

**SR 18: 180th Avenue SE to Maple Valley
(Jenkins Creek) Mitigation Site
C7444, (C6832) (C6008)**

USACE NWP 1999-4-00171

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

Issued March 2010



**Washington State
Department of Transportation**

Environmental Services Office

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SR 18 180th Avenue SE to Maple Valley (Jenkins Creek) Mitigation Site

USACE IP 1999-4-00171



General Site Information		
USACE IP 23 Number	1999-4-00171	
WSDOT Contract Number	C7444 (C6832) (C6008)	
Mitigation Location	SR 18 south of 256 th and west of Jenkins Creek, King County	
Monitoring Period	2004 – 2013	
Year of Monitoring	7 of 10	
Area of Project Impact	0.81 acre	
Type of Mitigation	Wetland Establishment	Wetland Restoration
Area of Mitigation	0.92 acre	0.56 acre
Type of Mitigation	Wetland Enhancement	Wetland Preservation
Area of Mitigation	4.43 acres	0.35 acre

Summary of Monitoring Results and Management Activities (2009)

Performance Measures	2009 Results	Management Activities
Permit Requirement (USACE)		
Creation and restoration areas will be saturated to the surface for 12.5 percent of the growing season (Permit Requirement 1)	Approximately 50% of the creation and restoration areas were saturated to the surface. (Appendix 2, Table 1, Figure 3)	
Performance Standards		
Create and restore at least 1.48 acres that support wetland hydrology	1.41 acres of creation and restoration (Appendix 2, Figure 4)	
King County noxious weeds will be controlled in the season they are identified	None Observed	Ongoing weed control
Less than 25% cover by reed canarygrass in enhancement and restoration areas	2% (CI _{80%} =1-4%)	Ongoing weed control
75% cover by at least three non-invasive native herbaceous facultative-wet and wetter species in the emergent wetland	92% (CI _{99%} =87-98%) 12 species observed	
25% cover by at least three non-invasive native woody facultative and wetter species in the forested wetland	81% (CI _{95%} =73-87) 8 species observed	
25% cover by at least three non-invasive native woody species in the buffer	85% (CI _{80%} =78-94%) 12 species observed	

Report Introduction

This report summarizes seventh-year (Year-7) monitoring activities at the State Route (SR) 18: 180th Avenue SE to Maple Valley (SR 18 Jenkins Creek) mitigation site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities documented in this report include 2009 vegetation surveys (August 14, 15 and 16), photo-documentation (March 17, 2010), and 2010 wetland hydrology observations (February 17, March 3, and March 17).

What is the SR 18 Jenkins Creek mitigation site?

This site was developed to compensate for 0.81 acre of palustrine forested and emergent wetland impacts resulting from capacity and safety improvements to SR 18 near Covington. The site contains a portion of Jenkins Creek and its confluence with an unnamed tributary. Improvements at the mitigation site include new spans over Jenkins Creek, allowing increased water flow to pass without increasing velocity. In addition, WSDOT replaced an undersized metal culvert that conveyed the unnamed tributary under SR 18 with a larger arch structure. Ecological connectivity was enhanced by replacing a 25-foot long bridge with a 256-foot long bridge that spans the main channel of Jenkins Creek, creating a below-grade travel corridor for wildlife. To enhance Jenkins Creek and its unnamed tributary native woody species were planted along the riparian corridor and large woody debris was placed in the creek and tributary. The site is intended to provide wetland establishment and restoration adjacent to enhanced wetlands. Intended functions include increased biofiltration, fish and wildlife habitat, food chain support, temperature moderation, floodwater storage, contaminant retention, nutrient removal, and organic material export.

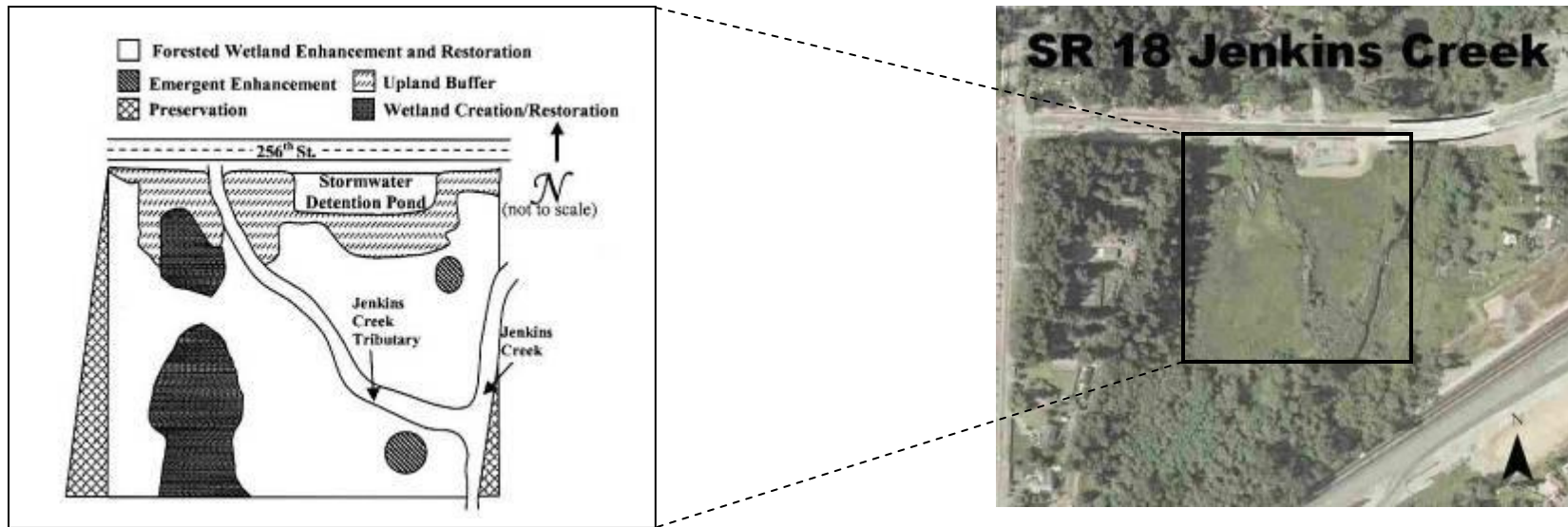


Figure 1 Site Sketch

The site is a combination of enhanced, created, and restored emergent and forested wetlands. An upland buffer exists along the north end of the site.

What are the performance criteria for this site?

Permit Requirement 1

Creation and restoration areas must be saturated to the surface. Saturation must be to the surface for at least 12.5 percent (30 consecutive days) of the growing season (March 1 through October 31). Saturation will be measured by observing soil saturation to the surface or by utilizing water wells.

Performance Standard 1

Creation and restoration areas must demonstrate a total of 1.48 acres or more that support wetland hydrology.

Performance Standard 2

All King County-listed Class A, B-designate, and County-selected priority noxious weed species will be controlled in the season they are first identified on the mitigation site.

Performance Standard 3

The enhancement and restoration areas shall contain no more than 25 percent areal (*sic*) cover by reed canarygrass at any point during the lifetime of the monitoring period.

Performance Standard 4

The emergent wetland mitigation areas will be comprised of a planted and native naturally colonizing plant community with 75% or more areal cover involving at least three non-invasive herbaceous plant species adapted for life in saturated soil conditions (facultative-wet or wetter).

Performance Standard 5

Forested wetland mitigation areas will be comprised of a planted and native naturally colonizing plant community with 25% or more areal cover involving at least three species of woody plant species adapted for life in saturated soil conditions (facultative or wetter).

Performance Standard 6

The buffer will be comprised of a planted and native naturally colonizing plant community with 25% or more areal cover involving at least three woody plant species.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 3 shows the planting plan (Krueger 2000).

How were the performance criteria evaluated?

WSDOT staff collected hydrology data using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997). Two permanent hydrology pit locations were established in Year-1 of monitoring and recorded on a map. Five shallow ground monitoring wells were installed in 2008 and focus in the creation/restoration areas of the site. During each monitoring visit, visual observations are made to determine the extent of inundation and surface saturation. Depth and location of standing water is recorded. At each pit location, in the absence of inundation or surface saturation, subsurface observations were made (Permit Requirement 1 and Performance Standard 1).

To evaluate standards for vegetative cover two separate baselines were established (Figure 2). A baseline was placed parallel to 256th Street to evaluate invasive and woody cover. The second baseline was placed through the emergent mitigation area in the southeast corner of the site. Sixteen sampling transects were randomly placed perpendicular to the 256th Street baseline and nineteen transects were placed in the emergent mitigation area. The line intercept method was used to estimate woody cover in the wetland and the buffer (Performance Standard 5 and 6). The point intercept method was used to estimate cover of reed canarygrass and noxious weeds, as well as native herbaceous plants in the emergent mitigation areas (Performance Standards 2, 3, and 4).

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 below was used to perform this analysis. 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).

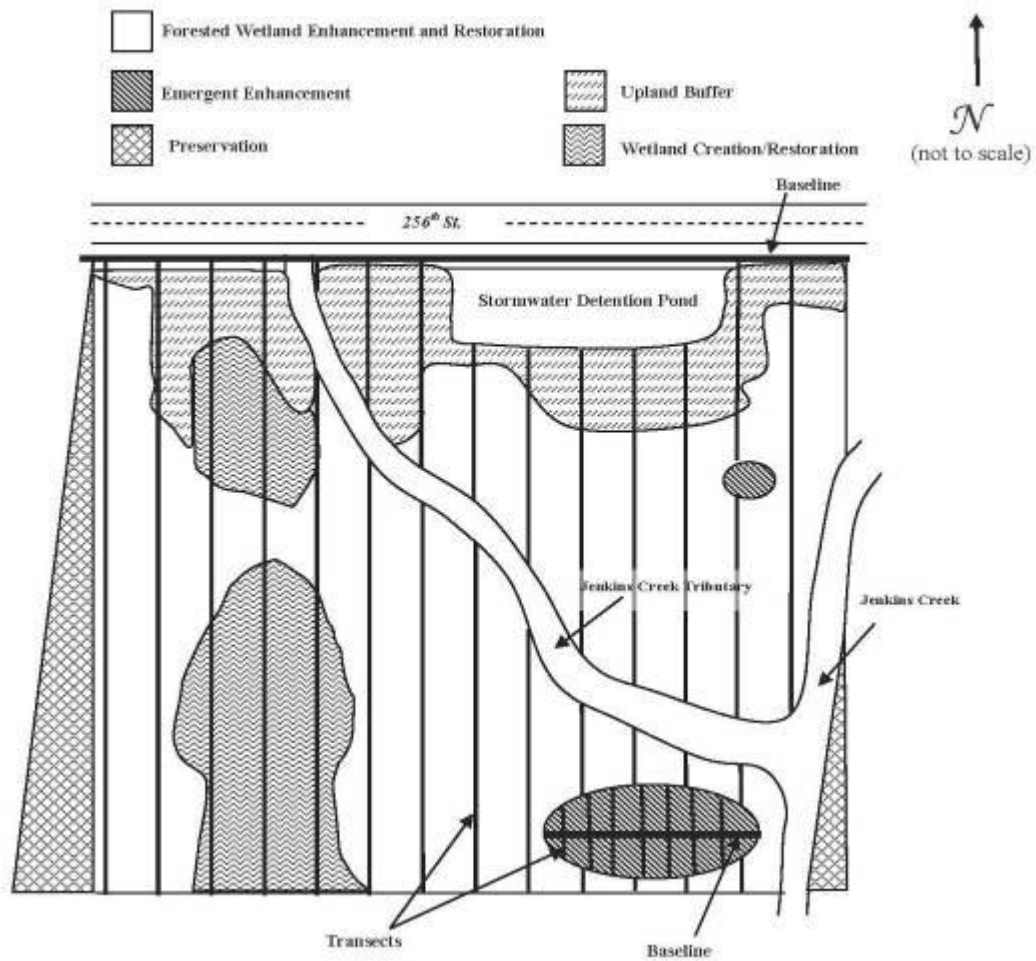


Figure 2 Site Sampling Design (2009)

How is the site developing?

The site is beginning to provide many of the intended wetland functions. A native woody and herbaceous plant community is established on site providing forage and refuge for wildlife. Willows (*Salix spp.*) and black cottonwood (*Populus balsamifera ssp. trichocarpa*) provide dense cover over the tributary, shading and moderating stream temperature, contributing organic matter, and improving fish habitat. Small birds and rodents have been observed using the habitat structures placed on site. The gentle sloping topography combined with dense herbaceous vegetation provides opportunity for flood flow attenuation and water quality improvement. Despite previous years' problematic hydrology data, a spring 2010 delineation indicates that the site has nearly developed the wetland acreage as intended.

Results for Permit Requirement 1

(Wetland areas must be saturated to the surface for at least 12.5 % of the growing season):

Data collected in 2010 suggest that wetland hydrology is present in the upper 12" of the soil in almost all of the intended areas of the site. However, observations made in the created and restored wetland areas indicate surface hydrology was present in approximately one half of the intended area. Appendix 2 contains the 2010 surface and subsurface hydrology observations by pit and ground monitoring well location.

Results for Performance Standard 1

(Wetland must demonstrate a total of 1.48 acres or more that support wetland hydrology):

A delineation conducted on April 2010 determined wetlands are present in approximately 1.41 acres of the intended creation and restoration areas (Appendix 2, Figure 4). The northwest area of the site (Photo 1) is typically inundated with up to six inches of standing water during the early growing season. A small polygon located in the southern portion of the created and restored area did not delineate out as wetland and was subtracted from the total.



Photo 1

Hydrology in the created and restored forested wetland (March 2009)

Results for Performance Standard 2

(Control all King County-listed Class A, B-designate, and County-selected priority noxious weed species):

King County-listed Class, B-designate species were not observed during monitoring activities. Ongoing weed control efforts have targeted all King County-listed noxious weed species the season they are first identified on the mitigation site. Weed control was conducted in October 2009.

Results for Performance Standard 3

(Less than 25% cover by reed canarygrass in the enhancement and restoration areas):

There is 2% ($CI_{80\%} = 1-2\%$) aerial cover of reed canarygrass in the enhancement and restoration areas. Weed control in the enhanced forested wetland appears to be effective. This species is mostly limited to areas adjacent to Jenkins Creek, the tributary to Jenkins Creek, and the enhanced emergent wetland. Native wetland species in the emergent wetland appear to be competing with reed canarygrass. Weed control in this area may help the native plant community become better established.

Additional Information:

Weed control efforts have been effective in controlling some species that may impede site development. *Vicia* species (vetches) and *Galium* species (bedstraws) cover many planted woody species in the buffer and in some areas in the forested wetland, appearing to limit growth of planted woody species. Removal of these climbing species is recommended for continued success of vegetation and achievement of future performance standards.

Results for Performance Standard 4

(75% cover by at least three non-invasive native herbaceous facultative-wet and wetter species in the emergent wetland):

The emergent wetland mitigation areas are comprised of a planted and native naturally colonizing plant community with an aerial cover of 92% ($CI_{99\%}=87-98\%$). The cover is comprised of thirteen non-invasive herbaceous plant species adapted to for life in saturated soils. The three dominant species are ovate spikerush (*Eleocharis ovata*), western touch-me-not (*Impatiens noli-tangere*), and marsh seedbox (*Ludwigia palustris*). It should be noted that the emergent area sampled in 2009 is less than half of the area sampled in 2007, due to the encroachment of volunteer black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and red alder (*Alnus rubra*).

Results for Performance Standard 5

(25% cover by at least three non-invasive native woody facultative and wetter species in the forested wetland):

The aerial cover in the forested wetland mitigation areas is 81% ($CI_{95\%}=73-87$). The cover is comprised of eight facultative and wetter species. The three dominant species are redosier dogwood (*Cornus sericea*), black cottonwood (*Populus balsamifera ssp. trichocarpa*), and Sitka spruce (*Picea sitchensis*). This greatly exceeds the Year-7 performance measure.

Results for Performance Standard 6

(25% cover by at least three non-invasive native woody species in the buffer):

The aerial cover of non-invasive native woody species in the buffer is 85% ($CI_{80\%}=78-94\%$). The aerial cover is provided by 12 planted or naturally colonizing woody species. The dominant species are comprised of Douglas-fir (*Pseudotsuga menziesii*), tall oregongrape (*Mahonia aquifolium*), snowberry (*Symphoricarpos albus*). This also greatly exceeds the Year-7 performance measure.

Appendix 1a – Goals and Performance Standards

The following excerpt is from the *SR 18 180th Avenue SE to Maple Valley Wetland Mitigation Plan* (Mass and Sullivan 2001). The performance criteria addressed this year are identified in **bold** font.

Mitigation Goals

The Jenkins Creek wetlands/floodplain complex provides important wetland and stream functions, and is a high quality system despite the surrounding levels of development. In the rapidly urbanizing Covington Sub-basin, the Jenkins Creek wetland system provides significant wildlife habitat, including habitat for migration/travel, escape, resting, forage, and reproduction. Jenkins Creek supports salmonid populations. Adjacent wetlands are integral to in-stream habitat, providing wintering habitat, water temperature moderation, inputs of detritus and woody debris, escape cover.

While the Jenkins Creek system currently provides significant wildlife and fish habitat, the overall quality and quantity of functioning could be improved using restoration and enhancement of degraded wetland and stream areas in that system. The proposed compensatory mitigation for this project is intended to replace wetland types and wetland functions that will be lost due to project construction. Proposed mitigation is anticipated to mitigate loss of the following functions:

- Fish and Wildlife Habitat: mitigation will increase available habitat for fish and wildlife, increase habitat and floodplain connectivity, and provide additional winter refugia for fish.
- Food chain support: mitigation will increase available wildlife forage material and detrital input to Jenkins Creek.
- Stream temperature moderation: mitigation will increase shade and canopy closure over the streams, while also enhancing potentials for recruiting large woody debris.
- Floodwater attenuation: mitigation will increase the floodplain area.
- Nutrient/contaminant trapping: mitigation will provide an increased area of vegetated floodplain having opportunity to intercept and transform road-runoff contaminants, fertilizers, herbicides, and other pollutants from residential and agricultural activities upstream.

Aside from wetland preservation, a combination of creation, restoration, and enhancement activities will be used to obtain these benefits. Overall, these activities will attempt to achieve 5.71 acres of palustrine forested wetland and 0.20 acre of emergent wetland as mitigation for the loss of 0.81 acre of palustrine forested and emergent wetland.

Objectives and Performance Standards

Objective 1: Wetland Areal Extent and Wetland Hydrology

The wetland mitigation actions involving creation and restoration must demonstrate a total of 1.48 acres or more that support wetland hydrology. Hydrology in zones of creation and restoration will be monitored in Monitoring Years One, Two, Three, Five, Seven, and Ten. Monitoring wells will be left in place to facilitate data analysis during plant establishment.

Performance Standards: Monitoring Years One through Five

PS1. Creation and restoration areas must demonstrate a total of 1.48 acres or more that support wetland hydrology (Table 3).

Monitoring/Delineation Schedule

A determination of areal extent will be during the hydrology monitoring period using standard wetland delineation methodology using these monitoring data. The boundary and areal extent of the area supporting wetlands hydrology will be determined using an instrument survey or other reliable methods of determining area.

Potential Contingency Actions

1. Regrade the site to achieve the required acreage supporting hydroperiods that meet the hydrology criterion for wetlands (Environmental Laboratory 1987). "Hydrology criterion" inundation or saturation within 12 inches of the surface for 12.5% of the growing season March 1 - October 31.

Objective 2: Vegetation

The mitigation program is intended to enhance 0.20 acre of emergent wetland (3 percent), enhance 4.23 acres of forested habitat (72 percent), and create and restore 1.48 acres of forested wetland (25 percent) (Table 3). Each of these habitats is expected to be dominated by native plant species. Wetland plant communities are expected to appear to be succeeding towards the intended forested and emergent communities.

Performance standards: Monitoring Year One (one year after planting)

PS2. At the end of the first growing season all planted material shall be alive and healthy (all dead material will be replaced). The enhancement and restoration areas shall contain no more than 25% areal cover by reed canarygrass at any point during the lifetime of the monitoring period.

Performance standards: Monitoring Year Two and Three

PS3. Three years after planting, emergent wetland mitigation areas will be comprised of a planted and native naturally colonizing plant community with 60% or more areal cover involving at least three non-invasive herbaceous plant species adapted for life in saturated soil conditions (facultative-wet or wetter). Forested wetland mitigation areas will be comprised of a plant and native naturally colonizing plant community with 15% or more areal cover involving at least three species of woody plant species adapted for life in saturated soil conditions (facultative or wetter).

PS4. Three years after planting, upland buffer zones will be comprised of a planted and native naturally colonizing plant community with 15% or more areal cover involving at least three woody plant species.

PS5. All King County-listed Class A, B-designate, and County-selected priority noxious weed species will be controlled in the season they are first identified in the season they are first identified on the mitigation site. Reed canarygrass (a King County Weed of Concern) is expected to be present during the life of this mitigation effort due to the abundant and adjacent source of propagules, as well as the presence of reed canarygrass on the mitigation site. **The enhancement and restoration areas shall contain no more than 25% areal cover by reed canarygrass at any point during the lifetime of the monitoring period.**

Performance Standards: Monitoring Year Five, Seven, and Ten

PS6. Five years after planting, emergent wetland mitigation areas will be comprised of a planted and native naturally colonizing plant community with 75% or more areal cover involving at least three non-invasive herbaceous plant species adapted for life in saturated soil conditions (facultative-wet or wetter). Forested wetland mitigation areas will be comprised of a planted and native naturally colonizing plant community with 25% or more areal cover involving at least three species of woody plant species adapted for life in saturated soil conditions (facultative or wetter).

PS7. Five years after planting, the buffer will be comprised of a planted and native naturally colonizing plant community with 25% or more areal cover involving at least three woody plant species.

Monitoring Schedule

Once during the middle part of the growing season in Monitoring Years One, Two, Three, Five, Seven, and Ten.

Potential Contingency Actions

1. Before the beginning of Monitoring Year One, all dead or unhealthy plants will be replaced. Thus, monitoring 100% survival in Monitoring Year One, (Performance Standard PS3) will be verifying this.
2. If the site does not meet performance standards PS4 and PS5 (Monitoring Year Three), additional planting will be conducted. Live, containerized plant material will be replanted and monitored to assure that coverage meets performance standards S6 and S7 (Monitoring Year Five).
3. If the site does not meet performance standards PS6 (vegetation not succeeding in directions that displace or weaken reed canarygrass), and PS7 and PS8 (Monitoring Year Five), resource agencies will be consulted for advice on further measures to remedy problems at the site. The monitoring schedule will be extended and such reasonable measures will be conducted as necessary to establish appropriate wetland vegetation. WSDOT will perform all reasonable measures considered necessary to establish and maintain a functioning wetlands/buffer system that meets the goals objectives of this monitoring plan.
4. The mitigation plan uses and promotes the growth of native vegetation. King County Class A, B-designate, and County-selected priority noxious weed species will be controlled in the season they are first identified on the site. -In the event that reed canarygrass in the enhancement and restoration areas exceeds 25% areal cover at any point during the monitoring period, a range of techniques will be employed to bring the area into compliance. These techniques include hand pulling and off-site disposal, hand spraying or wiping with Rodeo, flaming, trampling (crushing), and/or mowing.

Objective 3: Wildlife Habitat

Wildlife cover and forage availability for birds and small mammals should increase substantially. Addition of native plants, logs with rootwads, logs, log rolls, brush piles, and herpetofaunal hiberacula will increase habitat diversity and structure in newly revegetated areas. Generally, the creation, restoration, enhancement, and preservation of forested and emergent wetlands habitats are intended to provide feeding, breeding, and resting habitat for birds, small mammals,

amphibians, and reptiles. Such activity will also benefit fish in Jenkins Creek and its tributary by reducing water temperatures and contributing detrital and woody debris.

Performance Standards: Monitoring Year One (one year after planting)

PS8. All habitat structures identified on the plans have been placed on the site.

Performance Standards: Monitoring Year Two and Three

PS9. Habitat structures identified in the plans are still in place and functional.

Performance Standards: Monitoring Year Five, Seven, and Ten

None.

Monitoring Schedule

Once during Monitoring Years One, Two, and Three.

Potential Contingency Actions

1. Install or replace habitat structures that are missing, damaged, lost, non-functional

MONITORING PLAN

WSDOT's Wetland Mitigation Monitoring Program (Monitoring Program) uses objective-based monitoring to document success and change in WSDOT's wetland mitigation sites. Monitoring protocols are based on specific objectives written in each project's wetland mitigation plan, combined with evaluation of current site conditions. A customized monitoring program is developed for each site. The monitoring Program uses a variety of ecological monitoring techniques and protocols, including those outlined in Horner and Raedeke (1989) and WSDOT (2000b). Many standard techniques such as permanent transect lines, plots, and photo points are still used however the number and placement of those depend on specific objectives. Locations of photo points and

transects, if used, are not selected until the first year of monitoring. Statistical precision and accuracy are used to determine the number and configuration of transect and sample plots.

The Monitoring Program will begin monitoring hydroperiod in the wetland creation portion of the site immediately after completion of the grading plan, but prior to construction of the planting plan. During this period, hydrology will be monitored at least twice monthly using shallow groundwater wells or other means of observing soil saturation/inundation. After the planting plan has been constructed, Monitoring Year One will commence at the start of the subsequent year. Beginning with the first growing season after construction of the planting plan, the Monitoring Program will monitor the mitigation site for at least ten years. Parameters to be monitored during this ten-year period include hydroperiod and vegetation, as described above.

Reports for the ten-year monitoring period (including a report for each of Monitoring Years One, Two, Three, Five, Seven, and Ten) will be issued to the Corps of Engineers Seattle District Regulatory Branch, Washington State Department of Ecology, King County Department and Environmental Services, and other appropriate resource agencies for review and comment. Successful mitigation will be measured by attainment of the performance standards described in this mitigation effort meets the stated performance standards earlier than anticipated.

CONTINGENCY ACTIONS

WSDOT anticipates the mitigation goal will be achieved by accurately completing the grading and planting plans. However, contingency actions, as described above, may be needed to correct unforeseen problems. Such actions may consist of regarding the site in the case of insufficient hydroperiod, or replanting the site in the case of planting failure. However, natural recruitment of native wetland species and upland species (in the buffer) will be counted toward achieving performance standards for Vegetation. Should areal coverage of wetland or buffer plants consistently fall short of desired performance standards, WSDOT will consult with appropriate agencies in determining what additional measures could be implemented to ensure establishment of viable wetland and upland plant communities.

OPERATION AND MAINTENANCE

As described above, the goal of the proposed mitigation is to create a functional self-sustaining system that requires little or no maintenance. WSDOT will retain ownership of the site in perpetuity. Maintenance will be conducted on an as-needed basis by WSDOT personnel or designates and is anticipated to focus on maintaining access, repairing vandalism or fencing, correcting erosion or sedimentation problems, collecting trash, and managing King County Class A, B-designate, and County-selected priority noxious weed species.

Appendix 1B – SR 18 Jenkins Creek USACE Regulatory Branch

The following excerpt is from the *SR 18: 180th Ave SE to Maple Valley, Washington, Updated Wetland Mitigation Plan Addendum* (Brown 2002).

From USACE Regulatory Branch Letter (2002, p.2) (Permit 1999-4-00171)

The performance standard for wetland hydrology listed below supercedes the performance standard described in the “Final Wetland Mitigation Plan, SR 18: 180th Avenue SE to Maple Valley, Washington (MP 12.57 to MP 16.55) by Clayton J. Antieau, wetland Biologist and Paul. W. Krueger, Landscape Designer, and amended by John Maas and Terry Sullivan, WSDOT, Northwest Region” dated January 2001 and “SR 18: 180th Avenue SE to Maple Valley, Washington, Updated Wetland Mitigation Plan Addendum” dated August 15, 2002.

Performance Standard 1: Creation and restoration areas must be saturated to the surface. Saturation must be to the surface for at least 12.5 percent (30 consecutive days) of the growing season (March 1 through October 31). Saturation will be measured by observing soil saturation to the surface or by utilizing water wells.

In sandy soils, water must be standing in the well at 6 inches or less for at least 12.5 percent of the growing season. **In non-sandy soils, water must be standing in the well at 12 inches or less for at least 12.5 percent of the growing season.**

Appendix 1C – SR 18 Jenkins Cr. Ecology Permit 1999-4-00171

From Ecology Water Quality and Certification Permit 1999-4-00171

The Applicant shall prepare and submit annual monitoring reports to Ecology’s Sarah Suggs and Sandra Manning, P.O. Box 47600, Olympia, WA 98504-7600 no later than December 30th of each year following the first year of project completion. **Each year’s monitoring report shall include photographic documentation of the project taken from permanent reference points (Appendix 4).**

Appendix 2 – Hydrology Data Table, Spring 2010

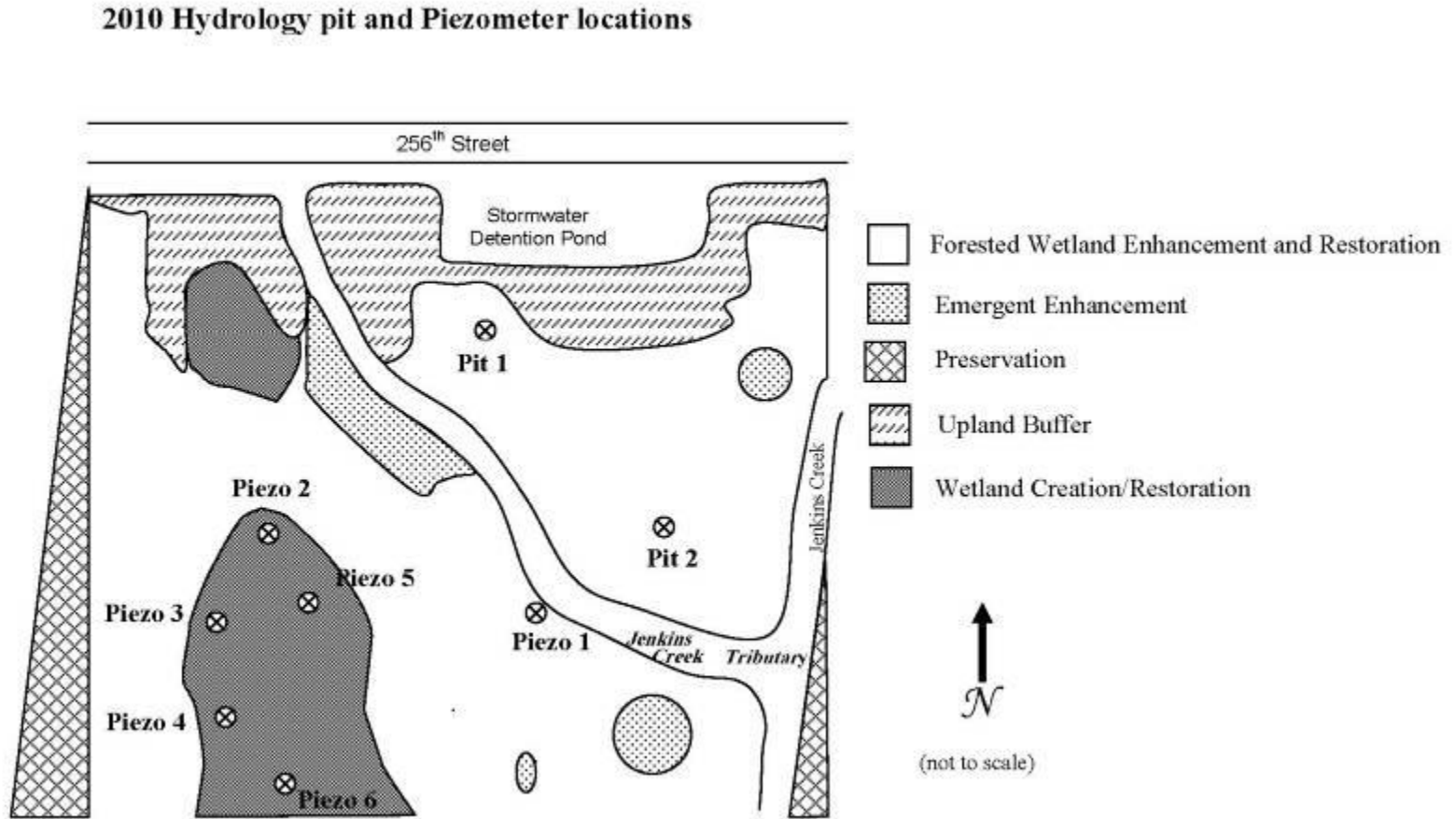
Table 1.

Hydrology Observations For SR SR 18 Jenkins Creek			
Date	2/17/2010	3/3/2010	3/17/2010
Observer	TM, DL, KA, DS, SP, TB	TM, KA	DL/KA
Was wetland hydrology observed in intended areas	Yes	Partial	No
Surface observation	Emergent area inundated to 7", surface flow associated with trib. To Jenkins creek. Standard was met because all creation and restoration areas showed sufficient hydrology. Pit 1 did not have sufficient hydrology, but it is not located in a "creation or restoration" area. -as per the standard	Hydrology was observed in approximately 40% of the site. A large amount of overland flow was observed near the creek at the center of the site. Only piezo 609 lacked standing water within 12"	Surface hydrology present over approx 25 % of site.
Subsurface Observations			
Pit 1	standing water at 14" and saturation at 13.5" after 1 hour 15 min.	none (not creation or restoration per standard)	standing water at 19", saturation at 17" after 50 minutes
Pit 2	standing water at 9" and saturation at 7" after 1 hour 20 min.	standing water at 5.5" initially	standing water at 14", saturation at 10" after 43 minutes
PZ 1	1"	2"	2.5"
PZ 2	1"	11.5"	11"
PZ 3	0.5"	2"	2"
PZ 4	7.5"	9"	4.5"
PZ 5	1"	1"	25"
PZ 6	12"	13"	9"
water marks			
drift lines	yes		

sediment deposits			
water-stained leaves		yes	yes
algal mats	yes	yes	
Wildlife observations (include activity observed)	SOSP singing, AMRO feeding, Snipe flushed	AMRO, RWBB,RBSA, WIWR,SNIP	AMRO, SPTO
Notes	Soil temp is 46(F) at 12 inches.		
Growing Season	PHCA, MAAQ, SALI, LOIN	SEE PREVIOUS VISIT	SEE PREVIOUS VISIT

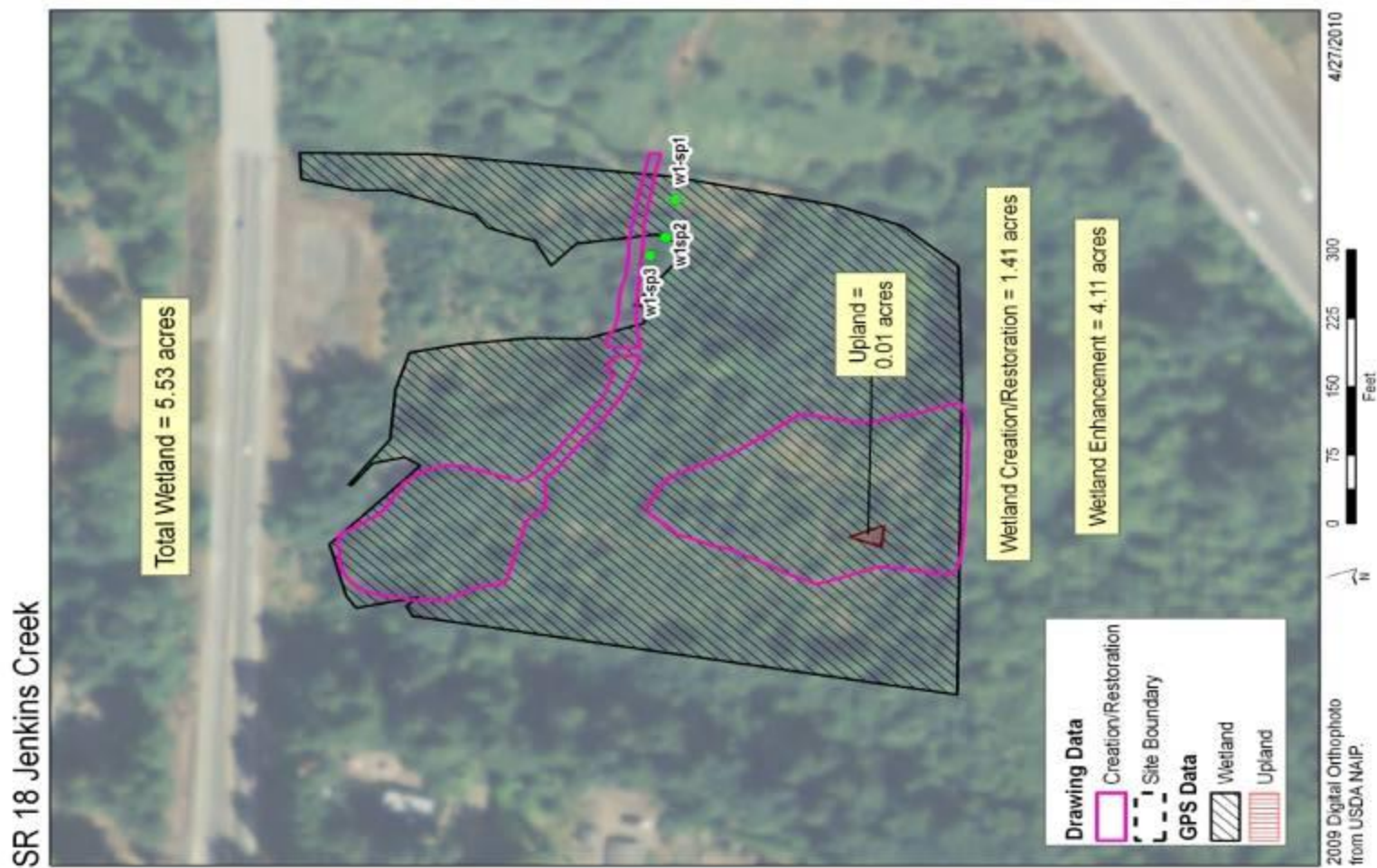
SR 18 Jenkins Creek Hydrology Pit Locations (Spring 2010)

Figure 3.



2010 Delineation Map

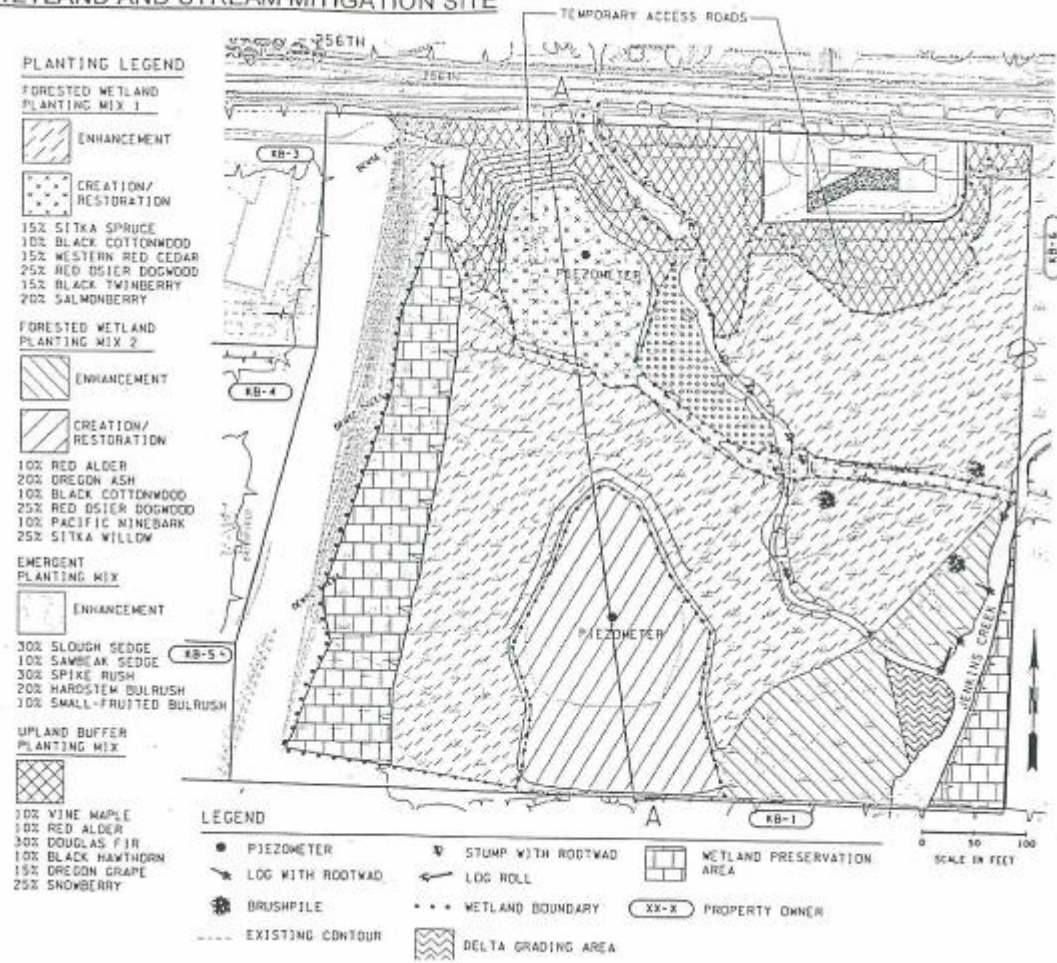
Figure 4.



Appendix 3 – Planting Plan

(from Krueger 2000)

WETLAND AND STREAM MITIGATION SITE



Appendix 4 Photo Point Locations

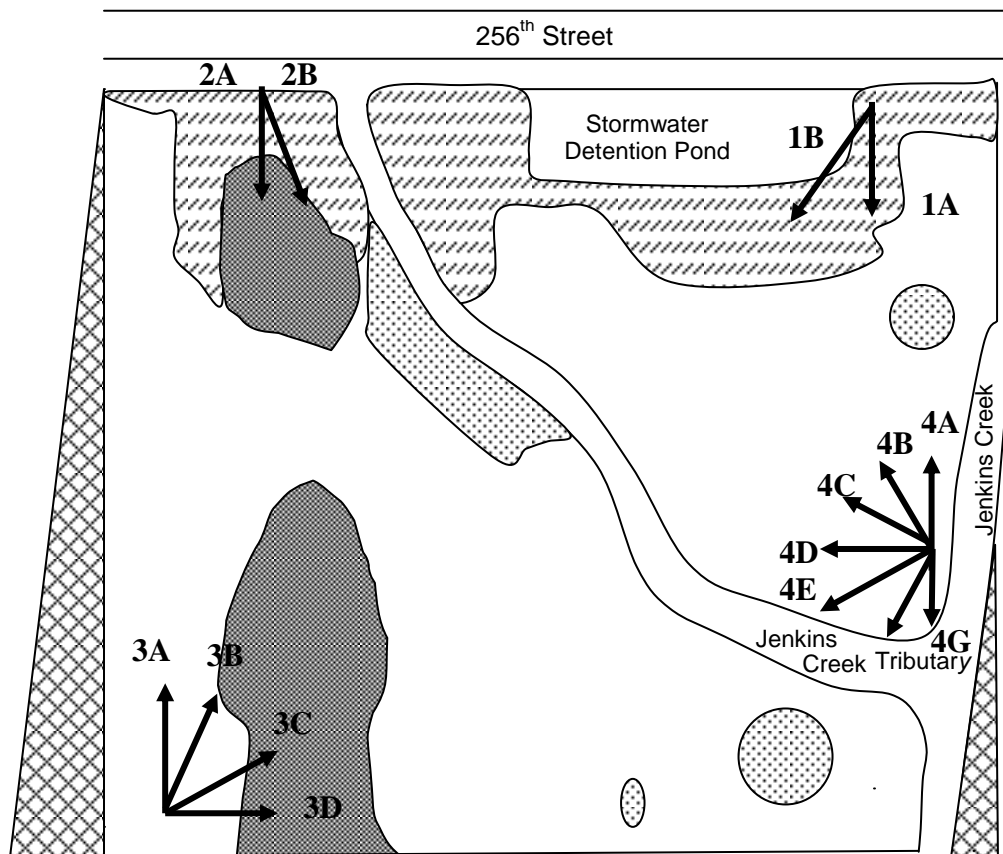
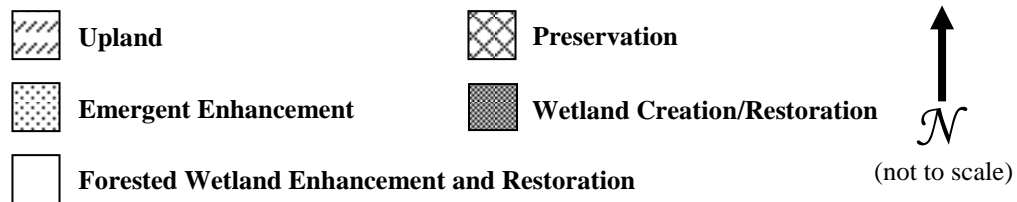


Photo Points

The photographs below were taken from permanent photo-points on March 17th, 2010 and document current site development.



Photo Point 1a



Photo Point 1b



Photo Point 2a



Photo Point 2b



Photo Point 3a



Photo Point 3b



Photo Point 3c



Photo Point 3d



Photo Point 4a



Photo Point 4b



Photo Point 4c



Photo Point 4d



Photo Point 4e



Photo Point 4f



Photo Point 4g

Literature Cited

1. Antieau, C. J. and Krueger, P. W. 2001. Final Wetland Mitigation Plan SR 18: Ave SE to Maple Valley, Washington (MP 12.57 to MP 16.55). Washington State Department of Transportation, Northwest Region, Seattle, WA.
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6. 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>