feet per second (cfs) in 5 of the 10 years on record. Mill Creek was a perennial stream throughout its length before 1960; it now dries up by mid-July (Wade 2001). Instream flow analysis within Salmon Creek and several tributaries in 1999 indicated that fall flows were significantly below optimum conditions for salmonid spawning and rearing (Caldwell et. al. 1999). Within the Salmon Creek watershed, therefore, the baseline condition for peak/base flows is **not properly functioning**.

Within the biological study area, urban and agricultural development has significantly altered peak and base flow conditions. Biological study area waterways have been ditched extensively and/or isolated from their floodplains and a significant number of historic biological study area wetlands have been drained. Additionally, increases in road and impervious surface density have further impaired peak and base flow conditions throughout the biological study area. Within the project biological study area, therefore, baseline conditions for peak/base flows are **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The proposed action includes a proposed stormwater management plan that will provide flow control primarily through open conveyance in roadside ditches and culverts to up to 10 newly constructed combined stormwater treatment wetland/detention ponds. In the vicinity of Dollars Corner and on 72nd Avenue, stormwater will be collected in catch basins and conveyed through a closed system via storm sewer to a combined stormwater treatment wetland/detention pond. Treated stormwater will outfall from the combined stormwater treatment/wetland detention ponds via an 18-inch outfall pipe, which will be constructed above the OHWM of any receiving waterbody.

The proposed stormwater treatment/flow control system will likely result in long-term improvements to the peak/base flow conditions within the biological study area. However, these improvements will not likely be significant enough to restore the indicator to proper functioning condition. At the watershed scale, the effects of the proposed action will not likely be measurable. Therefore, it is anticipated that the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

### **Increase in Drainage Network:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

The drainage network at both the project biological study area and watershed scales is **not properly functioning**. There have been significant increases in the drainage network throughout the biological study area and within the biological study area watersheds due to road building and urban development.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The proposed action includes a proposed stormwater management plan that will provide water quality treatment and flow control primarily through open conveyance in roadside ditches and culverts to media filter drains, a wetland/enhancement flow control facility, and approximately six newly constructed combined stormwater treatment wetland/detention ponds. In the vicinity of Dollars Corner and on 72nd Avenue, stormwater will be collected in catch basins and conveyed through a closed system via storm sewer to a combined stormwater treatment wetland/detention pond.

Given the baseline conditions of the watersheds and the biological study area, the current road density within the watersheds and biological study area, and the proposed stormwater treatment and flow control BMPs, the increased quantity of impervious surface is not likely to result in any measurable increase in drainage network within the biological study area or at the watershed scale. Therefore, it is anticipated that the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

## Watershed Conditions

### Road Density & Location:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Road density and location within the East Fork Lewis River watershed are significantly outside the realm of proper functioning condition. While no specific data regarding road density is available at the watershed scale, a 1995 USFS assessment indicated that many basins within the watershed have seen significant increases in the drainage network due to creation of roads and ditches, likely leading to increases in peak flows (USFS 1995). Additionally, the East Fork Lewis River and a number of tributaries have roads that are located in the valley bottoms. For these reasons, within the East Fork Lewis River watershed, the baseline condition for road density and location is **not properly functioning**.

Within the Gee Creek watershed, road density is also quite high. Although no specific data is available regarding road density within the Gee Creek watershed, Gee Creek and the majority of its tributaries flow through urbanized portions of Clark County where road density is very high. Within the Gee Creek watershed, therefore, the baseline condition for road density and location is **not properly functioning**.

Road density and location are also well beyond the limits of proper functioning condition within the Salmon Creek watershed. Within the Lake River basin (which includes Salmon Creek, Burnt Bridge Creek, and Whipple Creek), road density has been measured at 9.7 mi/mi<sup>2</sup>. Within the Salmon Creek watershed, therefore, the baseline condition for road density and location is **not properly functioning**.

Within the biological study area, with SR 502 and the network of roadways that cross it, road density is quite high. The number of places where roads cross waterbodies is also significant. Within the biological study area, it is determined that the baseline condition for road density and location is **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project will not result in any increase in road density or location, as the proposed action consists of widening an existing roadway. The results of the proposed action will have no measurable long-term impacts on road density or location, either within the project biological study area or at the watershed scale. Therefore, it is anticipated that the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

### Disturbance History:

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Levels of disturbance within the East Fork Lewis River, Gee Creek, and Salmon Creek watersheds are likely outside the realm of proper functioning condition. There is no specific data regarding equivalent clearcut area (ECA) or late succession old-growth (LSOG) retention, but overall levels of urban, agricultural and industrial development are high within the watersheds. Logging activity has historically been high, and there are very few LSOG tracts remaining in the watersheds. Disturbance is distributed fairly uniformly within the watersheds, but sensitive habitats have been significantly altered from their historic conditions. For these reasons, within the East Fork Lewis River, Gee Creek, and Salmon Creek watersheds, the baseline conditions for disturbance history are **not properly functioning**.

Disturbance levels within the biological study area are also above the threshold for proper functioning condition. As part of the existing SR 502 corridor and its associated roadways and infrastructure, much of the project biological study area is developed. Much of the residential and agricultural developments have permanently altered the vegetation composition within the biological study area, removing mature forested vegetation, draining wetlands, channelizing creeks and other waterbodies, and adding impervious surface. There is no LSOG present within the biological study area. The indicator for disturbance history within the project biological study area is **not properly functioning**.

The project will:  Improve  Maintain  Degrade, or  Temporarily degrade this indicator

Briefly describe how, at both the watershed scale and the project biological study area scale:

The level of disturbance associated with the proposed action is consistent with the current level of disturbance associated with the SR 502 corridor. No measurable additional disturbance-related effects will result from the proposed action, either within the project biological study area or at the watershed scale. Therefore, it is anticipated that the proposed action will **maintain** this indicator at both the biological study area and watershed scales.

### **Riparian Reserves:**

Briefly describe the current condition of this indicator at both the watershed scale and the project biological study area scale:

Riparian conditions within the East Fork Lewis River watershed have been substantially impacted by residential, agricultural, and mining development (LCFRB 2004a). Most of the mainstem has lost substantial amounts of riparian forest, much of it converted to lawns (LCFRB 2004a). Most tributaries throughout the watershed also have poor riparian conditions (Wade 2000). For these reasons, within the East Fork Lewis River watershed, the baseline condition for riparian reserves is **not properly functioning**.

Within the Gee Creek watershed, riparian conditions are also significantly disturbed. Although data is not available regarding riparian conditions within the Gee Creek watershed, Gee Creek and the majority of its tributaries flow through urbanized portions of Clark County, where riparian vegetation is largely lacking, or consists solely of invasive species such as Himalayan

blackberry and reed canarygrass. Within the Gee Creek watershed, therefore, the baseline condition for riparian reserves is **not properly functioning**.

Riparian conditions within the Salmon Creek watershed are poor (LCFRB 2004a). Development, agriculture, fill placement, and diking have eliminated most riparian vegetation along Lake River basin streams and tributaries, including Salmon Creek (LCFRB 2004a). Within the Salmon Creek watershed, therefore, the baseline condition for road density and location is **not properly functioning**.

Within the biological study area, the riparian reserve system is **functioning at risk**. Riparian vegetation has been altered significantly from the mosaic forest that likely historically covered the majority of the biological study area. Some forested riparian habitat exists along a section of Mill Creek. Elsewhere, riparian habitat consists largely of scrub-shrub and/or emergent vegetation, and most riparian vegetation along Mill Creek North, the unnamed tributary to the East Fork Lewis River, and the Gee Creek tributaries is dominated by reed canarygrass and/or Himalayan blackberry.

The project will:  **Improve**  **Maintain**  **Degrade, or**  **Temporarily degrade this indicator**

Briefly describe how, at both the watershed scale and the project biological study area scale:

The project will result in the removal of riparian vegetation along biological study area waterbodies. Most of the riparian vegetation that will be impacted consists of scrub-shrub habitat, but the impact to forested habitat along Mill Creek will result in the removal of mature Douglas fir and black cottonwood trees that currently provide shading and a potential source of LWD recruitment.

Proposed wetland mitigation and riparian restoration, including the restoration of approximately 3,000 to 5,000 linear feet of instream habitat near the headwaters of Curtin Creek will greatly offset any impacts to water temperature as a result of riparian vegetation removal. Additionally, potential restoration activities on Mill Creek North and potential channel realignment/ riparian enhancements on Mill Creek would further improve riparian conditions within those waterbodies. Mill Creek channel realignment/restoration activities would likely include removing a small amount of concrete bank armoring, realigning the stream channel, placement of LWD, and revegetating riparian areas with native plantings. The proposed action will likely temporarily degrade the riparian condition at the biological study area scale. Planned and potential restoration activities will likely result in a long-term improvement in riparian condition within the biological study area, though the improvement will not likely restore the indicator to proper functioning condition, so the indicator will be maintained in the long-term. The effects to riparian habitat will not be measurable at the watershed scale.

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## **Appendix F**

### **Clark County Riparian Habitat Evaluation Forms**

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**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 12/21/07

Land Use Designations \_\_\_\_\_

Investigator(s): ES and TR

Zoning: \_\_\_\_\_

Stream: East Gee Creek Tributary north of SR502, between NE 23rd Court & NE 29<sup>th</sup> Ave.

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: Ns

Base Riparian Zone Width: 75 feet

Reach #: \_\_\_\_\_

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>6 – Riffles (%)</u>	
0%	<u>0</u>
1-16%	1
17-33%	2
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	<u>-2</u>
34-66%	1
67-100%	3

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	<u>dec. 1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	0	1	2
<10%	<u>0</u>	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	<u>1</u>	1	0
17-33%	2	2	1
34-50%	2	3	2

17 – Off Channel Habitat
Present <u>3</u>
Absent <u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	1	-3	-4
45-100%	<u>0</u>	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	<u>1</u>
4-6	2
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	<u>1</u>
2	2
3+	3

Snags

21 – Snags/Acre (20"+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12"+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	-1
34-66%	<u>-2</u>
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	<u>1</u>
4-6	2
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	<u>1</u>
Semi-permanent	2
Permanent	3

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	<u>+2</u>
No	+0
Method:	

General Observations and Wildlife Occurrences

The main intermittent tributary collects runoff from a roadside ditch and culverts along the north side of SR502. A small side channel which intersects the main channel conveys water from the south through a culvert under SR502. The narrow, shallow main channel is approximately 3 feet wide and 4-6 inches deep. The channel winds through the low area of a landscaped yard. The riparian vegetation is predominantly grasses and herbaceous weeds with an overstory of mature Oregon ash. A few small ornamental shrubs have been planted in the riparian area.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u><b>FUNCTION</b></u>	<u><b>POSSIBLE POINTS</b></u>	<u><b>SCORE</b></u>
<i><b>Stream Flow Influence</b></i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i><b>Influence on Water Temperature &amp; D.O.</b></i>		
5 – Canopy Cover	3	<u>2</u>
6 – Riffles	3	<u>0</u>
<i><b>Control of Sedimentation</b></i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>-2</u>
<i><b>Control of Stream Pollution</b></i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i><b>Contribution to Food Web</b></i>		
11 – Canopy Cover	3	<u>2</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i><b>Structural Stream Diversity</b></i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>1</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>0</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>17</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u><b>FUNCTION</b></u>	<u><b>POSSIBLE POINTS</b></u>	<u><b>SCORE</b></u>
<i><b>Structural Complexity</b></i>		
19 – Native Woody Plant Species	3	<u>1</u>
20 – Multiple Canopy Layers	3	<u>1</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i><b>Connectivity</b></i>		
23 – Non-native Plant Species	1	<u>-2</u>
24 – Connection to Other PHS	2	<u>0</u>
<i><b>Abundant Food Sources</b></i>		
25 – Native Woody Plant Species	3	<u>1</u>
<i><b>Available Water</b></i>		
26 – Hydrological Characteristics	3	<u>1</u>
<i><b>Moist &amp; Mild Microclimate</b></i>		
27 – Temperature/Micro. Difference	2	<u>2</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>5</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>3.35</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>20.35</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 12/21/07

Land Use Designations \_\_\_\_\_

Investigator(s): ES and TR

Zoning: \_\_\_\_\_

Stream: E.F. Tributary – north of SR502  
and NE 42<sup>nd</sup> Avenue

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: Ns

Base Riparian Zone Width: 75 feet

Reach #: \_\_\_\_\_

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>6 – Riffles (%)</u>	
0%	0
1-16%	<u>1</u>
17-33%	2
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	<u>1</u>
67-100%	3

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>12 – Dominant Tree Species</u>	
67-100%	<u>dec. 1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	0
1	1
2	<u>2</u>
3	3

**\*NOTE:** Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	0	1	2
<10%	<u>0</u>	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	<u>1</u>	1	0
17-33%	2	2	1
34-50%	2	3	2

17 – Off Channel Habitat	
Present	3
Absent	<u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	1	-3	-4
45-100%	<u>0</u>	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	2
7+	<u>3</u>

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	<u>2</u>
3+	3

Snags

21 – Snags/Acre (20"+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12"+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	2
7+	<u>3</u>
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	<u>1</u>
Semi-permanent	2
Permanent	3

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	<u>+2</u>
No	+0
Method:	

General Observations and Wildlife Occurrences

The intermittent tributary collects runoff a culvert that conveys water under SR502 to the north. The tributary mainly follows the eastern edge of a remnant riparian forested area bordered by a heavily trampled pasture to the east, and rural residences to the north and west. Habitat within the well vegetated riparian forest is a mosaic of upland and wetland. Vegetation in the forest is predominantly native shrubs and trees including Oregon ash, black cottonwood, Scouler's willow, Pacific willow, clustered rose, Nootka rose, red-osier dogwood, snowberry, and beaked-hazelnut. The narrow stream channel varies from 2-4 feet wide and about 6 inches deep. The channel substrate is silty soil.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>3</u>
6 – Riffles	3	<u>1</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>1</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>3</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>2</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>1</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>0</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>25</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>3</u>
20 – Multiple Canopy Layers	3	<u>2</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>3</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>1</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>2</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>11</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>7.37</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>32.37</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 12/21/07

Land Use Designations \_\_\_\_\_

Investigator(s): ES and TR

Zoning: \_\_\_\_\_

**West Gee Creek Tributary/wetland  
north of SR502 & west of NE 21<sup>st</sup>**

Stream: Court

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: Ns

Base Riparian Zone Width: 75 feet

Reach #: \_\_\_\_\_

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>6 – Riffles (%)</u>	
0%	<u>0</u>
1-16%	1
17-33%	2
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	<u>-2</u>
34-66%	1
67-100%	3

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	<u>dec. 1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	0	1	2
<10%	<u>0</u>	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	<u>1</u>	1	0
17-33%	2	2	1
34-50%	2	3	2

17 – Off Channel Habitat	
Present	3
Absent	<u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	1	-3	-4
45-100%	<u>0</u>	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	<u>1</u>
4-6	2
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	<u>1</u>
2	2
3+	3

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<b>1</b>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	<u>1</u>
4-6	2
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	<u>1</u>
Semi-permanent	2
Permanent	3

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	+2
No	<u>+0</u>
Method:	

General Observations and Wildlife Occurrences

The intermittent tributary collects runoff from a roadside ditch along the north side of SR502, and from the area immediately south of SR502. A culvert conveys water under the roadway to the drainageway in the wetland pasture north of SR502. The drainageway follows the lowest topography of the pasture north of SR502. The drainageway is slightly incised approximately 6-8 inches and the banks are variably well defined and have been trampled by cattle. The terrain slope gently upslope to the west and east. Within the project corridor, herbaceous hydrophytic vegetation is dominant in the riparian area, with the exception of a few patches of native rose and scattered Oregon ash.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>1</u>
6 – Riffles	3	<u>0</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>-2</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>1</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>1</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>0</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>15</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>1</u>
20 – Multiple Canopy Layers	3	<u>1</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>1</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>1</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>0</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>4</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<u>2.67</u>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>17.68</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): TR and JP

Zoning: \_\_\_\_\_

Stream: Mill creek, east of NE 72<sup>nd</sup> Ave and north of SR502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Segment east of NE 72<sup>nd</sup>, north of SR502.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	2
34-50+%	<u>3</u>

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	3
33-66% Slope	0	1	<u>2</u>
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. 1
67-100%	con. 1
33-66% mixed	<u>3</u>

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	<u>2</u>	2	1
34-50%	2	3	2

17 – Off Channel Habitat	Present 3
	Absent <u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	<u>2</u>	2	2
11-44%	1	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	<u>2</u>
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	2
3+	<u>3</u>

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	0
1	<u>1</u>
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	<u>2</u>
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	<u>+2</u>
No	+0
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for most of reach on east side, steeper for west side, and then continue to be gradual in riparian area. Reach begins at SR502, and extends approximately 200 feet to the north, upstream. Double culvert under SR502, after reach, has cement ground and appears to affect/restrict high flows downstream .

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>0</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>2</u>
6 – Riffles	3	<u>3</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>2</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>0</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>2</u>
12 – Dominant Tree Species	3	<u>3</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>2</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>25</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>2</u>
20 – Multiple Canopy Layers	3	<u>3</u>
21 – Snags	3	<u>1</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>2</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>2</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>13</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>8.71</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>33.71</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): JP and TR

Zoning: \_\_\_\_\_

Stream: Mill Creek, east of NE 72<sup>nd</sup> Ave and south of SR502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Segment east of NE 72<sup>nd</sup>, between 72<sup>nd</sup> and SR502.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	<u>-2</u>
Absent	+0

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	2
34-50+%	<u>3</u>

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. 1
67-100%	con. 1
33-66% mixed	<u>3</u>

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	2	2	1
34-50%	<u>2</u>	3	2

17 – Off Channel Habitat
Present <u>3</u>
Absent <u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	<u>2</u>	2	2
11-44%	1	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	<u>2</u>
7+	<u>3</u>

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	2
3+	<u>3</u>

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	0
1	<u>1</u>
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	<u>2</u>
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	<u>+2</u>
No	+0
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for most of reach and continue to be gradual in riparian area. Some stretches of the bank are sparsely vegetated. Reach exists between two culverts: one under NE 72<sup>nd</sup>, one under SR502. Bottom of NE 72<sup>nd</sup> culvert is natural materials, but the culvert appears to affect/restrict high flows downstream. Also, a portion of bank exists under culvert at the time of the visit, but it was unvegetated. Double culvert under SR502 has cement ground, and also appears to restrict flows. Some undercut banks (2-3' feet high) present.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>0</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>-2</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>2</u>
6 – Riffles	3	<u>3</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>0</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>2</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>1</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>2</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>23</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>2</u>
20 – Multiple Canopy Layers	3	<u>3</u>
21 – Snags	3	<u>1</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>2</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>2</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>23</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>8.1</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>31.1</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): TR and JP

Zoning: \_\_\_\_\_

Stream: Mill Creek North, west of NE 67<sup>th</sup>  
Ave and north of SR 502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Segment north of SR502.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	<u>2</u>
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. <u>1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	<u>2</u>	2	1
34-50%	2	3	2

17 – Off Channel Habitat	
Present	<b>3</b>
Absent	<u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	<u>1</u>	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	<u>0</u>
1-3	1
4-6	2
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	<u>1</u>
2	2
3+	3

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<b>1</b>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	-1
34-66%	-2
67-100%	<b>-4</b>

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	<b>+2</b>

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	2
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	+2
No	<u>+0</u>
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for entire reach and continue to be gradual in riparian area. Reach begins at SR502, and extends approximately 200 feet to the north, upstream. Large 10-foot wide culvert under SR502, after reach, probably has no natural substrate, and appears to affect/restrict high flows downstream. Sides of culvert reinforced by sandbags, apparently to restrict flooding. Reach dominated by reed canarygrass. Riparian area immediately bordered by maintained meadow with horses.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>1</u>
6 – Riffles	3	<u>2</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>1</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>3</u>
18 – Fines	2	<u>1</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>27</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>0</u>
20 – Multiple Canopy Layers	3	<u>1</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-4</u>
24 – Connection to Other PHS	2	<u>2</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>0</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>0</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>3</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>2.01</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>29.01</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): TR and JP

Zoning: \_\_\_\_\_

Stream: Mill Creek North, west of NE 67<sup>th</sup>  
Ave and south of SR 502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Segment south of SR502.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	<u>-2</u>
Absent	+0

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	<u>2</u>
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. <u>1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE:** Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	<u>2</u>	2	1
34-50%	2	3	2

17 – Off Channel Habitat
Present <b>3</b>
Absent <u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	<u>1</u>	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	<u>1</u>
4-6	2
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	<u>2</u>
3+	3

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	1
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	<u>1</u>
4-6	2
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	+2
No	<u>+0</u>
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for entire reach and continue to be gradual in riparian area. Reach begins at SR502, and extends approximately 200 feet to the south, downstream. Large 10-foot wide culvert under SR502 (with sandbags on banks immediately before culvert), before reach, probably has no natural substrate, and appears to affect/cause high flows in reach. Reach has more vegetative diversity than reach north of SR502. Riparian area immediately bordered by maintained meadow.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>-2</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>1</u>
6 – Riffles	3	<u>2</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>1</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>3</u>
18 – Fines	2	<u>1</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>25</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>1</u>
20 – Multiple Canopy Layers	3	<u>2</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>2</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>1</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>0</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>9</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>6.03</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>31.03</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): TR and JP

Zoning: \_\_\_\_\_

Stream: Mill Creek, west of NE 92<sup>nd</sup> and north of SR 502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Upstream segment located north of SR502 for about 200' feet.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	-2
Absent	<u>+0</u>

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	<u>1</u>
17-33%	2
34-50+%	3

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	3
33-66% Slope	0	1	<u>2</u>
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. 1
67-100%	con. 1
33-66% mixed	<u>3</u>

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	<u>1</u>	1	0
17-33%	2	2	1
34-50%	2	3	2

17 – Off Channel Habitat
Present <u>3</u>
Absent 0

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	1	-3	-4
45-100%	<u>0</u>	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	<u>2</u>
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	<u>2</u>
3+	3

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	-1
34-66%	-2
67-100%	<u>-4</u>

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	<u>2</u>
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	+2
No	<u>+0</u>
Method:	

General Observations and Wildlife Occurrences

Banks are steep, 1-2 feet in some places, and ground levels off for most of riparian area. East side of the stream is directly adjacent to a developed lot and parking lot. Reach followed by a 6-foot metal double culvert that goes under SR502. Debris in the form of a 2-foot cement tube in creek channel. Riparian area dominated in most places with reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus discolor*).

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>0</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>1</u>
6 – Riffles	3	<u>1</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>2</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>1</u>
12 – Dominant Tree Species	3	<u>3</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>1</u>
17 – Off-channel Habitat	3	<u>3</u>
18 – Fines	2	<u>0</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>25</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>2</u>
20 – Multiple Canopy Layers	3	<u>2</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>1</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-4</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>2</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>0</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>6</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>4.02</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>29.02</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): JP and TR

Zoning: \_\_\_\_\_

Stream: Mill Creek, west of NE 92<sup>nd</sup> Ave and south of SR 502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Downstream segment located south of SR502 for about 300' feet.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	<u>-2</u>
Absent	+0

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	2
34-50+%	<u>3</u>

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	<u>1</u>	2	3
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	<u>+2</u>
Absent	+0

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	<u>1</u>
34-66%	2
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. <u>1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	1	2	3
10-30%	<u>0</u>	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	2	2	1
34-50%	<u>2</u>	3	2

17 – Off Channel Habitat	3
Present	<u>0</u>
Absent	<u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	2	2	2
11-44%	<u>1</u>	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	<u>2</u>
7+	3

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	<u>2</u>
3+	3

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	<u>0</u>
1	1
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	1
2-3	<u>2</u>
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	-1
34-66%	<u>-2</u>
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	+2

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	2
7+	<u>3</u>
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	+2
No	<u>+0</u>
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for most of reach and continue to be gradual in riparian area. Portion of reach closest to SR502 (northern portion) has canopy; southern portion is almost entirely emergent. Drainage culvert located in southern portion, creating a wider riparian area for a portion of the reach on the south side of the creek. Reach has more vegetative diversity than reach north of SR502, but less consistent canopy.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Stream Flow Influence</i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>2</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>-2</u>
<i>Influence on Water Temperature &amp; D.O.</i>		
5 – Canopy Cover	3	<u>1</u>
6 – Riffles	3	<u>3</u>
<i>Control of Sedimentation</i>		
7 – Slope/Vegetative Cover	3	<u>1</u>
8 – Vegetated Banks	3	<u>3</u>
<i>Control of Stream Pollution</i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>2</u>
<i>Contribution to Food Web</i>		
11 – Canopy Cover	3	<u>1</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i>Structural Stream Diversity</i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>0</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>1</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>21</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u>FUNCTION</u>	<u>POSSIBLE POINTS</u>	<u>SCORE</u>
<i>Structural Complexity</i>		
19 – Native Woody Plant Species	3	<u>2</u>
20 – Multiple Canopy Layers	3	<u>2</u>
21 – Snags	3	<u>0</u>
22 – Downed Logs	3	<u>2</u>
<i>Connectivity</i>		
23 – Non-native Plant Species	1	<u>-2</u>
24 – Connection to Other PHS	2	<u>0</u>
<i>Abundant Food Sources</i>		
25 – Native Woody Plant Species	3	<u>3</u>
<i>Available Water</i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i>Moist &amp; Mild Microclimate</i>		
27 – Temperature/Micro. Difference	2	<u>0</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>10</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<u>6.7</u>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>27.7</u></b>

**CLARK COUNTY HABITAT CONSERVATION ORDINANCE**  
**RIPARIAN HABITAT FIELD RATING FORM**

Date: 10/15/2007

Land Use Designations \_\_\_\_\_

Investigator(s): TR and JP

Zoning: \_\_\_\_\_

Stream: Mill Creek, west of NE 72nd and south of SR 502

Shorelines: \_\_\_\_\_

Legal: \_\_\_\_\_

Other: \_\_\_\_\_

Parcel #: \_\_\_\_\_

Stream Type: F

Base Riparian Zone Width: 200

Reach #: Segment west of NE 72<sup>nd</sup> and south of SR502 for approximately 200 feet.

(Note: Complete 1 field rating form for each reach)

**FISH HABITAT FUNCTIONS**

*Streamflow Influence*

<u>1 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>2 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

<u>3 – Springs or Seeps</u>	
Absent	<u>0</u>
Intermittent	1
Semi-Permanent	2
Permanent	3

<u>4 – Hydrology (excess flows, erosion, scour, etc.)</u>	
Present	<u>-2</u>
Absent	+0

*Influence on water Temperature & Dissolved Oxygen*

<u>5 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>6 – Riffles (%)</u>	
0%	0
1-16%	1
17-33%	2
34-50+%	<u>3</u>

*Control of Sedimentation*

7	10-33% Cover	34-66% Cover	67-100% Cover
0-33% Slope	1	2	<u>3</u>
33-66% Slope	0	1	2
67-100% Slope	0	1	2

<u>8 – Vegetated Banks</u>	
0-33%	-2
34-66%	1
67-100%	<u>3</u>

*Dissolved Oxygen Measurements* (optional): \_\_\_\_\_

*Control of Stream Pollution*

<u>9 – Vegetative Cover (%)</u>	
0-33%	1
34-66%	2
67-100%	<u>3</u>

<u>10 – Associated Wetlands</u>	
Present	+2
Absent	<u>+0</u>

*Contribution to Food Web*

<u>11 – Canopy Cover (%)</u>	
0-33%	1
34-66%	<u>2</u>
67-100%	3

<u>12 – Dominant Tree Species</u>	
67-100%	dec. <u>1</u>
67-100%	con. 1
33-66% mixed	3

<u>13 – LWD (Pieces per BFW)</u>	
0	<u>0</u>
1	1
2	2
3	3

**\*NOTE: Assessment criteria and scoring were based on conditions likely to be encountered. Users of this methodology may be required to exercise their best professional judgment as a result of unique site conditions.**

Stream Structural Diversity

Streams <10m (33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	<u>0</u>
0.1	1
0.2	2
>+0.3	3

Streams 10-20+m(33ft) wide

14 – LWD (Key Pieces per BFW)	
0.0	0
0.1-0.2	1
0.3-0.4	2
>+0.4	3

15 – Pools (%)	Gradient (%)		
	<2%	2-5%	>5%
>55%	3	3	3
41-54%	2	3	3
31-40%	<u>1</u>	2	3
10-30%	0	1	2
<10%	0	0	1

16 – Riffles (%)	Gradient (%)		
	<2%	2-5%	>5%
1-16%	1	1	0
17-33%	2	2	1
34-50%	<u>2</u>	3	2

17 – Off Channel Habitat	3
Present	<u>3</u>
Absent	<u>0</u>

18 – Fines (%)	Gradient (%)		
	<2%	2-5%	>5%
0-10%	<u>2</u>	2	2
11-44%	1	-3	-4
45-100%	0	-4	-5

**TERRESTRIAL WILDLIFE HABITAT FUNCTIONS**

Structural/Biological Complexity

Plant Species Diversity

19 – Native Woody Plant Species (#)	
0	0
1-3	1
4-6	<u>2</u>
7+	<u>3</u>

Vertical Diversity

20 – Multiple Canopy Layers	
1	1
2	2
3+	<u>3</u>

Snags

21 – Snags/Acre (20'+dbh, 6' high)	
0	0
1	<u>1</u>
2-3	2
4+	3

Downed Material

22 – Downed Logs/Acre (12''+ diam, 20'+ long)	
1	<u>1</u>
2-3	2
4+	3

Non-Native Plants

23 – Non-native Plant Species	
<10%	1
10-33%	<u>-1</u>
34-66%	-2
67-100%	-4

Connectivity with Other Ecosystems

24 – Riparian Corridor Connected to Other PHS Polygons or Points?	
No	<u>+0</u>
Yes	<u>+2</u>

Abundant Food Sources

25 – Native Woody Plant Species (#)	
1-3	1
4-6	<u>2</u>
7+	3
Specify:	

Available Water

26 – Hydrological Characteristics	
Intermittent	1
Semi-permanent	2
Permanent	<u>3</u>

Moist and Moderate Microclimate

27 – Temperature Microclimate Difference?	
Yes	<u>+2</u>
No	+0
Method:	

General Observations and Wildlife Occurrences

Banks are gradual for most of reach and continue to be gradual in riparian area. Some stretches of the bank are sparsely vegetated. Reach ends upstream at a 10-foot wide culvert which goes underneath NE 72<sup>nd</sup>. Bottom of culvert is natural materials, but the culvert appears to affect/restrict high flows. Also, a portion of bank exists under culvert at the time of the visit, but it was unvegetated. Lastly, a building is located in the riparian area of a stretch of the reach on the northern side of the creek.

## EVALUATION SUMMARY

### FISH HABITAT FUNCTIONS

<u><b>FUNCTION</b></u>	<u><b>POSSIBLE POINTS</b></u>	<u><b>SCORE</b></u>
<i><b>Stream Flow Influence</b></i>		
1 – Vegetative Cover	3	<u>3</u>
2 – Associated Wetlands	2	<u>0</u>
3 – Springs or Seeps	3	<u>0</u>
4 – Altered Hydrology	0	<u>-2</u>
<i><b>Influence on Water Temperature &amp; D.O.</b></i>		
5 – Canopy Cover	3	<u>2</u>
6 – Riffles	3	<u>3</u>
<i><b>Control of Sedimentation</b></i>		
7 – Slope/Vegetative Cover	3	<u>3</u>
8 – Vegetated Banks	3	<u>3</u>
<i><b>Control of Stream Pollution</b></i>		
9 – Vegetative Cover	3	<u>3</u>
10 – Associated Wetlands	2	<u>0</u>
<i><b>Contribution to Food Web</b></i>		
11 – Canopy Cover	3	<u>2</u>
12 – Dominant Tree Species	3	<u>1</u>
13 – Large Woody Debris	3	<u>0</u>
<i><b>Structural Stream Diversity</b></i>		
14 – Large Wood Debris	3	<u>0</u>
15 – Pools	3	<u>1</u>
16 – Riffles	3	<u>2</u>
17 – Off-channel Habitat	3	<u>0</u>
18 – Fines	2	<u>2</u>
<b>HABITAT SUBTOTAL (HS):</b>	<b>48</b>	<b><u>23</u></b>

### TERRESTRIAL WILDLIFE HABITAT FUNCTIONS

<u><b>FUNCTION</b></u>	<u><b>POSSIBLE POINTS</b></u>	<u><b>SCORE</b></u>
<i><b>Structural Complexity</b></i>		
19 – Native Woody Plant Species	3	<u>2</u>
20 – Multiple Canopy Layers	3	<u>3</u>
21 – Snags	3	<u>1</u>
22 – Downed Logs	3	<u>1</u>
<i><b>Connectivity</b></i>		
23 – Non-native Plant Species	1	<u>-1</u>
24 – Connection to Other PHS	2	<u>2</u>
<i><b>Abundant Food Sources</b></i>		
25 – Native Woody Plant Species	3	<u>2</u>
<i><b>Available Water</b></i>		
26 – Hydrological Characteristics	3	<u>3</u>
<i><b>Moist &amp; Mild Microclimate</b></i>		
27 – Temperature/Micro. Difference	2	<u>2</u>
<b>WILDLIFE SUBTOTAL (WS)</b>	<b>23</b>	<b><u>15</u></b>
Total: WS X% of Riparian Area that is Vegetated	23	<b><u>10.05</u></b>
<b>TOTAL SCORE +1 for Type 1 waters (FISH+WILDLIFE FUNCTIONS):</b>	<b>72</b>	<b><u>33.05</u></b>