

**SR 900 78th Vicinity to Newport Way Widening
Lake Sammamish State Park (LSSP) Wetland Mitigation Site
and Tributary B Stream Mitigation Site
WIN #A90098V**

USACE IP NWS-2007-29-SOD

Northwest Region

2013 MONITORING REPORT

Wetlands Program

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Department of Transportation**

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SR 900 78th Vicinity to Newport Way Widening Lake Sammamish State Park (LSSP) Wetland Mitigation Site and Tributary B Stream Mitigation Site

USACE IP NWS-2007-29-SOD

	General Site Information		
	USACE IP Number	NWS-2007-29-SOD	
	Mitigation Location	Southwest of Issaquah Creek in Lake Sammamish State Park	
	LLID Number	LSSP Wetland Site: 1220619475588 Tributary B Stream Site: 1220625475351	
	Construction Date	2009–2010	
	Monitoring Period	2011–2020	
	Year of Monitoring	3 of 10	
	Type of Impact ¹	Wetland	Buffer
	Area of Impact	0.75 acre	0.91 acres
	Type of Mitigation	Wetland Establishment	Wetland Enhancement Buffer Enhancement
	Area of Mitigation	1.74 acres	0.11 acre 2.81 acres

¹ Impact and mitigation numbers come from the as-built report (WSDOT 2010).

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Summary of Monitoring Results and Management Activities (2013)

Performance Standards	2013 Results	Management Activities
LSSP Wetland Mitigation Site		
Wetland hydrology will be present for at least 10% of the growing season	Drier than average year, no sub-surface data collected.	
Native woody species will maintain a minimum average density of four plants per 100 square feet within the scrub-shrub planting areas	9 plants/100ft ² (CI _{80%} = 8-10)	300 Twinberry and 300 Nootka Rose were planted in December 2013/January 2014.
No more than 30% cover by targeted invasive species in the wetland areas	10% cover	Manual weed control and herbicide application was occurred in October 2013.
Native woody species will maintain a minimum average density of four plants per 100 square feet in the wetland buffer and riparian buffer planting areas	7 plants/100ft ² (CI _{80%} = 6.7-8.1)	820 Alder, 950 Snowberry, 950 Nootka Rose and 900 Thimbleberry were planted in December 2013/January 2014.
No more than 30% cover by targeted invasive species in the buffer areas	5% cover	Manual weed control and herbicide application was occurred in October 2013.
Tributary B Stream Mitigation Site		
Native woody species will maintain a minimum average density of four plants per 100 square feet in the riparian buffer planting areas	5 plants/100ft ² (CI _{80%} = 4.6-5.5)	
No more than 30% cover by targeted invasive species in the riparian buffer areas	3% cover	Manual weed control and herbicide application was occurred in October 2013.
(Permit requirement) 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	94% survival (CI _{80%} = 92-97%)	

Report Introduction

This report summarizes third-year (Year-3) monitoring activities at the State Route (SR) 900 LSSP Wetland Mitigation Site and the SR 900 Tributary B Stream Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities in 2013 included a vegetation survey, photo-documentation, and assessments of wetland hydrology. Vegetation monitoring at LSSP took place on July 2 and 3, and hydrology visits occurred on March 14, 28, and April 11, 2013. Vegetation monitoring and photo documentation at Tributary B occurred on July 31, 2013.

What is the Lake Sammamish State Park (LSSP) Wetland Mitigation Site?

This 4.08-acre mitigation site (Figure 1) is located in Lake Sammamish State Park in Issaquah, WA. It comprises 1.74 acres of wetland establishment, 0.11 acre of wetland enhancement, 1.98 acres of wetland buffer enhancement, and 0.25 acre of riparian buffer enhancement within existing state park property. This site was created to replace acreage and functions lost due to wetland and buffer impacts associated with the widening of SR 900. As a result of the widening project, 0.75 acre of wetland and 0.91 acre of wetland and stream buffer were permanently impacted. Wetland functions that will be mitigated for at this site include flood flow alteration, flood storage, aquatic invertebrate and amphibian habitat, general wildlife habitat, and sediment, nutrient, and toxicant removal.

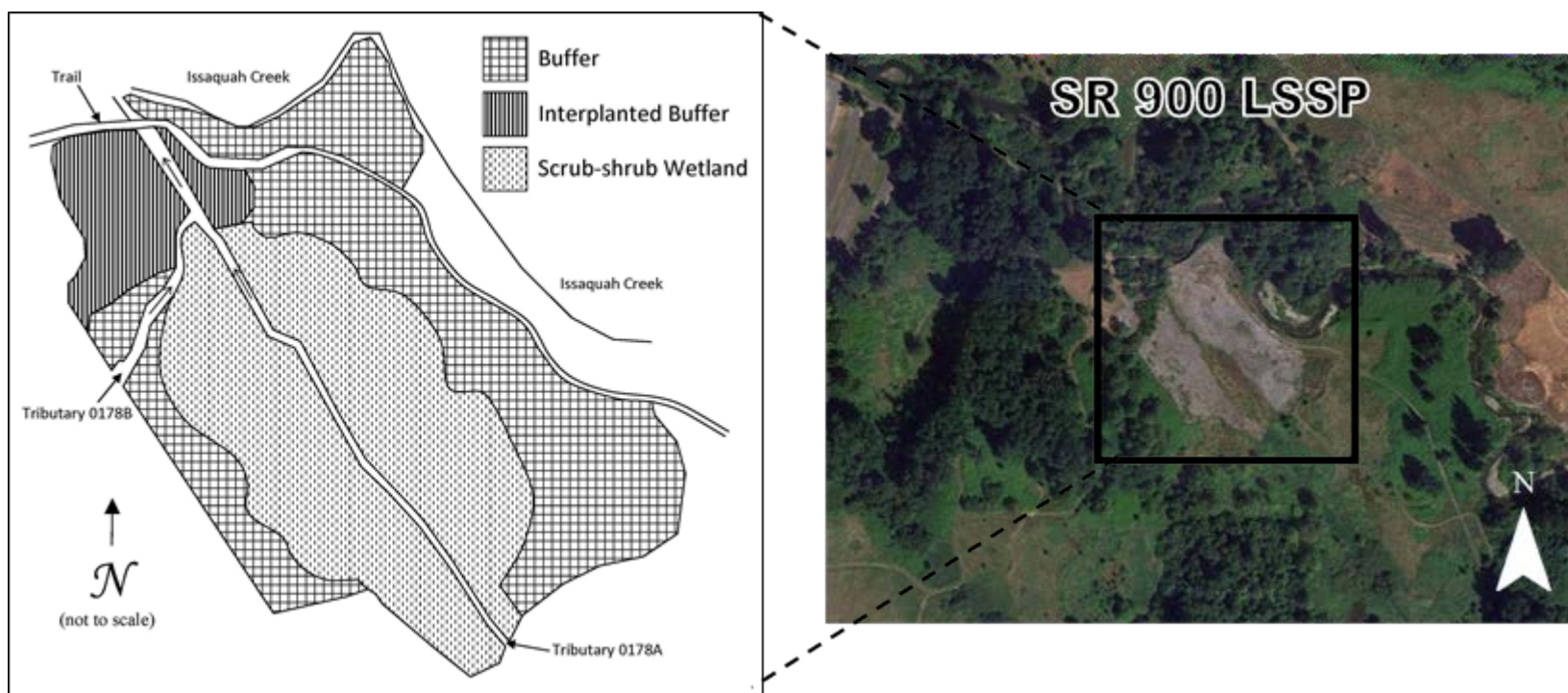


Figure 1 LSSP Site Sketch

The SR 900 LSSP Wetland Mitigation Site contains a scrub-shrub wetland along a tributary to Issaquah Creek within Lake Sammamish State Park. Appendix 2 includes site directions.

What is the Tributary B Stream Mitigation Site?

This 0.58-acre mitigation site (Figure 2) was created to mitigate for the combined 139 linear feet of perennial stream that was placed in a culvert as a result of the SR 900 widening project. Two hundred and thirty-three linear feet of Tributary B was enhanced in order to replace lost functions. The stream mitigation site will increase habitat for salmonids by providing high flow refuge. The riparian buffer plantings will contribute screening, shading, organic debris and large woody debris recruitment to the stream. The site will provide increased wildlife habitat by improving the quality of the riparian buffer, as well as increase the area and food resources available for aquatic invertebrates and amphibians, which in turn will lead to increased food resources for salmonids.

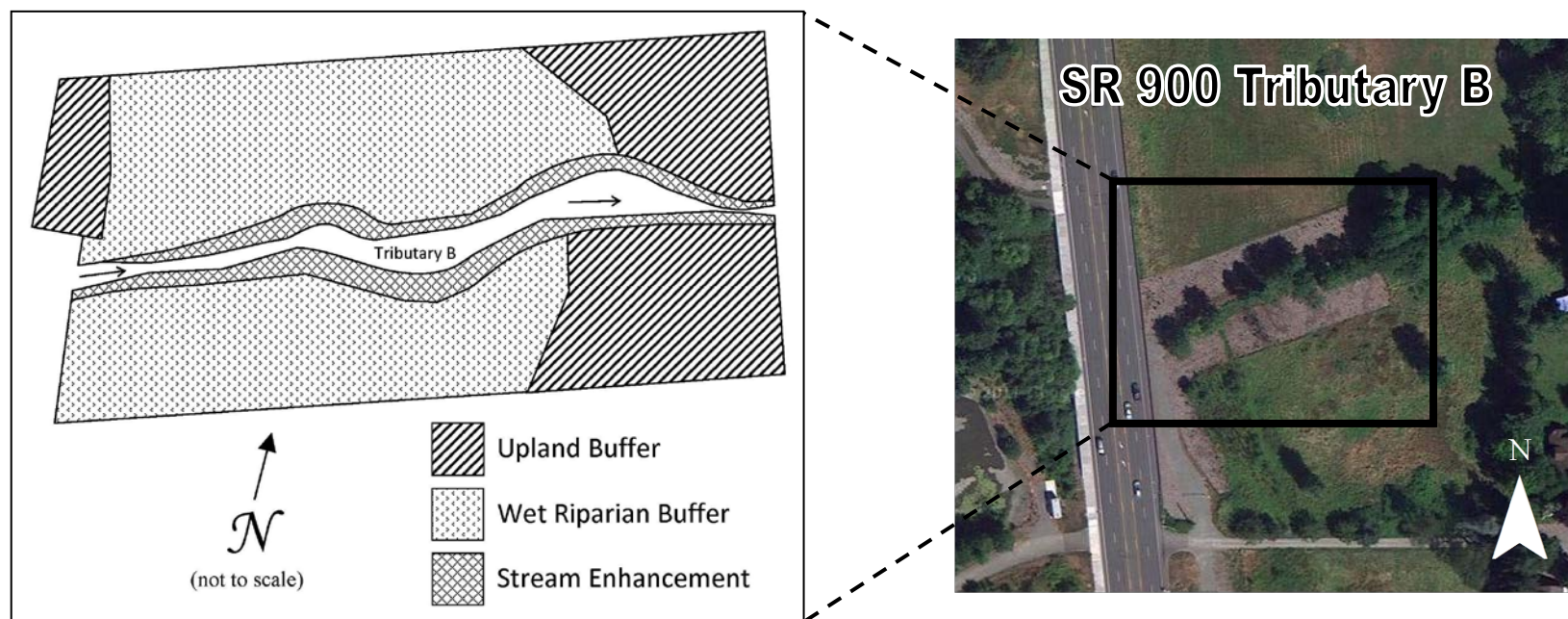


Figure 2 Tributary B Site Sketch

The SR 900 Tributary B Stream Mitigation Site consists of 233 linear feet of stream enhancement and 0.58 acre of riparian buffer enhancement along Tributary B as it emerges from the newly lengthened culvert under SR 900. Appendix 2 includes site directions.

What are the performance standards for this site

Year 3

Performance Standard 1

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

Performance Standard 2

The native woody species will maintain a minimum average density of four plants per 100 square feet within the scrub-shrub planting areas. Native colonizing vegetation will be included in this coverage calculation.

Performance Standard 3

No more than thirty percent cover by non-native invasive species as listed in Table 10 (Appendix 3) in the wetland areas except:

- 15% maximum cover across the entire mitigation site for blackberry (*Rubus laciniatus* and *R. armeniacus*).
- The presence of Japanese knotweed (*Polygonum cuspidatum* and related species) and purple loosestrife (*Lythrum salicaria*) will initiate eradication measures.

Performance Standard 4

The native woody species will maintain a minimum average density of four plants per 100 square feet in the wetland buffer and riparian buffer planting areas.

Performance Standard 5

No more than thirty percent cover by non-native invasive species as listed in Table 10 (Appendix 3) in the buffer areas except:

- 15% maximum cover across the entire mitigation site for blackberry (*Rubus laciniatus* and *R. armeniacus*).
- The presence of Japanese knotweed (*Polygonum cuspidatum* and related species) and purple loosestrife (*Lythrum salicaria*) will initiate eradication measures.

Performance Standard 6 (Tributary B)

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

Performance Standard 7 (Tributary B)

No more than thirty percent cover by non-native invasive species as listed in Table 10 (Appendix 3) in the riparian buffer areas except:

- 15% maximum cover across the entire mitigation site for blackberry (*Rubus laciniatus* and *R. armeniacus*).
- The presence of Japanese knotweed (*Polygonum cuspidatum* and related species) and purple loosestrife (*Lythrum salicaria*) will initiate eradication measures.

Permit Requirement 1 (Tributary B)

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 1 shows the As-built planting plan (WSDOT 2010).

How were the performance standards evaluated?

To evaluate standards for vegetative cover at the LSSP site, a baseline was established parallel to Tributary 0178A (Figure 2). Twenty-four sampling transects were randomly placed perpendicular to the baseline. The unequal-area belt transect method was used to determine woody density in the riparian buffer and scrub-shrub wetland (Performance Standard 2) and in the upland buffer (Performance Standard 4). The cover of target invasive and noxious weeds was visually estimated in the scrub-shrub wetland (Performance Standard 3) and in the upland buffer (Performance Standard 5). When addressing both of these sets of standards, the riparian buffer was combined with the scrub-shrub wetland instead of the upland buffer. This adjustment was made because the vegetation community composition and hydrologic conditions of the scrub-shrub wetland and the riparian buffer are much more similar than the riparian buffer and the upland buffer.

Hydrologic data was not collected in 2013. According to the precipitation analysis (Appendix 3 Table 1) the antecedent conditions were drier than normal, so the hydrology standard (Performance Standard 1) would not apply in 2013.

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

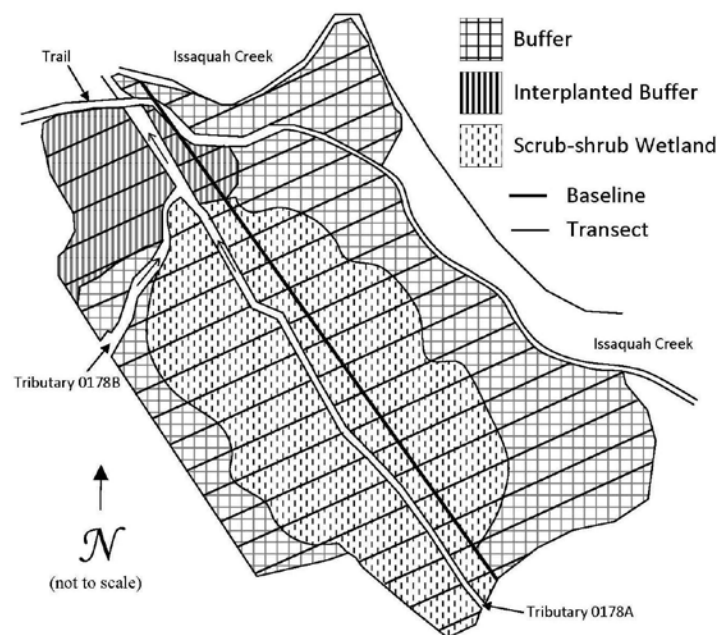
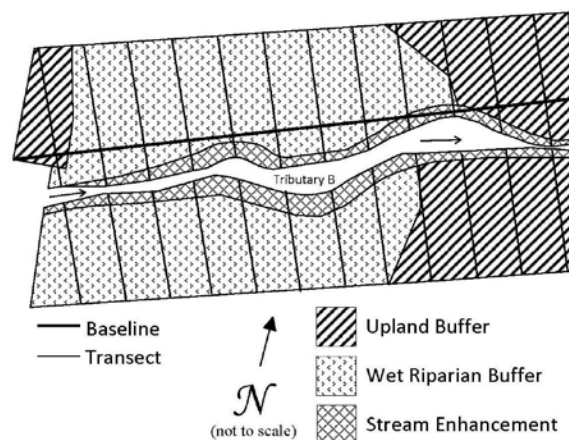


Figure 2 Site Sampling Designs (2013) LSSP above, Tributary B below



To evaluate standards for vegetative cover at the Tributary B site, a baseline was established parallel to Tributary B (Figure 2). Eleven sampling transects were randomly placed perpendicular to the baseline. The unequal-area belt transect method was used to determine woody density (Performance Standard 6) and woody species survival (Permit Requirement 1) across the site. The cover of target invasive and noxious weeds was visually estimated across the site (Performance Standard 7).

How is the LSSP Wetland Mitigation Site developing?

This site continues to develop as intended, with high density of planted woody species and limited cover of invasive species. The realigned creek channel appears stable at this time with no additional head-cutting observed over the course of 2012-2013.

How is the Tributary B Stream Mitigation Site developing?

The woody plantings on this site had relatively high survival and appear to be doing well. The cover of invasive species over most of the site is low. The watercress (*Nasturtium officinale*) that had choked the creek in previous years was not present in 2013.

Results for Performance Standard 1
(Wetland hydrology):

Groundwater measurements were not obtained in 2013 due to an internal miscommunication. Surface hydrology was mapped on three separate occasions during March and April. During each of those visits the riparian zone and some portion of the scrub-shrub wetland were either inundated or saturated. Sub-surface hydrology will be monitored moving forward and will be reported in the year-5 monitoring report.

Results for Performance Standard 2

(Native woody species will maintain an average density of 4 plants/100ft² within the scrub-shrub planting area):

The density of native woody vegetation in the riparian buffer and scrub-shrub wetland is 9 plants/100ft² (CI_{80%} = 8-10) (Photo 1). Dominant species observed in these zones included Pacific willow (*Salix lasiandra*), Nootka rose (*Rosa nutkana*), and twinberry honeysuckle (*Lonicera involucrata*).



Photo 1
Woody cover in the scrub-shrub wetland (July 2013)

Results for Performance Standard 3

(No more than thirty percent cover by target non-native invasive species in wetland areas):

The cover of target invasive species in the riparian buffer and scrub-shrub wetland is visually estimated to be three percent. The most abundant target invasive species observed was Himalayan blackberry (*Rubus armeniacus*). The only additional target invasive species present was paleyellow iris (*Iris pseudacorus*). Reed canarygrass (*Phalaris arundinacea*) is also present in the wetland but is not included in the list of target invasive species.

Results for Performance Standard 4

(Native woody species will maintain a minimum average density of four plants per 100 square feet in the wetland buffer and riparian buffer planting areas):

The density of native woody vegetation in the wetland buffer is 7.4 plants/100ft² (CI_{80%} = 6.7-8.1) (Photo 2). Dominant species observed in these zones included snowberry (*Symphoricarpos albus*), and thimbleberry (*Rubus parviflorus*).

Results for Performance Standard 5

(No more than thirty percent cover by target non-native invasive species in wetland areas):

The cover of target invasive species in the upland buffer is visually estimated to be three percent. The only target invasive species observed in the buffer was Himalayan blackberry (*Rubus armeniacus*). A few individual butterfly bushes (*Buddleja davidii*), a Washington State Class B non-designate species, were also present in the buffer.



Photo 2
Woody cover in the wetland buffer (July 2013)

Results for Performance Standard 6 (Tributary B)

(The native woody species will maintain a minimum average density of four plants per 100 square feet in the riparian buffer planting areas):

The density of native woody vegetation in the Tributary B riparian buffer is 5 plants/100ft² (CI_{80%} = 4.6-5.5) (Photo 4). This density value exceeds the performance standard target. Dominant species observed in this zone include Pacific willow (*Salix lasiandra*), Sitka willow (*Salix sitchensis*), and red alder (*Alnus rubra*).

Results for Performance Standard 7 (Tributary B)

(No more than thirty percent cover by target non-native invasive species across the site (riparian buffer)):

The cover of target non-native invasive species is visually estimated to be three percent. Target species observed included Himalayan blackberry (*Rubus armeniacus*), and cutleaf blackberry (*Rubus laciniatus*) which were primarily observed along the site boundary and along the banks of the creek. A few individual butterfly bushes (*Buddleja davidii*), a Washington State Class B non-designate species, were also present in the riparian buffer.

Results for Permit Requirement (Tributary B)

(80% survival of planted woody species):

The survival of planted woody species at the Tributary B riparian buffer site is 94% (CI_{80%} = 92-97%). This survival estimate exceeds the permit requirement target.



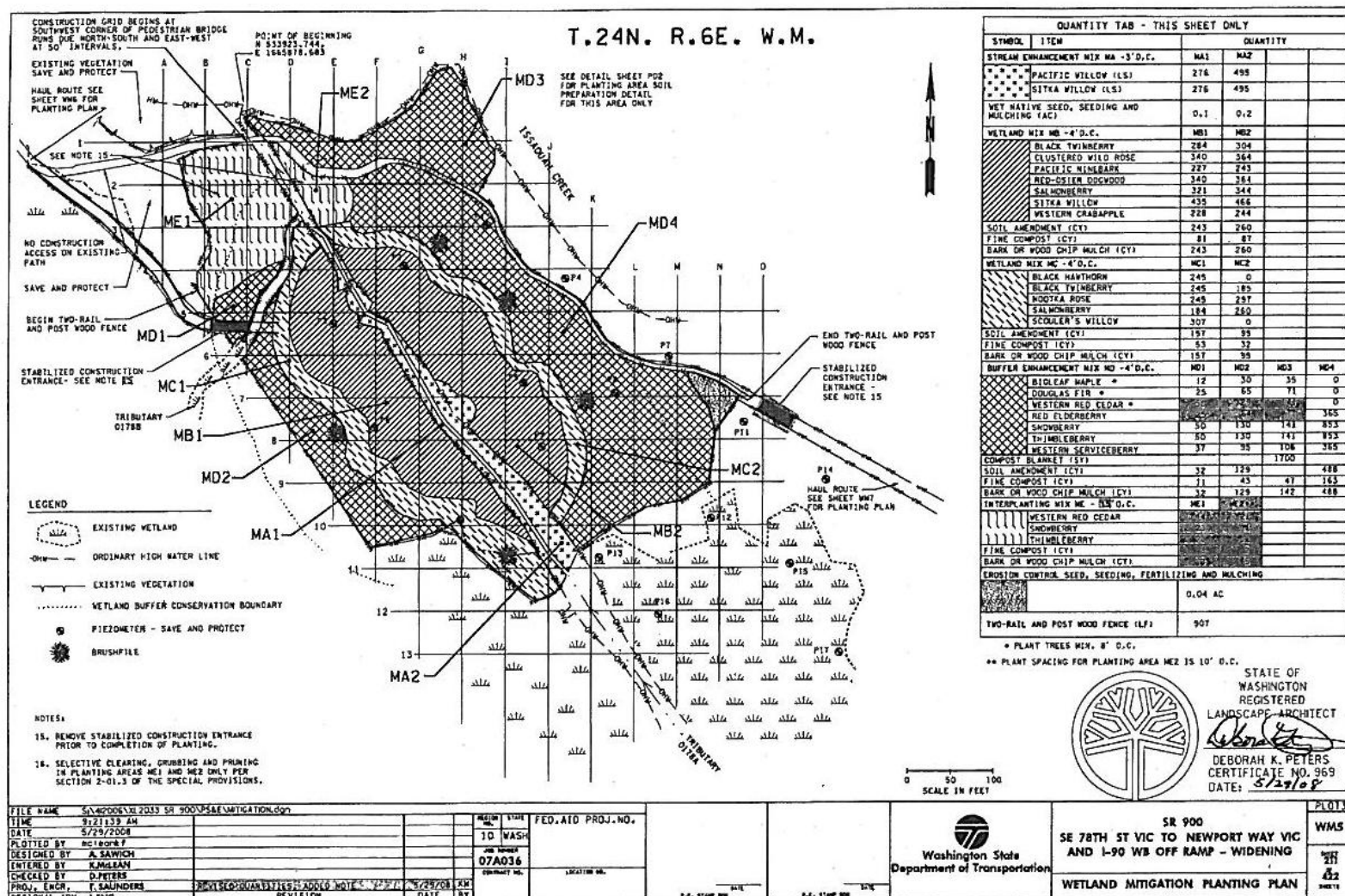
Photo 4
Planted woody vegetation at Tributary B (July 2013)

What is planned for these sites?

The region has plans for ongoing weed control as necessary for both sites in 2014.

Appendix 1 – Planting Plan (As-Built) with Photo Point Locations and Hydrology Pit or Well Locations

(from WSDOT 2010)



QUANTITY TABS - THIS SHEET ONLY

SYMBOL	ITEM	QUANTITY	SYMBOL	ITEM	QUANTITY	SYMBOL	ITEM	QUANTITY
STREAM ENHANCEMENT MIX-5' O.C.			WET RIPARIAN BUFFER MIX-5' O.C.			UPLAND MIX - 5' O.C.		
S1	S2		W1	W2		U1	U2	U3
	BLACK COTTONWOOD	7 9		BLACK COTTONWOOD	34 28		BIGLEAF MAPLE	3 8 19
	PACIFIC WILLOW(S)	8 10		OREGON ASH	30 24		DOUGLAS FIR	6 15 20
	RED-OSIER DOGWOOD	14 18		PACIFIC WILLOW	34 28		WESTERN RED CEDAR	9 23 30
	SITKA WILLOW (LS)	17 22		WESTERN RED CEDAR	43 35		INDIAN PLUM	3 7 10
	SAWBEAK SEED	35 44		BLACK TWILBERRY	60 49		RED ELDERBERRY	6 15 20
	SLOUGH SEDGE	35 44		CLUSTERED WILD ROSE	43 35		SNOWBERRY	11 30 40
	SOIL AMENDMENT (CY)	12 15		RED-OSIER DOGWOOD	60 49		THIMBLEBERRY	10 27 36
	FINE COMPOST (CY)	4 5		SALMONBERRY	60 49		VINE MAPLE	10 26 36
	BARK OR WOOD CHIP MULCH (CY)	12 15		SITKA WILLOW	64 52		SOIL AMENDMENT (CY)	12 30 41
							FINE COMPOST (CY)	4 10 14
							BARK OR WOOD CHIP MULCH (CY)	12 30 41

LEGEND

- NEW CONTOUR
- LOG WITH ROOTWAD
- LOG WITH ROOTWAD AND BRANCHES
- HVF HIGH VISIBILITY FENCE
- SAVE & PROTECT EXISTING NATIVE TREES & DESIREABLE VEGETATION

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
DAVID S. PETERSON
CERTIFICATE NO. 476
DATE: 04/04/08

SR 900
SE 78TH ST VIC TO NEWPORT WAY VIC
AND I-90 WB OFF RAMP - WIDENING

TRIBUTARY B
PLANTING PLAN

WASHINGTON STATE
Department of Transportation

FED. AID PROJ. NO.

REVISION

DATE BY

PLANTING PLAN

SM3

205

422

SHEETS

Appendix 2 – Photo Points

The photographs below were taken from permanent photo-points on July 3, 2013 (LSSP) and document current site development.



Photo Point 1a



Photo Point 1b



Photo Point 1c



Photo Point 2a



Photo Point 3a



Photo Point 3b



Photo Point 4a



Photo Point 4b



Photo Point 5a



Photo Point 5b



Photo Point 6a



Photo Point 6b

Driving Directions:

From I-90 east, take exit 15 for WA-900 W/17th Ave NW. Turn left onto WA-900 E/17th Ave NW. After approximately 0.3 mile, turn left onto NW Sammamish Road. After approximately 0.4 mile, turn right into Lake Sammamish State Park. Drive straight to the end of the last parking lot. The trail to the wetland mitigation site starts at the northeast corner of the last parking lot.

To get to the Tributary B site, go back to WA-900/17th Ave NW and head south for approximately one mile. Turns left on SE 75th Street, then immediately take another left into the mitigation site.

Appendix 3 – Data Tables

Table 1 Comparison of Observed and Normal Precipitation (NRCS 1997)

Monthly precipitation data for Kent, Washington.

	Long-term rainfall records ^a				Rain fall ^a	Condition dry, wet, normal ^b	Condition Value	Month weight value	Product of previous two columns
	Month	3 yrs. in 10 less than	Average	3 yrs. in 10 more than					
1 st prior month	March	3.15	4.13	4.81	2.48	D	1	1	1
2 nd prior month	Feb.	2.89	4.42	5.31	1.72	D	1	2	2
3 rd prior month	Jan.	3.93	5.29	6.20	2.18	D	1	3	3
Sum									6

^a NRCS 2014

^b Conditions are considered normal if they fall within the low and high range around the average.

Note: If sum is

6 - 9 then prior period has been
drier than normal
10 - 14 then period has been
normal
15 - 18 then period has been
wetter than normal

Condition value:

Dry (D) =1
Normal (N) =2
Wet (W) =3

Conclusions: Drier than normal precipitation conditions were present prior to the field visit.

Table 10. Non-native invasive species.

Scientific Name	Common Name
<i>Buddleia alternifolia</i>	fountain butterfly bush
<i>Cytisus scoparius</i>	Scot's broom
<i>Geranium robertianum</i>	herb Robert
<i>Ilex aquifolium</i>	English holly
<i>Iris pseudacorus</i>	yellow flag iris
<i>Lythrum salicaria</i>	purple loosestrife
<i>Polygonum cuspidatum</i> (and related species and hybrids)	Japanese knotweed
<i>Prunus laurocerasus</i>	English laurel
<i>Rubus laciniatus</i>	evergreen blackberry
<i>Rubus armeniacus</i> (discolor)	Himalaya or Armenian blackberry

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