



**CONFLUENCE**  
ENVIRONMENTAL COMPANY

4803 Forest Avenue SE  
**MITIGATION PLAN**

*Prepared for:*

**Laurie Cropp**  
March 6, 2018



# 4803 Forest Avenue SE MITIGATION PLAN

Prepared for:

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Mercer Island, WA 98040

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March 6, 2018

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## 1.0 INTRODUCTION

Confluence Environmental Company (Confluence) conducted site visits at 4803 Forest Avenue SE, Mercer Island, Washington (tax parcel 4045000145) (Figure 1). The purpose of the site visits was to determine the presence and extent of streams and wetlands on and the property. Critical areas such as erosion hazard areas, steep slopes, and landslide hazard areas were not evaluated (Confluence 2017a, b). The site visit identified and delineated one Category V wetland on the property (Confluence 2017a, b).

The owners are proposing to construct a single-family home on the property. Because of the size and shape of the property and the location of the wetland, impacts to the wetland buffer cannot be avoided. This report documents the mitigation that would be implemented to compensate for unavoidable impacts.

## 2.0 EXISTING SITE CONDITIONS

The site is currently partially developed. The western portion is developed with a detached garage, driveway, and yard. The eastern portion of the property, where the wetland is located, is undeveloped.

One wetland, identified as Wetland A, was delineated on the property (Confluence 2017b). Wetland A is slope wetland located in the eastern portion of the property (Figure 1) and is 638 square feet in size. It begins at the outlet of the stormwater pipe in the eastern portion of the property and ends at the lined basin in the central portion of the property. The existing stormwater pipe discharging at the top of the slope appears to be the primary source of hydrology for Wetland A.

According to the Cowardin classification (Cowardin et al. 1979), Wetland A is an emergent wetland. Wetland A is dominated by giant horsetail (*Equisetum telmateia*). The boundary of Wetland A was determined by topographic break, evidence of standing water or saturated soils, and the vegetative shift to non-hydrophytic vegetation. According to the 2004 Wetland Rating System (Hruby 2004), Wetland A was rated as a Category IV wetland.

According to Mercer Island City Code (MICC) 19.07.080, Category IV wetlands have a standard buffer of 35 feet but buffers can be reduced to a minimum width of 25 feet with enhancement. The upland (including the buffer) surrounding the wetland is dominated by invasive species such as Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*) and laurel (*Daphne* sp.). Figure 1 shows the wetland and the standard buffer.



Figure 1. Site Vicinity and Delineated Wetland

### 3.0 PROPOSED DEVELOPMENT

The proposed development is a new single-family residence. As part of the development, the existing garage would be demolished and a 2,217-square-foot home would be constructed (Figure 2). Because of the unusual shape of the property and the presence of steep slopes in the eastern portion of the property, development is limited to the western portion of the property.

Figure 2 shows the proposed development in relation to the wetland and standard 35-foot buffer and reduced 25-foot buffer. Because of the unusual shape of the property and location of the wetland, the proposed development would encroach into the standard 35-foot buffer.

### 4.0 IMPACTS TO CRITICAL AREAS

The proposed development would not impact Wetland A; however, both permanent and temporary impacts to the standard buffer would occur. According to MICC 19.07.030.A(13), Category IV wetlands of low value under 2,500 square feet can have their buffers altered and the applicant is not required to comply with the other regulations of the chapter, subject to an applicant meeting the specific conditions to the satisfaction of the code official. However, there are no specific set of conditions under 19.07.030.A(13) like there are under all the other specified allowed alterations. Nor does 19.07.030.A(13) refer to other sections of the code that need to be complied with, like other allowed alterations have. While there are no specific conditions or code sections to be met, the proposed mitigation would meet the minimum buffer width of 25 feet for Category IV wetlands described in MICC 19.07.080.

To avoid impacts to the wetland buffer to the maximum extent, the project proposes to reduce the standard buffer width from 35 feet to a minimum width of 25 feet in the western portion of the buffer only (Figure 2). This results in a buffer reduction of approximately 650 square feet (sq ft). Currently there is approximately 430 sq ft of impervious surface (as driveway) within the buffer reduction area. The remaining portion of the buffer within the proposed buffer reduction area is lawn. Using buffer reduction with enhancement, as allowed under MICC 19.07.00, results in no permanent impacts to the wetland buffer from the proposed development. Details on the proposed mitigation are in Section 5.0.

Temporary impacts to the reduced buffer would occur during construction. Currently the area where temporary impacts would occur is either impervious surfaces (e.g., the driveway) or lawn. Once construction is completed, the impervious surface will be gone and all disturbed soils in the reduced buffer area would be revegetated with grass seed.

ABE CALC'S.		
LENGTH	ELEVATION	LENGTH x ELEVATION
A = 30.0'	a = 81.1	2433.0
B = 24.0'	b = 81.36	1952.64
C = 3.0'	c = 82.0	246.0
D = 7.0'	d = 86.3	604.1
E = 3.0'	e = 86.2	258.6
F = 10.0'	f = 86.1	861.0
G = 3.0'	g = 87.6	262.8
H = 70.0'	h = 86.7	6069.0
I = 22.0'	i = 85.0	1870.0
J = 3.5'	j = 85.1	297.85
K = 10.0'	k = 85.3	853.0
L = 14.5'	l = 85.8	1244.1
M = 5.0'	m = 82.0	410.0
N = 10.5'	n = 86.3	906.15
O = 3.0'	o = 88.1	264.3
P = 24.0'	p = 88.1	2114.4
Q = 5.0'	q = 87.5	437.5
R = 10.0'	r = 87.0	870.0
TOTAL		20542.8
243.0'		20542.8
ARE = 20542.8 / 243.0'		84.54
ROOF MAG = 16.53		

FAR CALCULATIONS		
LOWER FLOOR ENCLOSED SF	TOTL SF	
UPPER FLOOR ENCLOSED SF	1695 SF.	
TOTAL ENCLOSED ELD (FROM OUTSIDE OF EXTENSION WALL IN)	3,427 SF.	
TOTAL LOT SF.	16,391 SF.	
FAR	20.1 %	

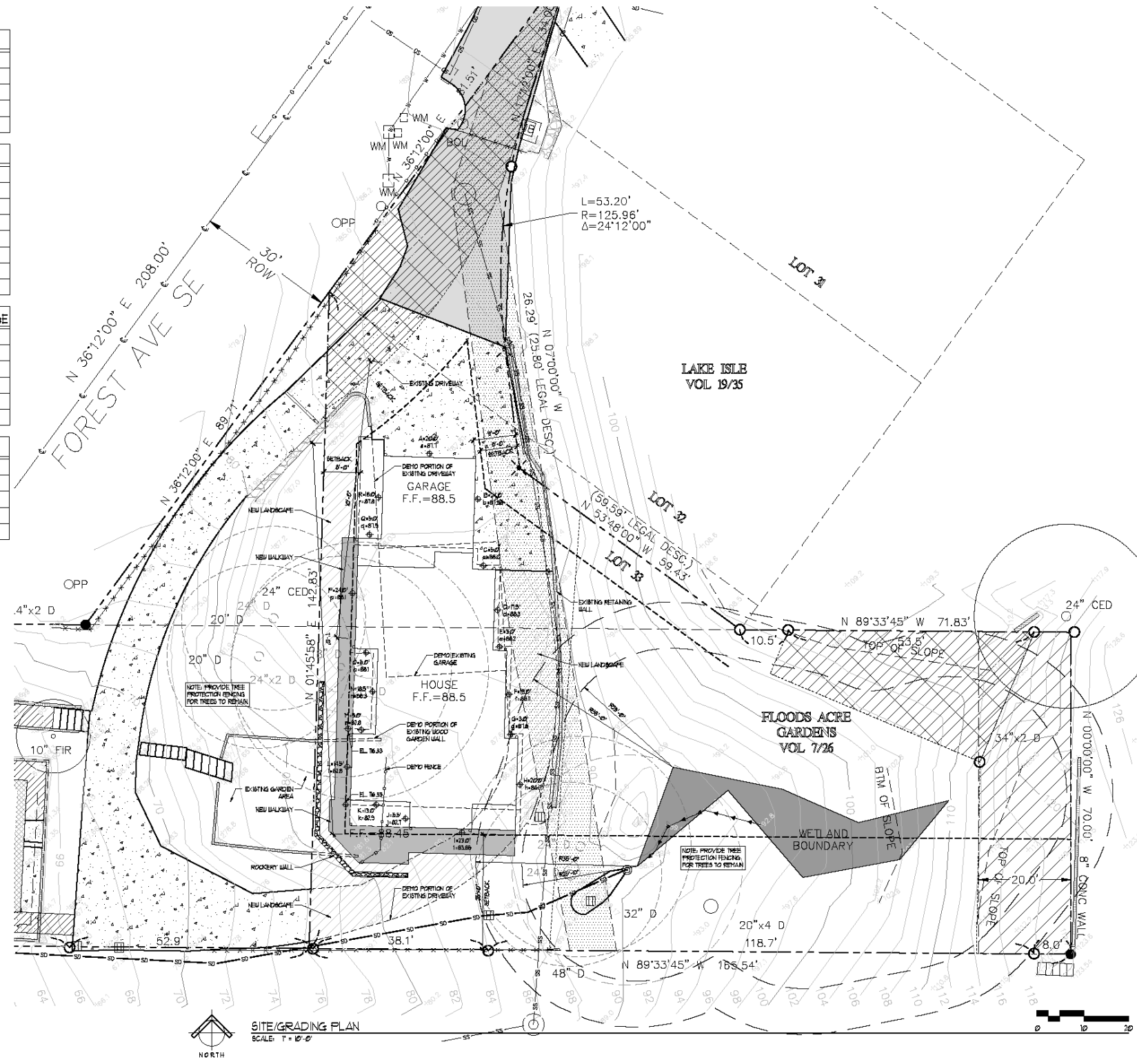
LOT COVERAGE BY STRUCTURE		
HOUSE FOOTPRINT W/ GARAGE	2317 SF.	
COVERED DRIVEWAY	1019 SF.	
COVERED PORCH 1	719 SF.	
COVERED PATIO 2	925 SF.	
COVERED DECK	710 SF.	
TOTAL	5980 SF. /	
TOTAL LOT SF.	16391 SF.	
% OF LOT	36.5 %	

IMPERVIOUS SURFACE COVERAGE		
ALL ROOFS (INCLUDING EAVES)	2,917 SF.	
DRIVEWAYS	2,620 SF.	
WALKWAY	363 SF.	
TOTAL	5,900 SF.	
TOTAL LOT SF.	16,391 SF.	
% OF LOT	34.45	

LOT SLOPE	
HIGHEST ELEVATION POINT OF LOT	117.6
LOWEST ELEVATION POINT OF LOT	76.0
ELEVATION DIFFERENCE	41.6
HORIZ. DIFFERENCE BETWEEN HIGH & LOW	94.44'
LOT SLOPE: 44.4% & 4.4'	28.2%



**R.F. ARCHITECTURE**  
 PRINCIPAL ARCHITECT  
 4803 FOREST AVENUE SE  
 MERCER ISLAND, WA 98040  
 206.333.0000

6880 REGISTERED ARCHITECT  
 EDWARD W. FLAKE  
 STATE OF WASHINGTON

ALL DIMENSIONS AND LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CLIENT OR SURVEYOR. THE DESIGNER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS. THE DESIGNER IS NOT PROVIDING ANY PROFESSIONAL SERVICES OTHER THAN ARCHITECTURAL DESIGN. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES. THE DESIGNER IS NOT PROVIDING ANY CONSULTING OR ENGINEERING SERVICES. THE DESIGNER IS NOT PROVIDING ANY PROFESSIONAL SERVICES OTHER THAN ARCHITECTURAL DESIGN.

CONTRACT NO. 1000000000000000  
 PROJECT NO. 1000000000000000

**CROPP RESIDENCE**  
 PROPOSED SINGLE FAMILY HOME  
 4803 FOREST AVENUE SE  
 MERCER ISLAND, WA 98040

DESIGN	RUF
DRAWN	RUF
CHECKED	RUF
REVISIONS	

NOV. 13, 2011  
 A-11

Figure 2. Proposed Development



## 5.0 PROPOSED MITIGATION

As stated above, the proposed development would reduce the buffer to 25 feet in the western portion of the wetland. The 25-foot buffer width would extend for a linear distance of approximately 67 feet before extending back out to 35 feet. This buffer reduction would only occur downslope of the wetland. Reducing the buffer from 35 feet to 25 feet along the western portion of the wetland results in a total buffer reduction of 650 sq ft. Table 1 summarizes the impacts and mitigation. Figure 3 presents the buffer reduction and mitigation areas.

**Table 1. Summary of Impacts and Mitigation**

Project Element	Impact Type	Impacts Area (sq ft)	Mitigation Type	Mitigation Area (sq ft)
Proposed House	Permanent	650	Buffer enhancement	650
Construction	Temporary	160	Restore to lawn (i.e., pre-impact condition)	160

The scientific literature recognizes that buffers provide important functions that protect wetlands (Sheldon et al 2005). Buffer functions are generally lumped into the following three categories:

- Hydrology
- Water Quality
- Habitat

For slope wetlands, such as Wetland A, the downslope portion of the wetland does not provide any hydrology or water quality functions to protect the wetland. Since proposed development would only reduce the buffer area downslope of the wetland, the development would not alter the current hydrology and water quality functions of the buffer.

Impervious surfaces provide no habitat function and lawn provides very little habitat function. Therefore, reducing the buffer from 35 feet to a minimum of 25 feet would not decrease existing habitat functions of the buffer, since habitat functions do not exist or are of very low quality within the reduced buffer area.

As stated above, according to MICC 19.07.080, reducing the buffer from 35 feet to 25 feet is allowed as long as the buffer reduction includes buffer enhancement and does not result in a net loss of functions. The proposed development reduces only the western (downslope) portion of the wetland, which provides little to no function. The reduced buffer comes to within 1-2 feet of the house; therefore, to maintain access to the house and allow for home maintenance, the reduced buffer area would either be converted from driveway to lawn or remain as lawn (once temporary impacts are finished). Having the reduced buffer area as lawn would not result in a

loss of function because, as described above, the existing conditions of the downslope portion of the buffer provides little to no water quality, hydrology, or habitat functions.

Rather than enhance the reduced buffer area, this mitigation proposes to enhance 650 sq ft of the buffer upslope of the reduced buffer area and within the standard buffer area (Figure 2). By enhancing the buffer in the proposed location, buffer functions are expected to increase. Since wetland buffers downslope of a slope wetland do not provide hydrology or water quality functions, enhancing the reduced buffer area would only increase the habitat function of that portion of the buffer. By enhancing the buffer on the slope, the plantings will not only increase habitat functions, they will increase water quality and hydrology functions.

## 6.0 MITIGATION PLAN

This section describes the goals, objectives, and performance standards of the buffer enhancement that will occur at 4803 Forest Avenue SE, Mercer Island, Washington. This section also describes the monitoring requirements of the planting plan. Table 2 summarizes the planting scheme.

**Table 2. Planting Scheme**

Common Name	Scientific Name	Container Size	Spacing	Quantity
Buffer Enhancement for Permanent Impacts (approximately 650 sq ft)				
Nootka rose	<i>Rosa nutkana</i>	1 gallon	5 ft OC	10
Oceanspray	<i>Holodiscus discolor</i>	1 gallon	5 ft OC	8
Salmonberry	<i>Rubus spectabilis</i>	1 gallon	5 ft OC	10
Western red cedar	<i>Thuja plicata</i>	5 gallon	5 ft OC	2
Total				30
Buffer Restoration for Temporary Impacts (approximately 160 sq ft)				
Seed mix	<i>Lolium sp. / Festuca sp.</i>	Seed	N/A	0.8 lb*

OC – On Center

\*Based on 5 pounds per 1,000 sq ft. Sod can be substituted for seed mix

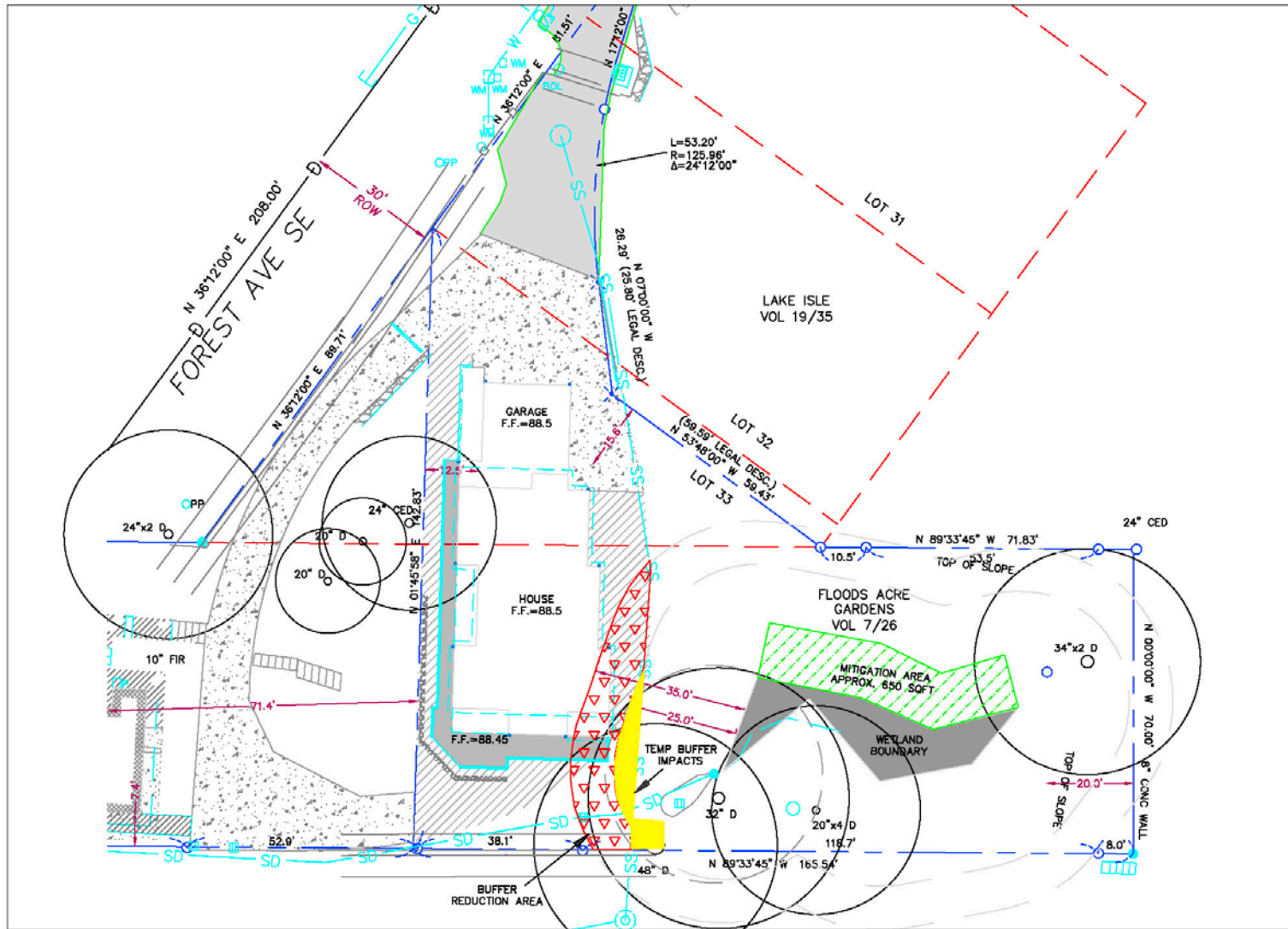


Figure 3. Buffer Reduction and Mitigation Areas

## 7.0 GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS

### 7.1 Goals and Objectives

The goal of this mitigation plan is to enhance 650 sq ft of a Category IV wetland buffer. The objective is that the mitigation area will be dominated with healthy, native plants.

### 7.2 Performance Standards

The following performance standards are to be monitored to document that the goals and objectives of the mitigation plan are being met. Table 3 summarizes the performance standards.

Table 3. Performance Standards

Performance Standard	Success Criteria				
	Year 1	Year 2	Year 3	Year 4	Year 5
PS1 – Percent Survival	100 %	100 %	NC	NC	NC
PS 2 – Percent Cover Native Species	NC	30	50	60	>75
PS 3 – Percent Cover Invasive Species	NC	≤10	≤10	≤10	≤10

PS – Performance Standard

NC – No Criterion

#### 7.2.1 Performance Standard 1 – Percent Survival

Planted vegetation and natural recruits will be monitored for survival for 2 years (Year 1 and Year 2). Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out for easier identification. Table 3 shows the success criteria for plant survival for each year of monitoring.

High mortality could result from improper installation, diseased or infested plants, inadequate watering, or extreme weather. If more than 25 percent of new plantings die in a single year, the cause of the high losses will be investigated and corrected before dead plants are replaced. Dead plant material will only be removed after that year's scheduled monitoring. If less than 80 percent of the total plants installed have survived during the Year 5 monitoring, additional plants will be installed to bring the planting schedule back into original specifications and yearly monitoring will continue for two additional years.

### **7.2.2 Performance Standard 2 – Percent Cover of Native Species**

Planted vegetation and natural recruits will also be monitored for percent cover for 5 years (Year 1, Year 2, Year 3, Year 4, and Year 5). Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out for easier identification. Table 3 shows the success criterion for percent cover of native species for each year of monitoring.

Five years of monitoring are planned; however, if the success criteria of Year 5 are met in Years 3 or 4, the site will be considered successful and no further monitoring will be conducted.

Plant growth, as determined by percent cover, could be negatively affected by improper installation, diseased or infested plants, inadequate watering, or extreme weather. If the percent cover success criterion is not met, the cause will be investigated and corrected. Correction measures may include increased watering, soil amendments, fertilizing, or revision of planting palette and additional plantings.

### **7.2.3 Performance Standard 2 – Percent Cover of Invasive Species**

The percent cover of area dominated by invasive species will be monitored for 5 years (Year 1, Year 2, Year 3, Year 4, and Year 5). Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out for easier identification. Table 3 shows the success criterion for percent cover of invasive species for each year of monitoring.

Five years of monitoring are planned; however, if the success criteria of Year 5 are met in Years 3 or 4, the site will be considered successful and no further monitoring will be conducted.

Dominance by invasive species could result from the disturbance of the soil, a high mortality rate of the native planted vegetation, or colonization by windborne seeds. To reduce colonization by invasive species, a site maintenance plan is described in Section 9.0. If more than 10 percent of area is covered by invasive species, the cause of infestation will be investigated and corrective actions will be taken before weeds are removed. Contingency measures could include increasing the frequency of weeding until native vegetation can grow and dominate the area, increasing the density of native vegetation with additional plantings, or planting the buffers with woody species to shade out invasive species in the buffer.

## **8.0 MONITORING PLAN**

A monitoring period of 5 years is proposed to ensure that plantings survive and establish successfully.

Data collected in Year 0 will provide the baseline for the success criteria for Years 1, 2, 3, 4, and 5 monitoring. Should the ecologist determine that any portion of the mitigation area needs to be replanted, a survey will be conducted after the replanting has been completed. This survey will then become the baseline for other monitoring surveys. For example, if survival success

criterion is not met in Year 2 and the ecologist determines that additional trees or shrubs need to be planted, a survey will be conducted after the addition of new plants. This survey will then provide the baseline for remaining monitoring events.

## 8.1 Plant Survival

Because of the small size of the mitigation area, all installed plants will be counted during each monitoring period. The number of living plants will be divided by the number of plants installed to determine the percent survival.

## 8.2 Percent Cover

Interim and final success will be defined by meeting the success criteria for percent cover and invasive species performance standards shown in Table 3. Up to 4 plots, no greater than 10 feet by 10 feet, will be established to calculate the aerial percent cover (i.e., “bird’s eye view”) of vegetation.

The location of each plot will be determined during the Year 0 monitoring. Each plot must be at least 30 feet apart from each other. In each circular plot, the percent cover of all vegetation, by species, and bare ground, will be estimated and recorded.

## 8.3 Photo Documentation

Photos of the mitigation area will be taken during each monitoring event to provide visual documentation of the mitigation area. Permanent photo points will be established at one corner of each plot to document the site over time. At each of the photo points, a fixed-lens digital camera will be used to take photographs, either a panoramic photo or one at every 90 degrees of the compass.

## 8.4 Frequency

Monitoring will occur during the growing season after deciduous plants have flowered or leafed-out. The Year 0 monitoring event will occur within 30 days after trees and shrubs have been installed. Each of the monitoring events will occur within 30 days of the calendar date of the Year 0 monitoring.

## 8.5 Reporting

For each monitoring event, the ecologist will prepare a report. One copy of each report will be provided to the King County project manager. The following will be included in each report:

- data tables;
- species lists;
- date of survey;

- a narrative description of methods and contingency measures taken;
- identified planted and naturally recruited trees and shrubs;
- interpretation of results; and
- color photos.

## 8.6 Year 0 Report (As-Built)

The Year 0 report will be submitted within 30 days after construction is completed. In addition to the general reporting requirements stated above, the following will be included in the Year 0 report:

- actual planting density (container size, average offset);
- description of any changes from the original design; and
- planting schedule.

## 8.7 Yearly Reports

The first yearly report is due within 1 year after the City's acceptance of the as-built report. All yearly reports will be submitted within 30 days of conducting the monitoring survey.

## 9.0 MAINTENANCE PLAN

Maintenance activities in the mitigation area will change throughout the duration of the monitoring and maintenance period. These activities will be concentrated immediately after installation and continue through the first and second year's post-installation as the vegetation survives and grows. If permits are received in time, installation will occur by fall of 2018.

### 9.1 Watering

Watering may be necessary depending on the date of planting and the amount of rainfall that year. If installation occurs before May 1, the plants will receive at least 1.5 inches of water (or equivalent of rainfall) twice per month during the spring of the first season and once per week during the summer months. Watering will be more crucial if installation occurs after May 1, because the plants will not have a chance to establish themselves during the rainy season. Biweekly watering (or rainfall equivalent) will be provided if plantings occur after May 1. Monitoring of rainfall and/or soil moisture will be used to determine the need for watering during the summer and early fall period. Watering will be less critical if planting occurs in the fall. Watering may be necessary during the summers of 2019, 2020, and 2021 to assist survival and establishment of plantings. Watering will be accomplished using a watering truck or temporary irrigation system.

## 9.2 Weeding

Weeding around shrubs will be important during the summer of the first year to ensure establishment and prevent stress to the plants from competition for resources. In the first growing season following installation, weeding will occur once monthly through August. All invasive species will be removed.

Weeding will also occur during the early and intermediate growing season of the second year after planting. The frequency can be gauged by necessity but should occur at least twice during the spring (ideally May and June), and then once more during the summer months (August or September). This weeding will also occur in the final year during establishment of the mitigation site. In other words, if planting occurs in the spring of 2019, the intensive weeding will occur during the summer of 2019 and the reduced intensity maintenance will occur in 2020 and 2021.

No weed whacking will be allowed around plantings. Weeding will be done using simple hand tools (e.g., rakes and hoes). No herbicide will be allowed. Removal of the highly invasive species such as Scotch broom (*Cytisus scoparius*), Himalayan blackberry, and reed canarygrass (*Phalaris arundinacea*) is especially important in the Northwest, and emphasis should be given to their removal to prevent invasion into the planted areas. Other native but weedy species such as horsetail may need to be weeded around installed plants to ensure installed plants are not choked out by the native, weedy species.

## 9.3 Mowing

No mowing will occur in the mitigation area.

## 9.4 Dead Plant Removal

Dead plant material will only be removed after scheduled monitoring. This will allow for the accurate assessment of planting success needed for the monitoring program. Replacement planting will be detailed in a section of the report from the monitoring program.

## 10.0 REFERENCES

Confluence (Confluence Environmental Company). 2017a. 4803 Forest Avenue Southeast watercourse evaluation. Prepared for Laurie Cropp, Mercer Island by Confluence Environmental Company, Seattle, Washington.

Confluence (Confluence Environmental Company). 2017b. 4803 Forest Avenue Southeast critical areas study update. Prepared for Laurie Cropp, Mercer Island by Confluence Environmental Company, Seattle, Washington.



- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States: U.S. Fish and Wildlife Service, Office of Biological Services, Publication FWS/OBS/79/31, Washington, D.C.
- Hruby, T. 2004. Washington State wetland rating system for western Washington, 2006 update. Washington State Department of Ecology, Publication # 04-06-025, Olympia, Washington.
- Sheldon, D., T. Hruby, P. Johnson, K. Harper, A. McMillan, T. Granger, S. Stanley, and E. Stockdale. March 2005. Wetlands in Washington State - Volume 1: A Synthesis of the Science. Washington State Department of Ecology. Publication #05-06-006. Olympia, WA. Available at <https://fortress.wa.gov/ecy/publications/documents/0506006.pdf> (accessed November 15, 2017).

