

SR 539 Potter Road Mitigation Site

SR 542: CED East Church Mountain Road Roadway Realignment and Culvert Replacement (MP 38.67 to MP 39.04) WIN# A54230G, **SR 539: Tenmile Road to Badger Road (SR 546) Widening (MP 5.90 to MP 12.62) WIN #A53910D** & SR 539 Widening Project: Horton to Tenmile Road (MP 1.64 to MP 6.26) WIN #A53902D

USACE NWS-2009-786
USACE NWS-2007-470-SOD
USACE 200500927

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

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Environmental Services Office

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SR 542: CED East Church Mountain Road Roadway Realignment and Culvert Replacement (MP 38.67 to MP 39.04),
SR 539: Tenmile Road to Badger Road (SR 546) Widening (MP 5.90 to MP 12.62) & SR 539 Widening Project:
 Horton to Tenmile Road (MP 1.64 to MP 6.26)

USACE NWS-2009-786 USACE NWS-2007-470-SOD USACE 200500927

	General Site Information		
	USACE NWS	2009-786	
	USACE NWS	2007-470-SOD	
	USACE	200500927	
	Mitigation Location	West of Van Zandt, off of Potter Road, Whatcom County	
	LLID Number	1222054487876	
	Construction Date	2008-2009	
	Monitoring Period	2010-2019	
	Year of Monitoring	1 of 10	
	Area of Project Impact ¹	Wetland	Buffer
7.67		6.11	
Type of Mitigation	Wetland Establishment	Wetland Enhancement	Buffer Enhancement
Area of Mitigation	10.4 acres	6.53 acres	9.24

¹Additional mitigation provided at SR 539 Larson Road, SR 539 Strand Road, and SR 539 Wisner Lake Mitigation Sites. See Appendix 4.

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results	Management Activities
100% survival of native planted woody species in the wetland	90% survival	Replanting occurred in Jan. and Feb. of 2011.
100% survival of native planted woody species in the buffer	95% survival	Woody planting replacement
No more than 20 percent cover by non-native invasive species across the entire mitigation site	7% cover	Manual weed control and herbicide application occurred in, July, Aug., Sept., and Oct. of 2010 and Jan., Feb. of 2011.

Report Introduction

This report summarizes Year-1 monitoring activities at the State Route (SR) 539 Potter Road 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. Evaluations of vegetative performance and photo documentation occurred on July 19th -21st.

What is the SR 539 Potter Road Mitigation Site?

This 26.17-acre newly established mitigation site (Figure 1) is located west of the SR 9, and the town of Van Zandt. This site was established to compensate for the loss of 7.67 acres of wetlands due to road widening along SR 539 and roadway realignment and culvert replacement on SR 542. The site will substantially increase the area for water quality, hydrologic, and habitat function. The site will be graded to detain surface water flows from the adjacent upland areas and provide storage for high winter flood events from the South Fork Nooksack River. Dense woody vegetation consisting of shrubs and trees will function to slow high flood flows during winter flood events. Underlying herbaceous vegetation will also function to slow flows and facilitate sediment, nutrient, and toxicant removal. High diversity of plant species combined with stratification and the availability of multiple aquatic regimes (i.e., high native plant richness) will provide general suitability for habitat for a variety of birds and mammals.



Figure 1 Site Sketch

The SR 539 Potter Road Mitigation Site consists of a scrub-shrub and forested wetland and upland buffer. The site is bisected by Olson's Slough, which drains to the South Fork of the Nooksack River.

What are the performance standards for this site?

Performance Standard 1

(Wetland) Planted woody species (trees and shrubs) will have 100 percent survival at the end of the of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Standard 2

(Upland Buffer) The vegetation will achieve 100 percent survival of planted woody species at the end of the of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Standard 3

No more than 20 percent cover by non-native invasive species across the **entire mitigation site**. Japanese knotweed and purple loosestrife shall not be tolerated on the mitigation site. The presence of Japanese knotweed English ivy, purple loosestrife, and Eurasian water milfoil will initiate the invasive species contingency measures.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 2 shows the planting plan (Fredericks 2009).

How were the performance standards evaluated?

To evaluate standards for vegetative cover, a 735-meter two segmented baseline was established on either side of Olson’s Slough (Figure 2). Thirty sampling transects were randomly placed perpendicular to the baseline. Survival of woody species in the wetland and buffer (Performance Standards 1 and 2) was determined using the unequal-area belt transect method. Twenty-nine two-meter wide belt transects were positioned along the length of each sampling transect. Survival was calculated as a proportion of live plantings observed to total plantings observed (alive and dead).

Cover of non-native species across the site (Performance Standard 3) was visually estimated.

Photographs were taken at established photo point locations to evaluate tree and shrub growth across the site (Appendix 3).

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

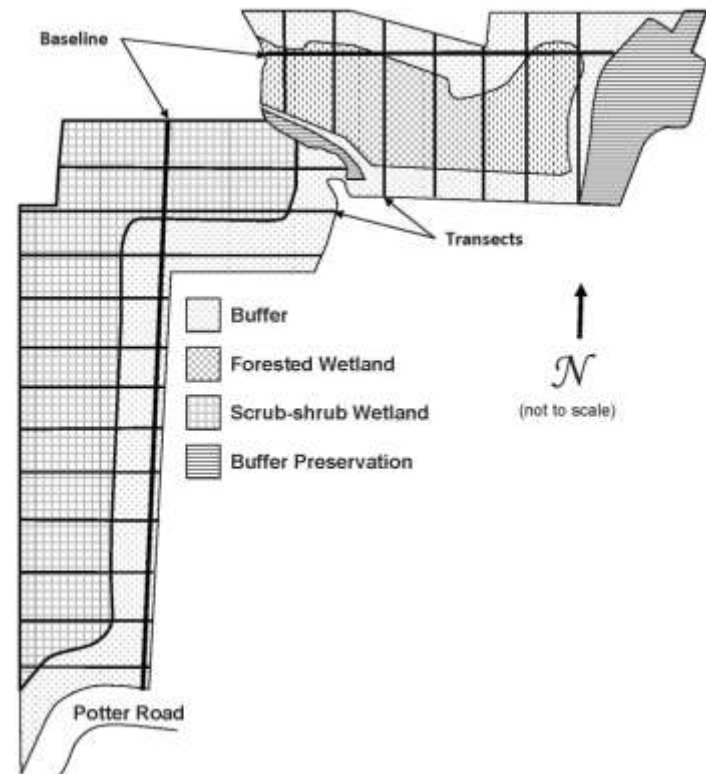


Figure 2 Site Sampling Design (2010)

How is the site developing?

This mitigation site is starting to develop. Woody plantings in the wetland and the buffer have a high survival rate and the wetland has a low cover of invasive species. The site appears to have adequate hydrology, and a diverse plant community is beginning to grow in the established wetland. It appears the grass throughout the site, especially in the buffers is stressing the desirable planted woody species. Active management of the grass occurred in the summer 2010 and is planned in 2011 to give the woody species a chance to better establish.

Wildlife habitat and food chain support are both functions that are provided on this site. Twenty-three species of birds were observed during the three day monitoring event. A family of Virginia Rails (*Rallus limicola*), a wetland-dependent species, was observed on site. Deer, a long-tailed weasel (*Mustela frenata*), and beaver herbivory were observed as well.

Results for Performance Standard 1

(100% survival of planted woody species in the wetland):

Survival of planted woody species in the wetland is 90 percent. Replanting occurred in January and February of 2011 achieving the performance standard (Photo 1). Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) stakes in the southern unit display a high rate of mortality and appear to be struggling. Garden vetch (*Vicia sativa*) is engulfing a number of the plantings and may pose a threat to woody species establishment. It was also noted that within the northern unit Sitka spruce (*Picea sitchensis*) and western red cedar (*Thuja plicata*) appeared stressed.



Photo 1
Woody cover in the wetland north of Olson's Slough (July 2010)

Results for Performance Standard 2

(100% survival of planted woody species in the buffer):

Survival of planted woody species in the buffer is 95 percent (Photo 2). If all dead woody plantings are replaced, the performance standard will be met. It should be noted that the plantings in the southern unit do not coincide with those listed on the planting plans. Pacific willow (*Salix lucida* ssp. *lasiandra*), one of the dominant species in the buffer, is not listed in the planting plans. Beaked hazelnut (*Corylus cornuta*) and red elderberry (*Sambucus racemosa*) appear to be completely absent from the buffer in the southern section. The planted woody species in the northern unit appear to be in direct competition with a dense herbaceous layer. Treatment and mulching around the plantings may reduce water and nutrient competition and benefit tree and shrub establishment. Limited numbers of western hemlock (*Tsuga heterophylla*) were observed and those that were present appear stressed.



Photo 2
Woody cover in the buffer south of Olson's Slough (July 2010)

Results for Performance Standard 3

(Non-native species not to exceed 20% cover):

The aerial cover by non-native invasive species across the entire mitigation site is qualitatively estimated at seven percent. This cover value meets the performance standard. The dominant species include reed canarygrass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus armeniacus*), and bull thistle (*Cirsium vulgare*). There is also a patch of Japanese knotweed (*Polygonum cuspidatum*) located in the understory of a remnant patch of red alder (*Alnus rubra*) within the buffer of the northern unit. As per the performance standard Japanese knotweed is not to be tolerated on site and its removal is required. The Japanese knotweed population was specifically targeted for elimination and will continue as needed.

What is planned for this site?

The Northwest Region Plant Establishment crew has visited the site on thirty-four separate occasions since monitoring was conducted over the summer. Extensive mowing and weeding has occurred around the woody plantings in an effort limit competition with the herbaceous layer. The Japanese knotweed population was specifically targeted for elimination and will continue as needed.

Infill live stake replanting occurred in January and February 2011 in the wetland area south of the channel. Mulching efforts are planned and have partially occurred in the buffers areas. Ongoing weed control is planned throughout the 2011 growing season. Additional replanting efforts are planned for fall of 2011.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *SR 504 Kid valley Road to Maple Flats Vicinity Detailed Wetland Mitigation Plan* (Scott 1998). The performance criteria addressed this year are identified in **bold** font.

Chapter 1. Wetland Mitigation Goals, Objectives, and Performance Criteria

The Potter Road Mitigation Site will be monitored for ten years to demonstrate that the intended goals and objectives are established. Goals describe the overall intent of mitigation efforts, and objectives describe individual components of the mitigation site in detail. Performance measures and performance standards describe specific on-site characteristics that indicate a function is being provided. Performance measures are used to guide management of the mitigation site. Performance standards are used to evaluate compliance with regulatory permits in the final year of monitoring. Contingency plans describe what actions can be taken to correct site deficiencies.

WSDOT uses the adaptive management process to improve mitigation success. Adaptive management involves learning from monitoring and implementing management activities, such as implementing parts of the site management or contingency plans. Information from monitoring is used to direct subsequent site management activities.

1.1 Goals

The proposed wetland mitigation is intended to replace wetland acreage and functions lost or impacted by the proposed project.

1.2 Objectives

1. The proposed mitigation on the Potter Road Mitigation Site intends to create 0.13 acres of wetland and enhance 0.26 acres of existing wetland with a 60 to 100-foot forested and shrub buffer for the project. The creation and enhancement areas will contain a scrub-shrub and forested vegetation community.
2. Improve hydrologic functions by increasing wetland area and flood storage capacity; extending wetland hydroperiod; increasing the connectivity of wetlands to Olson's Slough; and increasing cover of woody vegetation to slow flows.
3. Improve water quality functions by increasing wetland acreage; adding additional vegetation classes to facilitate sediment, nutrient, and toxicant removal; and increasing the connectivity of wetlands to Olson's Slough.
4. Improve habitat functions by increasing the area of vegetation strata; the number of water depth classes; canopy closure over the wetlands; the number of hydrologic regimes; the number of native plant species; the number of plant assemblages; vegetation class interspersions; improve buffer condition; increase the diversity of plant communities in areas currently dominated by reed canarygrass; and connect new wetland areas to Olson's Slough.
5. Improve floodplain and riparian function by establishing greater hydrologic connectivity to Olson's Slough and increasing woody cover directly adjacent to the creek.

1.3 Performance Criteria

The performance standards described below provide benchmarks for measuring achievement of the goals and objectives of the mitigation site. Mitigation activities are intended to meet these performance standards within a specified time frame. The performance standards are based on function characteristics described in Method for Assessing Wetland Functions (Hruby et al. 1999). These function-based performance standards measure structural attributes that provide a reasonable indication of wetland functions. Methods to monitor each performance standard are described in general terms.

Hydrologic Performance Criteria

The hydrologic performance measures/standards help to document and verify that wetland area and ground elevations are established according to the criteria specified during the design. These directly relate to Objectives 1 and 2.

Performance Measures

Years 1-9

The soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less, for a consecutive number of days greater than or equal to 10% of the growing season when rainfall meets or exceeds the 30-year average.

Year 10

The wetland areas will be delineated using current methods. The Potter Road Site will contain 0.13 acres of created wetland.

Performance Standard (final year of monitoring)

The wetland areas will be delineated using current methods. The Potter Road mitigation site will contain 0.13 acres of created wetland and 0.26 acre of enhanced wetland.

Wetland Vegetation Performance Criteria

The wetland vegetation performance criteria directly relate to Objectives 2, 3, 4 and 5.

Performance Measures

Year 1

Planted woody species (trees and shrubs) will have 100 percent survival at the end of the of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Year 3

The native woody species will maintain a minimum average density of four plants per 100 square feet in scrub-shrub and forested wetland communities. Native colonizing vegetation will be included in this coverage calculation.

Year 5

Native facultative or wetter woody species will achieve a minimum of 35 percent coverage in the forested and scrub-shrub wetland communities. Native colonizing vegetation will be included in these coverage calculations.

Year-7

Native facultative or wetter woody species will achieve a minimum of 50 percent coverage in the forested and scrub-shrub wetland communities. Native colonizing vegetation will be included in these coverage calculations.

Years 1-9

No more than 20 percent cover by non-native invasive species (Table 26) across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be tolerated on the mitigation site. The presence of Japanese knotweed, English ivy, purple loosestrife, and Eurasian water milfoil will initiate the invasive species contingency measures.

Performance Standards

Year 10

Native facultative or wetter woody species will achieve a minimum of 60 percent coverage in the forested and scrub-shrub wetland communities. Native colonizing vegetation will be included in these coverage calculations.

No more than 20 percent cover by non-native invasive species as listed in Table 26 across the entire mitigation sites. Japanese knotweed and purple loosestrife shall not be tolerated on the mitigation site. The presence of Japanese knotweed, English ivy, purple loosestrife, and Eurasian water milfoil will initiate the invasive species contingency measures.

Table 1. Non-native invasive species.

Scientific Name	Common Name
<i>Buddleia alternifolia</i>	Fountain butterfly bush
<i>Cirsium arvense</i>	Canadian thistle
<i>Cirsium vulgare</i>	Bull thistle
<i>Cytisus scoparius</i>	Scot's broom
<i>Hedera helix</i>	English ivy
<i>Ilex aquifolium</i>	English holly
<i>Iris pseudoacorus</i>	Yellow flag iris
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Phalaris arundinacea</i>	Reed canarygrass
<i>Prunus laurocerasus</i>	English laurel
<i>Rubus laciniatus</i>	Evergreen blackberry
<i>Rubus armeniacus (discolor)</i>	Himalaya or Armenian blackberry

Upland Buffer Vegetation Performance Criteria

The upland buffer woody vegetation performance criteria directly relate to Objectives 2, 3, 4 and 5.

Performance Measures

Year-1

The vegetation will achieve 100 percent survival of planted woody species at the end of the of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Year-3

The native woody species will maintain a minimum average density of four plants per 100 square feet in buffer communities.

Year-5

Native woody species will achieve a minimum of 30 percent coverage in the buffer community. Native colonizing vegetation will be included in this coverage calculation.

Year-7

Native woody species will achieve a minimum of 40 percent coverage in the buffer community. Native colonizing vegetation will be included in this coverage calculation.

Years 1-9

No more than 20 percent cover by non-native invasive species as listed in Table 26 in the buffer communities across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be tolerated on the mitigation site. The presence of Japanese knotweed or purple loosestrife will initiate the invasive species contingency measures.

Performance Standards

Year 10

Native woody species will achieve a minimum of 50 percent coverage in the buffer communities. Native colonizing vegetation will be included in this coverage calculation.

No more than 20 percent cover by non-native invasive species as listed in Table 26 in the buffer communities across the mitigation sites.

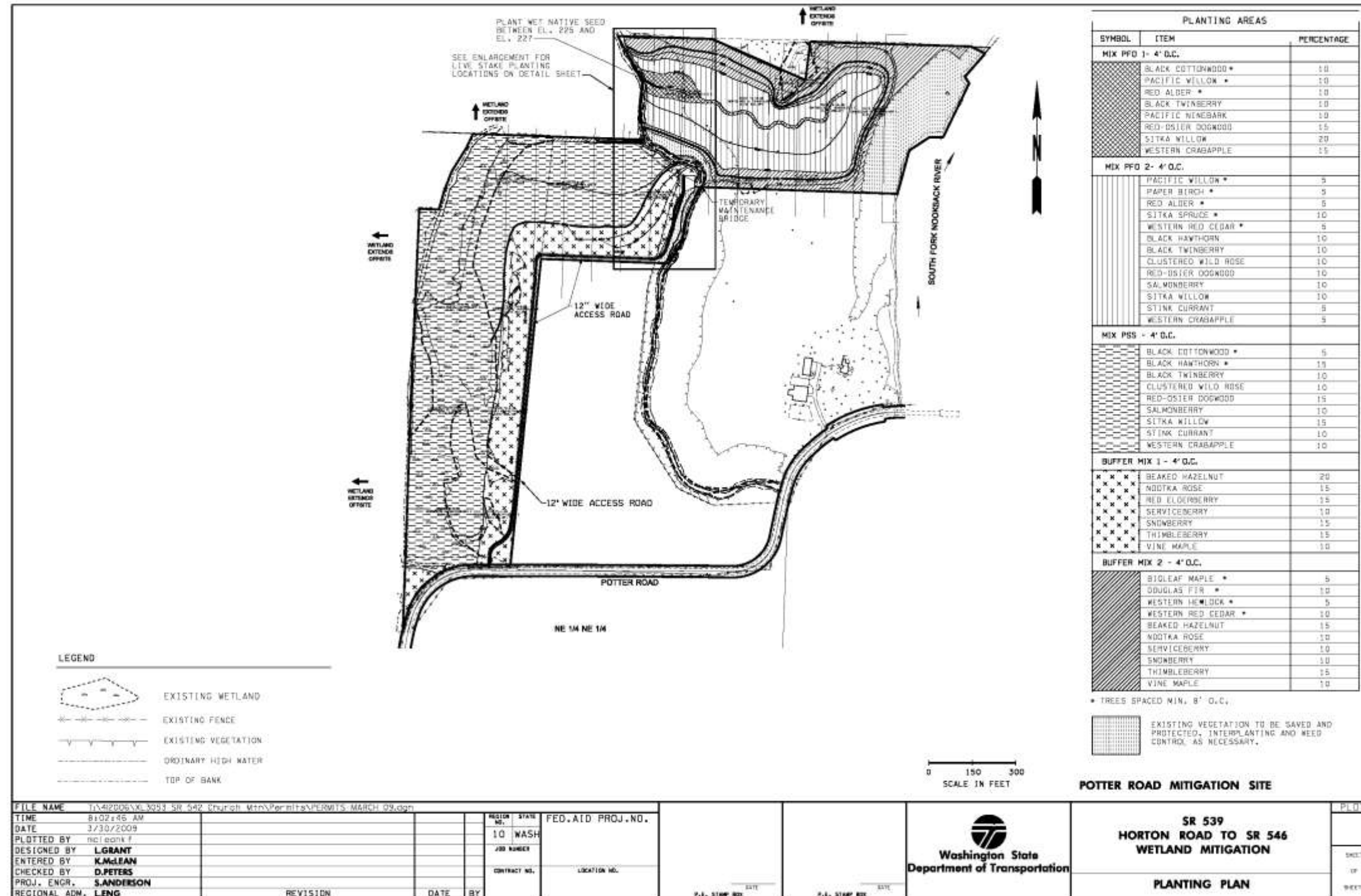
1.4 Monitoring

The wetland mitigation monitoring site will be monitored for a minimum of ten years. Formal monitoring procedures will be performed in years one, three, five, seven, and ten after initial acceptance of the mitigation construction. The site should be evaluated informally the summer following plant installation to evaluate survival rates and document the presence of non-native invasive species. Informal (qualitative) monitoring will occur in years two, four, six, eight, and nine. Monitoring reports will be submitted to the Corps of Engineers, Ecology, and Whatcom County for review and comment. Monitoring reports will be completed by April following the previous monitoring activities occurring in years one, three, five, seven, and ten. Mitigation success will be measured by the attainment of performance standards.

WSDOT has established a comprehensive set of monitoring methods that are based primarily on Elzinga *et al.* (1998). The actual methods used to monitor each site are documented in annual monitoring reports prepared by WSDOT's Wetland Assessment and Monitoring Program, which is based in the Environmental Services Office in Olympia, Washington. Some variation of the methods occurs as techniques are improved, or standards change.

Appendix 2 – Planting Plan

(from Frederickson 2009)



Appendix 3 – Photo Points

The photographs below were taken from permanent photo-points on July 20th, 2010 and document current site development.



Photo Point 1a



Photo Point 1b



Photo Point 1c



Photo Point 2a

The photographs below were taken from permanent photo-points on July 20th, 2010 and document current site development.



Photo Point 2b



Photo Point 2c



Photo Point 2d



Photo Point 2e

The photographs below were taken from permanent photo-points on July 20th, 2010 and document current site development.



Photo Point 2f



Photo Point 3a



Photo Point 3b



Photo Point 3c

The photographs below were taken from permanent photo-points on July 20th, 2010 and document current site development.



Photo Point 3d



Photo Point 3e



Photo Point 4a



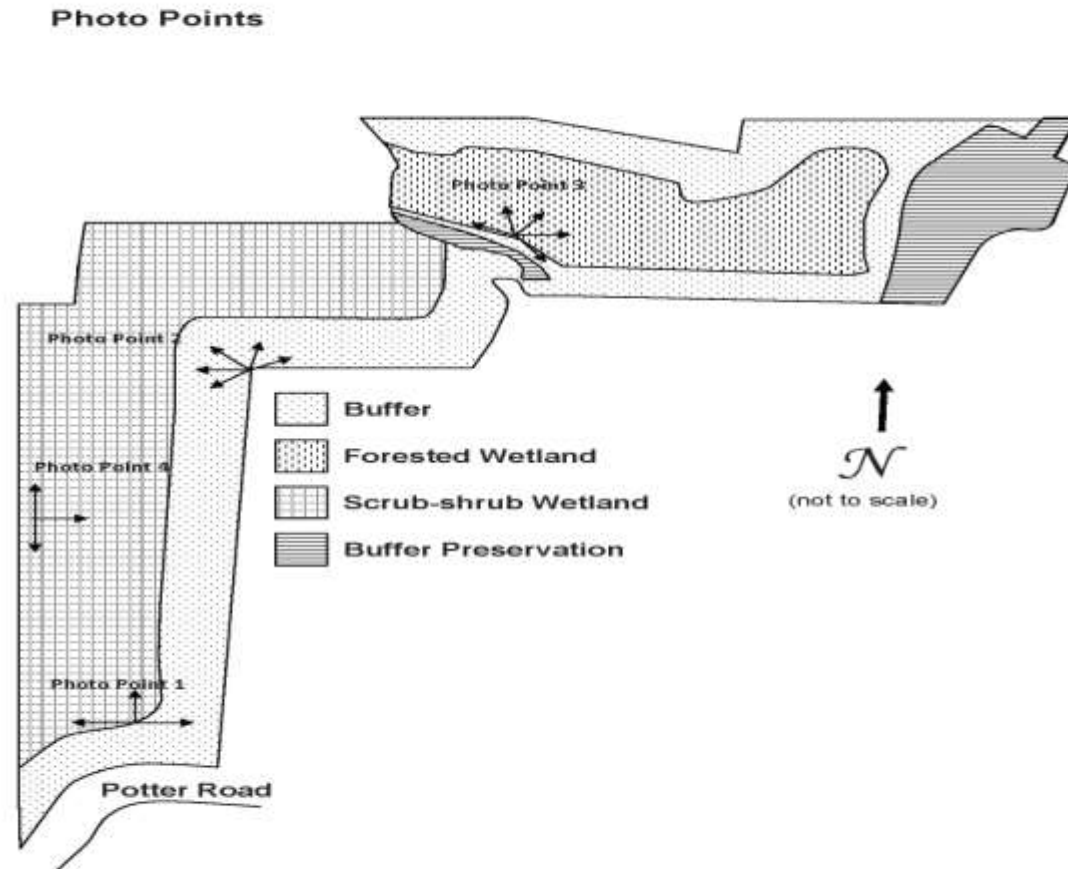
Photo Point 4b

The photograph below was taken from permanent photo-points on July 20th, 2010 and document current site development.



Photo Point 4c

Photo Points



Appendix 4

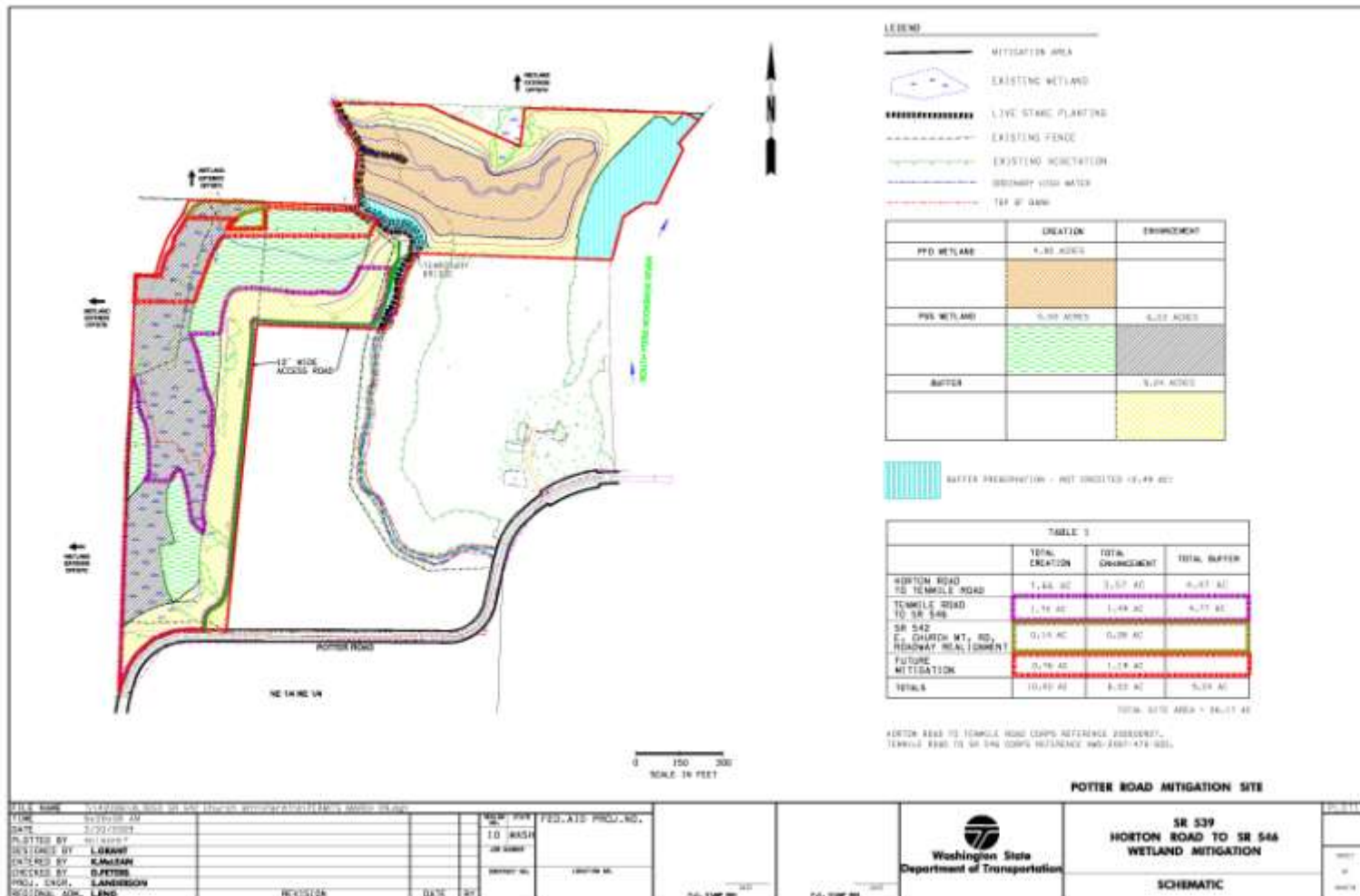
Impacts by Project

Project Name	USACE Permit Number	Permanent Wetland Impact	Permanent Wetland Buffer Impact	Permanent In-stream Impacts	Permanent Stream/Lake Buffer Impact	Permanent Stream/Lake Shading Impact	Permanent Open Water Impacts
SR 542 CED	NWS-2009-786	0.13	0.38			0.08	
SR 539 Horton to Tenmile	200500927	5.97	5.97	0.239	0.03		
SR 539 Ten Mile to Badger	NWS-2007-470-SOD	1.57	3.3	0.37	0.58	0.35	0.98
Totals (ac)		7.67	6.11	0.609	0.61	0.43	0.98

Mitigation Areas by Project

Mitigation Type	Potter Road Mitigation Site (ac)	Strand Road Mitigation Site (ac)	Wiser Lake Mitigation Site (ac)	Larson Road Mitigation Site (ac)	Totals (ac)
SR 539 Horton Road to Tenmile Road USACE #200500927					
Creation	7.66	0.00	0.00	0.37	8.03
Enhancement	3.57	6.26	0.00	1.12	10.95
Buffer Enhancement	4.47	4.37	0.00	0.10	8.94
SR 539 Tenmile Road to Badger Rd (SR 546) USACE #NWS-2007-470-SOD					
Creation	1.74	0.00	0.00	0.00	1.74
Enhancement	1.49	0.00	2.53	0.00	4.02
Buffer Enhancement	4.77	0.00	2.09	0.00	6.86
SR 542 CED East Church Mountain Rd USACE #NWS-2009-786					
Creation	0.13	0.00	0.00	0.00	0.13
Enhancement	0.26	0.00	0.00	0.00	0.26
Buffer Enhancement	0.00	0.00	0.00	0.00	0.00
Future Mitigation					
Creation	0.86	0.00	0.00	0.00	0.86
Enhancement	1.19	0.00	0.00	0.00	1.19

Mitigation Breakdown Map



Literature Cited

1. Fredricks, Kristin. 2009. SR 542 CED East Church Mountain Road Roadway Realignment and Culvert Replacement (MP 38.67 to 39.01) Wetland and Stream Mitigation Report.
2. Fredricks, Kristin. 2007. SR 539: Tenmile Road to Badger Road (SR.546) Widening (MP 5.90 to MP12.62) Final Wetland Mitigation Report
3. United States Army Corps of Engineers. 2009. Department of the Army Permit Number NWS-2009-786.
4. United States Army Corps of Engineers. 2007. Department of the Army Permit Number NWS-2007-470-SOD.
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7. 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>