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**Shell Puget Sound Refinery (PSR) Rail Unloading Facility  
Wetland Delineations and Rating Summary Within the Project Site**

URS. 2013. Wetland Delineation Report and Critical Areas Assessment. Crude by Rail East Gate.  
Prepared for Shell Puget Sound Refinery. November 6, 2013.

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## Wetland A



View of Wetland A from the top of the adjacent fill pile

Sample Plot SP-A1 at base of fill pile



Sample Plot SP-A1

Sample Plot SP-A4

### Description

**Location:** North end of study area

**Size:** 2.02 acres

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-A1,4  
**Upland:** SP-A2,3,5

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Temporarily Flooded / Saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Channelized Flow, Shallow Subsurface Flow

**Connectivity:** Water flows into Wetland A from developed areas of the refinery. The wetland drains into a ditch that flows into another ditch along the south side of North Texas Road. This ditch conveys water east into Padilla Bay (Puget Sound).

**Primary Indicators:** High Water Table (A2), Saturation (A3), Oxidized Rhizospheres along Living Roots (C3)

**Secondary Indicators:** Geomorphic Position (D2), Shallow Aquitard (D3), FAC-Neutral Test (D5)

**Common Vegetation**

**Trees:** none

**Shrubs:** Himalayan blackberry, Douglas hawthorn, trailing blackberry

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, hare sedge, meadow foxtail, soft rush, Canada thistle, reed canarygrass

**Prevalence Index:** 2.00 to 3.04

**Typical Soils**

Depth (in.)	Matrix Color	Redox Features	Texture	Coarse Fragments
0-11	10YR 3/1	none	Silty Clay Loam	none
11-18	2.5Y 5/2	10YR 4/6 10%	Silt Loam	none
11-18		10YR 3/1 30%		

**Hydric Soil Indicators:** Depleted below Dark Surface (A11), Depleted Matrix (F3)

**Functions Provided**

**Water Quality:** Low (10 points) – Sediment, nutrient and toxicant removal

**Hydrology:** Low (7 points) – Surface runoff retention

**Habitat:** Low (9 points) – Organic matter production and export

## Wetland D



Ponding at south end of Wetland D between SP-D1 and D5

SP-D2: depleted matrix beginning at 11 inches



Plot SP-D18 at north end of grazed field

Interior of forested wetland mosaic, north end of Wetland D



SP-D22 in forested wetland

SP-D26 in forested wetland mosaic

### Description

<b>Location:</b>	North half of study area	
<b>Size:</b>	45.86 acres (total within the study area)	Forested wetland mosaic: 7.45 acres (wetland area is 70% of 10.64 acres) Non-mosaic wetland: 38.41 acres
<b>Landscape:</b>	Glaciomarine Terrace, 0-3% slopes, concave to flat in pasture areas, undulating (hummocks and depressions) in forested mosaic area	
<b>Sample Points:</b>	<b>Wetland:</b> SP-C1,5,7,9 & SP-D1,2,5,6,8,11,12,15,16,18,21,22,24,26,28,30,33,34 <b>Upland:</b> SP-C2,3,4,6,8 & SP-D3,4,7,9,10,13,14,17,19,20,23,25,27,29,31,32,35	

Classification				
<b>Cowardin</b>	<b>Classes:</b> Palustrine Forested /Scrub-shrub/Emergent			
	<b>Water Regimes:</b> Seasonally Flooded / Temporarily Flooded / Saturated			
<b>Hydrogeomorphic Classes:</b> Depressional and Slope				
<b>Wetland Rating:</b>	III			
<b>Standard Buffer Width:</b>	150 feet			
Hydrology				
<b>Primary Sources:</b>	Precipitation, Surface Runoff, Channelized Flow, Shallow Subsurface Flow			
<b>Connectivity:</b>	Water flows into Wetland D from developed areas of the refinery to the west. The northern portion of the wetland drains into a ditch along North Texas Road. The central portion of the wetland drains into two ditches. The south end of the wetland drains into a ditch along the refinery access road. All of these channels convey water east into Padilla Bay (Puget Sound).			
<b>Primary Indicators:</b>	Surface Water (A1), High Water Table (A2), Saturation (A3), Algal Mats (B4), Oxidized Rhizospheres along Living Roots (C3)			
<b>Secondary Indicators:</b>	Geomorphic Position (D2), Shallow Aquitard (D3), FAC-Neutral Test (D5)			
Common Vegetation				
<b>Trees:</b>	red alder, black cottonwood, Pacific crabapple, western redcedar, quaking aspen			
<b>Shrubs:</b>	Nootka rose, salmonberry, snowberry, trailing blackberry, Douglas spirea, Sitka willow, sweetbrier rose, black twinberry, coast black gooseberry			
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, meadow fescue, meadow foxtail, softrush, horsetail, white clover, birds-foot trefoil, small-flowered forget-me-not, cattail, Canada thistle, reed canarygrass, wheatgrass, yellow glandweed, creeping buttercup  <b>Forest:</b> slender-foot sedge, fringe-cup, large-leaved avens, stinging nettle, water parsley, piggyback plant, lady fern, sword fern, slough sedge, manna-grass, willowherb			
<b>Prevalence Index:</b>	2.47 to 3.35			
Typical Soils				
<b>Depth (in.)</b>	<b>Matrix Color</b>	<b>Redox Features</b>	<b>Texture</b>	<b>Coarse Fragments</b>
0-6	10YR 3/1	none	Loam	none
6-10	10YR 3/1	7.5YR 4/3 3%	Loam	5% gravel
10-16	2.5Y 5/2	10YR 4/4 8%	Sandy Loam	15% gravel
<b>Hydric Soil</b> Depleted below Dark Surface (A11), Loamy Gleyed Matrix (F2), Depleted Matrix (F3), Redox Indicators: Dark Surface (F6)				
Functions Provided				
<b>Water Quality:</b>	Moderate (14 points) – Sediment, nutrient and toxicant removal			
<b>Hydrology:</b>	Low (10 points) – Surface runoff retention			
<b>Habitat:</b>	Moderate (26 points) – Organic matter production and export; habitat structure and diversity; habitat for aquatic invertebrates and amphibians			

## Wetland E



Sample Plot SP-E1 at north end of Wetland E

SP-E3: Depleted matrix beginning at 10 inches

Sample Plot SP-E4

Sample Plot SP-E7

### Description

**Location:** South half of study area, south of 4<sup>th</sup> Street, between the rail spur and a dirt access road; Wetland E includes an existing mitigation site in its northeastern corner

**Size:** 10.75 acres (total within the study area)

**Landscape:** Glaciomarine Terrace, 0-5% slopes, concave to flat

**Sample Points:** **Wetland:** SP-E1,3,4,5,7,9 SP-2E1  
**Upland:** SP-E2,6,8,10 SP-2E2

### Classification

**Cowardin Classes:** Palustrine Forested / Emergent

**Water Regimes:** Seasonally Flooded / Temporarily Flooded / Saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** III

**Standard Buffer Width:** 150 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Channelized Flow, Shallow Subsurface Flow

**Connectivity:** Water flows into Wetland E from developed areas of the refinery to the west. The wetland is drained by Ditches E1, E2 and E3. Water from these ditches flows into Stream S which conveys water east into Padilla Bay (Puget Sound).

**Primary Indicators:** Surface Water (A1), High Water Table (A2), Saturation (A3), Algal Mats (B4), Oxidized Rhizospheres along Living Roots (C3)

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**Secondary Indicators:** Geomorphic Position (D2), Shallow Aquitard (D3), FAC-Neutral Test (D5)

**Common Vegetation**

**Trees:** red alder, black cottonwood, Pacific crabapple

**Shrubs:** English hawthorn, cascara, Nootka rose, salmonberry, snowberry, trailing blackberry, Douglas spiraea, sweetbrier rose, black twinberry

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, meadow foxtail, softtrush, white clover, birds-foot trefoil, Canada thistle, reed canarygrass, wheatgrass, creeping buttercup

**Forest:** slender-foot sedge, fringedcup, large-leaved avens, stinging nettle, piggyback plant, lady fern, sword fern, willowherb

**Prevalence Index:** 2.70 to 3.10

**Typical Soils**

Depth (in.)	Matrix Color	Redox Features	Texture	Coarse Fragments
0-5	10YR 3/2	7.5YR 4/4 10%	Sandy Loam	0
5-13	10YR 4/2	7.5YR 3/4 20%	Sandy Loam	10% gr.
13-18	10YR 4/2	7.5YR 4/4 10%	Sandy Loam	15% gr., 10% cobble

**Hydric Soil Indicators:** Depleted below Dark Surface (A11), Depleted Matrix (F3), Redox Dark Surface (F6)

**Functions Provided**

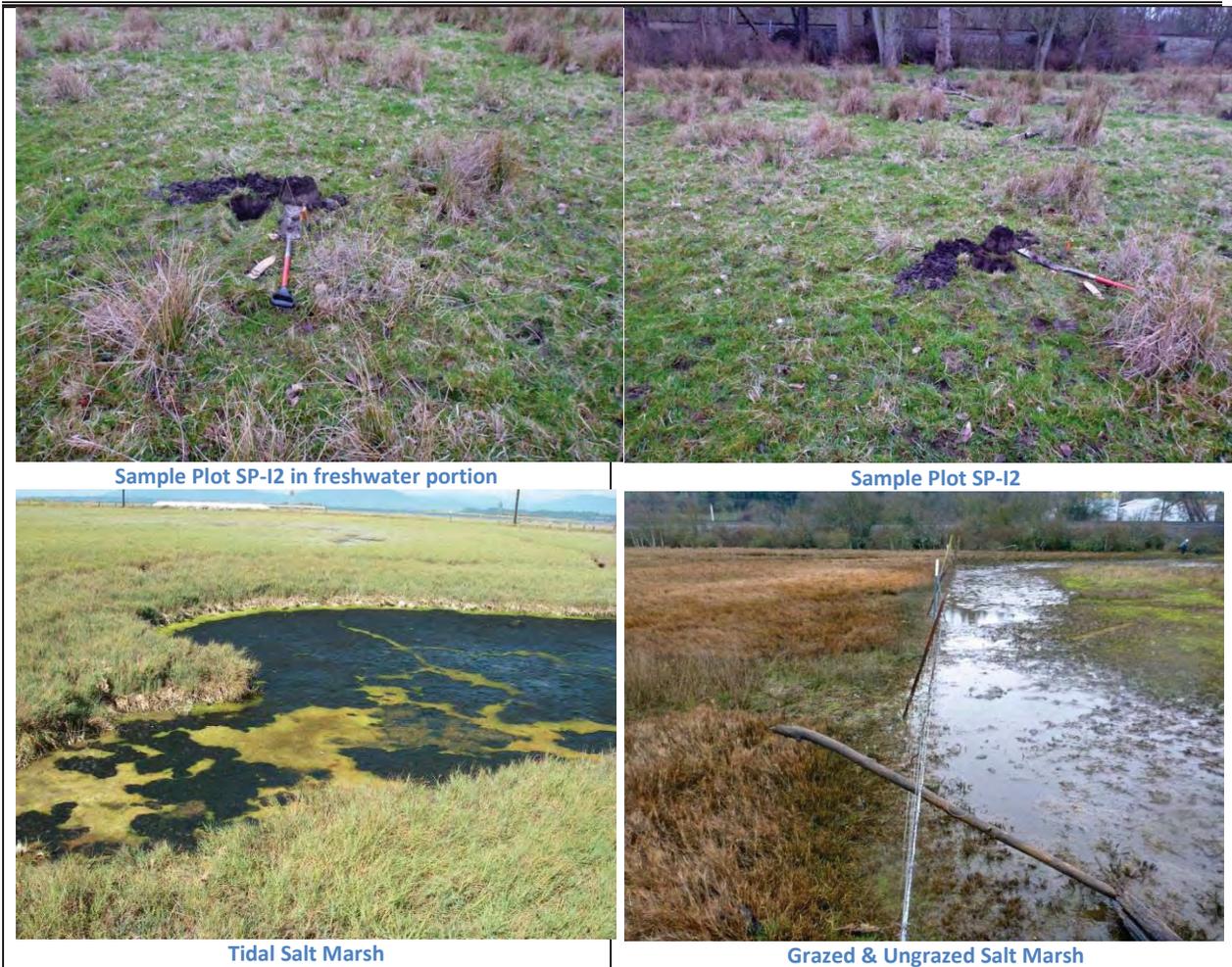
**Water Quality:** Low (10 points) – Sediment, nutrient and toxicant removal

**Hydrology:** Low (10 points) – Surface runoff retention

**Habitat:** Low (18 points) – Organic matter production and export; habitat structure

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## Wetland I1



### Description

**Location:** South end of study area. Contained by the BNSF mainline on the south and East March Point Road on the east.

**Size:** 2.48 acres (total within study area – extends offsite to the north)

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-I2 **Upland:** SP-I1

### Classification

**Cowardin Classes:** Palustrine Forested / Scrub-shrub / Emergent  
Estuarine Intertidal Emergent

**Water Regimes:** Seasonally Flooded / Temporarily Flooded / Saturated  
Regularly and Irregularly Flooded

**Hydrogeomorphic Classes:** Depressional and Slope  
Salt Water Tidal Fringe

**Wetland Rating:** II

**Standard Buffer Width:** 300 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Channelized Flow, Shallow Subsurface Flow  
Tidal inundation and tidally influenced groundwater

**Connectivity:** Wetland I1 drains directly into Padilla Bay through Stream S which crosses under East March Point Road in two open-bottom concrete culverts.

**Primary Indicators:** High Water Table (A2), Saturation (A3), Oxidized Rhizospheres along Living Roots (C3)

**Secondary Indicators:** Geomorphic Position (D2)

**Common Vegetation**

<b>Trees:</b>	black cottonwood, red alder, Pacific crabapple, Douglas-fir [mainly located outside of study area]
<b>Shrubs:</b>	Douglas spirea, Nootka rose, Sitka willow, Himalayan blackberry, snowberry [mainly located outside of study area]
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, meadow foxtail, soft rush, creeping buttercup
<b>Salt Marsh:</b>	salt grass, woody saltwort, Baltic rush, spear saltbush, bentgrass, arrow-grass
<b>Prevalence Index:</b>	2.93

**Typical Soils**

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-5	5Y 5/1	7.5YR 4/4 10%	Loam	old ditch spoils
5-15	10YR 3/1	7.5YR 3/3 5%	Loam	
15-18	5Y 4/1	10YR 4/3 30%	Loamy Coarse Sand	5% gravel

**Hydric Soil Indicators:** Redox Dark Surface (F6)

**Functions Provided (Freshwater portion)**

**Water Quality:** Moderate (14 points) – sediment, nutrient and toxicant retention

**Hydrology:** Low (8 points) – surface runoff retention

**Habitat:** Moderate (23 points)–Organic matter production and export; habitat structure and diversity

**Estuarine:** Most of the salt marsh is fenced off from cattle. Tidal channels and pools in this area provide feeding habitat for juvenile fish and wading birds.

## Wetland I2



Sample Plot SP-13



Sample Plot SP-13

### Description

<b>Location:</b>	South end of study area
<b>Size:</b>	0.35 acre
<b>Landscape:</b>	Glaciomarine Terrace, 3-5% slopes, flat
<b>Sample Points:</b>	<b>Wetland:</b> SP-I3 <b>Upland:</b> SP-I4

### Classification

<b>Cowardin</b>	<b>Classes:</b>	Palustrine Emergent
	<b>Water Regimes:</b>	Temporarily Flooded / Saturated

**Hydrogeomorphic Classes:** Slope

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, Surface Runoff, Shallow Subsurface Flow
<b>Connectivity:</b>	At high flows, water sheet flows out of Wetland I2 a short distance into Ditch I that conveys water east into Padilla Bay (Puget Sound).
<b>Primary Indicators:</b>	Surface Water (A1), High Water Table (A2), Saturation (A3), Oxidized Rhizospheres along Living Roots (C3)
<b>Secondary Indicators:</b>	Geomorphic Position (D2)

### Common Vegetation

<b>Trees:</b>	none
<b>Shrubs:</b>	none
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, meadow foxtail, softtrush, white clover
<b>Prevalence Index:</b>	3.20

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	Coarse Fragments
0-4	10YR 3/2	none	Loam	none
4-10	10YR 3/2	7.5YR 4/6 10%	Loam	15% gravel
10-16	10YR 4/2	10YR 4/2 30%	Sandy Loam	10% gravel

**Hydric Soil Indicators:** Depleted below Dark Surface (A11), Depleted Matrix (F3), Redox Dark Surface (F6)

### Functions Provided

<b>Water Quality:</b>	Low (2 points) – Very low function
<b>Hydrology:</b>	Low (2 points) – Very low function
<b>Habitat:</b>	Low (9 points) – Organic matter production and export

## Wetland J



Sample Plot SP-J2

Sample Plot SP-J2

### Description

<b>Location:</b>	South end of study area
<b>Size:</b>	0.13 acre (within the study area); entire wetland is 0.92 acre
<b>Landscape:</b>	Glaciomarine Terrace, 0-3% slopes, concave to flat
<b>Sample Points:</b>	<b>Wetland:</b> SP-J2 <b>Upland:</b> SP-J1

### Classification

<b>Cowardin Classes:</b>	Palustrine Emergent
<b>Water Regimes:</b>	Seasonally Flooded / Temporarily Flooded / Saturated
<b>Hydrogeomorphic Classes:</b>	Depressional and Slope
<b>Wetland Rating:</b>	IV
<b>Standard Buffer Width:</b>	50 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, Surface Runoff, Shallow Subsurface Flow
<b>Connectivity:</b>	At high flows, water sheet flows out of Wetland J a short distance into a ditch that conveys water east into Padilla Bay (Puget Sound).
<b>Primary Indicators:</b>	Surface Water (A1), High Water Table (A2), Saturation (A3)
<b>Secondary Indicators:</b>	Geomorphic Position (D2), FAC-Neutral Test (D5)

### Common Vegetation

<b>Trees:</b>	none
<b>Shrubs:</b>	none
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, meadow foxtail, softgrass
<b>Prevalence Index:</b>	2.90

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-7	10YR 3/2	10YR 4/4 5%	Loam	old fill material
7-10	2.5Y 4/2	10YR 4/4 10%	Sandy Clay Loam	fill; 15% gravel
10-18	10YR 3/2	7.5YR 3/4 5%	Loam	
18-20	10Y 5/1	10YR 4/4 15%	Sandy Loam	

**Hydric Soil Indicators:** Redox Dark Surface (F6)

### Functions Provided

<b>Water Quality:</b>	Low (4 points) – Very low function
<b>Hydrology:</b>	Low (10 points) – Surface runoff retention
<b>Habitat:</b>	Low (10 points) – Organic matter production and export

## Wetland N



Wetland N looking east



Wetland N looking west

### Description

**Location:** Southeast corner of study area along Padilla Bay

**Size:** 0.04 acres

**Landscape:** Padilla Bay shoreline

**Sample Points:** none

### Classification

**Cowardin Classes:** Estuarine Intertidal Emergent

**Water Regimes:** Regularly Flooded

**Hydrogeomorphic Classes:** Salt Water Tidal Fringe

**Wetland Rating:** II

**Standard Buffer Width:** 300 feet

### Hydrology

**Primary Sources:** Tidal inundation

**Connectivity:** On Padilla Bay

**Primary Indicators:** Surface Water (A1), Water marks (B1), Sediment deposits (B2), Drift Deposits (B3), Surface soil cracks (B6), Oxidized rhizospheres along living roots (C3),

**Secondary Indicators:** Drainage patterns (B10), Geomorphic position (D2), FAC-neutral test (D5)

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** Lyngbye's sedge

**Prevalence Index:** 1.0

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks

**Hydric Soil Indicators:** Soils not described.

### Functions Provided

Functional analysis not available for Salt Water Tidal Fringe wetlands.

## Wetland O



Wetland O (lower right) from South March Point Road

### Description

<b>Location:</b>	Southeast corner of study area, between BNSF mainline and East March Point Road
<b>Size:</b>	0.18 acres
<b>Landscape:</b>	Located in a closed depression created by embankments for the road and railroad and separated from Padilla Bay by a manmade berm.
<b>Sample Points:</b>	none

### Classification

<b>Cowardin</b>	<b>Classes:</b>	Palustrine Emergent
	<b>Water Regimes:</b>	Seasonally flooded

**Hydrogeomorphic Classes:** Depressional

**Wetland Rating:** III

**Standard Buffer Width:** 150 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, surface runoff from road and railroad, tidally influenced groundwater
<b>Connectivity:</b>	No apparent surface connection to Padilla Bay, but the wetland is separated from the bay by a manmade berm. Groundwater is likely tidally influenced.
<b>Primary Indicators:</b>	High water table (A2)
<b>Secondary Indicators:</b>	Geomorphic position (D2), FAC-neutral test (D5)

### Common Vegetation

<b>Trees:</b>	none
<b>Shrubs:</b>	none
<b>Herbs:</b>	cattails
<b>Prevalence Index:</b>	1.0

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks

**Hydric Soil Indicators:** Soils not described.

### Functions Provided

<b>Water Quality:</b>	High (24 points) – sediment, nutrient and toxicant retention
<b>Hydrology:</b>	Moderate (14 points) – surface runoff retention
<b>Habitat:</b>	Low (7 points) – Organic matter production

## Wetland Q



Wetland Q from S. Marsh Point Road



Looking west from east end of Wetland Q

### Description

<b>Location:</b>	South end of study area, between BNSF mainline and South March Point Road
<b>Size:</b>	1.01 acres
<b>Landscape:</b>	Located in a swale created by embankments for the road and railroad.
<b>Sample Points:</b>	<b>Wetland:</b> SP-Q1 <b>Upland:</b> none due to adjacent embankments

### Classification

<b>Cowardin</b>	<b>Classes:</b>	Palustrine forested/scrub-shrub
	<b>Water Regimes:</b>	Seasonally flooded / saturated

**Hydrogeomorphic Classes:** Depressional

**Wetland Rating:** III

**Standard Buffer Width:** 150 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, surface runoff from road and railroad, channelized flow
<b>Connectivity:</b>	Drains into a culvert under the railroad bed which connects to Stream I1. Stream I1 flows into Padilla Bay (Puget Sound).
<b>Primary Indicators:</b>	Water marks (B1), Sediment deposits (B2), Surface soil cracks (B6), Oxidized rhizospheres along living roots (C3),
<b>Secondary Indicators:</b>	Water-stained leaves (B9), Drainage patterns (B10), Dry-season water table (C2), Geomorphic position (D2)

### Common Vegetation

<b>Trees:</b>	Pacific willow, Sitka willow, Scouler's willow
<b>Shrubs:</b>	Douglas spiraea, Nootka rose, salmonberry, Pacific crabapple, black twinberry, blackberry, snowberry
<b>Herbs:</b>	slough sedge, reed canarygrass, cattails, bentgrass
<b>Prevalence Index:</b>	2.03

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-6	10YR 3/2	7.5YR 4/6 15%	Silt loam	
6-14	10YR 4/2	7.5YR 4/6 20%	Silty clay loam	
14-20	10GY 5/1	10YR 4/4 20%	Silty clay loam	Very moist

**Hydric Soil Indicators:** Depleted matrix (F3); Redox dark surface (F6)

### Functions Provided

<b>Water Quality:</b>	Moderate (23 points) – sediment, nutrient and toxicant retention
<b>Hydrology:</b>	Low (8 points) – surface runoff retention
<b>Habitat:</b>	Low (11 points) – Organic matter production and export

## Wetland R



Sample Plot SP-R1



Sample Plot SP-R1

### Description

**Location:** South end of study area, west of the rail spur

**Size:** 0.10 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-R1 **Upland:** SP-R2

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Occasionally Flooded / Seasonally Saturated

**Hydrogeomorphic Classes:** Depressional

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff

**Connectivity:** Wetland R is in a shallow depression. At high flows, runoff flows into Ditch E2, which flows into Stream I1, which flows into Padilla Bay.

**Primary Indicators:** Algal mat (B4), Oxidized rhizospheres along living roots (C3)

**Secondary Indicators:** Water-stained leaves (B9), Geomorphic position (D2)

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, tall fescue, meadow foxtail

**Prevalence Index:** 3.08

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-5	10YR 3/1.5	10YR 3/3; 2%	Loam	10% gravel
5-10	10YR 3/1.5	10YR 3/3; 5%	Loam	20% gravel
10-18	5Y 5/1.5	7.5YR 4/6; 20%	Sandy loam	10% gravel

**Hydric Soil Indicators:** Depleted below dark surface (A11); Depleted matrix (F3)

### Functions Provided

**Water Quality:** Low (4 points)

**Hydrology:** Low (8 points) – surface runoff retention

**Habitat:** Low (9 points)

## Wetland S



Sample Plot SP-S1



Sample Plot SP-S1

### Description

<b>Location:</b>	Southwest corner of study area, west of the rail spur
<b>Size:</b>	0.86 acre (total within study area); Wetland extends offsite to the west
<b>Landscape:</b>	Glaciomarine Terrace, 0-3% slopes, concave to flat; undulating in the forest
<b>Sample Points:</b>	<b>Wetland:</b> SP-S1 <b>Upland:</b> SP-S2

### Classification

<b>Cowardin</b>	<b>Classes:</b>	Palustrine forested, scrub-shrub and emergent (study area is emergent only)
	<b>Water Regimes:</b>	Seasonally and occasionally flooded / Seasonally saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** II

**Standard Buffer Width:** 300 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, Surface runoff, Seasonal high groundwater table
<b>Connectivity:</b>	Drains into ditch E2, which drains into Stream I1, which drains into Padilla Bay (Puget Sound).
<b>Primary Indicators:</b>	Oxidized rhizospheres along living roots (C3)
<b>Secondary Indicators:</b>	Water-stained leaves (B9), Geomorphic position (D2)

### Common Vegetation

<b>Trees:</b>	black cottonwood, quaking aspen, western red cedar, red alder
<b>Shrubs:</b>	salmonberry, Douglas spiraea,
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, tall fescue, meadow foxtail, sweet vernal grass <b>Forest:</b> slough sedge
<b>Prevalence Index:</b>	> 3.0

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-9	10YR 3/1	10YR 4/4; 5%	Loam	20% gravel
9-16	5Y5/1	10YR 5/6; 30%	Loam	10% gravel

**Hydric Soil Indicators:** Redox dark surface (F6); Depleted matrix (F3)

### Functions Provided

<b>Water Quality:</b>	High (22 points) – sediment, nutrient and toxicant retention
<b>Hydrology:</b>	Moderate (10 points) – surface runoff retention
<b>Habitat:</b>	High (22 points) – Organic matter production and export; habitat structure and diversity; habitat for aquatic invertebrates and amphibians

## Wetland T



Description				
<b>Location:</b>	East side of study area, north of 4 <sup>th</sup> Street			
<b>Size:</b>	0.12 acre			
<b>Landscape:</b>	Glaciomarine Terrace, 0-3% slopes, concave to flat			
<b>Sample Points:</b>	<b>Wetland:</b> SP-T1 <b>Upland:</b> SP-T2			
Classification				
<b>Cowardin Classes:</b>	Palustrine forested			
<b>Water Regimes:</b>	Seasonally and occasionally flooded			
<b>Hydrogeomorphic Classes:</b>	Depressional			
<b>Wetland Rating:</b>	III			
<b>Standard Buffer Width:</b>	150 feet			
Hydrology				
<b>Primary Sources:</b>	Precipitation, Surface runoff, Seasonal high groundwater table			
<b>Connectivity:</b>	Wetland T is isolated, but groundwater movements may discharge to ditches or an intermittent stream that drain to Padilla Bay (Puget Sound).			
<b>Primary Indicators:</b>	Oxidized rhizospheres along living roots (C3), Sparsely vegetated concave surface			
<b>Secondary Indicators:</b>	Geomorphic position (D2)			
Common Vegetation				
<b>Trees:</b>	black cottonwood, quaking aspen, western red cedar, red alder, big leaf maple			
<b>Shrubs:</b>	salmonberry, Pacific crabapple, red elderberry, Himalayan blackberry, Indian plum			
<b>Herbs:</b>	lady fern, creeping buttercup, large leaf avens, fringe cup, bluegrass			
<b>Prevalence Index:</b>	> 3.0			
Typical Soils				
Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-10	10YR 3/1	10YR 3/3; 2	Silt loam	15% gravel
10-16	2.5Y 4/2	10YR 4/4; 15%	Loam	30% gravel
<b>Hydric Soil Indicators:</b>	Redox dark surface (F6); Depleted below dark surface (A11)			
Functions Provided				
<b>Water Quality:</b>	High (24 points) – sediment, nutrient and toxicant retention			
<b>Hydrology:</b>	Moderate (10 points) – surface runoff retention			
<b>Habitat:</b>	Moderate (12 points) – Organic matter production and export; habitat structure and diversity			

## Wetland U



Sample Plot SP-U1



Sample Plot SP-U1

### Description

**Location:** East side of study area, north of 4<sup>th</sup> Street

**Size:** 0.24 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-U1 **Upland:** SP-U2

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Occasionally Flooded / Seasonally Saturated

**Hydrogeomorphic Classes:** Depressional

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff

**Connectivity:** Wetland U is in a shallow depression. At high flows, surface water likely sheet flows into Wetland V, thence into Ditch D1, which flows into Padilla Bay.

**Primary Indicators:** Oxidized rhizospheres along living roots (C3)

**Secondary Indicators:** Geomorphic position (D2)

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, tall fescue, meadow foxtail, white clover

**Prevalence Index:** 3.01

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-9	10YR 3/2	10YR 4/3; 5%	Loam	5% gravel
9-16	2.5Y 5/2	10YR 4/4; 20%	Clay Loam	15% gravel

**Hydric Soil Indicators:** Depleted matrix (F3)

### Functions Provided

**Water Quality:** Low (8 points) – low function

**Hydrology:** Low (10 points) – surface runoff retention

**Habitat:** Low (10 points) – organic matter production and export

## Wetland V



Sample Plot SP-V1



Sample Plot SP-V1

### Description

**Location:** East side of study area, north of 4<sup>th</sup> Street

**Size:** 1.07 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-V1 **Upland:** SP-V2

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Occasionally Flooded / Seasonally Saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Shallow Subsurface Flow

**Connectivity:** Wetland V is on a narrow bench/shallow depression on a gentle slope. At high flows, surface water likely flows east into the ditch along East March Point Road, and/or south into Ditch D1. These ditches flow into Padilla Bay.

**Primary Indicators:** Oxidized rhizospheres along living roots (C3)

**Secondary Indicators:** Geomorphic position (D2)

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, tall fescue, meadow foxtail, white clover, Kentucky bluegrass

**Prevalence Index:** 3.02

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-7	10YR 3/2	10YR 4/3; 3%	Loam	15% gravel
7-16	5Y 5/1	10YR 5/6; 20%	Clay Loam	10% cobble, 25% gravel

**Hydric Soil Indicators:** Depleted matrix (F3)

### Functions Provided

**Water Quality:** Low (4 points) – low function

**Hydrology:** Low (7 points) – surface runoff retention

**Habitat:** Low (13 points) – organic matter production and export

## Wetland W



### Description

**Location:** East side of study area, near the northwest corner of East March Point Road and 4<sup>th</sup> Street

**Size:** 0.06 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-W1 **Upland:** SP-W2

### Classification

**Cowardin Classes:** Palustrine forested

**Water Regimes:** Seasonally and occasionally flooded

**Hydrogeomorphic Classes:** Depressional

**Wetland Rating:** III

**Standard Buffer Width:** 150 feet

### Hydrology

**Primary Sources:** Precipitation, Surface runoff, Seasonal high groundwater table

**Connectivity:** At high flows, runoff may flow into a ditch along East March Point Road, which discharges to Padilla Bay (Puget Sound).

**Primary Indicators:** Oxidized rhizospheres along living roots (C3), Sparsely vegetated concave surface, Sediment deposits (B2)

**Secondary Indicators:** Geomorphic position (D2), Water-stained leaves (B9), Shallow aquitard (D3)

### Common Vegetation

**Trees:** black cottonwood, quaking aspen, Scouler's willow

**Shrubs:** Salmonberry, Pacific crabapple, black twinberry, Indian plum, trailing blackberry

**Herbs:** Lady fern, fringe cup

**Prevalence Index:** 3.09

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
1-0				Litter
0-9	10YR 3/1	10YR 4/4; 10%	Silty clay loam	
9-16	10Y 4/1	7.5YR5/6; 30%	Clay loam	10% gravel

**Hydric Soil Indicators:** Redox dark surface (F6); Loamy gleyed matrix (F2)

### Functions Provided

**Water Quality:** High (22 points) – sediment, nutrient and toxicant retention

**Hydrology:** Moderate (10 points) – surface runoff retention

**Habitat:** Moderate (17 points) – Organic matter production and export; habitat structure and diversity

## Wetland Y



Sample Plot SP-Y1



Sample Plot SP-Y1

### Description

**Location:** East side of study area, north of 4<sup>th</sup> Street

**Size:** 0.42 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-Y1 **Upland:** SP-Y2

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Occasionally Flooded / Seasonally Saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Shallow Subsurface Flow

**Connectivity:** Wetland Y is in a narrow, shallow depression. At high flows, surface water likely flows east into the ditch along East March Point Road. This ditch flows into Padilla Bay.

**Primary Indicators:** none (no water at time of inspection due to seasonality of wetland hydrology)

**Secondary Indicators:** Geomorphic position (D2), other: deep hoof prints and ruts

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, tall fescue, meadow foxtail, white clover, Kentucky bluegrass

**Prevalence Index:** 3.03

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-8	10YR 3/1	10YR 4/3; 8%	Loam	20% gravel
8-16	10YR 4/2	10YR 4/4; 10%	Loam	20% gravel, charcoal
16-18	5Y 5/1.5	10YR 4/4; 15%	Clay Loam	20% gravel

**Hydric Soil Indicators:** Depleted matrix (F3), Redox Dark Surface (F6)

### Functions Provided

**Water Quality:** Low (4 points) – low function

**Hydrology:** Low (7 points) – surface runoff retention

**Habitat:** Low (10 points) – organic matter production and export

## Wetland Z



Sample Plot SP-Z1



Sample Plot SP-Z1

### Description

**Location:** East side of study area, north of 4<sup>th</sup> Street

**Size:** 0.64 acre

**Landscape:** Glaciomarine Terrace, 0-3% slopes, concave to flat

**Sample Points:** **Wetland:** SP-Z1 **Upland:** SP-Z2

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Occasionally Flooded / Seasonally Saturated

**Hydrogeomorphic Classes:** Depressional and Slope

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Shallow Subsurface Flow

**Connectivity:** Wetland Z is in a shallow depression. At high flows, surface water likely flows east into the ditch along East March Point Road. This ditch flows into Padilla Bay.

**Primary Indicators:** Oxidized Rhizospheres (C3)

**Secondary Indicators:** Geomorphic position (D2), other: deep hoof prints

### Common Vegetation

**Trees:** none

**Shrubs:** none

**Herbs:** **Grazed Pasture:** meadow foxtail, colonial bentgrass, tall fescue, white clover, Kentucky bluegrass

**Prevalence Index:** >3.0

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-8	10YR 3/1	7.5YR 4/6; 1%	Silt Loam	
8-13	10YR 4/2	7.5YR 3/4; 10%	Loam	5% gravel
13-18	5Y 5/2	10YR 4/6; 30%	Sandy Loam	

**Hydric Soil Indicators:** Redox Dark Surface (F6)

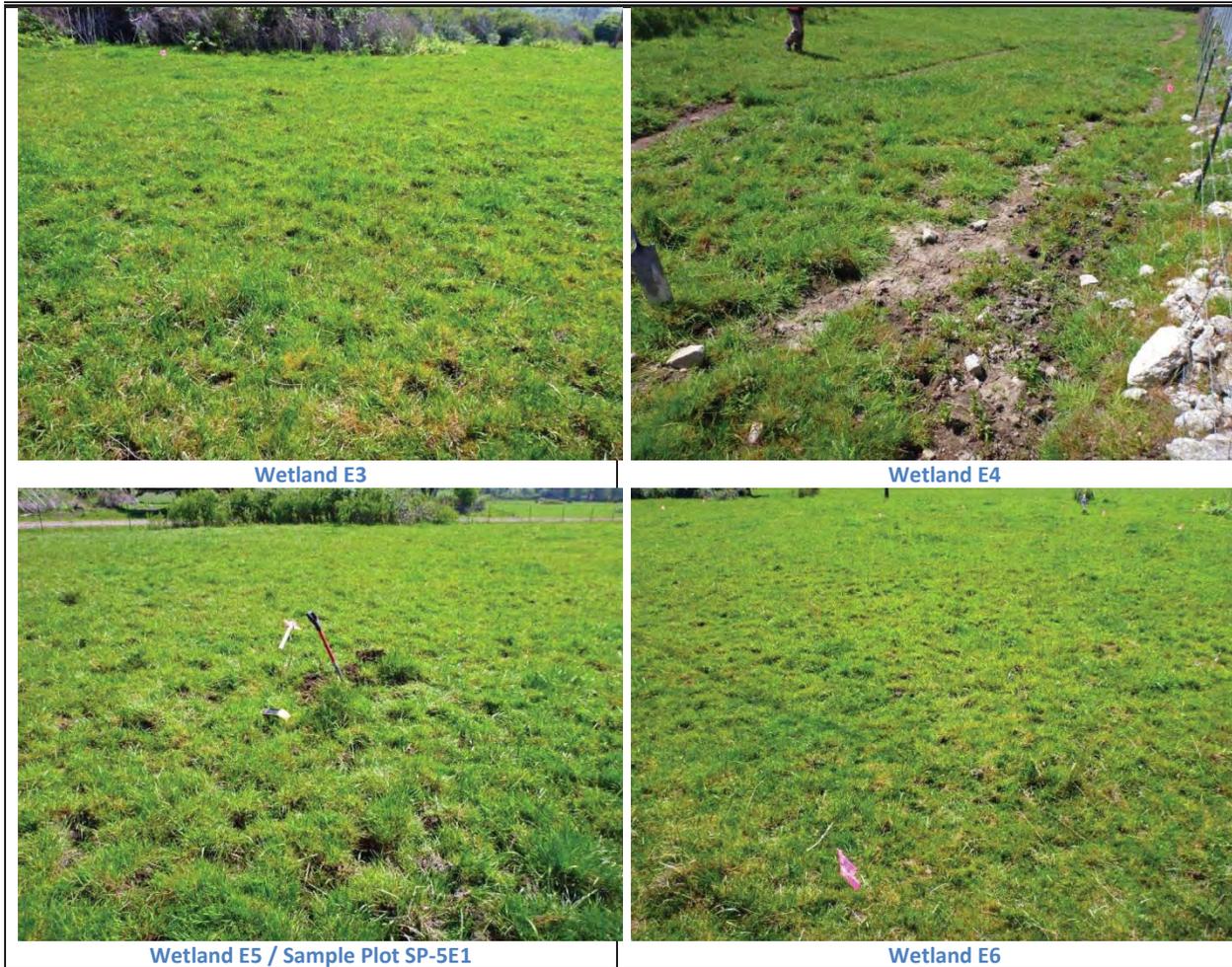
### Functions Provided

**Water Quality:** Low (6 points) – low function

**Hydrology:** Low (10 points) – surface runoff retention

**Habitat:** Low (12 points) – organic matter production and export

## Wetlands E3, E4, E5 & E6



Description	
<b>Location:</b>	South end of study area, south of 4 <sup>th</sup> Street
<b>Size:</b>	E3: 0.17 acre E4: 0.05 acre E5: 0.18 acre E6: 0.20 acre
<b>Landscape:</b>	Glaciomarine Terrace, 0-3% slopes, concave to flat
<b>Sample Points:</b>	<b>Wetland E5:</b> SP-5E1 (other wetlands are similar) <b>Upland:</b> SP-5E2
Classification	
<b>Cowardin Classes:</b>	Palustrine Emergent
<b>Water Regimes:</b>	Temporarily Flooded / Saturated
<b>Hydrogeomorphic Classes:</b>	Depressional and Slope
<b>Wetland Rating:</b>	IV
<b>Standard Buffer Width:</b>	50 feet
Hydrology	
<b>Primary Sources:</b>	Precipitation, Surface Runoff, Shallow Subsurface Flow
<b>Connectivity:</b>	At high flows, water sheet flows out of the shallow depressional wetlands in a southeasterly direction and into Ditch E3. This ditch conveys water to Stream I1, which flows east into Padilla Bay (Puget Sound).
<b>Primary Indicators:</b>	none (no water at time of inspection, May 9 <sup>th</sup> , due to seasonality of wetland hydrology)
<b>Secondary Indicators:</b>	Geomorphic Position (D2), Other: deep hoof prints

**Common Vegetation**

Trees: none

Shrubs: none

Herbs: **Grazed Pasture:** velvetgrass, colonial bentgrass, tall fescue, meadow foxtail, white clover, Kentucky bluegrass, crested dog's-tail

Prevalence Index: 3.00

**Typical Soils**

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-12	10YR 3/1.5	10YR 4/4 5%	Loam	20% gravel, charcoal
12-18	2.5Y 5/2	10YR 5/6 10% 10Y 5/1 2%	Sandy Loam	10%cobble,20%gravel

**Hydric Soil Indicators:** Depleted below Dark Surface (A11), Redox Dark Surface (F6)

**Functions Provided**

**Water Quality:** Low (8 points) – Low function

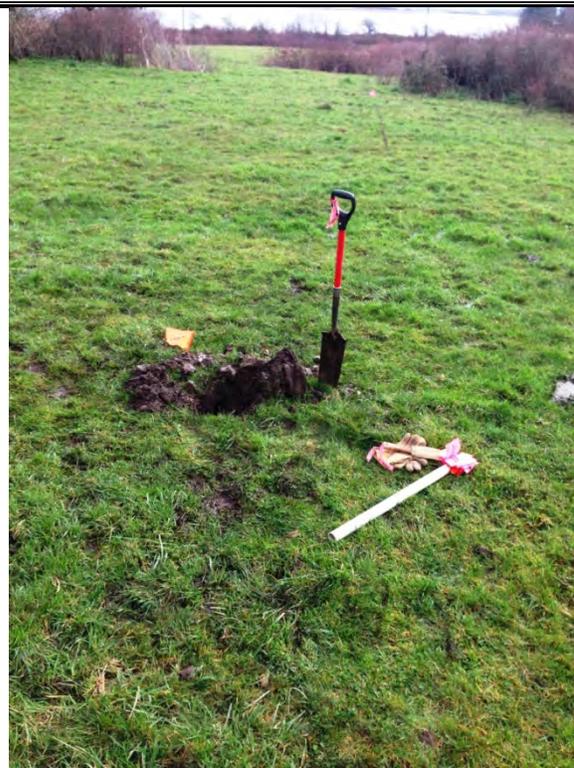
**Hydrology:** Low (7 points) – Surface runoff retention

**Habitat:** Low (10 points) – Organic matter production and export

## Wetland BB



Sample Plot SP-BB-9



Sample Plot SP-BB-9

### Description

**Location:** North end of study area between contractor's parking lot and Wetland I1.

**Size:** 0.74 acre

**Landscape:** Glaciomarine Terrace, 3-5% slopes, flat

**Sample Points:** **Wetland:** SP-BB-9  
**Upland:** SP-BB-10

### Classification

**Cowardin Classes:** Palustrine Emergent

**Water Regimes:** Temporarily Flooded / Saturated

**Hydrogeomorphic Classes:** Slope with small surface depressions

**Wetland Rating:** IV

**Standard Buffer Width:** 50 feet

### Hydrology

**Primary Sources:** Precipitation, Surface Runoff, Shallow Subsurface Flow

**Connectivity:** Wetland BB drains into Wetland I1 through a created channel approximately 25 feet long

**Primary Indicators:** Surface Water (A1), High Water Table (A2), Saturation (A3)

### Common Vegetation

**Trees:** None

**Shrubs:** None

**Herbs:** **Grazed Pasture:** velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, white clover, meadow foxtail

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-10	10YR 3/2	10YR 4/3 2%	Loam	
10-16	5Y 5/1	10YR 4/6 15%	Sandy Clay Loam	10% cobble 20% gravel

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**Hydric Soil** Depleted below Dark Surface (A11)

**Indicators:**

**Functions Provided (Freshwater portion)**

**Water Quality:** Low (2 points) – sediment, nutrient and toxicant retention

**Hydrology:** Low (2 points) – surface runoff retention

**Habitat:** Low (10 points)–organic matter production and export

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## Wetland CC



Sample Plot SP-CC-11



Sample Plot SP-CC-11

### Description

<b>Location:</b>	North end of study area between contractor's parking lot and Wetland I1.
<b>Size:</b>	0.31 acre
<b>Landscape:</b>	Glaciomarine Terrace, 3-5% slopes, flat
<b>Sample Points:</b>	<b>Wetland:</b> SP-CC-11 <b>Upland:</b> SP-CC-12

### Classification

<b>Cowardin</b>	<b>Classes:</b> Palustrine Emergent
	<b>Water Regimes:</b> Temporarily Flooded / Saturated
<b>Hydrogeomorphic Classes:</b>	Slope with small surface depressions
<b>Wetland Rating:</b>	IV
<b>Standard Buffer Width:</b>	50 feet

### Hydrology

<b>Primary Sources:</b>	Precipitation, Surface Runoff, Shallow Subsurface Flow
<b>Connectivity:</b>	Wetland CC drains into Wetland I1 through a shallow swale
<b>Primary Indicators:</b>	Surface Water (A1), High Water Table (A2), Saturation (A3)

### Common Vegetation

<b>Trees:</b>	None
<b>Shrubs:</b>	None
<b>Herbs:</b>	<b>Grazed Pasture:</b> velvetgrass, colonial bentgrass, creeping bentgrass, tall fescue, crested dogtail, white clover, meadow foxtail

### Typical Soils

Depth (in.)	Matrix Color	Redox Features	Texture	CFs/Remarks
0-4	10YR 3/2	--	Loam	
4-10	10YR 3/2	7.5YR 4/4 5%	Loam	15% gravel
10-16	2.5Y 5/1.5	10YR 5/6 15%	Sandy Clay Loam	25% gravel

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**Hydric Soil Indicators:** Depleted below Dark Surface (A11); Redox Dark Surface (F6)

**Functions Provided (Freshwater portion)**

**Water Quality:** Low (2 points) – sediment, nutrient and toxicant retention

**Hydrology:** Low (2 points) – surface runoff retention

**Habitat:** Low (12 points)–organic matter production and export

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