

SR 525, SR 99 I/C Joint Wetland (Lincoln Way) Mitigation Site

USACE NWP (26) 98-4-02126

USACE NWS-2009-1278

USACE NW (??) 1999-4-00222

USACE NW (14) 2000-4-01504

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

Issued March 2011



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Environmental Services Office

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	General Site Information	
	USACE Permits	98-4-02126 2009-1278 1999-4-00222 2000-4-01504
	Mitigation Location	North of Lincoln Way at Fender Drive, Snohomish Co.
	LLID Number	1222805478741
	Construction Date	2000
	Monitoring Period	2001-2010
	Year of Monitoring	10 of 10
	Area of Project Impacts¹	1.27 acres
	Type of Mitigation	Wetland Establishment
	Area of Mitigation²	1.67 acres

¹The original planned and permitted project wetland impacts totaled 1.36 acres. Only three of the five projects were constructed resulting in less wetland impacts as listed above. One additional project with wetland impacts was mitigated for with Lincoln Way in 2009 (See Appendix 3 for details).

²Additional mitigation to compensate for the project impacts is being provided by SR 99 Manor Way.

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results ³	Management Activities
Water is above, at or near the surface of the land for a minimum of 12.5 percent of the growing season	Present	
The wetland areas will be delineated using the current methodology to assure that the site contains 1.67 acres of new wetland.	Present	
The wetlands maintain 75% areal coverage of native emergent species in the emergent zones.	98% (CI _{90%} = 95-100% cover)	
Areal cover of native woody species in the forested/scrub-shrub zone combined will be 50% and consist of facultative or wetter native species.	74% (CI _{80%} = 65-83% cover)	

Report Introduction

This report summarizes final-year (Year-10) monitoring activities at the State Route (SR) 525, SR 99 I/C Joint Wetland (SR 99 Lincoln Way) Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site success. Monitoring activities conducted on July 12th and 13th included vegetation surveys and photo-documentation. Assessments of wetland hydrology occurred on February 23rd, March 8th, and March 23rd.

³ Estimated values are presented with their corresponding statistical confidence interval. For example, 74% (CI_{80%} = 65-83% cover) means we are 80% confident that the true aerial cover value is between 65% and 83%.

What is the SR 99 Lincoln Way Wetland Mitigation Site?

Lincoln Way is one of two mitigation sites created to compensate for the loss of 1.27 acres of wetlands resulting from four different projects that impact the Swamp Creek and Lake Serene watersheds. This mitigation site is located north of Lincoln Way in a rapidly developing residential neighborhood that drains into Swamp Creek in Snohomish County (Figure 1). Pre-existing conditions at the mitigation site included only upland areas. The mitigation site is intended to provide contaminant buffering, and improve both wildlife habitat and flood attenuation. Sources of hydrology include overland flows or groundwater seepage from areas to the north and northwest, and a culvert delivers surface water from a natural drainage from the east to the center of the site.

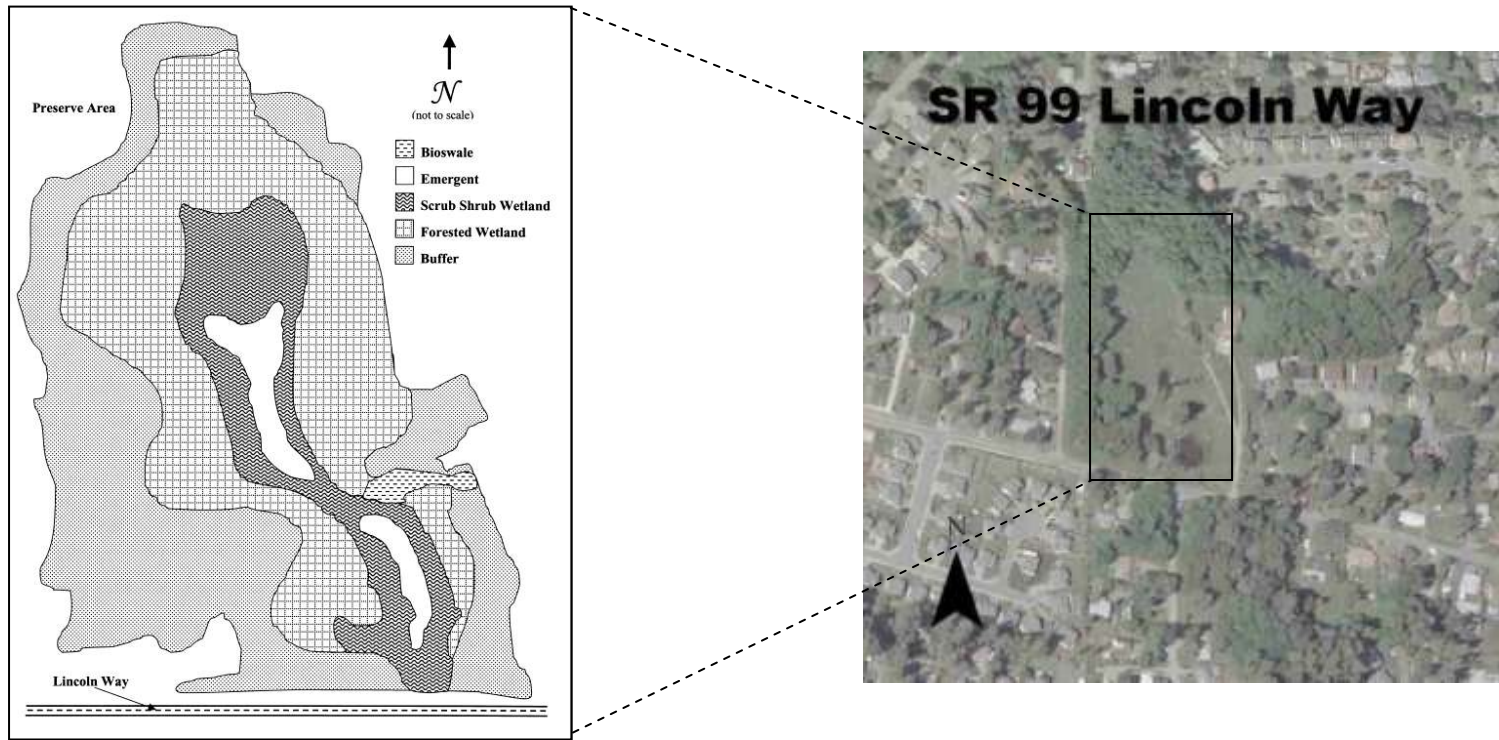


Figure 1 Site Sketch

This site contains emergent, scrub-shrub, and forested wetlands that were created from upland areas.

What are the performance standards for this site?

Performance Standard 1

Water is above, at or near the surface of the land for a minimum of 12.5 percent of the growing season (30 consecutive days from March through October).

Performance Standard 2

The wetland areas will be delineated using the current methodology to assure that the Lincoln Way site contains 1.67 acres of new wetland.

Performance Standard 3

The wetlands maintain 75% areal coverage of native emergent species in the emergent zones.

Performance Standard 4

Areal cover of native woody species in the forested/scrub-shrub zone combined will be 50% and consist of facultative or wetter native species.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 4 shows the planting plan (WSDOT 1999).

How were the performance standards evaluated?

To evaluate standards for woody cover in the scrub-shrub wetland, a baseline was established through the center of the site (Figure 2). Twenty-four sampling transects were randomly placed perpendicular to the baseline. The line intercept method was used to estimate woody cover (Performance Standard 4) in the scrub-shrub and forested wetlands. A baseline was established through the center of the emergent zone and the point intercept method was used to estimate herbaceous cover (Performance Standards 3). Open water areas were not included in the sample.

WSDOT staff collected hydrology data using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997) (Performance Standard 1). Six permanent hydrology pit locations were established and recorded on a map (Appendix 3). 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 are made.

In 2008, a wetland delineation was conducted in order to address Performance Standard 2.

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

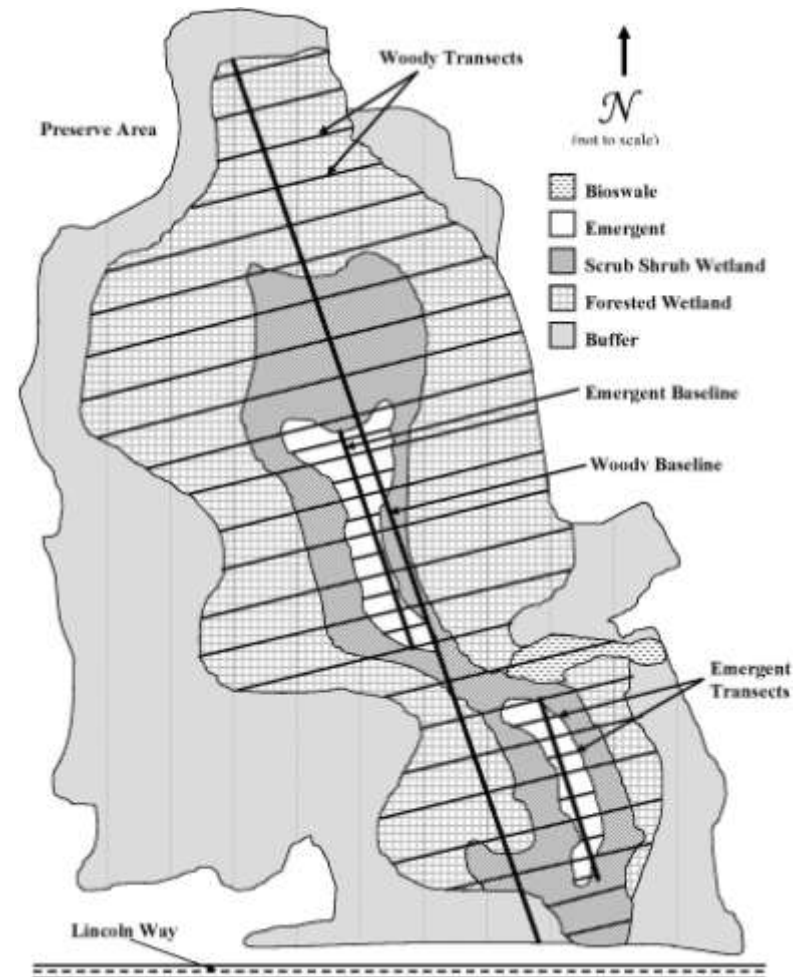


Figure 2 Site Sampling Design (2010)

Is this site a success?

This final-year mitigation site has generally developed as planned. The site provides the intended functions including wildlife habitat, flood attenuation, and contaminant buffering. Long-term hydrology monitoring data and a wetland delineation conducted during June 2008 suggest that grading activities were successful and the intended wetland hydrologic regime is present across the site.

Quantitative sampling of vegetative cover in the summer of 2010 confirmed the achievement of all year-10 performance standards. A planted and naturally colonizing tree and shrub community has developed on site with a diverse community of native species present. The emergent wetland areas have filled in with planted and naturally colonizing native plant species. The cover of native woody species in the buffer has surpassed the most recent target and provides continuous cover around a majority of the site.

The wetland plant community continues to provide increased habitat complexity, food chain support, opportunities for nesting and perching birds as well as fruit, seed, and leaf litter production. Cover of invasive species is low, and habitat structures, fencing, and signage are in place.

Manual and herbicide weed control efforts occurred in March, April, May, July, August, Sept., and August of 2010.

Results for Performance Standard 1
(Wetland hydrology):

Monitoring records from February and March 2010 indicate wetland hydrology is present in all intended areas (Photo 1). Hydrology data collected in 2010 indicate that saturated soil or standing water was present either at or within 12 inches of the soil surface (see Appendix 3).

Results for Performance Standard 2
(1.67 acres of wetland will be created):

A wetland delineation was completed on June 4th and 5th, 2008 to determine total wetland acreage on this site. The result is 1.95 acres of wetland present on site. This is more than the required area.

Results for Performance Standard 3
(Native herbaceous/emergent vegetation will achieve 75% coverage):

Aerial cover of native emergent species is 98% ($CI_{90\%} = 95-100\%$). This estimate exceeds the target in the performance measure for year-10. Inundated areas lacking vascular rooted plants were not included in this calculation.

Dominant species observed in this zone include slough sedge (*Carex obnupta*), soft-stem bulrush (*Schoenoplectus tabernaemontani*), soft rush (*Juncus effusus*), and broadleaf cattail (*Typha latifolia*) (Photo 2).



Photo 1
Shallow inundation in the emergent wetland (March 2010)



Photo 2
Native emergent cover (July 2010)

Results for Performance Standard 4

(Native facultative or wetter woody species will achieve 50% coverage):

The aerial cover of facultative or wetter native species in the forested and scrub-shrub wetlands is 74% (CI_{80%} = 65-83%). This cover value exceeds the performance standard target (Photo 3). Dominant species observed in this zone include red alder (*Alnus rubra*), redosier dogwood (*Cornus sericea*), and willows (*Salix* spp.).



Photo 3
Native woody cover in the forested wetland (July 2010)

What is planned for this site?

This document includes results from the last year of planned monitoring. Maintenance will be performed by WSDOT personnel and would be confined to repairing vandalism, erosion damage, minor revegetation (if necessary), trash collection, and weed control.

Appendix 1 – Goals and Performance Standards

The following success standards are excerpted from the *Joint Wetland Mitigation Plan for SR 524: (196th St./Filbert Road) 24th to SR 527, SR 405: Bothell to Swamp Creek, Stage 2, SR 525: I-5 to SR 99 Widening, SR 525 Swamp Creek Park and Ride Extension, and SR 525: SR 99 Interchange* (WSDOT 1999). The standards addressed this year are identified in **bold** font

GOALS

The goal of the proposed compensatory mitigation is to replace wetland types, acreage, and functions, which will be lost due to wetland impacts associated with the proposed projects. The proposed mitigation intends to create a total of 2.96 acres of wetland with plantings of native vegetation to achieve palustrine emergent, scrub-shrub, and forested vegetative classes as mitigation for the loss of 1,357 acres. A wetland buffer of 25 feet minimum is proposed at each site, creating 0.45 acres of buffer at Manor Way and 0.75 acres at Lincoln Way. The created wetlands are anticipated to provide the following functions and values:

- Wildlife habitat – through increasing the available shrub and tree cover and habitat structures;
- Flood attenuation – through increasing density of vegetative cover,
- Contaminant buffering – by providing a well-vegetated wetland area to intercept sediment and contaminants.

OBJECTIVES AND PERFORMANCE MEASURES

WSDOT will use the following objectives and performance standards as specific criteria to measure the mitigation site’s success.

Objective 1 - Hydrology

The mitigation sites will provide ground or surface water inundation or saturation sufficient to support a long-term wetland site.

Performance Standards

First through Tenth Year:

- a. **Water is above, at or near the surface of the land for a minimum of 12.5 percent of the growing season (30 consecutive days from March through October.**

Fifth Year:

- b. First through tenth year standard applies

Tenth Year:

- c. **First through tenth year standard applies.**

- d. **The wetland areas will be delineated using the current methodology to assure that the Manor Way site contains 1.29 acres of new wetland and the Lincoln Way site contains 1.67 acres of new wetland.**

Objective 2 - Vegetation

The compensatory mitigation sites will include a total of approximately 2.96 acres of emergent, forested, and scrub-shrub wetland vegetation and 1.20 acres of planted wetland buffer. The proposed Lincoln Way wetland will have an initial planting of 6% emergent, 30% scrub shrub, and 64% forest vegetation. Manor Way would have 22% emergent, 34% scrub-shrub, and 44% forested.

Performance Standards

First year:

- a. During the first year plant establishment, planted species that are dead or unsatisfactory shall be replaced. Maintaining a one-foot radius weed free condition around each woody plant and irrigation as necessary to ensure continued growth shall be accomplished.

Third year:

- b. The emergent zones will have 70% relative areal (*sic*) coverage of facultative-wet or wetter native (i.e., excluding reed canarygrass or purple loosestrife) emergent vegetation, comprised of minimum of three native species. The scrub-shrub and forested zones combined will have 15% areal (*sic*) cover by native facultative or wetter woody species, comprised of at least three species each.
- c. The buffer will have 15% areal (*sic*) coverage of native woody species.

Fifth year:

- d. The emergent zones will have 75% or greater relative areal (*sic*) coverage of native facultative-wet or wetter species. The scrub-shrub and forested zones combined will have 25% areal (*sic*) cover by native facultative or wetter woody species, comprised of at least three species each.
- e. The buffer will have 35% areal (*sic*) cover of native woody species.

Tenth year:

- f. The wetlands maintain 75% areal (*sic*) coverage of native emergent species in the emergent zones. Areal (*sic*) cover of native woody species in the forested/scrub-shrub zone combined will be 50% and consist of facultative or wetter native species.**

Objective 3 - Wildlife

Wildlife cover and forage availability for birds and small mammals should increase substantially. The addition of fruit bearing shrubs and stumps, logs, and brush piles will increase habitat diversity and structure in the newly vegetated areas. Overall, creating an emergent and scrub-shrub wetland is intended to provide feeding, breeding, and resting habitat for birds, small mammals, and amphibians.

Performance Standards

First year:

- a. Habitat structures identified in the plans have been placed on the site.

Third year:

- b. Habitat structures identified in the pans are still in place.
- c. After three years, increases in wildlife cover and forage species will improve habitat structure. This is expected to provide a corresponding increase in wildlife use.
- d. Vegetation standards in Objective 2 apply.

Fifth year:

- e. After five years wildlife cover and forage species will be established to where habitat structure will change from a single layer of vegetation to multiple layers.

- f. Vegetation standards in Objective 2 apply.

Tenth year:

- g. Vegetation standards in Objective 2 apply.**

CONTINGENCY PLANS

Mitigation goals should be accomplished through successful completion of the planting plan. Contingency plans will ultimately consist of replanting the site in the case of planting failure or other unforeseen problems. The natural recruitment of native wetland species and upland species (to the buffer) throughout the mitigation site will assist any revegetation contingency plan.

In the event that the areal (*sic*) coverage of forest wetland or forested buffer plants falls short of the listed performance standards, additional measures will be employed to assure the establishment of these plant communities at the site(s). In the event that by year three the hydrology standard is not met for 2.96 acres of the sites, agencies shall be consulted and remedial actions shall be employed to assure establishment of wetland hydrology at the site(s).

The following schedule summarizes how we assure achievement of performance standards and mitigation goals:

If the site does not meet the standards of success for vegetative cover after the third growing season, additional planting will be performed. Sprigs, cuttings, seeds or live plant material is necessary will be replanted and monitored to assure that coverage meets performance standard criteria. If required, remedial grading will occur if the hydrology standard is not met for two years of non-drought conditions.

If the site does not meet the standards of success for vegetative cover after the fifth growing season, resource agencies will be consulted to discuss further measures to remedy the problems at the site. The monitoring program will be extended and remedial measures will be performed as necessary to establish appropriate wetland vegetation. WSDOT will perform all measures considered necessary to establish and maintain a functioning wetland system.

The mitigation plan is designed to utilize and promote the growth of native vegetation. Attempts will be made to limit the spread of exotic or noxious species and they will not be allowed to dominate the site. Noxious and invasive species identified in Snohomish County's Critical Area Regulation will be eliminated immediately if found occurring on the site, before large populations can establish. A weed control program will be implemented if more than 10% of the wetland is invaded by invasive exotic species (e.g., reed canarygrass or purple loosestrife).

OPERATIONS AND MAINTENANCE

The goal of the wetland mitigation site is to create a functional self-sustaining system that should require very little maintenance. Once the vegetation establishes minimum disturbance will occur. WSDOT will retain the site in perpetuity. Maintenance will be performed by WSDOT personnel and would be confined to repairing vandalism, erosion damage, minor revegetation (if necessary), trash collection, and weed control.

MONITORING

The site will be monitored by WSDOT for a minimum of ten years following mitigation construction and planning. Formal monitoring will be performed according to procedures outlined in WSDOT's Monitoring Methods (1996 Wetland Mitigation Monitoring Report) during the first, third, fifth, seventh and tenth year after planting. Informal monitoring will occur in the second, fourth, sixth, eighth and ninth years. Monitoring reports will be issued annually to the Corps of Engineers, Department of Ecology, Snohomish County and other resource agencies or local governments for review and comment. Successful mitigation will be measured by attainment of performance standards listed in the goals and objectives section of this document.

Appendix 2 – Methods

To evaluate standards for woody cover in the scrub-shrub wetland, a baseline was established through the center of the site (Figure 2). Twenty-four sampling transects were randomly placed perpendicular to the baseline. The line intercept method was used to estimate woody cover (Performance Standard 4) in the scrub-shrub and forested wetlands. Twenty-two randomly positioned twenty-five meter line segment sample units were placed along sampling transects in the forested and scrub-shrub zones. A baseline was established through the center of the emergent zone and the point intercept method was used to estimate emergent cover (Performance Standards 3). Twelve 5 meter randomly positioned line-segment sample units (20 points each) were placed along sampling transects in the emergent zone. Open water areas were not included in the sampled area.

Sample size analysis confirmed sufficient sampling had been completed based on site sampling objectives and the desired level of statistical confidence. The sample size equation shown here (below) was used to perform the analysis on data collected (Performance Standards 3 and 4). 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

WSDOT staff performed a wetland delineation using methods described in the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2008), the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997), the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), and a Global Positioning System (Trimble TSCI data logger) (Performance Standards 1 and 2).

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

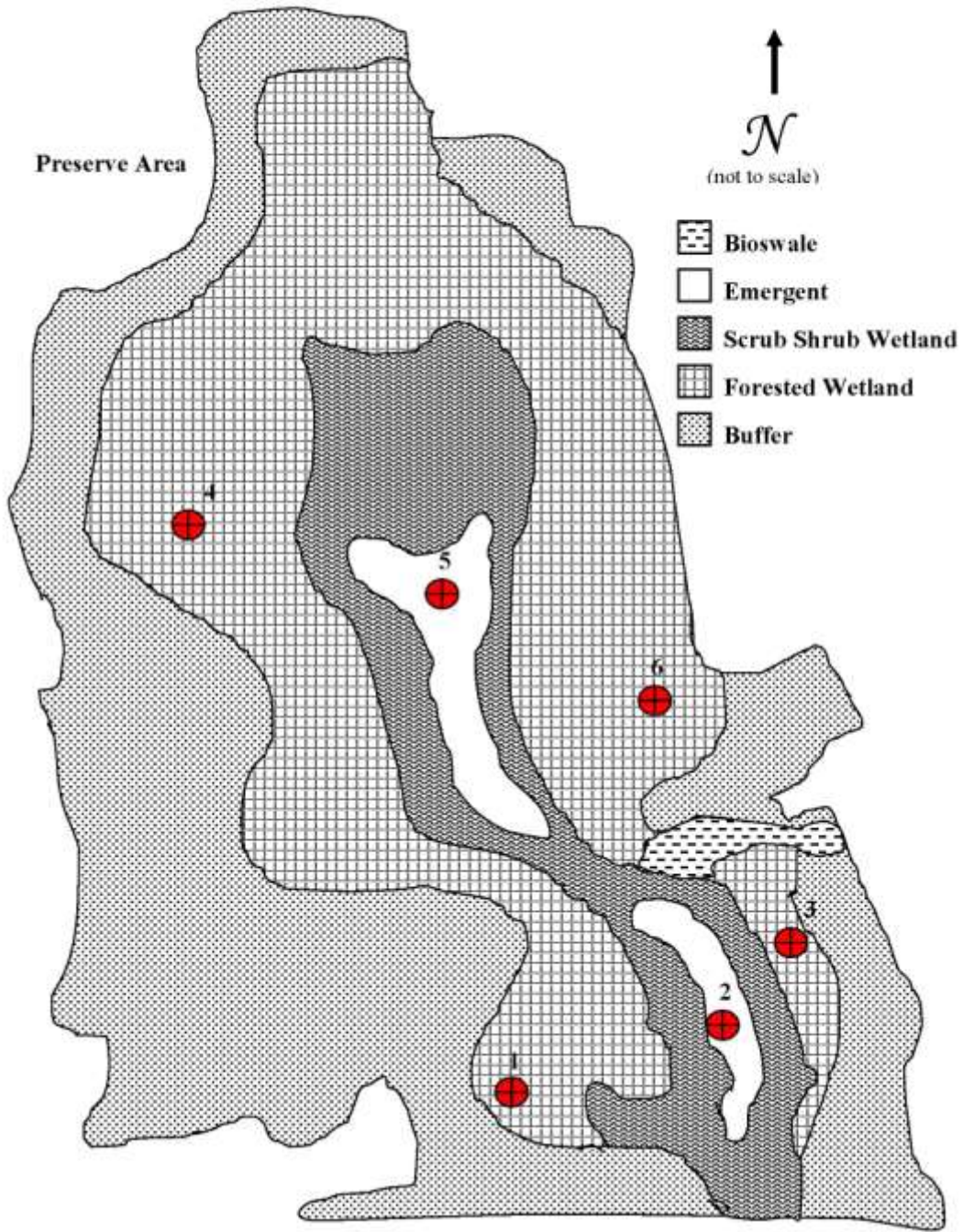
Appendix 3 – Data Tables

Table 1 Hydrology Observations			
Date	Surface Observations	Surface and Sub-surface Observations	
23 Feb 10	Most of PEM and PSS (and some parts of the PFO) zones inundated or saturated to the soil surface.	Pit 1	Water at 9.5” instantly
		Pit 2	Inundated 14”
		Pit 3	Water at 12” after 40 minutes
		Pit 4	Saturated between 6-11” after 30 minutes
		Pit 5	Inundated 2.5”
		Pit 6	Water at 9.5” instantly
8 March 10	PEM and PSS (and some parts of the PFO) zones inundated or saturated to the soil surface.	Pit 1	Saturated at 5” after 39 minutes
		Pit 2	Inundated 12”
		Pit 3	Water at 11” after 44 minutes
		Pit 4	Water at 6” after 1 minute
		Pit 5	Inundated 2”
		Pit 6	Saturated at 4” after 30 minutes
23 March 10	Saturation or inundation present across a majority of the site	Pit 1	Water at 10” instantly
		Pit 2	Inundated 10”
		Pit 3	Water at 11” after 30 minutes
		Pit 4	Saturated to surface
		Pit 5	Inundated 3”
		Pit 6	Water at 7.5” instantly

Table 2 Wetland Impacts

Project	Permit	Impact area (acres)
I-405, Bothell to Swamp Creek (HOV) – Stage 2	USACE NW (??) 1999-4-00222)	0.009
SR 525, I-5 to SR 99 – Widening	USACE NW 14, #2000-4-01504)	0.25
I-5/196 th Street (SR 524) Interchange Braided Ramp	USACE NWS 2009-1278	0.26
SR 525, SR 99 Interchange	USACE NW 26 98-4-02126	0.747
	Total	1.23

Hydrology Pit Locations



Appendix 5 – Photo Points

The photographs below were taken from permanent photo-points on July 14, 2010 and document current site development.



Photo Point 1



Photo Point 2



Photo Point 3

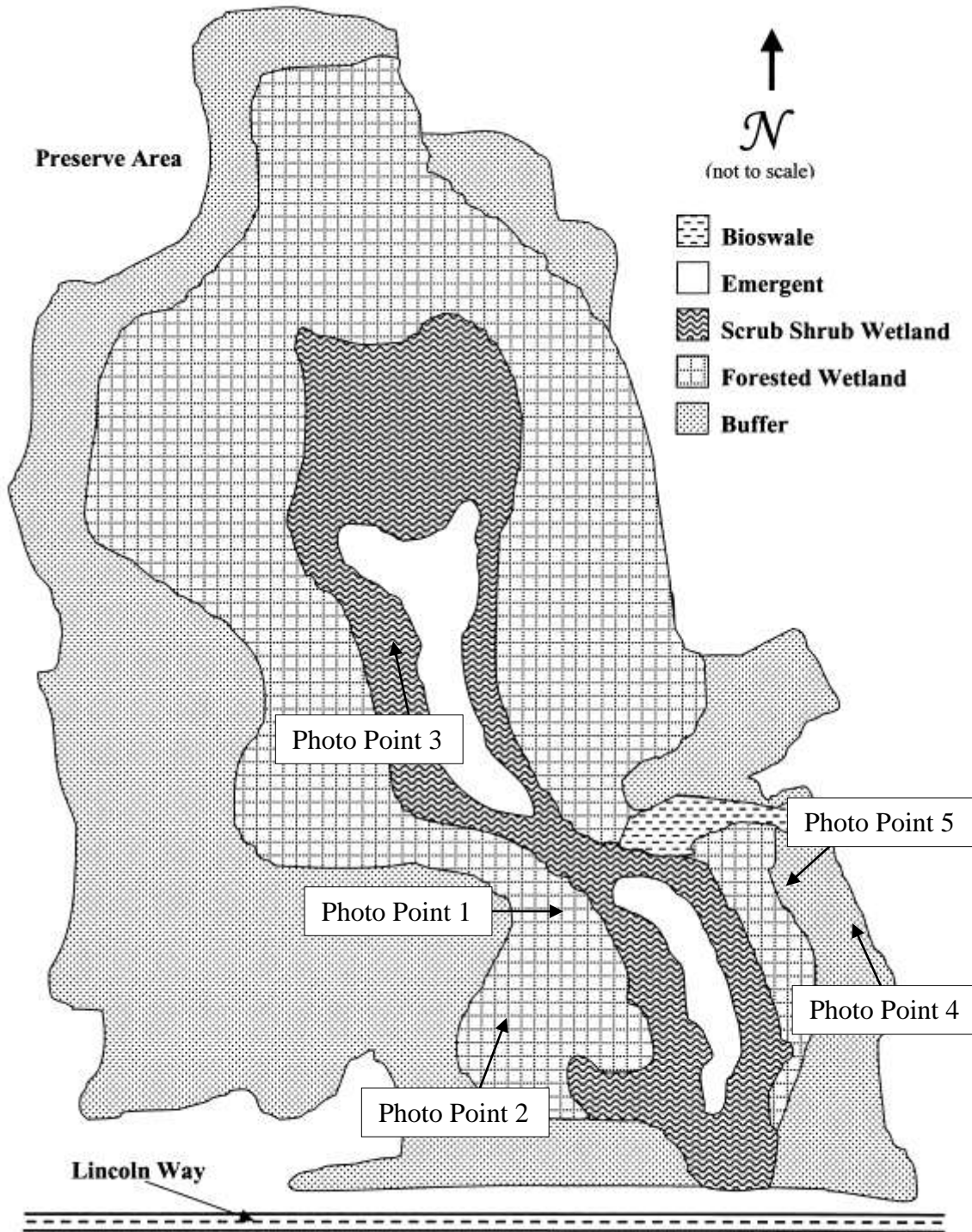


Photo Point 4



Photo Point 5

Photo Point Map



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