

I-405 Kelsey Creek Wetland Mitigation Site
I-405, Congestion Relief and Bus Rapid Transit Projects:
SE 8th to I-90 Project, **112th Ave SE to I-90 Project**
USACE NWP (14) 200501405, NWP (14) 200600524

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

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Environmental Services Office

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	General Site Information	
	USACE Numbers	(14) 200501405, (14)200600524
	Mitigation Location	In Kelsey Creek Park, in the City of Bellevue, King Co.
	LLID Number	1221672475986
	Construction Date	2007-2008
	Monitoring Period	2008-2017
	Year of Monitoring	3 of 10
	Type of Impact	Wetland
	Area of Project Wetland Impacts ¹	0.160 acre
	Type of Mitigation	Wetland Restoration
Area of Mitigation ^{1,2}	2.452 acres	

¹ See Appendix 5 for a breakdown of the project impact and mitigation acreages.

² In addition to the projects listed in this report, the I-405 Kelsey Creek was created as advance mitigation for future I-405 Corridor Program projects. The Bellevue Braids Project will not be using the Kelsey Creek site for any impacts. The Kelsey Creek site will be used to mitigate for impacts on the SR 520 to I-5 Improvement Project and part of the Renton to Bellevue Project, but these projects are currently on hold pending funding.

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results ³	Management Activities
Wetland hydrology present in the restored wetland	Present in most of the wetland restoration areas	
Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetland.	6 plants/100ft ² (CI _{80%} 5-7)	
Cover of reed canarygrass will not exceed 30% and cover of King County class A noxious weeds, non-native blackberries, and Scot's broom will not exceed 20% in the wetland restoration areas.	Reed canarygrass: 1% King County Class A: none Blackberries and Scot's broom: 1%	Weeds controlled manually (without herbicides) by the City of Bellevue
Installed snags and large woody debris in-place and functional	In place and functional	
Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the buffer.	6 plants/100ft ² (CI _{80%} 4-8)	Supplemental watering in the buffer by the City of Bellevue
Cover of reed canarygrass will not exceed 30% and cover of King County class A noxious weeds, non-native blackberries, and Scot's broom will not exceed 20% in the buffer.	Reed canarygrass: 3% King County Class A: none Blackberries and Scot's broom: 1%	Weeds controlled manually (without herbicides) by the City of Bellevue

Report Introduction

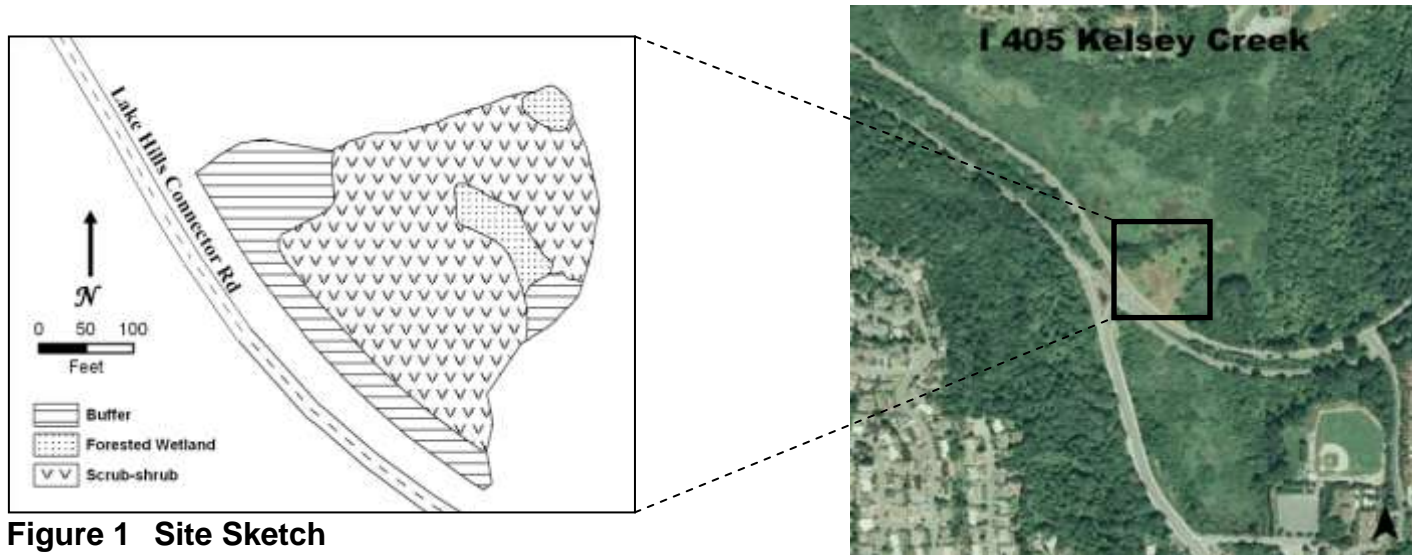
This report summarizes third-year (Year-3) monitoring activities at the Interstate (I) 405 Kelsey Creek Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities in 2010 included vegetation surveys, photo-documentation, and assessments of wetland hydrology. Hydrology visits occurred on February 24, and March 9 and 21. Vegetation monitoring was conducted on July 6 and 7.

³ Estimated values are presented with their corresponding statistical confidence intervals. For example, 6 plants/100ft² (CI_{80%} 5-7) means we are 80% confident that the true density is between 5 and 7 plants per 100 square feet.

What is the I-405 Kelsey Creek Mitigation Site?

The Kelsey Creek Mitigation Site includes 2.452 acres of wetland restoration located within Kelsey Creek Park in the City of Bellevue. This 3.6-acre mitigation site (Figure 1) is bordered on three sides by the existing Kelsey Creek wetland complex.

This site was established in part to compensate for the loss of 0.160 acre of wetlands due to road improvements and widening associated with the SE 8th to I-90 Project and the 112th Ave. SE to I-90 Project. This site provides 0.201 acre of mitigation for wetland impacts and 0.124 acre as compensation for impacts to mature forested buffer. All of this mitigation is in the form of wetland restoration for a total of 0.325 acre of mitigation associated with these two projects. The remaining wetland restoration acreage on this site is intended as advanced mitigation for future I-405 Corridor Program projects.



The I-405 Kelsey Creek Mitigation Site contains scrub-shrub wetland, forested wetland and upland buffer plant communities.

What are the performance standards for this site?

Performance Standard 1

The soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 3 consecutive weeks (10 percent) of the growing season in a year when rainfall meets or exceeds the 30-year average.

Performance Standard 2

Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetland.

Performance Standard 3

Reed canarygrass will not exceed 30 percent aerial cover in the wetland restoration areas. Other species identified as King County Class A noxious weeds, including non-native blackberries and Scot's broom, will not exceed 20 percent aerial cover in the wetland restoration areas. If this cover threshold is exceeded, weed control measures will be implemented. If purple loosestrife or non-native knotweeds (Japanese, giant, Himalayan or related hybrid) are observed during monitoring, methods directed at eradicating these species will be implemented immediately (see Section 6.6, Contingency Plans)

Performance Standard 4

The snags and large woody debris installed in the wetland mitigation area will be in-place and functional during each monitoring event in Year 1 through Year 3. If snags are fallen or missing or if large woody debris is missing it will be replaced in-kind.

Performance Standard 5

Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the buffer.

Performance Standard 6

Reed canarygrass will not exceed 30 percent aerial cover in the buffer areas. Other species identified as King County Class A noxious weeds, including non-native blackberries and Scot's broom, will not exceed 20 percent aerial cover in the buffer. If this cover threshold is exceeded, weed control measures will be implemented. If purple loosestrife or non-native knotweeds (Japanese, giant, Himalayan or related hybrid) are observed during monitoring, methods directed at eradicating these species will be implemented immediately (see Section 6.6, Contingency Plans)

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 3 shows the planting plan (Epstein and Clark 2005).

How were the performance standards evaluated?

WSDOT staff collected hydrology data using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997) (Performance Standard 1). Four permanent hydrology pit locations were established and one monitoring well was sampled this year and recorded on a map. During each monitoring visit, visual observations were made to determine the extent of inundation and surface saturation. Depth and location of standing water was recorded. At each pit and well location, in the absence of inundation or surface saturation, subsurface observations were made.

To evaluate standards for vegetative density, a 148 meter baseline was established parallel to the buffer planting area (Figure 2). Seventeen sampling transects were randomly placed perpendicular to the baseline using the restricted random method. The unequal-area belt transect method was used to determine woody density in the wetland and the buffer (Performance Standards 2 and 5). Fifteen one-meter wide unequal-belt sampling transects fell within the wetland zone and seventeen one-meter wide unequal-belt sampling transects within the buffer.

Cover of non-native and invasive species (Performance Standards 3 and 6) was estimated qualitatively. Snags and Large woody debris on site were counted during the summer monitoring visit (Performance Standard 4).

For additional details on the methods, view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2004).

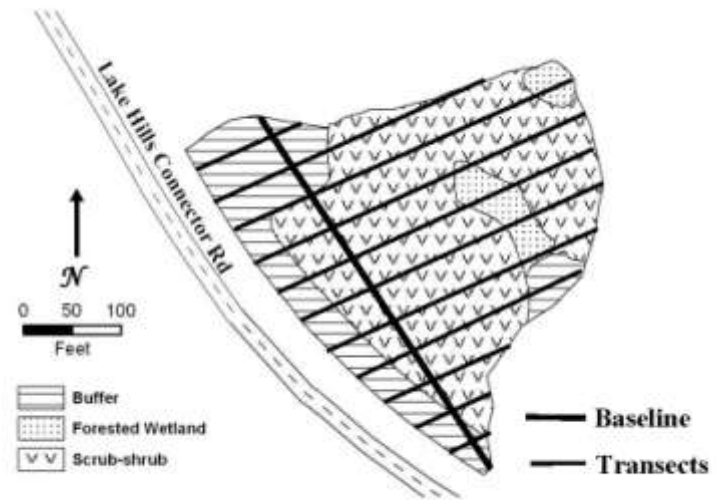


Figure 2 Site Sampling Design (2010)

How is the site developing?

This site is developing as planned. All of the vegetation standards have been met for Year-3 and the site is on track to meet the Year-5 cover standards. The achievement of woody density standards, the thick understory of herbaceous species and the surface water present indicate the intended water quality functions are being supported.

The planned habitat structures were present at the time of monitoring and in use by wildlife indicating the enhancement of wildlife habitat. In addition to the many species of birds observed on site, there were also large mammal tracks, snakes, coyote tracks, deer browse, beaver sign, and evidence of rodent predation.

Control of non-native invasive species and watering of planted species was occurring at the time of the summer monitoring visit. The estimated invasive cover is very low onsite indicating that management activities have been effective.

Results for Performance Standard 1
(Wetland Hydrology):

Surface inundation was observed in the scrub-shrub wetland on all three visits (Photo 1). However, not all hydrology monitoring pits exhibited saturation or inundation during all three monitoring visits in 2010. Pit 1, located in the forested wetland, showed little hydrology in the upper 12 inches of the soil (results in Appendix 2, Table 1). The months of February and March, 2010 were within the 30 year average range for precipitation (Appendix 2, Table 3). The dates of monitoring happened to fall at the end of dry periods within the two month period (Appendix 2, Table 2). This may have contributed to the lack of hydrology in the upper 12 inches of the soil.

Results for Performance Standard 2

(Native woody species will maintain a density of four plants per 100 square feet in the wetland.):

The density of native woody species in the wetland is 6 plants/100ft² (CI_{80%} 5-7) (Photo 2). Dominant species include roses (*Rosa* spp.), willows (*Salix* spp.), and redosier dogwood (*Cornus sericea*) ranging from approximately one to 1.5 meters tall up to 2.5 meters. A couple of species such as Sitka spruce (*Picea sitchensis*) and Pacific ninebark (*Physocarpus capitatus*) appeared to be struggling.

A solid herbaceous layer is developing in the understory of the scrub-shrub and forested wetlands (Photo 2). The area is also being colonized by black cottonwood (*Populus balsamifera* ssp. *Trichocarpa*) and red alder (*Alnus rubra*) volunteers.



Photo 1 Surface inundation in the scrub-shrub wetland (March 2010)



Photo 2 Woody and herbaceous cover in the Wetland (July 2010)

Results for Performance Standard 3

(Reed Canarygrass will not exceed 30% cover and King Co. Class A weeds will not exceed 20% cover in the restored wetland):

Invasive species observed in the wetland were mostly on the eastern side of the site (Photo 3). Cover of reed canarygrass (*Phalaris arundinacea*) is estimated at one percent and other species such as Himalayan blackberry (*Rubus armeniacus*), thistles (*Cirsium* spp.), and Scotch broom (*Cytisus scoparius*) make up another one percent cover. Most non-native invasive species (not included in this estimate) were observed just outside of the site on the east and north borders.



Photo 3
Edge of site (July 2010)

Results for Performance Standard 4

(Snags and large woody debris will be present and functioning):

While monitoring the site in July, 2010, fifteen standing snags and thirty-seven large woody debris piles were observed. Raptors were observed perched on snags and a garter snake was observed on a habitat structure.



Photo 4
Woody cover in the buffer (July 2010)

Results for Performance Standard 5

(Native woody species will maintain a density of four plants per 100 square feet in the buffer):

The density of native woody species in the buffer is 6 plants/100ft² (CI_{80%} 4-8) (Photo 4). Dominant species include black cottonwood (*Populus balsamifera* ssp. *Trichocarpa*), red alder (*Alnus rubra*), and willows (*Salix* spp.). All species present range from approximately one to three meters tall. There is a wide diversity of species present.

Results for Performance Standard 6

(Reed Canarygrass will not exceed 30% cover and King Co. Class A weeds will not exceed 20% cover in the buffer):

Invasive species observed in the buffer are mostly on the perimeter of the site. Cover of reed canarygrass (*Phalaris arundinacea*) is estimated at three percent. The only other non-native invasive species observed in the buffer is Himalayan blackberry (*Rubus armeniacus*), making up another one percent cover. As with the wetland, most non-native invasive species (not included in this estimate) were observed just outside of the site.

What is planned for this site?

Weed control will be performed as needed throughout the site. Supplemental watering will be applied in the upland buffer during the summer dry periods as needed.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *I-405 Kelsey Creek Wetland Mitigation Plan (WSDOT 2006)*. The performance criteria addressed this year are identified in **bold** font.

GOALS AND OBJECTIVES

6.2 Functions and Values

The Aquatic Resources Mitigation Act (RCW 90.74) directs the state to authorize innovative mitigation measures for state-funded infrastructure projects. This is accomplished by requiring state regulatory agencies to consider mitigation proposals that are timed, designed, and located in a manner to provide equal or better biological functions and values compared to traditional on-site, in-kind mitigation proposals.

The project will result in a reduction of habitat functions provided by wetland areas, particularly in Wetland 12.45M. This wetland contains scrub-shrub and forested habitats that include standing snags and some native vegetation species. These habitat functions will not be mitigated through stormwater treatment and detention or other water quality BMPs. Therefore, compensatory wetland mitigation will be needed primarily to address impacts to wetland habitat. WSDOT proposes to compensate for the loss in wetland habitat through off-site wetland habitat restoration and enhancement at the Kelsey Creek mitigation area. The proposed off-site habitat mitigation site will increase habitat functions within a regionally significant wildlife habitat area, and maintain overall habitat functions within the general project vicinity. Although Wetland 12.45M contains native vegetation and diversity, overall function of the habitat is considered low due to the lack of buffer, limited connection to adjacent habitats, and high degree of human disturbance. Rather than replicate the existing low-quality functions at a new location or locations, WSDOT proposes mitigation that would maximize bird, insect, and small-mammal habitat opportunities and provide greater habitat functions over the long term than currently occur along the I-405 corridor.

6.3 Objectives and Standards of Success for Kelsey Creek Wetland Mitigation Site

6.3.1 Objective – Hydrology

The following objective for the site must be met:

- Establish wetland hydrology in a minimum of 2.452 acres of restored wetland.

Interim Performance Measures (Monitoring Years 1-9)

The soils will be saturated to the surface, or standing water will be present 12 inches below the surface or less for at least 3 consecutive weeks (10 percent) of the growing season in a year when rainfall meets or exceeds the 30-year average.

Success Standard (Years 5 and 10)

Wetland areas will be delineated using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997) to ensure that the mitigation site contains at least 2.452 acres of restored wetland.

6.3.2 Objective – Wetland Vegetation

The following objective for the mitigation site must be met to achieve success:

- Establish a predominance of native, hydrophytic tree and shrub vegetation communities in the wetland restoration area.

Interim Performance Measures

Performance Measure 1 (Year 1): Planted woody species in the wetland will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetland.

Performance Measure 3 (Year 5): After 5 years, aerial cover of native woody species will be at least 35 percent in the forested and scrub-shrub wetland restoration area.

Performance Measure 4 (Year 5): At least three native, non-invasive facultative or wetter woody plant species will achieve a minimum of 5 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 5.

Performance Measure 5 (Year 7): After 7 years, aerial cover of the native woody species will be at least 50 percent in the forested and scrub-shrub wetland restoration area.

Performance Measure 6 (Years 1-9): Reed canarygrass will not exceed 30 percent aerial cover in the wetland restoration areas. Other species identified as King County Class A noxious weeds, including non-native blackberries and Scot's broom, will not exceed 20 percent aerial cover in the wetland restoration areas. If this cover threshold is exceeded, weed control measures will be implemented. If purple loosestrife or non-native knotweeds (Japanese, giant, Himalayan or related hybrid) are observed during monitoring, methods directed at eradicating these species will be implemented immediately (see Section 6.6, Contingency Plans)

Success Standards

Success Standard 1 (Year 10): After 10 years, aerial cover of native woody species will be at least 65 percent in the forested and scrub-shrub wetlands.

Success Standard 2 (Year 10): At least two native, non-invasive facultative or wetter woody plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

Success Standard 3 (Year 10): Reed canarygrass will not exceed 30 percent aerial cover in the wetland restoration areas. Other species identified as King County Class A noxious weeds, including non-native blackberries and Scot's broom, will not exceed 20 percent aerial cover in the wetland restoration areas. Purple loosestrife and non-native knotweeds (Japanese, giant, Himalayan or related hybrid) shall not be present at the mitigation site.

6.3.3 Objective – Habitat Structures

The following objective for the site must be met:

- Increase the habitat value of the restored wetland area by placing 15 standing snags and 37 pieces of large woody debris within the wetland mitigation area.

Interim Performance Measures

Performance Measure 1 (Years 1-3): The snags and large woody debris installed in the wetland mitigation area will be in-place and functional during each monitoring event in Year 1 through Year 3. If snags are fallen or missing or if large woody debris is missing it will be replaced in-kind.

Performance Measure 2 (Years 4-9): The snags and large woody debris installed in the wetland mitigation area will be in-place and functional during each monitoring event in Year 4 through Year 9. If snags are fallen or missing as a result of vandalism or improper installation, they will be replaced by installing unanchored large woody debris within the wetland. Out-of-kind replacement will occur because re-installing vertical snags after year 3 could result in potentially damaging established vegetation. Missing large woody debris will be replaced in-kind. If snags have fallen as a result of rot or other natural process, they will remain as found and this performance measure will be met.

Success Standard

Success Standard 1 (Year 10): At least 52 pieces of wood (vertical snags, naturally fallen snags, and/or large woody debris) will occur at the mitigation site by Year 10.

6.3.4 Objective – Upland Buffer Vegetation

The following objective for the site must be met:

- Establish a predominance of native tree and shrub vegetation communities in the upland buffer areas.

Interim Performance Measures

Performance Measure 1 (Year 1): Planted woody species in the buffer will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the buffer.

Performance Measure 3 (Year 5): After 5 years, aerial cover of native woody species will be at least 30 percent in the buffer.

Performance Measure 4 (Year 5 and 7): At least three native, non-invasive plant species will achieve a minimum of 5 percent relative cover for each species in the buffer.

Performance Measure 5 (Year 7): After 5 years, aerial cover of native woody species will be at least 45 percent in the buffer.

Performance Measure 6 (Years 1–9): Reed canarygrass will not exceed 30 percent aerial cover in the buffer areas. Other species identified as King County Class A noxious weeds, including non-native blackberries and Scot’s broom, will not exceed 20 percent aerial cover in the buffer. If this cover threshold is exceeded, weed control measures will be implemented. If purple loosestrife or non-native knotweeds (Japanese, giant, Himalayan or related hybrid) are observed during monitoring, methods directed at eradicating these species will be implemented immediately (see Section 6.6, Contingency Plans)

Success Standards

Success Standard 1 (Year 10): After 10 years, aerial cover of native woody species will be at least 55 percent in the buffer.

Success Standard 2 (Year 10): At least two native, non-invasive woody plant species will achieve a minimum of 7 percent relative cover for each species in the buffer.

Success Standard 3 (Year 10): Reed canarygrass will not exceed 30 percent aerial cover in the buffer. Other species identified as King County Class A noxious weeds, including non-native blackberries Scot’s broom, will not exceed 20 percent aerial cover in the buffer. Purple loosestrife and non-native knotweeds (Japanese, giant, Himalayan or related hybrid) shall not be present in the buffer.

Appendix 2 – Hydrology Data

Table 1 Hydrology Observations (see Figure 3 for sample locations)

Date	Surface Observations	Subsurface Observations	
2/24/2010	Mixed surface saturation and shallow inundation in most of the PSS. No surface hydrology in the PFO zones.	Pit 1	No standing water after 28 min.
		Pit 2	Standing water at 11" after 29 min.
		Well	Monitoring well measured with a water level meter. Water at 9.5"
		Pit 4	Standing water at 12" and saturation at 7" after 45 minutes
		Pit 5	Saturation to the surface.
3/09/2010	Mixed surface saturation and shallow inundation in most of the PSS. No surface hydrology in the PFO zones.	Pit 1	Standing water at 18"
		Pit 2	Standing water at 8.5"
		Well	Monitoring well measured with a solinst. Water at 12.5"
		Pit 4	Standing water at 9.5"
		Pit 5	Surface saturation
3/24/2010	Several areas of inundation in PSS zones. PFO areas have no surface hydrology.	Pit 1	None
		Pit 2	None
		Well	Monitoring well measured with a solinst. Water at 15"
		Pit 4	None
		Pit 5	Saturated to the surface.

Figure 3 Hydrology Sample Locations (for data displayed in Table 1)

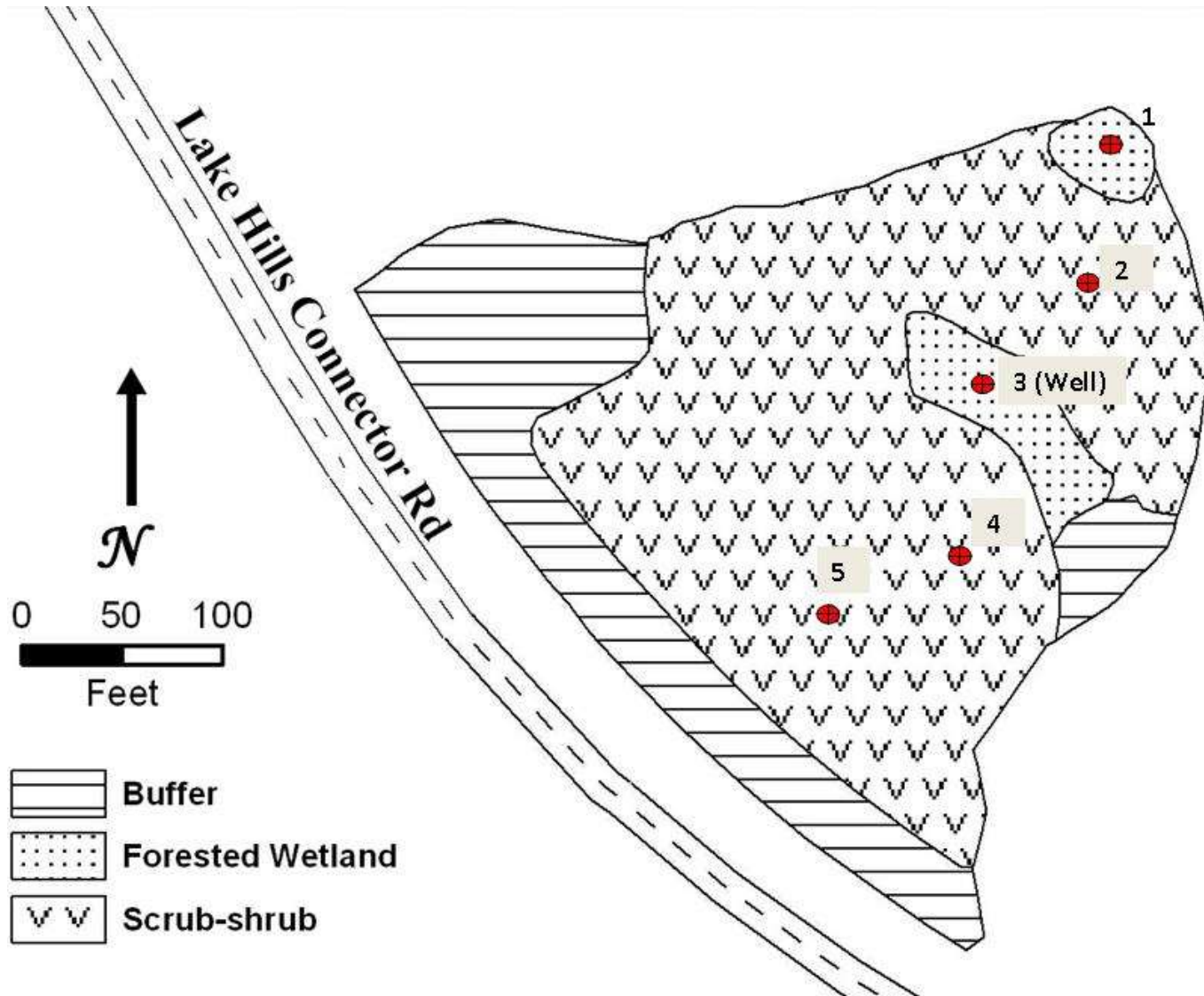


Table 2 Precipitation data from February 1st, 2010 to March 31st, 2010. Weather Underground weather station KWABELLE17 in Bellevue, WA.

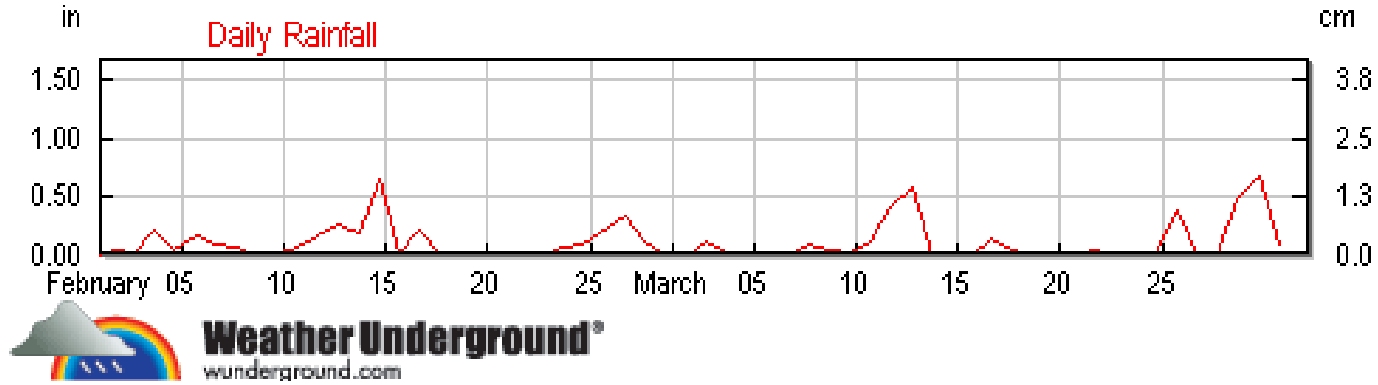
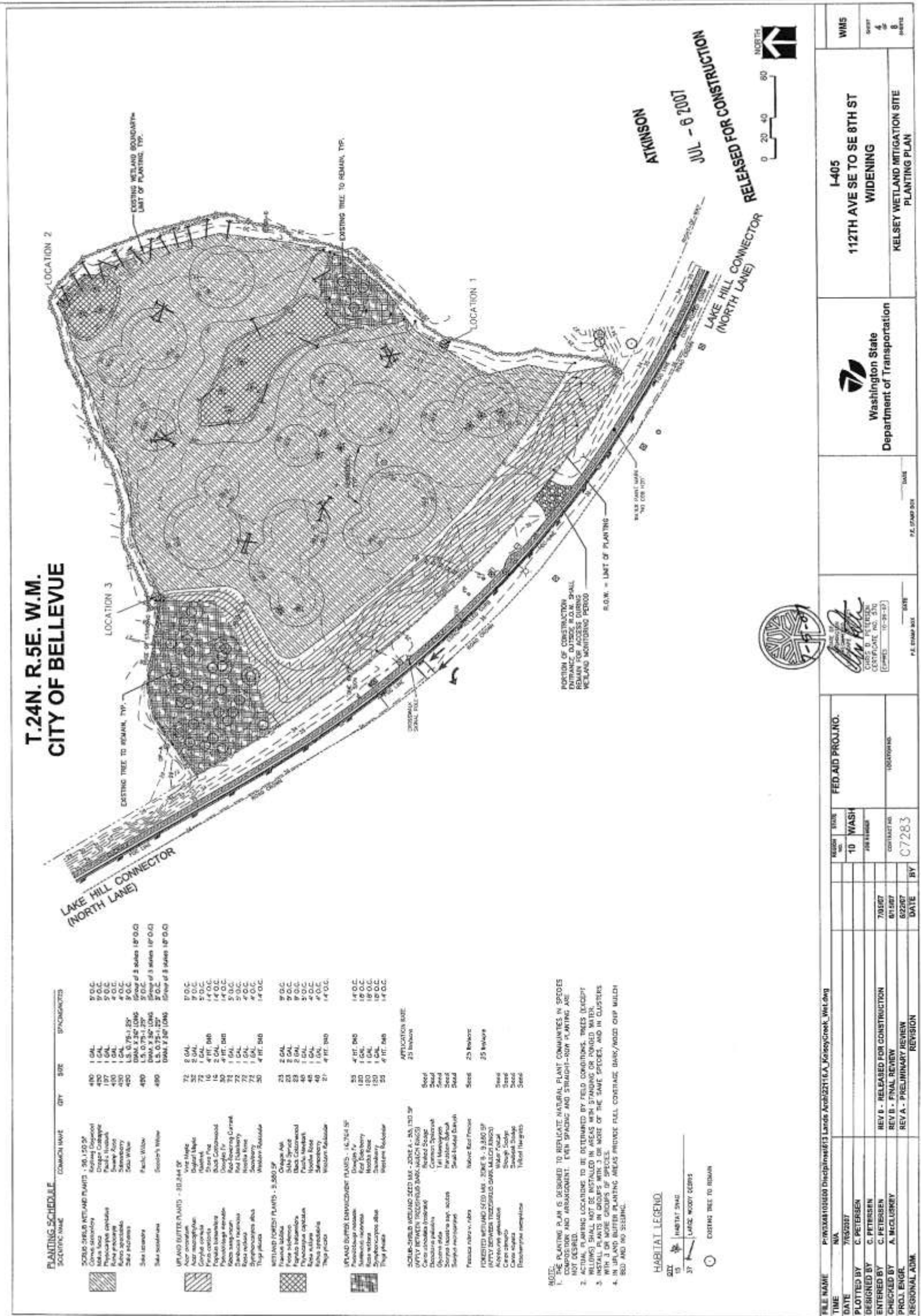


Table 3 Average Rainfall from WETS Station : SEATTLEW TCOMA WSCMO AP, WA7473 and Weather Underground weather station KWABELLE17

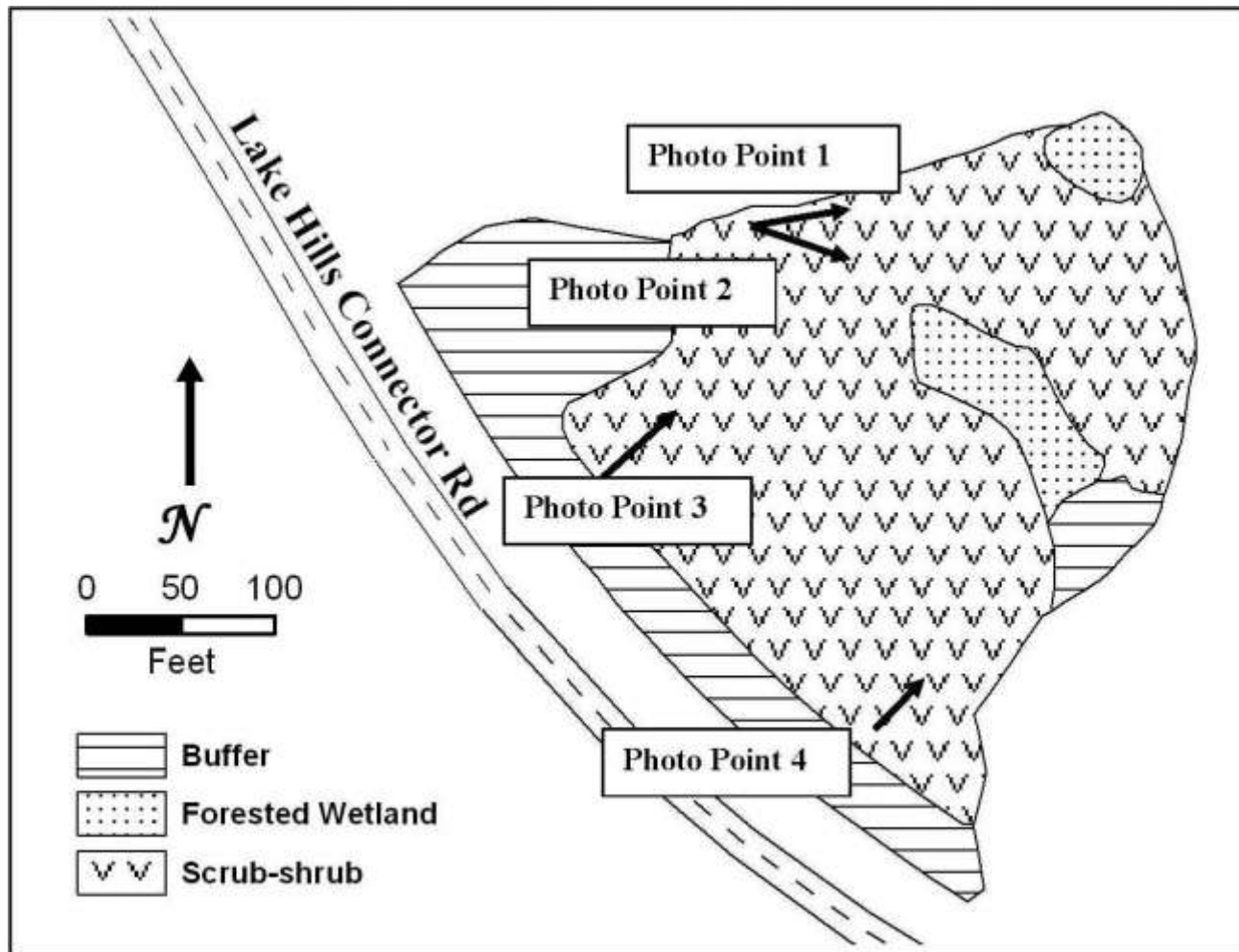
Month	30 year average (inches)	30% chance will have		2010 total rainfall per month
		Less than	More than	
February	4.18	2.73	5.02	2.77
March	3.75	2.77	4.40	3.20

Appendix 3 – Planting Plan

(Epstein and Clark 2005)



Appendix 4 – Photo Points



The photographs below were taken from permanent photo-points on July 6th, 2010 and document current site development.



Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4

Appendix 5 – Project Impacts and Mitigation Summary

Table 4 Project Impacts and Mitigation Summary

Project	USACE Permit Number	Wetland Impacts (acres)	Restoration Needed per Implementing Agreement (acres)	Additional Mitigation Provided (acres) ⁴	Total Restoration Applied (acres)	
SE 8th to I-90	NWP (14) 200501405	0.062	0.079	-	0.079	
112th Ave SE to I-90	NWP (14) 200600524	0.098	0.122	0.124	0.246	
Totals		0.160	0.201	0.124	0.325	
					Total Proposed Restoration (acres)	2.452
					Excess Available as Advance Mitigation for Future Impacts (acres) ⁵	2.127

⁴ Additional mitigation provided for forested buffer impacts per Ecology recommendation

⁵ Excess mitigation calculated using proposed restoration acreage. This acreage may change once a wetland delineation is conducted to determine the actual acreage of restored wetland that is present on site.

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