

**SR 518 Sea Tac Airport to I-5/I-405 Interchange Stream
Mitigation Site**

USACE # 200600651

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

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SR 518 Sea Tac Airport to I-5/I-405 Interchange Stream Mitigation Site

USACE # 200600651

	General Site Information			
	USACE Number	200600651		
	Mitigation Location	Gilliam Creek sub-basin between North Airport Expressway Interchange and the I-5/I405 interchange in Tukwila, King County		
	LLID Number	1222849474625		
	Construction Date	2008-2009		
	Monitoring Period	2010-2015		
	Year of Monitoring	1 of 5		
	Area of Project Impact	Wetland	Stream Channel	Stream Buffer
		0.951 acre	518 ft	1.152 acre
	Type of Mitigation	Wetland Establishment	Stream Channel Re-alignment	Stream Bank/Buffer Planting
Area of Mitigation¹	0.807 credits	518ft	1.152 acre	

¹To fully compensate for these wetland impacts, WSDOT debits 0.807 wetland mitigation credits from the Springbrook Bank credit ledger (Appendix 5). By debiting credits representing moderate to high functional values as compensation for the loss of low to moderate functional values, the net ecological benefits represented by 0.807 Springbrook bank credits will offset the loss of wetland area and function caused by the project.

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Summary of Monitoring Results and Management Activities (2010)

Performance Criteria	2010 Results ²	Management Activities
Performance Standard		
Planted woody vegetation adjacent to streams will achieve 100% survival.	<ul style="list-style-type: none"> • Southwest tributary: 99% survival (CI_{80%}= 98 -100%) • Unnamed tributary 1: 98% survival • Unnamed tributary 2: 97% survival 	Ongoing weed control, Replanting completed
All rootwads and instream woody debris will be visually inspected on an annual basis to ensure that they have remained in place.	All rootwads and instream woody debris remain in place, however, two weirs are not present according to the construction plans.	
Coir fabric will remain in place to prevent bank erosion. Coir fabric and stream banks will be visually inspected on an annual basis.	Coir fabric in place, no apparent stream bank erosion.	
Stream channels will be visually inspected on an annual basis for evidence of breaching.	No apparent evidence of breaching.	
Permit Requirement		
Reed canarygrass and Scot's broom will not exceed 20 percent aerial cover in the stream mitigation sites	<ul style="list-style-type: none"> • Southwest tributary: 5% cover • Unnamed tributary 1: < 1% cover • Unnamed tributary 2: < 1% cover 	Ongoing weed control
Japanese Knotweed shall not be present at the stream mitigation sites.	<ul style="list-style-type: none"> • Southwest tributary: absent • Unnamed tributary 1: absent • Unnamed tributary 2: absent 	Ongoing weed control
80% woody survival (Tributary 1 and tributary 2)	<ul style="list-style-type: none"> • Unnamed tributary 1: 98% survival • Unnamed tributary 2: 97% survival 	Ongoing weed control
80% woody survival (Southwest tributary)	99% survival (CI _{80%} = 98 -100%)	Ongoing weed control

² Estimated values are presented with their corresponding statistical confidence interval. For example, 99% survival (CI_{80%} = 98-100%) means we are 80% confident that the true aerial cover value is between 98% and 100%.

Report Introduction

This report summarizes first-year (Year-1) monitoring activities at the State Route (SR) 518 Sea Tac Airport to I-5/I-405 Interchange Stream Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities included vegetation surveys and photo-documentation. Vegetation surveys occurred on August 16th, 2010 at the southwest tributary and on November 9, 2010 at the unknown tributaries 1&2.

What is the SR 518 Gilliam Creek Tributaries Stream Mitigation Site?

This 1.15-acre stream mitigation site (Figure 1) consists of stream re-alignment on three tributaries to Gilliam Creek and the associated buffer restoration south of SR 518. This site was created to compensate for the relocation of 518 linear feet of stream channel due to road improvements along SR 518. Stream channels relocated are equivalent to the area of permanently impacted stream channels, and lost functions will be replaced, including fish habitat (southwest tributary of Gilliam Creek), water quality improvement, and input of organic materials.

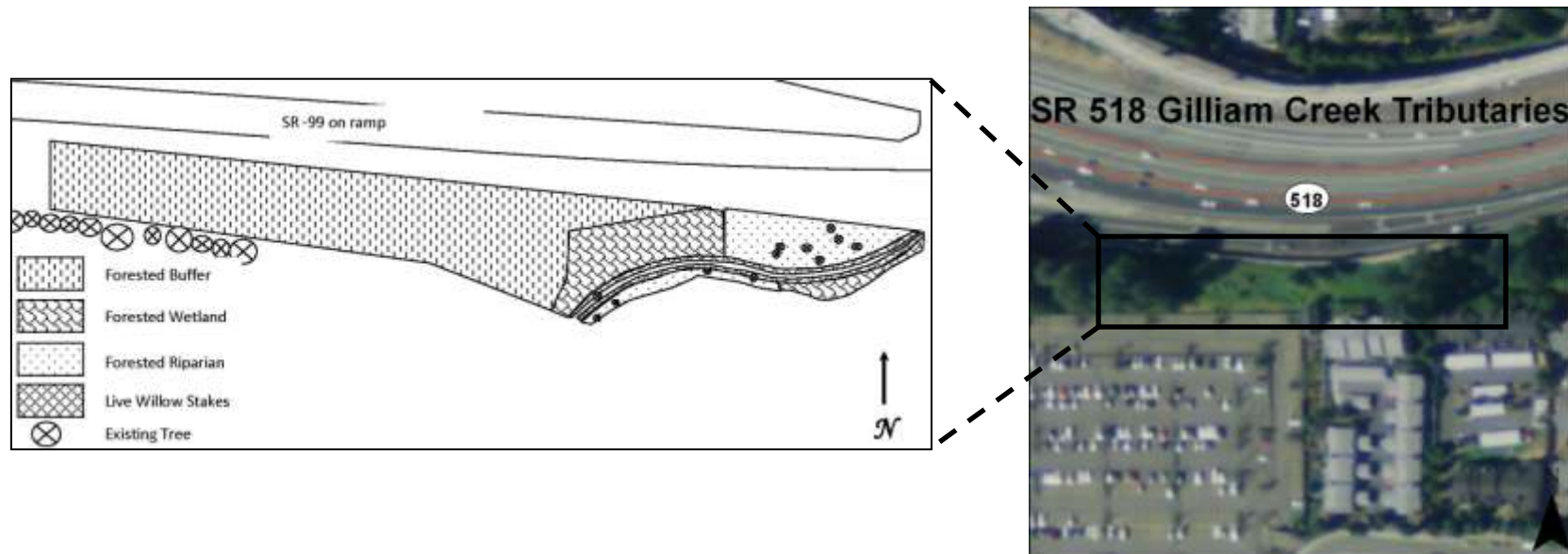


Figure 1 Site Sketch Southwest tributary to Gilliam Creek

The SR 518 Gilliam Creek Tributaries Stream Mitigation Site contains three new stream channels to offset lost functions of water quality treatment and organic inputs.

What are the performance standards for this site?

Performance Standard 1

Planted woody vegetation adjacent to streams will achieve 100% survival one year after the sites are planted. If all dead plants are replaced, this performance standard is achieved.

Performance Standard 2

All rootwads and instream woody debris will be visually inspected on an annual basis to ensure that they have remained in place.

Performance Standard 3

Coir fabric will remain in place to prevent bank erosion. Coir fabric and stream banks will be visually inspected on an annual basis.

Performance Standard 4

Stream channels will be visually inspected on an annual basis for evidence of breaching.

Permit Requirement 1

Reed canarygrass and Scot's broom will not exceed 20 percent aerial cover in the stream mitigation sites. If this cover threshold is exceeded, weed eradication or control measures will be implemented as part of the contingency plan.

Permit Requirement 2

Japanese Knotweed shall not be present at the stream mitigation sites. If it is discovered during monitoring eradication methods will be implemented immediately.

Permit Requirement 3

Within one year of project completion, the banks shall be revegetated with native or other approved woody species. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival (unnamed tributaries 1 and 2).

Permit Requirement 4

Within one year of project completion, the banks shall be revegetated with native or other approved woody species. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival (southwest tributary).

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 3 shows the planting plan (Herrera 2006).

How were the performance standards evaluated?

To evaluate standards for vegetative cover, a baseline was established parallel to the SR 99 on ramp (southwest tributary to Gilliam Creek) (Figure 2). Twenty sampling transects were randomly placed perpendicular to the baseline. The unequal belt transect method was used to estimate woody survival. Total counts were conducted at the unnamed tributaries 1 and 2 (Performance Standard 1, Permit Requirement 3 and 4). The southwest tributary was visually inspected (Performance Standards 2, 3 and 4). Invasive cover was qualitatively assessed (Permit Requirement 1 and 2).

For additional details on the methods, see Appendix 2 of this report or view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

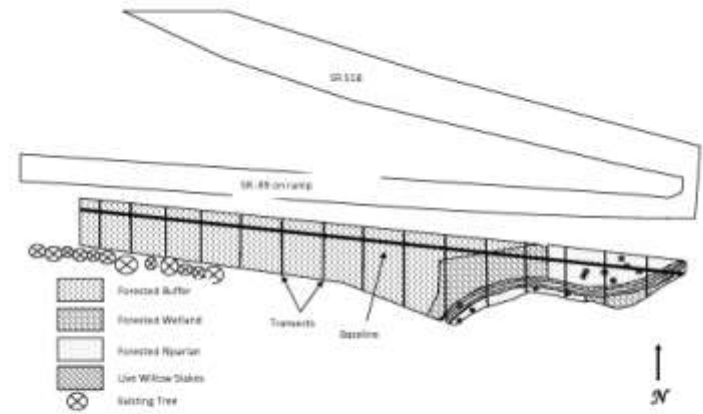


Figure 2 Site Sampling Design (2010)

How is the site developing?

The southwest tributary is currently in the process of remediation. The site is in the process of being permitted for a design fix on the weirs. Due to repairs to the weir configurations a number of the plantings will be temporarily removed to provide access for heavy equipment during the summer of 2011.

Tributary 1 is beginning to develop quite well. There is high survival and the plantings for the most part appear healthy and vigorous. Willow (*Salix* spp.) fascines along the realigned tributary are flourishing, reaching heights of 3-meters. A few bigleaf maples (*Acer macrophyllum*) appear stressed and a number of Oregon ash (*Fraxinus latifolia*) have what appear to be aphids. The invasive cover was exceedingly low.

Tributary 2 is also beginning to develop quite well. Overall, the woody plantings appear healthy and vigorous. A few stressed western red cedars (*Thuja plicata*) and vine maple (*Acer circinatum*) were observed on site. The invasive cover is exceedingly low and there is extensive evidence of Himalayan blackberry (*Rubus armeniacus*) control.

Results for Performance Standard 1

(Planted woody vegetation adjacent to streams will achieve 100% survival):

Survival of woody species at the southwest tributary is estimated to be 99% (CI_{80%} = 98-100%) (Photo 1). Dominant species include roses (*Rosa* spp.) and vine maple (*Acer circinatum*). Survival of woody species is estimated to be 98 percent and 97 percent, respectively, for unnamed tributary 1 and 2. Additional planting is planned for 2011.

Results for Performance Standard 2

(All rootwads and instream woody debris will be visually inspected on an annual basis to ensure that they have remained in place):

An inspection of the stream determined that that there has been no movement of rootwads or in-stream woody debris, though there appears to be two less structures than depicted on the as-builts.

Results for Performance Standard 3

(Coir fabric will remain in place to prevent bank erosion. Coir fabric and stream banks will be visually inspected on an annual basis):

The coir fabric was only visible along the western portion of the tributary; however no bank erosion was evident.



Photo 1
Woody survival at southwest tributary (July 2010)

Results for Performance Standard 4

(Stream channels will be visually inspected on an annual basis for evidence of breaching):

A visual inspection revealed no evidence of stream breaching.

Results for Permit Requirement 1

(Reed canarygrass and Scot’s broom will not exceed 20 percent aerial cover in the stream mitigation sites):

Aerial cover of reed canarygrass (*Phalaris arundinacea*) and Scotch broom (*Cytisus scoparius*) was qualitatively assessed at five percent on the southwest tributary; this was composed of entirely reed canary grass. Reedcanary grass and Scot’s broom were not present on Tributaries 1 and 2.

Results for Permit requirement 2

(Japanese Knotweed shall not be present at the stream mitigation sites):

Japanese Knotweed was not present on any of three stream realignment planting areas.

Results for Permit requirement 3

(80% woody survival (Tributary 1 and Tributary 2)):

Survival of woody species is estimated to be 98% and 97%, respectively for unnamed tributary 1 and 2 (Photos 2 and 3). This exceeds the permit requirement.



Photo 2
Woody survival at Tributary 1 (August 2010)



Photo 3
Woody survival at Tributary 2 (August 2010)

Results for Permit requirement 4

(80% woody survival (Southwest tributary))

Survival of woody species at the southwest tributary is determined to be 99% ($CI_{80\%} = 98-100\%$). Dominant species include roses (*Rosa* spp.) and vine maple (*Acer circinatum*).

What is planned for this site?

The southwest tributary is currently in the process of remediation. The unnamed tributaries will be replanted during the winter of 2011 and continued invasive control is planned through the 2011 growing season.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *SR 518 SeaTac Airport to I5/I405 Interchange Stream Mitigation Plan* (Herrera 2006). The performance criteria addressed this year are identified in **bold** font.

Goals, objectives, and performance standards for the SR 518 SeaTac to I-5/I-405 interchange project.

Objective Performance Standard

Goal 1: Create new stream channels to offset the lost functions of water quality treatment and organic input.

1.1 Create new channels of equivalent or greater area.

1.1.1 Overall for the project, approximately 0.079 acres of stream channel area will be relocated. See Table 3 for areas that apply to each stream.

1.2 Stabilize stream banks with native vegetation.

1.2.1 Planted woody vegetation adjacent to streams will achieve 100% survival one year after the sites are planted. If all dead plants are replaced, this performance standard is achieved.

1.2.2 Within the planted buffer areas, a minimum of 66 percent of the total cover will include planted shrubs and trees. The achievement of this performance standard will be evaluated during the third- and fifth year.

1.2.3 Within the planted buffer areas, woody vegetation (shrubs and trees) will have for shoots per 100 square feet in year 3 and 35 percent cover by year five.

1.3 Stabilize stream banks.

1.3.1 All rootwads and instream woody debris will be visually inspected on an annual basis to ensure that they have remained in place.

1.3.2 Coir fabric will remain in place to prevent bank erosion. Coir fabric and stream banks will be visually inspected on an annual basis.

1.4 Retain flows within the channel.

1.4.1 Stream channels will be visually inspected on an annual basis for evidence of breaching.

1.5 Create stable streambed profiles that convey all flows.

1.5.1 Stream channels will be constructed per approved plans as demonstrated by as-built drawings.

Goal 2: Establish and enhance riparian habitat to offset the lost functions of water quality treatment and organic input.

2.1 Provide shading and temperature regulation through the establishment of native forested plant communities.

2.1.1 See 1.2.1 through 1.2.4.

2.2 Provide organic material inputs through plant establishment.

2.2.1 See 1.2.1 through 1.2.4.

Monitoring, Maintenance, and Contingencies

Monitoring Plan

The stream mitigation areas will be monitored for a minimum of 5 years. WSDOT will conduct formal monitoring and complete monitoring reports on the first, third, and fifth years. These monitoring reports will be submitted to regulatory agencies. On years two and four, informal qualitative monitoring will be conducted. The monitoring program will determine the effectiveness of the mitigation measures in meeting the goals, objectives, and performance standards presented previously. The monitoring effort will include observations of general site conditions, plant health, plant survival, and the presence of invasive species. During each monitoring event, the mitigation areas will be photographed from permanent photo stations to be established during the first year.

Maintenance Plan

During the first year of monitoring, the planting contractor will be responsible for maintaining 100 percent plant survival, according to the contract plans. In accordance with the 1-year plant survival guarantee, the contractor will replace plants that have died during the first year. Before the plants are replaced, the contractor will consult with a biologist assigned by WSDOT to determine why the desired species are not surviving and, if necessary, to make appropriate native plant substitutions. In addition, throughout the summer of the first year, the contractor will be responsible for providing supplemental irrigation as frequently as necessary to ensure healthy plant conditions.

Contingency Plan

If the percent coverage requirements for native emergent species, native woody (shrub or tree) species, and invasive species are not satisfied, contingency activities may include but are not limited to plant replacement, plant supplementation, plant substitution,

adjustment of the planting layout to reflect specific or changing site conditions, weed control, and installation and adjustment of tree protection devices.

PERMIT REQUIREMENTS

The following excerpt is from the USACE permit # 200600651. Requirements addressed this year are identified in **bold** font.

Reed canarygrass and Scot’s broom will not exceed 20 percent aerial cover in the stream mitigation sites. If this cover threshold is exceeded, weed eradication or control measures will be implemented as part of the contingency plan.

Japanese knotweed shall not be present at the stream mitigation sites. If it is discovered during monitoring, eradication methods will be implemented immediately.

The following excerpt is from Hydraulic Project Approval permit # 105508-3. Requirements addressed this year are identified in **bold** font.

Within one year of project completion, the banks shall be revegetated with native or other approved woody species. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival.

Appendix 2 – Methods

To evaluate standards for vegetative cover, a baseline was established parallel to the SR 99 on ramp (southwest tributary to Gilliam Creek) (Figure 2). Twenty one-meter wide sampling transects were randomly placed perpendicular to the baseline. The unequal belt transect method was used to estimate woody survival. Total counts were conducted at the unnamed tributaries 1 and 2 (Performance Standard 1, Permit Requirement 3 and 4)). The southwest tributary was visually inspected (Performance Standards 2, 3 and 4). Invasive cover was qualitatively assessed (Permit Requirement 1 and 2).

Sample size analysis confirmed sufficient sampling had been completed based on site sampling objectives and the desired level of statistical confidence. The sample size equation shown here (below) was used to perform the analysis on data collected (Performance Standards 1, 5, and 7). In this equation, the precision level (B) equals half the maximum acceptable confidence interval width multiplied by the sample mean.

$$n = \frac{(z)^2 (s)^2}{(B)^2}$$

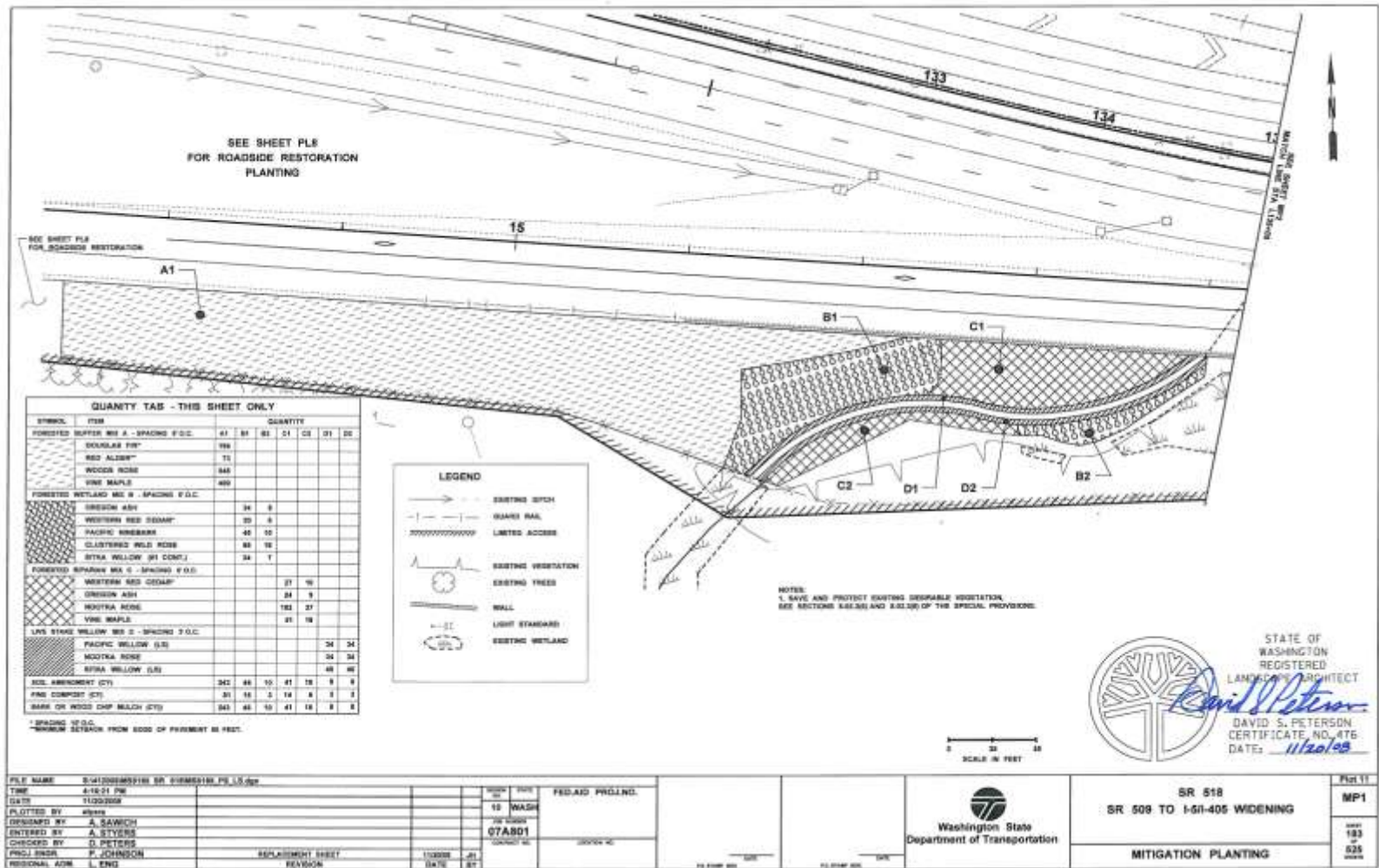
n = unadjusted sample size
 z = standard normal deviate
 s = sample standard deviation
 B = precision level

For additional details on the methods view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

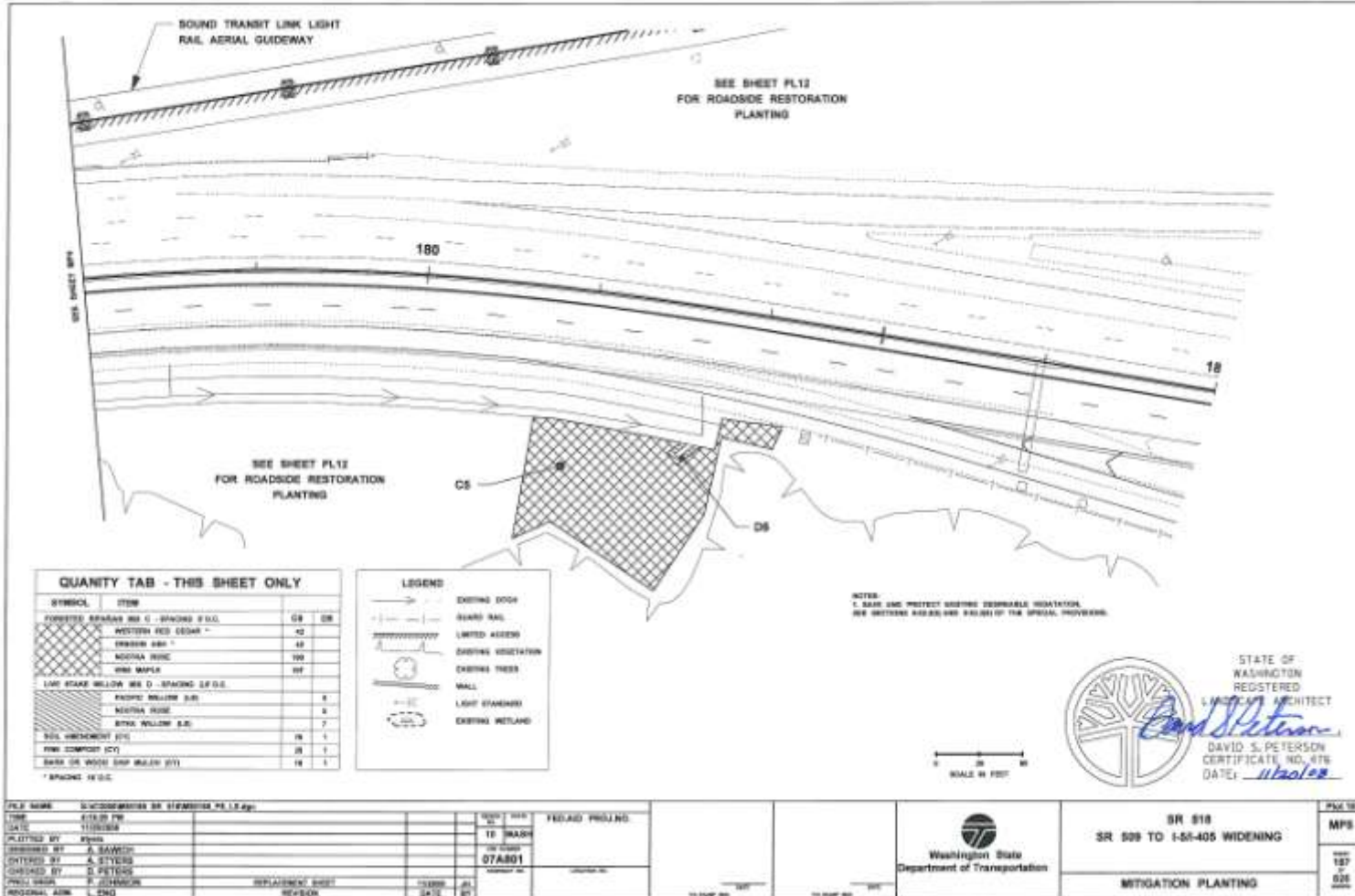
Appendix 3 – Planting Plan

(from Herrera 2006)

Southwest Tributary



Unnamed Tributary 2



Appendix 4 – Photo Points

The photographs below were taken from permanent photo-points on August 16th, 2010 and document current site development at the southwest tributary.



Photo Point 1a



Photo Point 1b

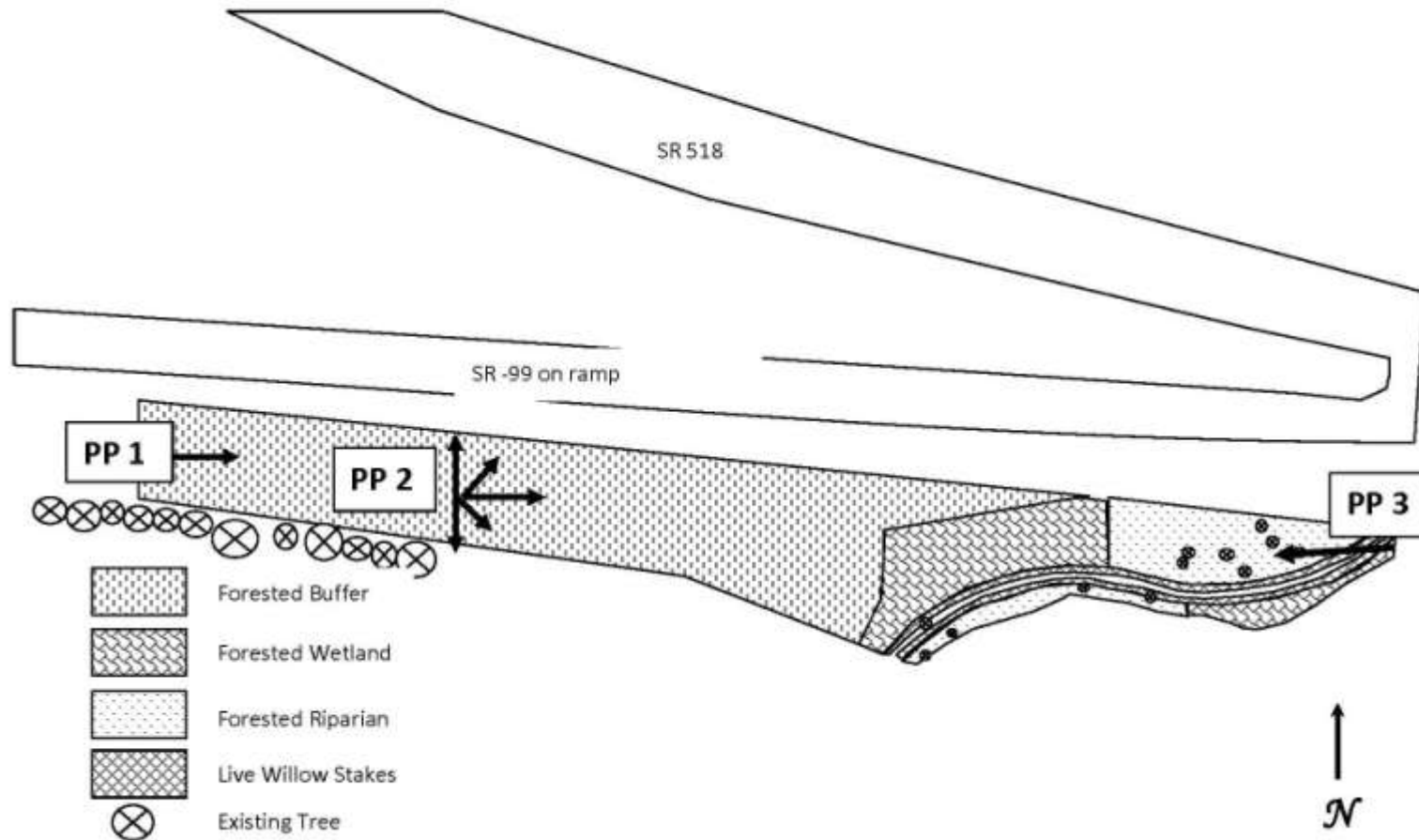


Photo Point 1c



Photo Point 2

Photo Point Map (southwest tributary)



Literature Cited

1. Herrera Environmental Consultants, Inc. 2006. SR 518 SeaTac Airport to I5/I405 Interchange Stream Mitigation Plan.
2. United States Army Corps of Engineers. 2007. Department of the Army Permit Number 200600651.
3. Washington State Department of Fish and Wildlife. 2007. Hydraulic Project Approval Permit Number 105508-3.
4. Washington State Department of Transportation (WSDOT) WSDOT Wetland Mitigation Site Monitoring Methods (12 June 2008). <http://www.wsdot.wa.gov/NR/rdonlyres/C211AB59-D5A2-4AA2-8A76-3D9A77E01203/0/MethodsWhitePaper052004.pdf>