

SR 20: Quiet Cove to SR 20 Spur Safety Mitigation Site
SR 11: Chuckanut Park and Ride
WIN # A02027C

USACE NWP (23) 200601135
USACE NWS 2008-460-SOD

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 NWP 23 USACE NWS	200601135 2008-460-SOD		
Mitigation Location	Within the city limits of Anacortes adjacent to Fidalgo Bay		
LLID Number	1225719484631		
Construction Date	2009		
Monitoring Period	2010-2020		
Year of Monitoring	1 of 10		
Area of Project Impact	Wetland	Buffer	Stream Buffer
	0.66	0.53	0.28
Type of Mitigation	Wetland Establishment	Wetland Enhancement	Buffer Enhancement
Area of Mitigation ¹	1.39	0.45	1.46

¹The project will provide 1.61 acres of mitigation credit. The 1.61 acres of wetland mitigation minus the wetland enhancement area of 0.06 acre from the 0.45 acre of wetland enhancement for the indirect wetland impacts totals 1.55 acres and will exceed the Ecology mitigation area recommendation of 0.98 acre by 0.57 acre (58%). An additional ten percent of the wetland restoration area (bringing the total mitigation area to 1.08 acre) was set aside as mitigation for any unforeseen wetland impacts that may have occurred from small changes during project design and construction. If the additional 0.10 acre area is not used it will not be credited towards any project. The remaining 0.31 acre of restoration will be set aside for potential future mitigation projects within the basin upon Corps, Ecology, and Skagit County approval.

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Summary of Monitoring Results and Management Activities (2010)

Performance Criteria	2010 Results ²	Management Activities
Performance Standards		
Wetland hydrology present	Not addressed this year	
100% survival of native woody vegetation in the wetland	91% survival (CI _{80%} = 89-94%)	Additional replacements installed January 2011.
Cover of invasive species across the entire site	Qualitatively estimated at 5%	
100% survival of native woody vegetation in the upland buffer	93% survival (CI _{80%} = 92-95%)	Additional replacements installed January 2011.
100% survival of native woody vegetation in the riparian enhancement area	95% survival	Additional replacements installed January 2011.
Cover of invasive species in riparian enhancement area	Qualitatively estimated at 3%	Ongoing weed control.
Permit Requirement		
80% survival of planted native woody species	<ul style="list-style-type: none"> • 95% survival at Meadow Creek • No evidence of planting at the unnamed tributary to Campbell Lake 	<ul style="list-style-type: none"> • Additional replacements installed January 2011 at both locations.

Report Introduction

This report summarizes first-year (Year-1) monitoring activities at the State Route (SR) 20 Quiet Cove to SR 20 Spur Safety Mitigation Site (SR 20 Quiet Cove). Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities include vegetation surveys and photo-documentation. Vegetation monitoring occurred on July 26th and 27th, 2010.

² Estimated values are presented with their corresponding statistical confidence interval. For example, 91% survival (CI_{80%} = 89-94%) means we are 80% confident that the true survival value is between 89% and 94%.

What is the SR 20 Quiet Cove Mitigation Site?

This 5.95-acre mitigation site (Figure 1) is a combination of wetland enhancement, establishment, and existing wetland located southeast of Fidalgo Bay at the corner of SR 20 and March Point Road in the city of Anacortes. This site was created to compensate for the loss of 0.66 acre of wetlands due to road improvements along SR 20. The seasonally ponded depressions and surrounding scrub-shrub areas are designed to provide mitigation for lost wetland functions including wildlife habitat, biological support, and storm water control. See Appendix 2 for the Riparian Enhancement at Meadow Creek.

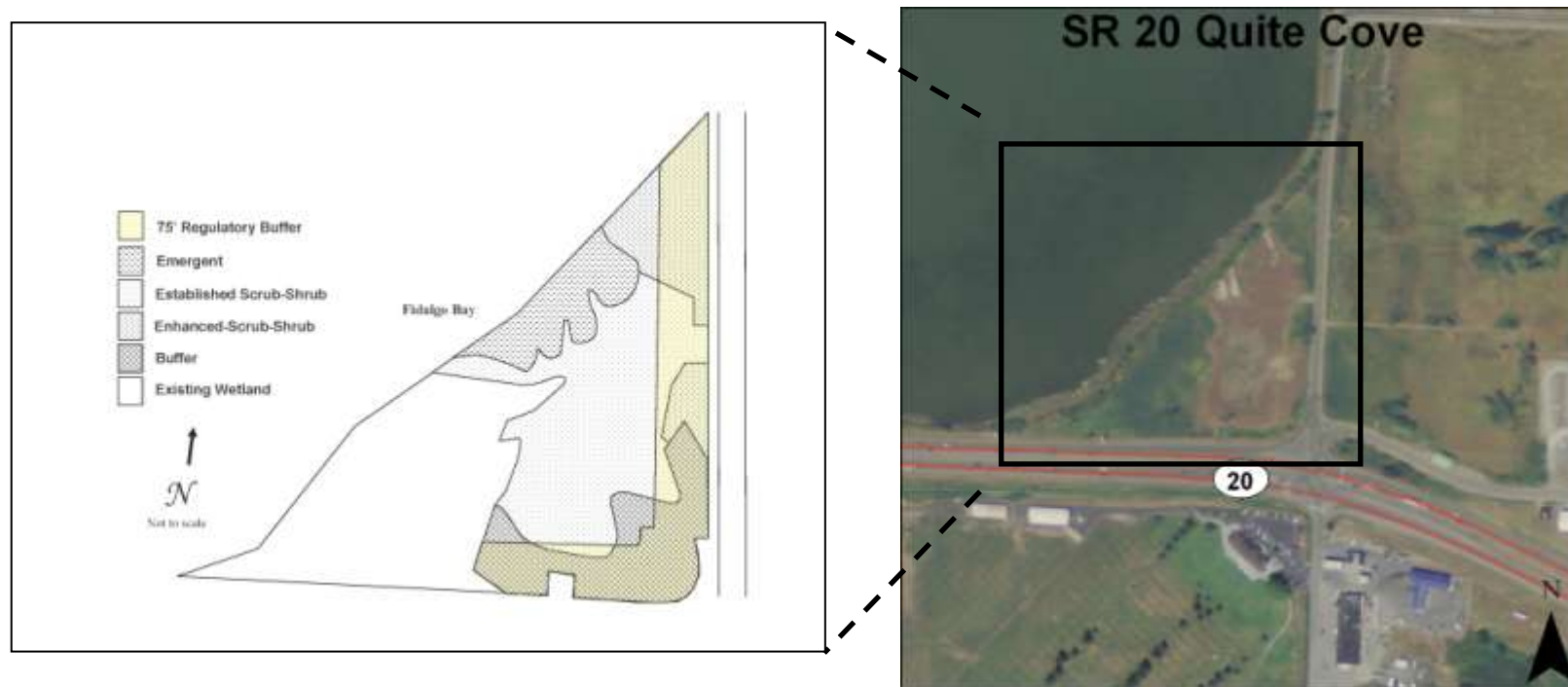


Figure 1 Site Sketch

The SR 20 Quiet Cove Mitigation Site contains three established emergent finger-like depressions that are tidally influenced from Fidalgo Bay. Scrub-shrub areas flank the finger-like depressions and buffer enhancement borders the site to the east and south.

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 in a monitoring well at 12 inches below the surface or less, for a consecutive number of days greater than or equal to 10% of the growing season in years when rainfall meets or exceeds the 30-year average.

Performance Standard 2

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

Performance Standard 3

No more than thirty percent cover by non-native invasive species as listed in Table 10 across the **entire mitigation site**. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Performance Standard 4

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

Performance Standard 5

All woody vegetation installed in **riparian enhancement** areas should have 100 percent survival one year following installation. If dead plantings are replaced then performance measure will be met (Meadow Creek).

Performance Standard 6

No more than thirty percent cover by non-native invasive species listed in Table 10 in the **riparian enhancement** areas. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures (Meadow Creek).

Permit Requirement #1

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 provides the complete text of the performance standards for this project, and Appendix 2 shows the planting plan for the Quiet Cover mitigation area, and the Meadow Creek Mitigation area (Fredericks 2007).

How were the performance standards evaluated?

To evaluate standards for vegetative cover in the wetland, a baseline was established diagonally across the center of the wetland (Figure 2). Twenty sampling transects were randomly placed perpendicular to the baseline. The unequal-area belt transect method was used to determine survival of planted woody species (Performance Standard 2). One-meter wide belt transects were placed along the length of each transect. A second baseline was placed parallel to the southern border of the site to sample for vegetative cover in the buffer. Twenty sampling transects were randomly placed perpendicular to the baseline. The unequal-area belt transect method was used to determine survival of planted woody species (Performance Standard 4). One-meter wide belt transects were placed along the length of each transect. Only the areas with an upland buffer community were sampled, this excluded the enhanced wetlands on the eastern border within the regulated buffer. These areas were sampled as wetland vegetative cover. Cover of non-native invasive species was qualitatively estimated (Performance Standards 3 and 6). Survival of woody plantings along the streambanks was assessed by conducting a total count. Survival percentage is based on numbers established in the field, comparing the ratio of visibly live to dead native woody species (Permit Requirement 1 and Performance Standard 5). Photographs were taken to evaluate tree and shrub growth (Appendix 3).

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

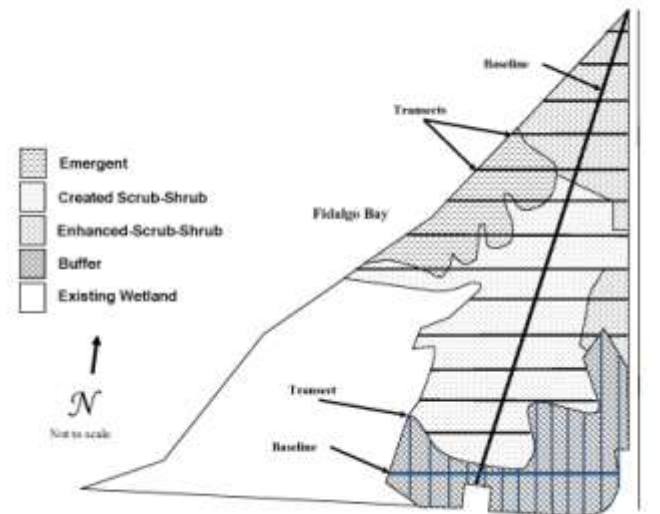


Figure 2 Site Sampling Design (2010)

How is the site developing?

This mitigation site is starting to develop as planned. Woody plantings in the wetland and the buffer have a high survival rate and the wetland has a low cover of invasive species. The site appears to have adequate hydrology, and a diverse plant community is beginning to grow in the established wetland.

The three emergent “fingers” are beginning to be colonized by Seacoast bulrush (*Schoenoplectus maritimus*) and there has been a considerable increase in cover (Photo 4 – p. 9).

Ground water discharge, flood attenuation, sediment and toxicant retention, and nutrient removal and transformation are some of the functions intended for this site. Grading and plant establishment activities have likely enhanced the performance of these functions.

The site is intended to provide wildlife habitat and food chain support as well, and it appears that both functions are supported. Eleven species of birds were seen on site within the two day monitoring period. There is also sign of deer bedding and small mammal herbivory.

Results for Performance Standard 1
(Hydrology present in the wetland):

Due to the timing of monitoring initiation, the Monitoring Team was unable to conduct hydrology monitoring during the early growing season. However, during vegetation monitoring visit areas of saturation, algal mats, salt crusts, and surface soil cracks were observed. Hydrology monitoring is scheduled for spring of 2011.

Results for Performance Standard 2
(100% survival of native woody vegetation in the wetland):

Survival of planted woody species is 91% survival ($CI_{80\%} = 89-94\%$) (Photo 1). The wetland woody species were replanted to 100 percent in the winter of 2009. The performance standard has been met. The site is on a trajectory to meet Year-3 density performance standards. There is moderate mortality of willow (*Salix* spp.) stakes around the three lobes of emergent plantings.

Results for Performance Standard 3
(Cover of invasive species across the entire wetland mitigation site):

The cover of non-native invasive species across the entire mitigation site is estimated at five percent. The majority of cover is comprised of reed canarygrass (*Phalaris arundinacea*) and is primarily located in the buffer. Also present on site, but not included in coverage estimates, are Canada thistle (*Cirsium arvense*), and tansy ragwort (*Senecio*

jacobaea). Active weed management was observed on site (Photo 2 – next page).



Photo 1
Woody cover in the scrub-shrub wetland (July 2010)

Results for Performance Standard 4

(100% survival of native woody vegetation in the upland buffer):

Survival of planted woody species is 93% survival (CI_{80%} = 92-95%) (Photo 3). Garden vetch (*Vicia sativa*) was observed growing in dense mats over a number of woody species in the buffer; its removal may benefit the establishment of plantings. The majority of the western serviceberry (*Amelanchier alnifolia*) on site exhibited signs of severe herbivory. The upland woody species were replanted to 100 percent in the winter of 2009. The performance standard has been met. The site is on a trajectory to meet Year-3 density performance standards.

Results for Performance Standard 5

(100% survival of native woody vegetation in the riparian enhancement area):

Survival of all woody vegetation installed on Meadow Creek is 95 percent. Willows (*Salix* spp.), redosier dogwood (*Cornus sericea*), and twinberry honeysuckle (*Lonicera involucrata*) planted along the creek appear healthy and vigorous. The majority of the mortality occurred in the northwest corner near the retention pond.

Results for Performance Standard 6

(Cover of invasive species in riparian enhancement area):

The cover of non-native invasive species across riparian enhancement area at Meadow Creek is estimated at three percent. The majority of cover is comprised of Himalayan blackberry (*Rubus armeniacus*) with large stands along the borders of the site. Paleyellow iris (*Iris pseudacorus*) is present along the edge of Meadow Creek. Also present on site, but not included in coverage estimates, climbing nightshade (*Solanum dulcamara*) and tansy ragwort (*Senecio jacobaea*).



Photo 2
Treated Canada thistle (*Cirsium arvense*) (July 2010)



Photo 3
Woody cover in buffer (July 2010)

Results for Permit Requirement 1

(80% survival of planted native woody species):

For results at Meadow Creek see Performance Standard 5.

A walk through of the area of the unnamed stream in the vicinity of Campbell Lake did not reveal evidence of woody plantings. As per communication with the region, this area was planted as per contract in 2010 and was replanted in January of 2011.



**Photo 4
Emergent cover in finger-like depressions (July 2010)**

What is planned for this site?

Replacement plant material is scheduled to be installed in the mitigation site upland buffer during the 2011/2012 planting window. Weed control shall continue in 2011 as necessary.

Appendix 1 – Goals and Performance Standards

Goal

The goal of the proposed compensatory mitigation is to replace wetland acreage and functions lost due to the wetland impacts associated with the proposed project.

Functions and Values

The re-established and enhanced wetlands on the mitigation site are intended to provide flood flow alteration, sediment removal, nutrient and toxicant removal, organic matter production, erosion control and shoreline stabilization, aquatic invertebrate and amphibian habitat, general wildlife habitat, and native plant richness functions.

Existing fill within the wetland will be removed and the site will be re-graded to match in with the existing wetland elevations to create a depressional wetland which will increase flood flow alteration on the site. The main portion of the restored wetland will be planted with wetland shrub vegetation with minor emergent wetland restoration associated with the extension of the existing tidally influenced channel. Enhanced wetland areas will contain both shrub and emergent elements. The wetland configuration, and densely planted herbaceous and shrub vegetation will function to slow flows and facilitate sediment, nutrient, and toxicant removal, produce organic matter, and provide aquatic invertebrate and amphibian habitat. These areas will contain a high diversity of plant species; provide different habitat via multiple Cowardin classes, therefore, will provide general habitat for small mammals, birds, and wetland associated mammals/birds; and increase native plant richness within the wetland.

Objectives, Interim Performance Measures, and Success Standards

The following list describes the thresholds that will determine site success and guide management for the mitigation site and riparian enhancement.

Objective 1 – Wetland Hydrology

The wetland mitigation site will possess ground and/or surface water inundation or saturation sufficient to support the wetland site.

Performance Measures

Years 1-9

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

Year 5

The wetland areas will be delineated using current methods. The mitigation site will contain 1.39 acres of re-established wetland.

Success Standards

Year 10

The wetland areas will be delineated using current methods. The mitigation site will contain 1.39 acres of re-established wetland.

Objective 2 – Wetland Vegetation

The mitigation site will include a total of approximately 1.39 acres of scrub-shrub and emergent wetland communities.

Performance Measures

Year 1

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

Year 3

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

Year 5

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

Native facultative or wetter herbaceous vegetation will achieve a minimum of 50 percent coverage in the emergent wetland communities. Native colonizing vegetation will be included in this coverage calculation.

Year 7

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

Native facultative or wetter herbaceous vegetation will achieve a minimum of 70 percent coverage in the emergent wetland communities. Native colonizing vegetation will be included in this coverage calculation.

Years 1-9

No more than thirty percent cover by non-native invasive species as listed in Table 10 across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Success Standards

Year 10

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

Native facultative or wetter herbaceous vegetation will achieve a minimum of 80 percent coverage in the emergent wetland communities. Native colonizing vegetation will be included in this coverage calculation.

No more than thirty percent cover by non-native invasive species as listed in Table 10 across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Objective 3 – Buffer Vegetation

The mitigation site will include a total of approximately 0.67 acres of enhanced upland buffer vegetation.

Performance Measures

Year 1

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

Year 3

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

Year 5

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

Year 7

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

Years 1-9

No more than thirty percent cover by non-native invasive species as listed in Table 10 across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Success Standards

Year 10

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

No more than thirty percent cover by non-native invasive species as listed in Table 10 across the entire mitigation site. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

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>Hedera helix</i>	English ivy
<i>Ilex aquifolium</i>	English holly
<i>Iris pseudoacorus</i>	yellow flag iris
<i>Lythrum salicaria</i>	purple loosestrife
<i>Phalaris arundinacea</i>	reed canarygrass
<i>Polygonum cuspidatum (and related species and hybrids)</i>	Japanese knotweed
<i>Prunus laurocerasus</i>	English laurel
<i>Rubus laciniatus</i>	evergreen blackberry
<i>Rubus armeniacus (discolor)</i>	Himalaya or Armenian blackberry

Objective 3 – Riparian Vegetation

The Meadow Creek riparian buffer restoration and enhancement area will include a total of 0.94 acres of riparian vegetation. Riparian enhancement at the unnamed stream re-alignment will include a total of 0.19 acre of riparian vegetation.

Performance Measures

Year 1

All woody vegetation installed in riparian enhancement areas should have 100 percent survival one year following installation. If dead plantings are replaced then performance measure will be met.

Years 3

All native woody vegetation should have 80 percent survival after three years installation in the riparian enhancement areas. Native colonizing vegetation will be included in this coverage calculation.

Years 1-3

No more than thirty percent cover by non-native invasive species listed in Table 10 in the riparian enhancement areas. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Success Standard

Year 3:

Aerial coverage of trees and shrubs in the riparian enhancement areas should be a minimum aerial coverage of 30 percent.

No more than thirty percent cover by non-native invasive species as listed in Table 10 in the riparian enhancement areas. Japanese knotweed and purple loosestrife shall not be present on the mitigation site. The presence of these two species will initiate the invasive species contingency measures.

Monitoring Plan

The mitigation site will be monitored for a minimum of ten years or longer as needed to meet the performance standards. Formal monitoring procedures will be performed in years one, three, five, seven, and ten after initial acceptance of the mitigation construction. The site should be evaluated informally the summer following plant installation to evaluate survival rates and document the presence of non-native invasive species. Informal (qualitative) monitoring will occur in years two, four, six, eight,

and nine. Monitoring reports will be submitted to the Corps of Engineers, Ecology, Skagit County, and other resource agencies for review and comment.

Monitoring reports will be completed by April following the previous monitoring activities occurring in years one, three, five, seven, and ten. Mitigation success will be measured by the attainment of performance standards.

CONTINGENCY PLAN

As necessary, contingency measures (i.e., adaptive management options) will be implemented to meet performance measures and success standards. The following describes potential situations that may occur on site and the potential contingencies that might be implemented to correct the problem. Since not all site conditions can be anticipated, the contingencies discussed below do not represent an exhaustive list of potential problems or remedies.

Hydrology

Hydrologic problems occurring on a mitigation site are typically the result of either insufficient water or excessive water. Insufficient water can occur seasonally during draught conditions or can be a long-term problem. Long-term problems can be the result of altered surface water flows on- or off-site for surface water driven wetlands. For ground water driven mitigation sites, typical long-term hydrologic problems that result in either excessive or insufficient hydrology can occur from a design based on inaccurate groundwater data, the establishment of incorrect final grade elevations, or unperceived soil condition that alters groundwater flows. Hydrologic contingency measures will be implemented based on site conditions observed or monitoring data collected during the annual monitoring site visits. Contingencies for insufficient or excessive hydrology are:

- Clearly identify the source of the problem
- Consult with the mitigation design team, including members of Biology, Landscape Architecture, and Hydrology, and the resource agencies to determine an appropriate course of action.
- Adjust site elevations through grading to achieve appropriate hydrologic conditions.

Vegetation

Problems related to vegetation include plant mortality, lack of vigor and vitality, and poor growth resulting in low plant cover. These problems can be the result of insufficient maintenance, particularly watering in the first few growing seasons, animal browse, competition from invasive species, incorrect plant selection, altered site conditions, and vandalism.

Contingencies for plant mortality and poor plant cover include:

- Plant replacement – Additional planting may be required to meet plant survival and plant cover requirements. Plant species will be evaluated in relation to site conditions to determine if plant substitutions will be required.
- Weed control – Control of non-native invasive species may be required to meet survival and plant cover requirements. Weed control methods could include mechanical or hand control, mulching, or herbicide application.
- Herbivore control – If plant survival or vegetation cover standards are not met because of animal browse, the wildlife responsible will be identified and the appropriate control measure will be employed. This could include plant protection, fence installation, or the use of repellents.
- Vandalism – To prevent vegetation disturbance from vandalism, fence installation and sensitive area signage may be installed.

MAINTENANCE PLAN

WSDOT will maintain the site annually for the first ten years. Maintenance will include the removal of non-native invasive plant species to meet the performance standards and could include watering, fertilizing, litter removal, plant replacement, and mulch replacement.

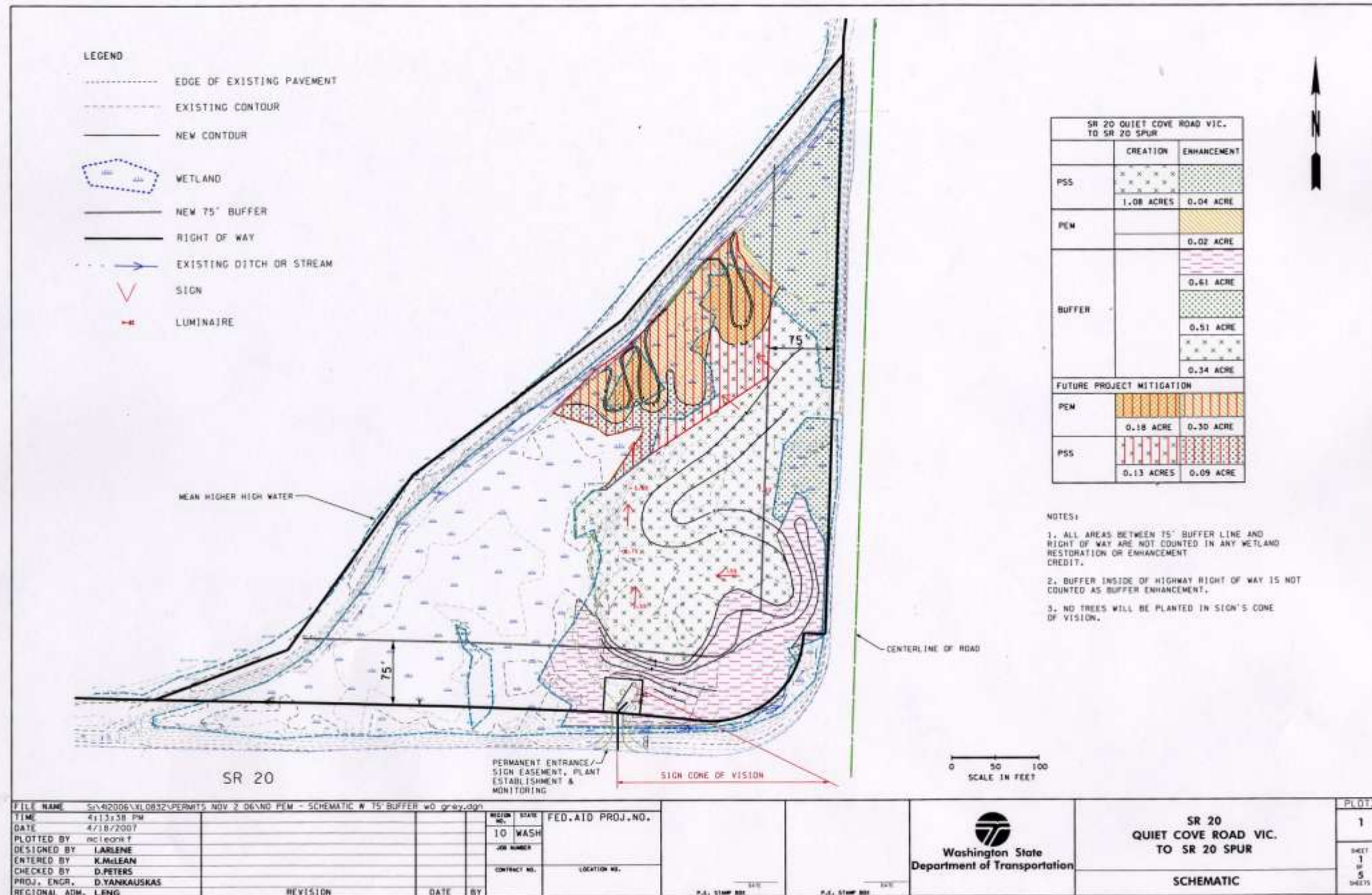
PERMIT REQUIREMENTS

The following excerpt is from the WDFW Hydraulic Project Approval # 107086-1. Requirements addressed this year are identified in **bold** font.

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 2 – Planting Plans

(from Fredericks 2007)



Meadow Creek Planting Plan

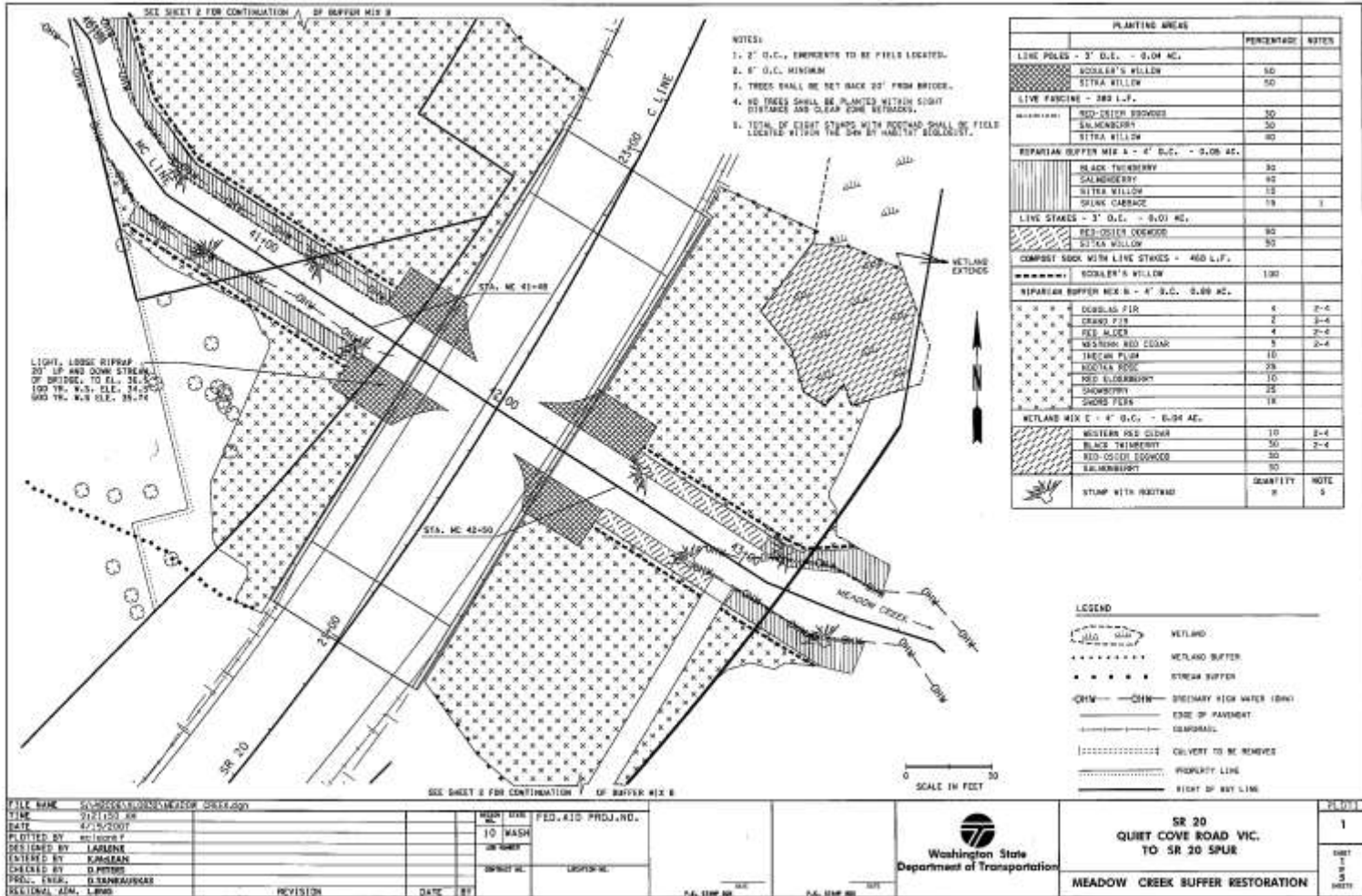
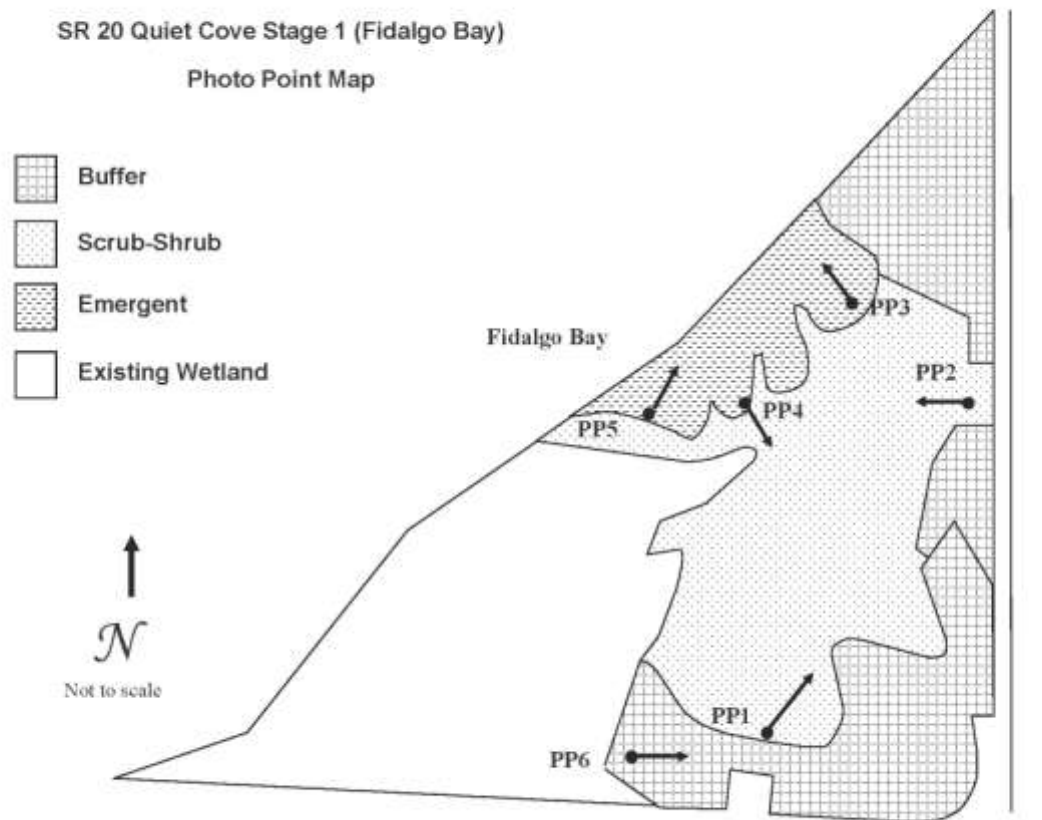


Photo Point Map



Appendix 3 – Photo Points

The photographs below were taken from permanent photo-points on July 27, 2010 and document current site development.



Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4

The photographs below were taken from permanent photo-points on July 27, 2010 and document current site development.



Photo Point 5



Photo Point 6

Literature Cited

1. Ecology. See Washington State Department of Ecology.
2. Fredericks, Kristen. (2007). SR 20: Quiet Cove to SR 20 Spur Safety Improvements Final Wetland Mitigation Report.
3. United States Army Corps of Engineers. 2006. Department of the Army Permit Number 200601135.
4. United States Army Corps of Engineers. 2008. Department of the Army Permit Number 2008-460-SOD.
5. Washington State Department of Ecology (Ecology). 1997. Washington State Wetlands Identification and Delineation Manual. Publication No.96-94, Olympia, WA.
6. Washington State Department of Transportation (WSDOT) WSDOT Wetland Mitigation Site Monitoring Methods (12 June 2008). <http://www.wsdot.wa.gov/NR/rdonlyres/C211AB59-D5A2-4AA2-8A76-3D9A77E01203/0/MethodsWhitePaper052004.pdf>