

GREENBANK MARSH WETLAND RECONNAISSANCE

GREENBANK, WA

ISLAND COUNTY TAX PARCEL #S7050-00-00A03-0 AND

S7050-00-00A04-0

Submitted to Rob Hallbauer, Whidbey Island Conservation District

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Executive Summary

On behalf of Mr. Rob Hallbauer and Tom Slocum, of the Whidbey Island Conservation District, Element Solutions conducted a Wetland Planning Level-Reconnaissance of Island County Tax Parcels S7050-00-00A03-0 and S7050-00-00A03-0 on May 17, 2016. Additionally, the wetlands complex adjacent to the subject parcels was estimated and rated using remote-sensing methods and limited field observations. The subject property, totaling 2.45 acres, is located on North Bluff Road in rural Island County, northeast of Greenbank, Washington. This investigative work was conducted at the request of the Whidbey Island Conservation District, in order to inform their decisions regarding the proposed restoration of Greenbank Marsh within the boundaries of the subject parcels. The Whidbey Island Conservation District has expressed interest conducting some form of habitat or hydrological restoration on the parcels, in order to improve the hydrological conveyance and ecological function of the subject property.

Three large wetlands, Wetlands A, B, and C, encompass the Greenbank Marsh complex. Wetland A occupies the western side of the subject property and extends beyond parcel boundaries to the west occupying an approximate total of 3.86-acres. Wetland A is a considered a wetland of special characteristics and a Washington State Heritage Wetland and a Coastal Lagoon (Category I Wetland) by Washington Department of Natural Resources, Ecology, and Island County. Additionally, Wetland A is classified as palustrine emergent, scrub-shrub wetland that is regularly flooded by tidal salt water (PEM/SSN), and will require a 100, 150, or 200-foot habitat buffer depending land use intensity.

The Wetland B occupies the majority of the marsh west of North Bluff Road, extends south to Wonn Road, and is not located within the subject parcels. Wetland B, occupying approximately 18.67-acres, is considered a wetland of special characteristics and is a Washington State Heritage Wetland and an Associated Coastal Lagoon Wetland (Category I Wetland) by Washington Department of Natural Resources, Ecology, and Island County. Additionally, Wetland B is classified as palustrine aquatic bed, emergent, scrub-shrub, forested, wetland that is permanently flooded/seasonally flooded & saturated (PAB/EM/SS/FO/HE). Wetland B has an Island County Wetland Rating score of 26 and will require a 75, 110, or 150-foot habitat buffer depending land use intensity.

The Wetland C occupies the southern side of the subject parcels and extends beyond parcel boundaries to the south occupying approximately 1-acres. Wetland C is a considered a wetland of special characteristics including being listed as a Heritage Wetland and an Associated Coastal Lagoon Wetland (Category I Wetland) by Washington Department of Ecology and Island County respectively. Additionally Wetland C is classified as palustrine emergent wetland that is seasonally flooded/saturated by freshwater tidal forces (PEMR). Wetland C has an Island County Wetland Rating score of 24 and will require a 75, 110, or 150-foot habitat buffer depending land use intensity.

Any impacts to Wetland A, B, C or their buffers should be avoided or, if they cannot be avoided, appropriately mitigated for pursuant to Island County, US Army Corps of Engineers, and Washington Department of Ecology regulations.

Lead Author Qualifications

Jeff Ninnemann, PWS, LG is a wetland ecologist with over 14 years of experience in wetland delineation, stream assessment, and fish and wildlife assessment. Mr. Ninnemann is a certified Professional Wetland Scientist (PWS certification #1829) through the Society of Wetland Scientists Professional Certification Program. He completed the five-day training course for Wetland Delineations through the Wetland Training Institute, the two-day Department of Ecology training courses for Wetland Rating in both Eastern and Western Washington, Ecology 8-hour 2015 Wetland Rating Update Workshop, and Ecology's two-day Ordinary High Water Mark (OHWM) Determination training. In addition, Mr. Ninnemann has completed multiple continuing education courses in advanced hydric soil indicators, plant identification, and mitigation design, review, and implementation. His areas of expertise include wetland identification and delineation, wetland mitigation and restoration design, fish and wildlife assessments, permitting, project management, vegetation analysis, and native plant identification.

1 Introduction

On behalf of Mr. Rob Hallbauer and Tom Slocum, of the Whidbey Island Conservation District, Element Solutions (Element) conducted a Wetland Planning Level-Reconnaissance of Island County Tax Parcels S7050-00-00A03-0 and S7050-00-00A03-0. Additionally, the wetlands complex adjacent to the subject parcels was estimated and rated using remote sensing methods and limited field observations. The subject property, which totals approximately 2.45 acres, with an adjoining wetland area totaling approximately 20.5-acres is located in Section 04, 08, 09, Township 30N, and Range 02 East of the Willamette Meridian (Lat/Lon: 48.109892°, -122.567621°). Element scientists visited the site, on May 17, 2016, in order to assess wetland conditions and inform proposed restoration alternatives.

The purpose of this wetland reconnaissance is to confirm the presence, location, estimate the extent, and category of wetlands on and adjacent to the subject property under the jurisdiction of Island County (County), the Washington State Department of Ecology (Ecology), and the U.S. Army Corps of Engineers (USACE). Buffer requirements were determined based upon the category of the critical wetland areas and development intensity as specified in Island County Critical Area Code (ICCAO 17.02.040). Element staff scientists evaluated the wetland areas, assessed their functional value, and determined their category based on existing conditions and available data.

2 Methods

2.1 Preliminary & On-site Review

Element performed a three-step evaluation to determine the presence and extent of wetlands and other critical habitats within or adjacent to the subject property (Figure 1). This evaluation began with a preliminary discussion of the subject property between Element scientists and the client, who provided information about the project characteristics and objectives. Element then conducted a data review of existing information regarding the project area. Subsequently, a detailed field investigation was performed to evaluate site vegetation, soils, and hydrology.

The goal of the data review and the site investigation was to accurately describe the geologic, hydrologic, and biological aspects of the parcels in order to provide sufficient data for the client and the regulatory agencies to make informed decisions regarding the wetlands.

Public resource documents were used to provide initial site information on vegetation, soils, hydrology, and critical habitats. These resources included the following:

- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Soil Survey, NRCS Hydric Soils List for Island County, spatial data December 13, 2013 and tabular data September 30, 2014.
- Washington Natural Heritage Wetland Sites, Washington State Department of Natural Resources. September 24, 2014. <http://www1.dnr.wa.gov/nhp/refdesk/datasearch>
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, 2006.
- County Critical Areas Map, 2007.

- Washington State Department of Natural Resources, Forest Practice Application Review System (FPARS), ARCIMS mapping application, 2015. <http://fortress.wa.gov/dnr/app1/fpars/viewer.htm>
- LIDAR Maps from the Puget Sound LIDAR Consortium.
- Island County Aerial Photographs (various sources) (Appendix B).
- National Oceanic and Atmospheric Administration's (NOAA) Advanced Hydrologic Prediction Service (AHPS) Mapper, 2015: <http://water.weather.gov/precip/>

Wetlands are identified based on the presence of hydrophytic vegetation, hydric soils, and wetland hydrology, all of which must be present for an area to be considered a jurisdictional wetland as described in the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and Corps Regional Supplements (U.S. Army Corps of Engineers, 2010) and the Washington State Wetlands Identification and Delineation Manual (Ecology, 1997) and Chapter 17.02 of Section 17.02.040 of the ICCAO.

2.2 Island County Wetland Rating System

Wetlands in Island County are assessed using the Island County Wetland Buffer Worksheet developed by the County (Appendix C). The ratings system is utilized to determine the appropriate buffer width for wetlands in Island County (ICCAO, 2008).

2.3 Western Washington Wetland Rating System

Wetlands within the project area were assessed using the Washington State Wetland Rating System for Western Washington (Ecology, 2015). The 2015 document was used for the purpose of categorizing. Island County's code does not utilize the state rating form, however if the project is reviewed by state or federal agencies they will require that the state rating form be used in addition to the County Rating System.

3 Site Investigation Results

3.1 General Site Description

The study parcels total approximately 2.45 acres and are currently undeveloped open space, with a small beach parking lot and boat ramp located in the eastern side of the parcels (Appendix A: Figures 1, and 2). The subject property is adjacent to the Homes Harbor shoreline and the greater Saratoga Passage. The wetlands on the subject property are connected to Puget Sound by a tide gate and +400-foot long culvert. The Greenbank Marsh wetland complex historically was directly or partially connected to Puget Sound and likely resembled an estuary, with an open water access to a wide range of tides, more so than a coastal lagoon, which is often isolated from the sound except for high tidal events (Appendix B: Historical Aerials).

3.2 Site Document Review

Multiple databases were consulted to review site characteristics and background information prior to data collection in the field. Information obtained during the document review supported the following interpretations:

- The NWI and County Critical Areas maps indicated that three large wetlands were present within the Subject property. The NWI-mapped wetlands in question, were within the boundaries of Wetland A, and the NWI data roughly correspond to field observations, however they didn't represent the full extent of the wetlands.
- The subject property and wetland are listed within a section and township that contains a Washington Wetland Natural Heritage Site, as classified by DNR (2014).
- The Forest Practice Application Review System (FPARS) supplied by the Washington State Department of Natural Resources through the ARCIMS mapping application (accessed June 13, 2016) was reviewed to determine the characteristics of any stream systems in the vicinity. A "Type F" fish-bearing stream (requiring a 100-ft buffer under ICCAO) is shown to run through the wetlands within the Subject property.
- The NRCS Soil Survey for Island County indicates mucky and sandy complexes on the property.
- Draft Alternatives Analysis and Conceptual Design Report: Greenbank Beach and Boat Club, Inc. Drainage and Habitat Improvement Project Prepared by: Whidbey Island Conservation District Coupeville, WA November 2013.

3.3 Field Work Summaries

The data used to determine vegetative communities, soil types, and the existence and type of hydrology present on site was collected on the USACE Wetland Determination Data Form: Western Mountains, Valleys and Coast Supplement (Appendix C). At the time of the May, 2016 site visit, more than a half dozen soil pits were implemented, two of which were documented, to identify the wetland areas and described on data sheets (Figure 2 and Appendix C).

3.4 Vegetation

On-site vegetation consisted of a mix of emergent, scrub-shrub patches, as well as second-growth forest, and moderately-wooded forest patches. Vegetation within the upland ("non-wetland") sections consisted wide spectrum of native and non-native emergent, shrubs, and trees. These species includes but were not limited to:

- Dandelion (*Taraxacum officinale*)
- Sitka spruce (*Picea sitchensis*)
- Salmonberry (*Rubus spectabilis*)
- Indian plum (*Oemleria cerasiformis*)
- Himalayan blackberry (*Rubus armeniacus*)
- Nootka Rose (*Rosa nootkana*)
- Red alder (*Alnus rubra*)
- Sea-Watch (*Angelica lucida*)
- Curly Dock (*Rumex crispus*)
- Hookers Willow (*Salix hookeriana*)
- Pacific Madrone (*Arbutus menziesii*)
- Tall Oregon grape (*Mahonia aquifolium*)
- Tall fescue (*Schedonorus arundinaceus*)
- Red fescue (*Festuca rubra*)
- Wild mint (*Mentha arvensis*)
- Yarrow (*Achillea millefolium*)
- Orchardgrass (*Dactylis glomerata*)
- American Vetch (*Vicia americana*)
- Dunegrass (*Elymus mollis*)
- Sheep sorrel (*Rumex acetosella*)
- Scouler's Willow (*Salix scouleriana*)
- Canadian Thistle (*Cirsium arvense*)

- Common Plantain (*Plantago major*)
- Colonial Bentgrass (*Agrostis capillaris*)
- Trailing Blackberry (*Rubus ursinus*)
- Velvet grass (*Holcus lanatus*)
- Seashore Bluegrass (*Poa macrantha*)

Vegetation in the wetland areas of the subject parcels consisted of a cross of hydrophytic plants (OBL and FACW) and plants that can also survive in low-moisture conditions (FAC and FACU). Plant species within wetland areas included, but were not limited to:

- Salmonberry (*Rubus spectabilis*)
- Himalayan blackberry (*Rubus armeniacus*)
- Nootka Rose (*Rosa nootkana*)
- Red alder (*Alnus rubra*)
- Sea-Watch (*Angelica lucida*)
- Curly Dock (*Rumex crispus*)
- Hookers Willow (*Salix hookeriana*)
- Bittersweet Nightshade (*Solanum dulcamara*)
- Stinging Nettles (*Urtica dioica*)
- Slough Sedge (*Carex obnupta*)
- Lady Fern (*Athyrium filix-femina*)
- Pacific Crabapple (*Malus fusca*)
- Softstem bulrush (*Scirpus tabernaemontanii*)
- European Beachgrass (*Ammophila arenaria*)
- Tall Oregon grape (*Mahonia aquifolium*)
- Red fescue (*Festuca rubra*)
- Yarrow (*Achillea millefolium*)
- Sheep sorrel (*Rumex acetosella*)
- Scouler's Willow (*Salix scouleriana*)
- Canadian Thistle (*Cirsium arvense*)
- Creeping buttercup (*Ranunculus repens*)
- Common cattail (*Typha latifolia*)
- Water Parsley (*Oenanthe sarmentosa*)
- Pacific Silverweed (*Potentilla anserina*)
- Twinberry (*Lonicera involucrate*)
- Velvet grass (*Holcus lanatus*)
- Sickle-leaf rush (*Juncus falcatus*)
- Dagger-leaf rush (*Juncus ensifolius*)
- Seashore Saltgrass (*Distichlis spicata*)

The vegetation within the Wetland A was represented by a distinct plant community of salt tolerant species. The occurrence of salt tolerant plant species were mapped and shown in Figure 3. Salt tolerant plant species within Wetland A included, but were not limited to:

- Pacific Silverweed (*Potentilla anserina*)
- Sickle-leaf rush (*Juncus falcatus*)
- Seashore Saltgrass (*Distichlis spicata*)
- Softstem bulrush (*Scirpus tabernaemontanii*)

3.5 Hydrology

Our reconnaissance occurred just before the summer growing season for our region (May, 2016). Summers in the Pacific Northwest are generally characterized by clear days, high temperatures, and decreased precipitation when compared to other months. Natural wetlands in the area were showing signs of declining capacity water levels at the time of the field investigations.

A combination of wetland hydrology characteristics of permanently flooded, tidally flooded, seasonally flooded, high water table, and/or saturated soils were observed in test pits within the wetland areas. The northeastern portion of the Greenbank Marsh complex is tidally influenced,

with saltwater entering the estuary through the tide gate at the property's northwestern corner. Additional saltwater intrusion into the existing wetland system likely occurs as marine waters flow through the beach berm during high tides. Moreover, the system likely increases ponding caused by freshwater mounding during high tides and storm events. Hydrological mounding can occur when runoff from uplands and streams encounter high tides which result in a damming effect on the runoff. The southwestern portion of the Greenbank Marsh wetland complex is dominated by non-tidal freshwater, high water table, runoff from uplands to the west and north, and direct precipitation.

The surface and sub-surface flow generally travels down gradient from upland areas to the south, north, and west of onsite wetlands (Figure 4). Once in the wetland the hydrologic flow travels toward the northeast via a culvert under North Bluff Road, and then flows east into the center of the coastal lagoon (Wetland A) . From the coastal lagoon surface water then travels through a tide gate and +400-foot long culvert and into the Puget Sound. Two streams feed into the wetland complex; one flows out of a pond located west of the wetland complex and within the Greenbank Farm complex, and another stream drains the uplands north of the wetlands. Washington Department of Natural Resources lists both unnamed streams as fish-bearing. The confirmation of the location and status of these streams were beyond the scope of this study. However, numerous culverts, and stormwater ditches were observed draining into the wetland complex from the development on the north side of the subject property.

3.6 **Island County Wetland Rating System**

The wetlands on the subject property were assessed using the Island County Wetland Buffer Worksheet (Appendix C, 2008). NWI maps and aerial photos were used to get a larger scale view of vegetation, hydroperiods, surrounding areas, and the wetland units as a whole (Figures 2, 3, 4, and 5). The habitat score, determined through the rating system, provides a numerical value that represents the wetland's ability to prevent pollution and improve water quality, prevent flooding and stream erosion, and express the quality, diversity, complexity, and connectivity of wildlife habitat.

The County wetland rating system indicated that Wetland A is an Island County High Priority Wetland: Coastal Lagoon. (Table 1, Appendix D).

The County wetland rating system indicated that Wetland B is an Island County Class B wetland (Wetland Associated with a Coastal Lagoon) with an outlet in the northeast property corner. Wetland B has a habitat score of 26 (Table 1, Appendix D).

The County wetland rating system indicated that Wetland C is an Island County Class B wetland (Wetland Associated with a Coastal Lagoon) with an outlet in the northeast property corner. Wetland B has a habitat score of 24 (Table 1, Appendix D).

3.7 **Western Washington Wetland Rating**

The wetlands on the subject parcel were assessed using Ecology's 2015 wetland rating system for the category evaluation. National Wetlands Inventory maps and aerial photos were used to get a large-scale view of vegetation, hydroperiods, surrounding areas, land uses, and the

wetland units as a whole. The worksheets used to determine scores are presented below (Figures 2, 3, 4, 5, 6, 7, and Appendix E).

The Ecology wetland rating system indicated that Wetland A is a wetland with Special Characteristics (Wetland of High Conservation Value and Coastal Lagoon). Additionally the functional value assessment resulted in a total functional score of 23. Both of these factors results in Wetland A being considered a Category I wetland according to the 2015 Ecology wetland rating system. (Table 1, Appendix E).

The Ecology wetland rating system indicated that Wetland B is a wetland with Special Characteristics (Wetland of High Conservation Value). Additionally the functional value assessment resulted in a total functional score of 25. Both of these factors results in Wetland B being considered a Category I wetland according to the 2015 Ecology wetland rating system. (Table 1, Appendix E).

The Ecology wetland rating system indicated that Wetland C is a wetland with Special Characteristics (Wetland of High Conservation Value). However the functional value assessment resulted in a total functional score of 20 (functional values of a Category II wetland). However, due to the Wetland C being a wetland of high conservation value, it still considered a Category I wetland according to the 2015 Ecology wetland rating system. (Table 1, Appendix E).

3.8 **Priority Habitats and Species: WDFW and WA DNR Digital Data**

A desktop analysis of online PHS data for a radius of 1-mile around the subject area was conducted. This online data indicate that Priority Habitats exist within the 1-mile search area; namely, Great blue heron (*Ardea herodias*) and wetland habitats that were also observed during the site evaluation. In addition, the near vicinity (beach front of the subject parcel) and Homes Harbor shoreline is known to provide spawning habitat for forage fish species such as Pacific herring (*Clupea pallasii*) and Pacific Sand Lance (*Ammodytes hexapterus*). Furthermore, WDFW has documented bald eagle (*Haliaeetus leucocephalus*) nesting sites, and waterfowl and shorebird concentrations nearby and in Lake Hancock to the west. It is also likely the Greenbank Marsh provides exemplary and diverse habitats for a host of aquatic, terrestrial, and avian species. A variety of salmonids (*Oncorhynchus sp.*) have also been documented near the Holmes Harbor shoreline.

The review of online data determined that the proposed project will occur entirely within the 150-ft shoreline buffer in addition to established 150-ft HCA buffers. These PHS buffers are defined in the County Code (ICC 17.02A, 17.02B, and 17.05A) and are addressed specifically in other sections of this report.

4 **Determination & Alternatives Evaluation**

4.1 **Determination**

Wetland A was determined to be an Island County High Priority Wetland: Coastal Lagoon, according to the County rating form (Island County 2008) and an Ecology wetland of Special Characteristics Category I (Wetland of High Conservation Value and Coastal Lagoon) (Ecology

2015). Wetland A occupies approximately 3.86-acres of the subject property (Table 1, Figure 2). Wetland A is classified as palustrine emergent, scrub-shrub wetland that is regularly flooded by tidal salt water (PEM/SSN). The wetland meets the size requirements for jurisdictional wetlands within the County and will be regulated as such: Wetland A will receive a 100, 150, or 200-foot habitat buffer depending land use intensity, according to Island County Critical Area Code (ICCAO 17.02.040) (Table 1).

Wetland B was determined to be an Island County Type B Wetland: Wetland Associated with a Coastal Lagoon, with a functional score of 26, according to the County rating form (Island County 2008). Wetland B is an Ecology wetland of Special Characteristics Category I (Wetland of High Conservation Value), with a total functional score of 25 (Ecology 2015). Wetland B occupies approximately 18.67-acres of the subject property (Table 1, Figure 2). Wetland B is classified as palustrine aquatic bed, emergent, scrub-shrub, forested, wetland that is permanently flooded/seasonally flooded & saturated (PAB/EM/SS/FO/HE). The wetland meets the size requirements for jurisdictional wetlands within the County and will be regulated as such: Wetland B will receive a 75, 110, or 150-foot habitat buffer depending land use intensity, according to Island County Critical Area Code (ICCAO 17.02.040) (Table 1).

Wetland C was determined to be an Island County Type B Wetland: Wetland Associated with a Coastal Lagoon, with a functional score of 24, according to the County rating form (Island County 2008). Wetland C is an Ecology wetland of Special Characteristics Category I (Wetland of High Conservation Value), with a total functional score of 20 (Ecology 2015). Wetland C occupies approximately 1-acres of the subject property (Table 1, Figure 2). Wetland C is classified as palustrine emergent wetland that is seasonally flooded/saturated by freshwater tidal forces (PEMR). The wetland meets the size requirements for jurisdictional wetlands within the County and will be regulated as such: Wetland B will receive a 75, 110, or 150-foot habitat buffer depending land use intensity, according to Island County Critical Area Code (ICCAO 17.02.040) (Table 1).

Table 1. Critical Area Information and Buffer Widths.

Critical Area	NWI Classification	Category/ Type	Island County Habitat Score	Ecology Total Functional Score	Buffer Width (ft)*
Wetland A	PEM/SSN	Coastal Lagoon	NA	23	100/150/200
Wetland B	PAB/EM/SS/FO/HE	Type B	26	25	75/110/150
Wetland C	PEMR	Type B	24	20	75/110/150

*Buffer width depends on low, moderate, or high intensity development.

4.2 Alternatives Evaluation

The Alternatives Analysis and Conceptual Design Report: Greenbank Beach and Boat Club, Inc.

Drainage and Habitat Improvement Project, Whidbey Island Conservation District, 2013”, report was reviewed and evaluated for this planning level-reconnaissance report. Specifically, we reviewed the drainage and restoration options presented in the report with respect to ecological and wetland functions. During our review we determined that it is difficult to evaluate potential project impacts on the large wetland complex west of North Bluff Road, given that resolution of the LiDAR was poor and survey data is unavailable.

The field reconnaissance conducted on May 17, 2016, included a delineation of the salt tolerant vegetation found on the site (Figure 3). Although this likely corresponds to areas that are regularly inundated with brackish water, many plants have a range of salt tolerance and the intrusion of salt water into the marsh could vary slightly compared to the mapped areas. Additional factors such as high tide, wind fetch, storm events, precipitation, and runoff will also effect the level of salinity within the wetland complex.

Over all we found that the salt tolerant vegetation correlated closely with the mapped OHWM presented in Sheet #1 of the *Alternatives Analysis and Conceptual Design Report* (WICD, 2013).

Detailed descriptions of the objectives of the restoration and individual Option specifications is shown in Appendix B.

4.2.1 **Option #1: Outfall Deflector Structure**

The installation of an outfall deflector would likely increase hydrologic conductivity slightly, resulting in less ponding and flooding, assuming that it is maintained and gravel is regularly removed; however according to the 2013 report (WICD) the tide gate would still be a limiting factor on hydrological conductivity. The Outfall Deflector Structure is not anticipated to have much effect on the functions of the wetland or distribution of plant communities within the Marsh compared to the current condition. Assuming the responsible parties continue to complete regular maintenance of the gravel intake, a small increase in fish passage would potentially be achieved. However, other obstacles to fish passage including the tide gate, +400-foot long culvert would remain the same and continue to be limiting factors to fish passage. The overall effect of this option is that fish utilization would not likely increase.

The USACE and Department of Ecology generally do not consider restoration and mitigation projects that rely on man-made structures or activities to be sustainable throughout the foreseeable future.

4.2.2 **Option #2: Tide Gate Replacement**

The replacement of the existing tide gate with a more effective tide gate design with proven success would potentially increase the hydrological conductivity of the outflow within the system, but would also decrease the saltwater inflow. The reduction in the amount of saltwater entering the marsh would drastically change wetland functions and vegetative communities within the northern portion of the marsh. Due to the porous nature of the beach berm, total saltwater exclusion does not appear feasible. Moreover, a reduction of saline water intrusion may result in the loss of much of the salt tolerant vegetation and increase proliferation of freshwater vegetation on the western side of N. Bluff Road, thereby reducing ecological diversity and wetland functions as a whole. Invasive species in the area (Himalayan blackberry

and bittersweet nightshade) are also more likely to expand in a freshwater environment, and this would reduce fish passage within the system.

The inclusion of a correctly sized aperture that allows back flow of salt water could improve the marsh-complex assuming that the aperture allows increased flow of salt water into the marsh as compared to current conditions. If the aperture is sized to allow the same amount of water currently leaking through the tide gate than changes in ecological function would likely not be observed. However, if an increase back flow is allowed then the salt tolerant vegetation will likely expand within the marsh increasing the diversity and function of the wetland complex. The inclusion of the aperture could increase fish passage within the system, however the +400-foot long culvert would still restrict fish utilization within the marsh.

The USACE and Department of Ecology generally do not consider restoration and mitigation projects that are reliant on man-made structures or activities to be sustainable in the future.

4.2.3 **Option #3: Partial Restoration of Tidal Flow**

The installation of the stream channel and muted tide gate could greatly increase the ecological and wetland functions of the marsh complex. The addition of a stream channel would add ecological complexity to the site that would inherently lift habitat functions as a whole. The tidal exchange of water during low and moderate tides would create a much more dynamic and diverse estuarine system. Salt tolerant vegetation would likely expand on both sides of N. Bluff Road and fish passage would be restored during periods of high tide ;thereby increasing salmonid and forage fish usage. The increase in fish utilization would also increase heron, other predatory birds, and mammal presence within and around the marsh.

The extent of the salt water tolerant expansion is difficult to interpret given the limited topographic information on the site west of N. Bluff Road. The Lidar information, which was used to analyze this site, appears to be slightly inaccurate compared to field observation and may have been obstructed by vegetation. However the expansion of the salt tolerant vegetation and estuarine system would likely be between 10% and 15% above current conditions. Additional survey information may clarify this question.

The armoring of the stream channel along the beach front and boat ramp, may alter the sediment transport along the beach, however additional information would be required to determine how that would affect the beach habitat or environment.

4.2.4 **Option #4: Full Restoration of Tidal Flow**

The installation of the natural tidal channel and restoration of full tidal flow, would greatly increase the ecological and wetland functions of the marsh complex and more closely restore it to historical conditions. The addition of a natural tidal channel would add ecological complexity to the site that would lift habitat functions, much like Option #3 above. The natural tidal exchange of water would create a very dynamic and diverse unique estuarine system. Salt tolerant vegetation would greatly expand on both sides of N. Bluff Road. Fish passage would be restored and therefore salmonid and forage fish usage is likely to increase, as well as use by other marine flora and fauna. The increase in fish utilization would also increase heron, other predatory birds, and mammal presence within and around the marsh.

The restoration of natural tidal flow would allow for a much needed expansion of estuarine wetlands. As a result of the removal of the dike and tide gate, this option would not only expand the extent of salt tolerant vegetation within the marsh complex, but it would also expand the square footage of the wetland itself (approximately 30,000-ft²), greatly increasing habitat, hydrologic, and water quality functions. The expansion of the salt tolerant vegetation and estuarine system would likely be between 25% and 35% above current conditions, although it could include all of the wetland, which could increase the estuarine wetland habitat in the Puget Sound by approximately 16-acres.

Table 2. Summary of Ecological Benefits for Given Options.

Option	Ecological Function	Fish Utilization	Wetland Size
Outfall Deflector Structure	No Change	No Change	No Change
Tide gate Replacement	<ul style="list-style-type: none"> Negative impact without aperture. No change to small increase depending on size of aperture. 	<ul style="list-style-type: none"> Negative impact without aperture. No change to small increase depending on size of aperture. 	No Change
Partial Restoration of Tidal Flow	Moderate to large increase.	Moderate to large increase.	No Change
Full Restoration of Tidal Flow	Very large increase	Very large increase	Increase

4.2.5 Additional Considerations

- The extent of Puget Sound estuarine environments has been drastically reduced when compared to historic conditions, and many estuaries have been filled for harbors, marinas, cities, and other development. The areas where natural estuaries can be re-established are even fewer, however the Greenbank Marsh appears to offer a rare opportunity to increase the ecological function of our shoreline. The Wetland Category of Wetland C is considered a Category I wetland primarily due to its historic significance as an estuary and its association with a Coastal Lagoon, based on ecological function it is a Category II. The re-establishment of tidal flow (Options #3 or #4) would create enough of a functional lift that it would increase to a Category I by function alone.
- The loss of parking lot and community use space in Option #4 could be offset, by expanding the parking lot and community space northwest of the proposed raised parking lot shown in Sheet #5 of *Draft Alternatives Analysis and Conceptual Design Report* (WICD, 2013). This would mean that there would be no net loss of community space for the Greenbank Beach and Boat Club.
- The potential costs of Options #3 and #4 may be offset through partnerships with other interested shareholders, such as, tribes, land trusts, restoration grants, salmon enhancement groups.

- Option #4 could be increase in ecological function while cooperating with adjacent land owners. The position of the dike could be moved south onto the adjacent land owners property. This would increase the lagoon and estuary square footage at the same time as providing a dry driveway for the landowner.
- Additional information would increase the ecological understanding of how these options would affect the ecology, habitat, stormwater drainage of the area. Suggested additional areas to study include but are not limited to:
 - Professional survey of the subject property and Greenbank Marsh Complex to determine extent of potential tidal influence.
 - Professional determination of Ordinary High Water Mark,
 - Hydrological Monitoring of the Coastal Lagoon area as well the wetland west of North Bluff Road,
 - Salinity test of the marsh during high tide,
 - On-site information regarding groundwater and tidal interactions within the Subject property,
 - Sediment transport analysis of Options #3 and #4.

5 Closure

We have used the most current, established methods to make determinations as to the location, size, and types of wetlands on this parcel. All of the above statements are based on our best professional judgment. Although we follow the federal, state, and local criteria, we cannot guarantee that the U.S. Army Corps of Engineers or the local jurisdiction determination will correspond to ours.

This report was prepared by:



Jeff Ninnemann, PWS, LG
Senior Wetland Ecologist, Environmental Geologist



Adam Crispin, Environmental Scientist
Aquatic Ecologist

Statement of Limitations

This document has been prepared by Element Solutions for the exclusive use and benefit of the Client. No other party is entitled to rely on any of the conclusions, data, opinions, or any other information contained in this document.

This document represents Element Solution's best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by members of the geologic engineering and Wetland Science professions currently practicing under similar conditions. No warranty, expressed or implied, is made.

Appendix A: Figures

Figure 1. Greenbank Wetland Reconnaissance, Site Vicinity Map.

Figure 2. Greenbank Wetland Reconnaissance, Wetland Buffers, and Soil Point Locations.

Figure 3. Greenbank Wetland Reconnaissance, Cowardin Classes and Salt Tolerant Vegetation.

Figure 4. Greenbank Wetland Reconnaissance, 2-ft Contour and Hydrologic Flow Map.

Figure 5. Greenbank Wetland Reconnaissance, Hydroperiods.

Figure 6. Greenbank Wetland Reconnaissance, 1-km Habitat and Land Use Radius Map.

Figure 7. Greenbank Wetland Reconnaissance, 303d Listed Waterbodies and TMDL.

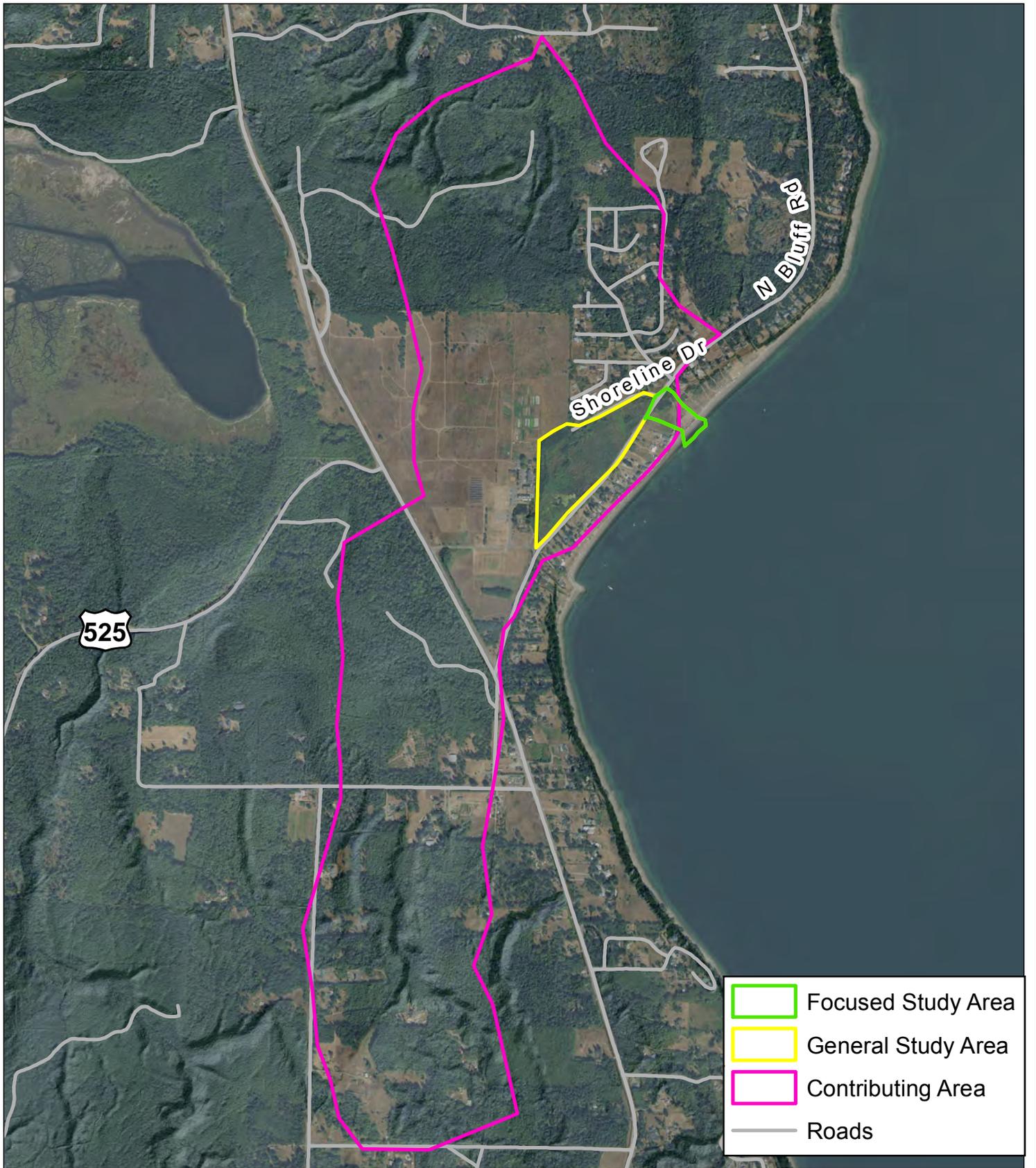


FIGURE 1

Greenbank Wetland
Reconnaissance
Site Vicinity Map

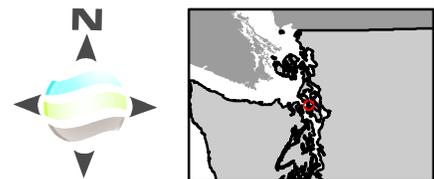
Date: 6/18/2016



info@elementsolutions.org

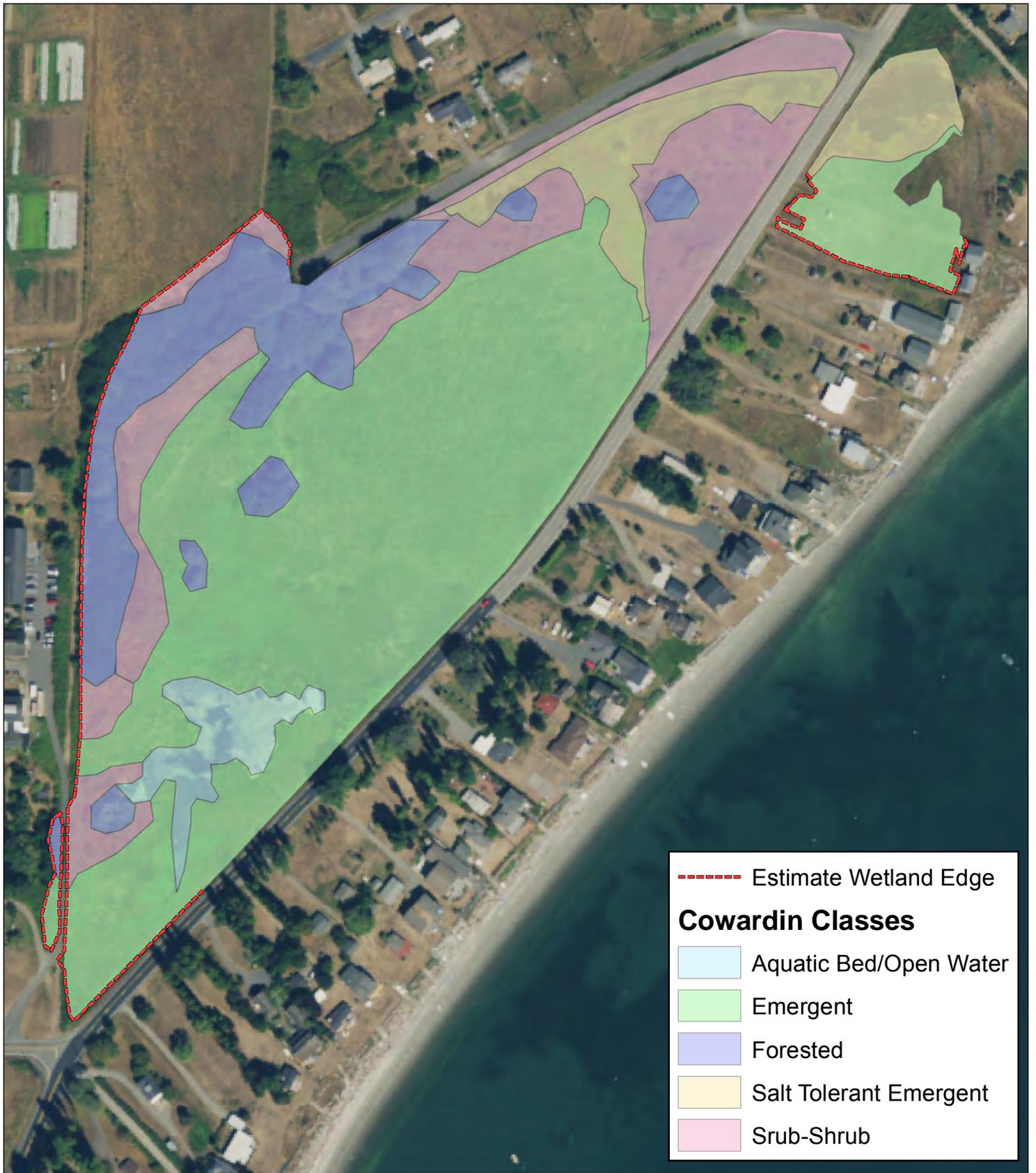


0 160 320 480 640 FEET



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FIGURE 2
 Greenbank Wetland
 Reconnaissance
 Wetlands, Buffers, and Soil Plts.
 Date: 6/18/2016

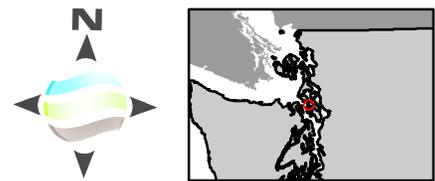


----- Estimate Wetland Edge

Cowardin Classes

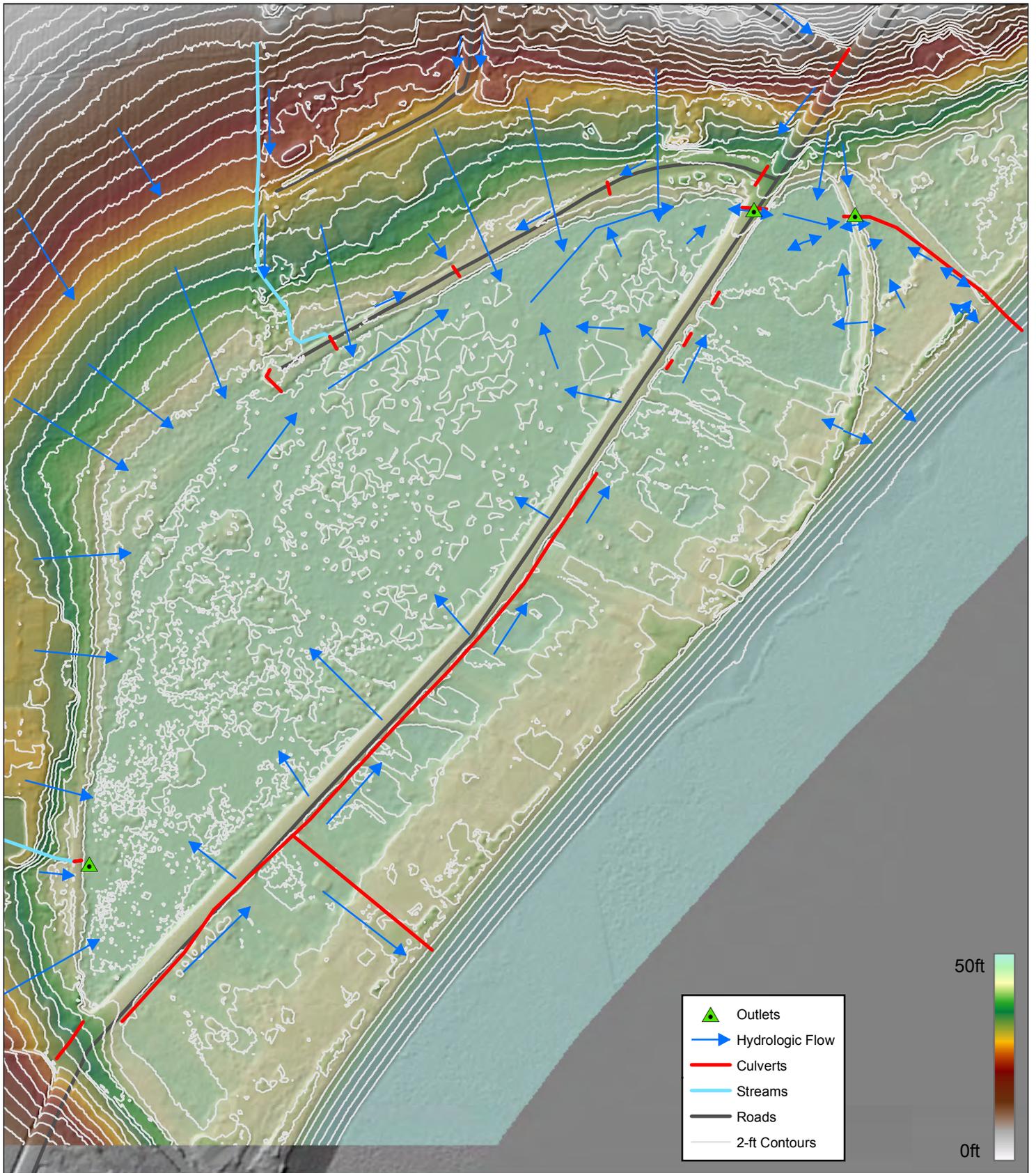
- Aquatic Bed/Open Water
- Emergent
- Forested
- Salt Tolerant Emergent
- Srub-Shrub

0 140 280 420 560 FEET



info@elementsolutions.org

FIGURE 3
 Greenbank Wetland Recon
 Cowardin Classes and Salt
 Tolerant Vegetation
 Date: 6/20/2016



0 210 420 630 840 FEET



1812 Cornwall Avenue
 Bellingham, WA 98225
 info@elementsolutions.org
 Phone: 360.671.9172

FIGURE 4

Greenbank Wetland Reconnaissance
 2ft Contour Map and Hydrologic
 Flow

Date: 6/20/2016

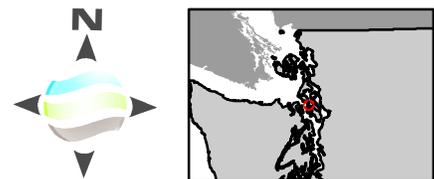


— Streams
— Estimate Wetland Edge
— Culverts

Hydroperiods

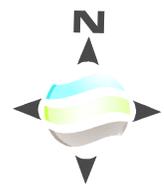
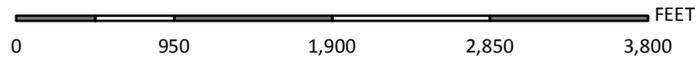
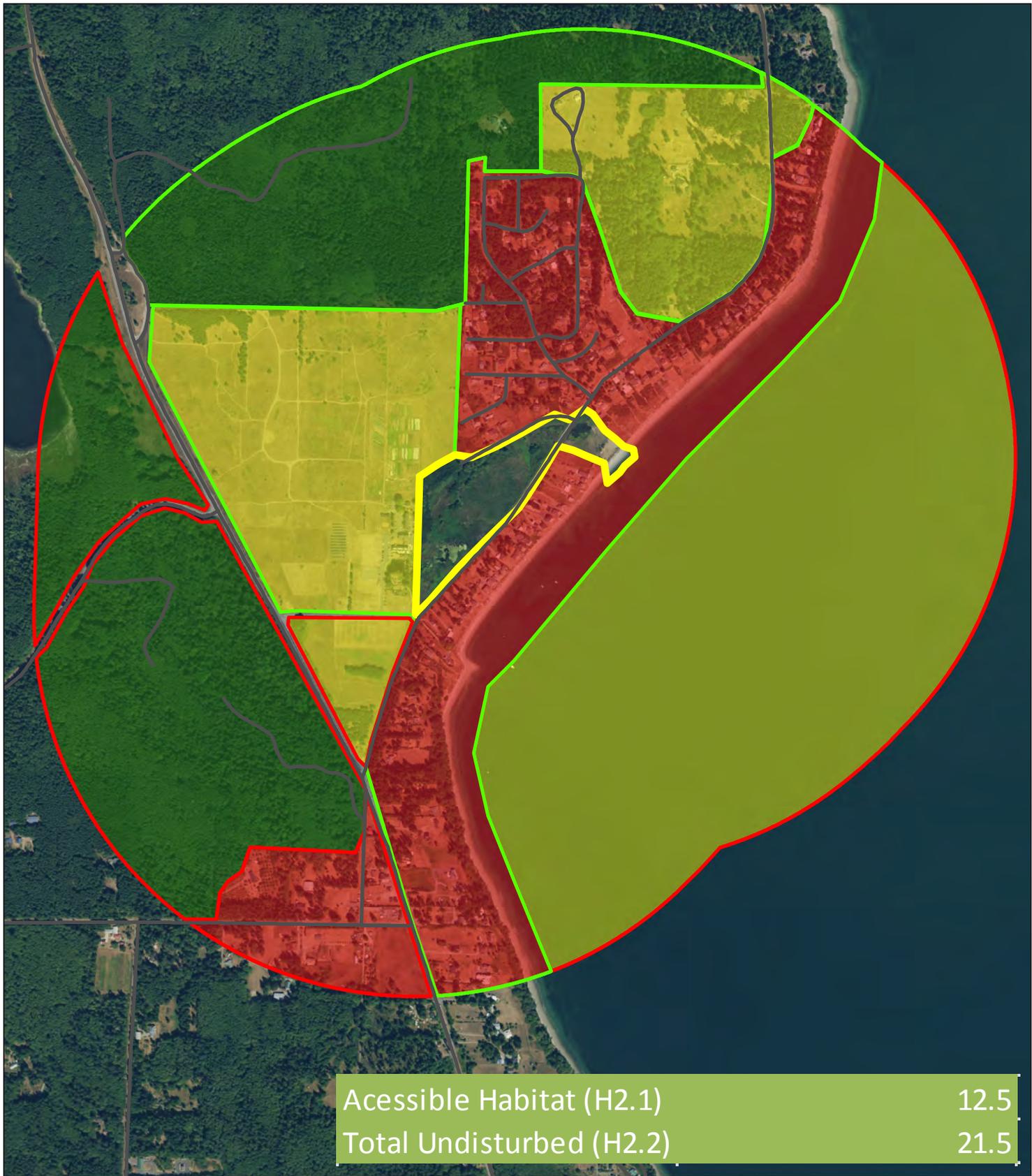
- Permanently Flooded
- Regularly Tidally Flooded
- Saturated
- Seasonally Flooded
- Seasonally Flooded/Saturated

0 140 280 420 560 FEET



info@elementsolutions.org

FIGURE 5
 Greenbank Wetland Recon
 Hydroperiods
 Date: 6/20/2016



Roads	Abutting Hablntensity	
Study Area	No	High
	Yes	Low/Med
		Undisturbed



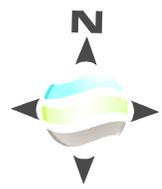
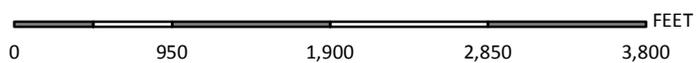
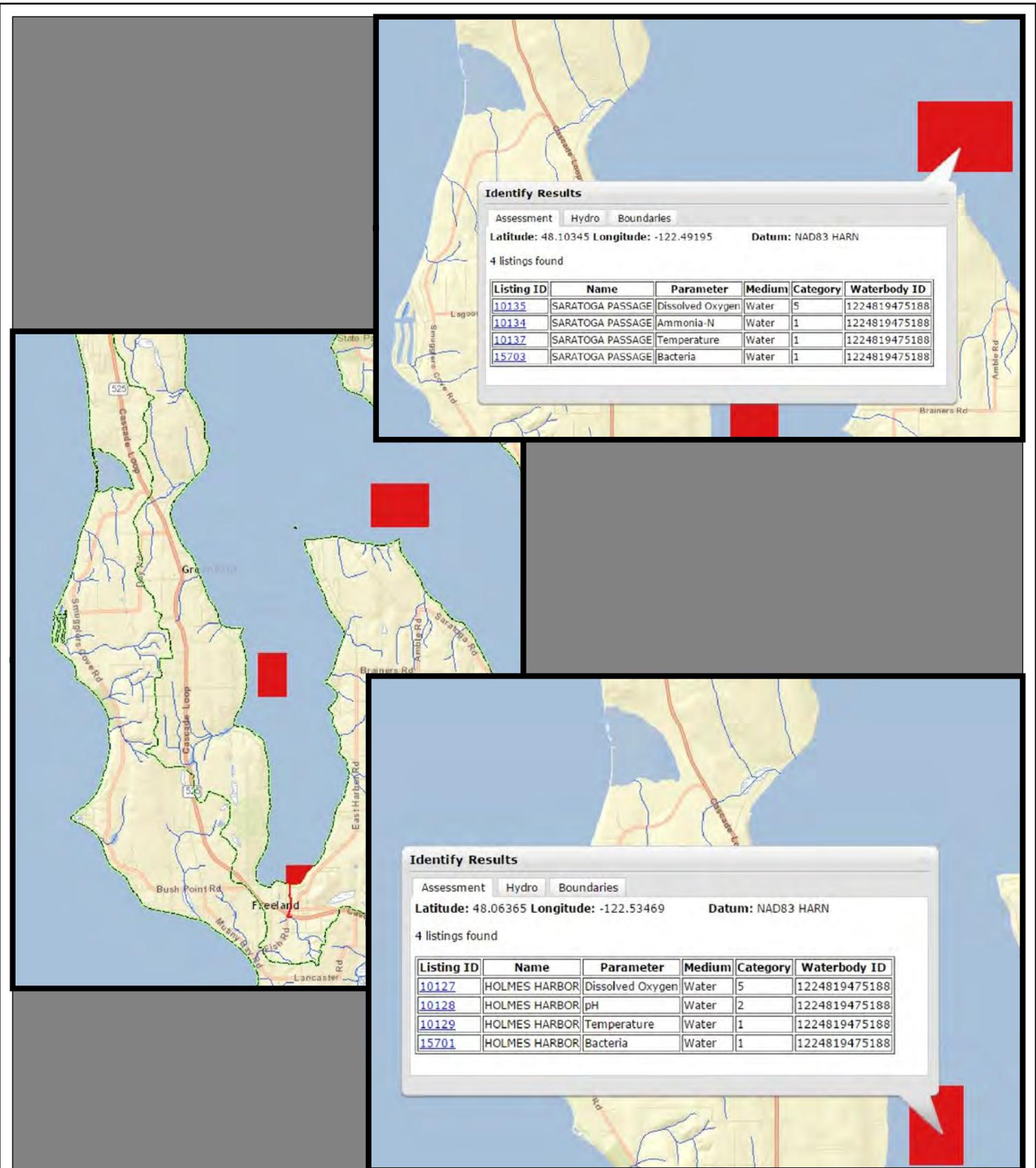
ELEMENT
solutions

1812 Cornwall Avenue
Bellingham, WA 98225
info@elementsolutions.org
Phone: 360.671.9172

FIGURE 6

Greenbank Wetland Reconnaissance
1Km Habitat Land Use Radius Map

Date: 6/20/2016




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1812 Cornwall Avenue
 Bellingham, WA 98225
 info@elementsolutions.org
 Phone: 360.671.9172

FIGURE 7
 Greenbank Wetland Reconnaissance
 303d Listed Waterbodies and TMDL

Date: 6/20/2016

Appendix B: Historical Aerial Photographs



5/2/2015 Google Earth



3/29/2016 Google Earth



7/17/2015 Google Earth



5/2/2015 Google Earth



7/10/2014 Google Earth



Image USDA Farm Service Agency

9/25/2011 Google Earth



8/25/2011 Google Earth



Image USDA Farm Service Agency

6/25/2009 Google Earth



4/30/2009 Google Earth



Image Island County
Image USDA Farm Service Agency

5/26/2007 Google Earth



7/6/2006 Google Earth



Imagery Date: 7/31/2005 lat 48.109670°

7/31/2005 Google Earth

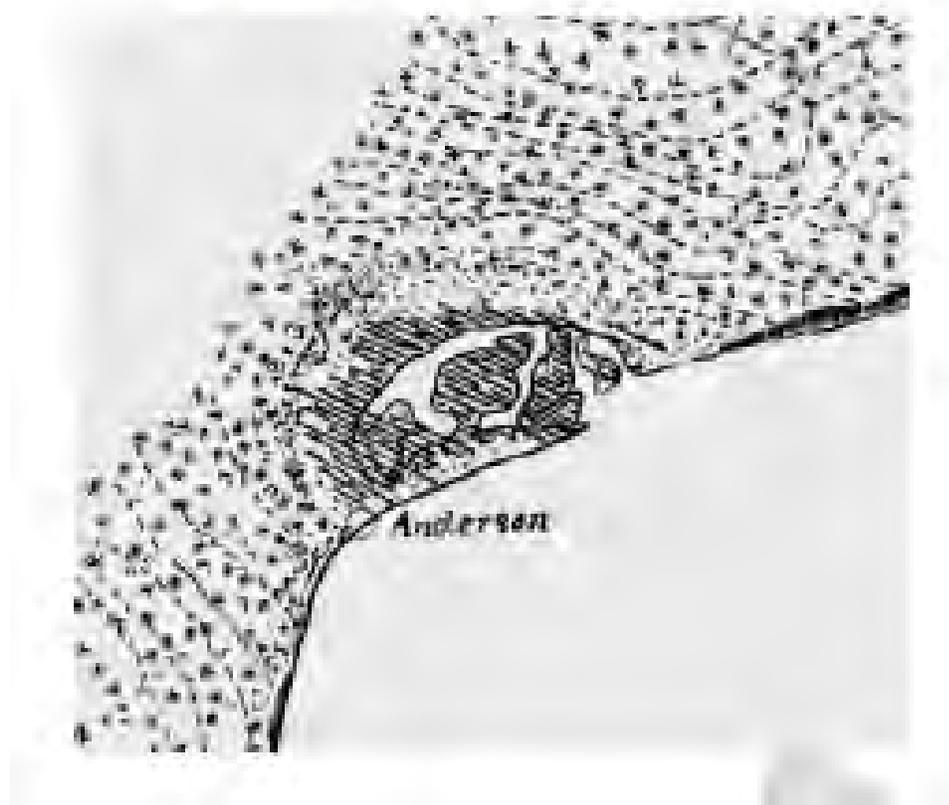


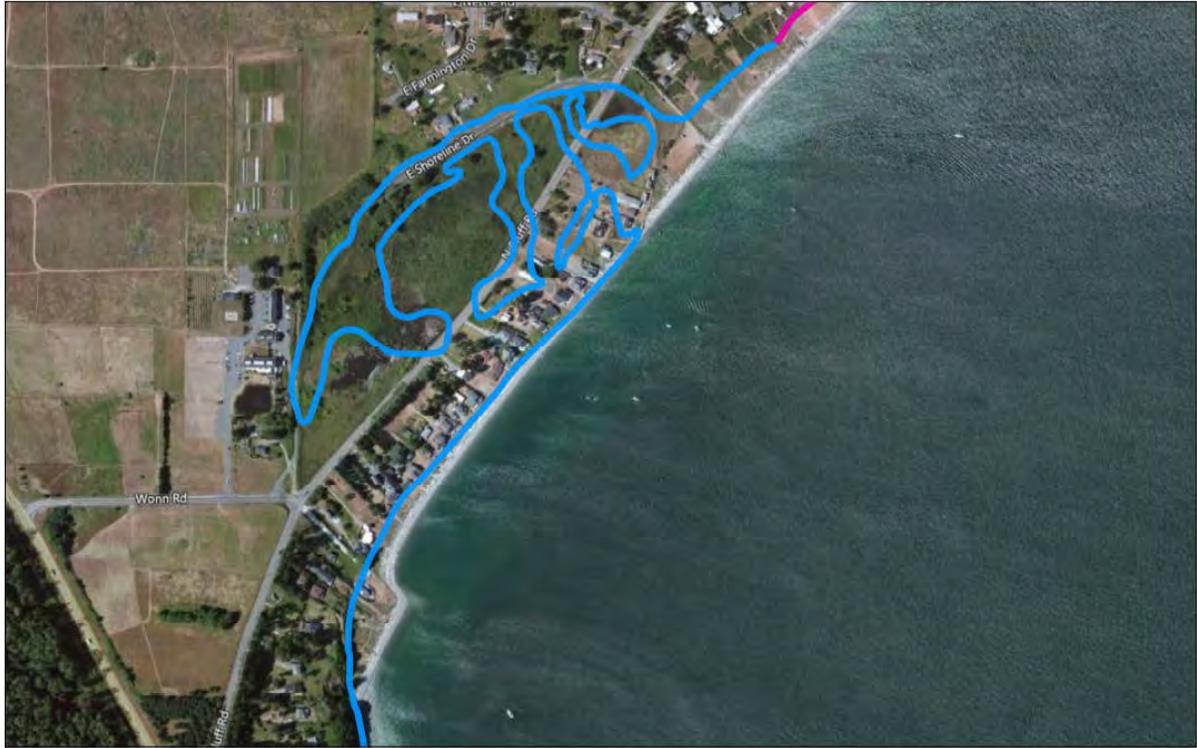
7/9/1990 Google Earth

Figure 2 from Draft Alternatives Analysis and Conceptual Design Report: Greenbank Beach and Boat Club, Inc. Drainage and Habitat Improvement Project (November 2013)

Figure 2 from Draft Alternatives Analysis and Conceptual Design Report: Greenbank Beach and Boat Club, Inc. Drainage and Habitat Improvement Project (November 2013)

Figure 2: 1888 Shoreline Chart





June 14, 2016

0 0.075 0.15 0.3 mi
0 0.1 0.2 0.4 km
1:9,028
Image courtesy of USGS Earthstar Geographics SIO © 2016 Microsoft Corporation © 2010 NAVTEQ © AND

2016 aerial photograph with outline of estimated 1888 Historical Shoreline.

Appendix C: Wetland Soil Pit Data Sheets.

WETLAND DETERMINATION DATA FORM
Western Mountains, Valleys, and Coast Supplement to the
1987 COE Wetlands Delineation Manual

Project Site: <u>Greenbank Marsh Restoration Issues Assessment Project</u>	Sampling Date: <u>5/17/2016</u>
Applicant/Owner: <u>Rob Hallbauer and Tom Slocum</u>	Sampling Point: <u>Soil Point 1</u>
Investigator: <u>Jeff Ninnemann</u>	City/County: <u>Island County</u>
Section, Township, Range: <u>Sec: 04, Twnshp: 30N, RNGE: 2E</u>	State: <u>WA</u>
Landform (hillslope, terrace, etc) <u>backshore</u>	Slope (%) <u>none</u>
	Local relief (concave, convex, none) <u>none</u>
Subregion (LRR) <u>LRR MLRA2</u>	Lat <u>48.109807° N</u>
	Long <u>-122.567347° W</u>
Soil Map Unit Name <u>Beaches-Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes</u>	NWI classification: <u>none</u>
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(If no, explain in remarks.)
Are "Normal Circumstances" present on the site? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> significantly disturbed?	(If needed, explain any answers in Remarks.)
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> naturally problematic?	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is this Sampling Point within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size 30' _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet	
1.				Number of Dominant Species that are OBL, FACW, or FAC:	1 (A)
2.				Total Number of Dominant Species Across All Strata:	3 (B)
_____ = Total Cover				Percent of Dominant Species that are OBL, FACW, or FAC:	33 (A/B)
Sapling/Shrub Stratum (Plot size 30' _____)				Prevalence Index Worksheet	
1.				Total % Cover of	
2.				Multiply by	
3.				OBL species	x 1 =
4.				FACW species	x 2 =
5.				FAC species	x 3 =
_____ = Total Cover				FACU species	x 4 =
				UPL species	x 5 =
				Column totals	(A) (B)
Herb Stratum (Plot size 30' _____)				Prevalence Index = B / A =	
1. Dune grass (<i>Elymus mollis</i>)	35	Yes	FACU*		
2. Tall fescue (<i>Schedonorus arundinaceus</i>)	5	No	FAC		
3. Red fescue (<i>Festuca rubra</i>)	20	Yes	FAC		
4. Yarrow (<i>Achillea millefolium</i>)	20	Yes	FACU		
5. Canadian Thistle (<i>Cirsium arvense</i>)	8	No	FAC		
6. Common Plantain (<i>Plantago major</i>)	4	No	FAC		
7. Velvet grass (<i>Holcus lanatus</i>)	8	No	FAC		
8.					
9.					
10.					
11.					
_____ 100 _____ = Total Cover				* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
Woody Vine Stratum (Plot size _____)				Hydrophytic Vegetation Indicators	
1.				No	Dominance test is > 50%
2.					Prevalence test is ≤ 3.0 *
_____ = Total Cover				Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)	
				Wetland Non-Vascular Plants *	
				Problematic Hydrophytic Vegetation * (explain)	
% Bare Ground in Herb Stratum _____				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: Dune grass is FACU according to Cook 1997.					

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6"	10 YR 3/2						Sand	Some roots, shell fragments
6-13"	2.5 Y 4/1						Sand	shell fragments

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains ²Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Indicators for Problematic Hydric Soils³

- 2cm Muck (A10)
- Red Parent Material (TF2)
- Other (explain in remarks)

³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present?

Yes

No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply):

- | | |
|--|--|
| <input type="checkbox"/> Surface water (A1) | <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Water-Stained Leaves (except MLRA 1, 2, 4A & 4B) (B9) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Salt Crust (B11) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (explain in remarks) |

Secondary Indicators (2 or more required):

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A & 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks

Field Observations

- | | | | |
|--|------------------------------|--|-------------|
| Surface Water Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Water Table Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Saturation Present?
(includes capillary fringe) | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |

Wetland Hydrology Present?

Yes

No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM
Western Mountains, Valleys, and Coast Supplement to the
1987 COE Wetlands Delineation Manual

Project Site: <u>Greenbank Marsh Restoration Issues Assessment Project</u>	Sampling Date: <u>5/17/2016</u>
Applicant/Owner: <u>Rob Hallbauer and Tom Slocum</u>	Sampling Point: <u>Soil Point 2</u>
Investigator: <u>Jeff Ninnemann</u>	City/County: <u>Island County</u>
Section, Township, Range: <u>Sec: 04, Twnshp: 30N, RNGE: 2E</u>	State: <u>WA</u>
Landform (hillslope, terrace, etc) <u>backshore</u>	Slope (%) <u>none</u>
	Local relief (concave, convex, none) <u>none</u>
Subregion (LRR) <u>LRR MLRA2</u>	Lat <u>48.109809° N</u>
	Long <u>-122.567739° W</u>
Soil Map Unit Name <u>Beaches-Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes</u>	NWI classification: <u>none</u>
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(If no, explain in remarks.)
Are "Normal Circumstances" present on the site? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> significantly disturbed?	(If needed, explain any answers in Remarks.)
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> naturally problematic?	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is this Sampling Point within a Wetland? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Hydric Soils Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Wetland Hydrology Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size 30' _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet	
1.				Number of Dominant Species that are OBL, FACW, or FAC:	2 (A)
2.				Total Number of Dominant Species Across All Strata:	3 (B)
_____ = Total Cover				Percent of Dominant Species that are OBL, FACW, or FAC:	66 (A/B)
Sapling/Shrub Stratum (Plot size 30' _____)				Prevalence Index Worksheet	
1.				Total % Cover of	
2.				Multiply by	
3.				OBL species	x 1 =
4.				FACW species	x 2 =
5.				FAC species	x 3 =
_____ = Total Cover				FACU species	x 4 =
				UPL species	x 5 =
				Column totals	(A) (B)
				Prevalence Index = B / A =	
Herb Stratum (Plot size 30' _____)				Hydrophytic Vegetation Indicators	
1. Pacific Silverweed (<i>Potentilla anserina</i>)	35	Yes	OBL	Yes	Dominance test is > 50%
2. Sickle-leaf rush (<i>Juncus falcatius</i>)	35	Yes	FACW		Prevalence test is ≤ 3.0 *
3. Red fescue (<i>Festuca rubra</i>)	5	No	FAC		Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)
4. Sheep sorrel (<i>Rumex acetosella</i>)	3	No	FACU		Wetland Non-Vascular Plants *
5. Canadian Thistle (<i>Cirsium arvense</i>)	5	No	FAC		Problematic Hydrophytic Vegetation * (explain)
6. unknown grass	25	Yes	FAC?		
7. unknown grass	15	No	FAC?		
8.					
9.					
10.					
11.					
_____ 100 _____ = Total Cover				* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
Woody Vine Stratum (Plot size _____)				Hydrophytic Vegetation Present?	
1.				Yes	<input checked="" type="checkbox"/>
2.				No	<input type="checkbox"/>
_____ = Total Cover					
% Bare Ground in Herb Stratum _____					
Remarks: The majority of grass species found in this area are FAC, so it was assumed that the unknown grass species on the site are likely FAC.					

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3"	10 YR 2/1						Silty Sand	shell fragments
3-12"	2.5 Y 3/1	98	2.5Y 4/4	2	C	M	Sand	shell fragments

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains ²Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input checked="" type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Indicators for Problematic Hydric Soils³

- 2cm Muck (A10)
- Red Parent Material (TF2)
- Other (explain in remarks)

³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present?

Yes

No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply):

- | | |
|--|--|
| <input type="checkbox"/> Surface water (A1) | <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Water-Stained Leaves (except MLRA 1, 2, 4A & 4B) (B9) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Salt Crust (B11) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input checked="" type="checkbox"/> Other (explain in remarks) |

Secondary Indicators (2 or more required):

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A & 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks

Field Observations

- | | | | |
|---|------------------------------|--|-------------|
| Surface Water Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Water Table Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Saturation Present? (includes capillary fringe) | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |

Wetland Hydrology Present?

Yes

No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soil was damp but not quite saturated. Professional opinion and experience shallow groundwater monitoring the next door property.

WETLAND DETERMINATION DATA FORM
Western Mountains, Valleys, and Coast Supplement to the
1987 COE Wetlands Delineation Manual

Project Site: <u>Greenbank Marsh Restoration Issues Assessment Project</u>	Sampling Date: <u>5/17/2016</u>
Applicant/Owner: <u>Rob Hallbauer and Tom Slocum</u>	Sampling Point: <u>Soil Point 3</u>
Investigator: <u>Jeff Ninnemann</u>	City/County: <u>Island County</u>
Section, Township, Range: <u>Sec: 04, Twnshp: 30N, RNGE: 2E</u>	State: <u>WA</u>
Landform (hillslope, terrace, etc) <u>backshore</u>	Slope (%) <u>none</u>
Local relief (concave, convex, none) <u>none</u>	
Subregion (LRR) <u>LRR MLRA2</u>	Lat <u>48.110094° N</u>
Long <u>-122.566992° W</u> Datum	
Soil Map Unit Name <u>Beaches-Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes</u>	NWI classification: <u>none</u>
Are climatic/hydrologic conditions on the site typical for this time of year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	(If no, explain in remarks.)
Are "Normal Circumstances" present on the site? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> significantly disturbed?	(If needed, explain any answers in Remarks.)
Are Vegetation <input type="checkbox"/> , Soil, <input type="checkbox"/> , or Hydrology <input type="checkbox"/> naturally problematic?	

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Is this Sampling Point within a Wetland? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Hydric Soils Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Wetland Hydrology Present? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Remarks:	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size 30' _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet	
1.				Number of Dominant Species that are OBL, FACW, or FAC:	2 (A)
2.				Total Number of Dominant Species Across All Strata:	4 (B)
_____ = Total Cover				Percent of Dominant Species that are OBL, FACW, or FAC:	50 (A/B)
Sapling/Shrub Stratum (Plot size 30' _____)				Prevalence Index Worksheet	
1.				Total % Cover of	
2.				Multiply by	
3.				OBL species	x 1 =
4.				FACW species	x 2 =
5.				FAC species	50 x 3 = 150
_____ = Total Cover				FACU species	40 x 4 = 160
				UPL species	x 5 =
				Column totals	90 (A) (B) 310
				Prevalence Index = B / A = 3.44	
Herb Stratum (Plot size 30' _____)				Hydrophytic Vegetation Indicators	
1. Dune grass (<i>Elymus mollis</i>)	20	Yes	FACU*	No	Dominance test is > 50%
2. Curly Dock (<i>Rumex crispus</i>)	5	No	FAC	No	Prevalence test is ≤ 3.0 *
3. Red fescue (<i>Festuca rubra</i>)	25	Yes	FAC	Morphological Adaptations * (provide supporting data in remarks or on a separate sheet)	
4. Colonial Bentgrass (<i>Agrostis capillaris</i>)	20	Yes	FAC	Wetland Non-Vascular Plants *	
5. Seashore Bluegrass (<i>Poa macrantha</i>)	20	Yes	FACU	Problematic Hydrophytic Vegetation * (explain)	
6.				* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
7.					
8.					
9.					
10.					
11.					
_____ 90 _____ = Total Cover					
Woody Vine Stratum (Plot size _____)				Hydrophytic Vegetation Present?	
1.				Yes	<input type="checkbox"/>
2.				No	<input checked="" type="checkbox"/>
_____ = Total Cover					
% Bare Ground in Herb Stratum _____					
Remarks: Dune grass is FACU according to Cook 1997.					

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8"	10 YR 3/2						Sand	Some roots, shell fragments
8-12"	2.5 Y 4/2						Sand	shell fragments

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains ²Loc: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Redox Depressions (F8) |

Indicators for Problematic Hydric Soils³

- 2cm Muck (A10)
- Red Parent Material (TF2)
- Other (explain in remarks)

³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric soil present?

Yes

No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply):

- | | |
|--|--|
| <input type="checkbox"/> Surface water (A1) | <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Water-Stained Leaves (except MLRA 1, 2, 4A & 4B) (B9) |
| <input type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Salt Crust (B11) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (explain in remarks) |

Secondary Indicators (2 or more required):

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A & 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks

Field Observations

- | | | | |
|--|------------------------------|--|-------------|
| Surface Water Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Water Table Present? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |
| Saturation Present?
(includes capillary fringe) | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Depth (in): |

Wetland Hydrology Present?

Yes

No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix D: Island County Wetland Rating Sheets

Island county planning and community development

Wetland Buffer Worksheet

This Wetland Buffer Worksheet must be submitted with any development proposal related to a Single Family Home that involves property containing or affected by a wetland; or, at the single family homeowner's option, a Wetland Report including the elements of this Worksheet can be prepared by a Wetland Professional hired by the Single Family homeowner/applicant. A wetland report containing the elements of this worksheet, and prepared by a private wetland professional, will be required of all other applicants (non-residential or commercial) when the proposed development is on land that contains or is affected by a wetland or wetland buffer.

The following questions are designed to help you identify important characteristics of the wetland and the area surrounding it. Your answers should apply to the **entire wetland**, not just the part that is on your property. This Worksheet, along with information from the Land Use Intensity Worksheet, will help County planners determine the buffer width for your wetland. A buffer is the vegetated area adjacent to the boundary of a wetland that protects it from disturbance and inputs to protect water quality and habitat.

Applicant name (please print): Whidbey Conservation District **Date:** 6/01/2016

habitat score: Coastal Lagoon (from Page WBW:7 of this Worksheet) **Wetland ID:** Wetland A

Wetland Buffer: 100/150/200 feet

For county Use only

Confirmation Date: _____

Confirmed By: _____

describe and score the Wetland and Its surroundings

1. high priority Wetland type

Does all or part of your wetland meet the definition of any of the following wetland types? Maps showing known locations of these types are available from the County. However, not all locations are known, so you should evaluate your wetland independently to see if it meets these definitions.

 Bog: A relatively undisturbed Wetland with at least seventy percent (70%) ground cover of mosses; or with water with a pH of less than 5.0; or with more than thirty percent (30%) cover of Sitka Spruce, Western Red Cedar, Western Hemlock or Lodgepole Pine; and a preponderance of plants that are listed as bog species in Table 3 of the 2004 Wetland Rating System prepared by the Washington State Department of Ecology; and having Peat or Muck soils at least sixteen (16) inches deep. Many Bogs are fed largely by precipitation. County maps identify the location of some but not all Bogs. See also Relict Bog. If the criteria are met, put an "X" the space at the beginning of this definition. Many Bogs have acidic conditions, low nutrient levels; soils classified as peat or muck; and are fed largely by precipitation.

 X **coastal lagoon Wetland:** A wetland located within a shallow water body adjacent to marine waters that is partly or completely separated from Puget Sound by a barrier beach. A Coastal Lagoon receives periodic influxes of salt water which may occur from storm surges or flow through porous beach sediments. The water in a Coastal Lagoon is saline or brackish (>0.5 ppt measured near the bottom) during most of the year. If the criteria are met, put an "X" in the space at the beginning this definition.

 delta estuary Wetland: An Estuarine wetland located directly adjacent to or within a Delta Estuary. These wetlands are located on the north end of Camano Island adjacent to the mouth of the Skagit and Stillaguamish Rivers. If the criteria are met, put an "X" in the space at the beginning of this definition.

 estuarine Wetland: A tidal wetland containing emergent vegetation that is usually semi-enclosed by land but has open or partly obstructed access to Puget Sound. If the criteria are met, put an "X" in the space at the beginning of this definition.

If the wetland meets one of the above, your buffer can be determined from the chart below; if not, please continue to the remaining questions.

The type of wetland you marked above gives a preliminary determination of the width of the buffer that may be recommended for a new Development Proposal. Select the largest applicable buffer from Table 1 below. **You are then done with this assessment.**

table 1				
Intensity level (Intensity Worksheet)	Bog	coastal lagoon wetland	delta estuary wetland	estuarine
low	125 ft	100 ft	40 ft	30 ft
Moderate	190 ft	150 ft	90 ft	55 ft
high	250 ft	200 ft	125 ft	90 ft

Island county planning and community development

Wetland Buffer Worksheet

This Wetland Buffer Worksheet must be submitted with any development proposal related to a Single Family Home that involves property containing or affected by a wetland; or, at the single family homeowner's option, a Wetland Report including the elements of this Worksheet can be prepared by a Wetland Professional hired by the Single Family homeowner/applicant. A wetland report containing the elements of this worksheet, and prepared by a private wetland professional, will be required of all other applicants (non-residential or commercial) when the proposed development is on land that contains or is affected by a wetland or wetland buffer.

The following questions are designed to help you identify important characteristics of the wetland and the area surrounding it. Your answers should apply to the **entire wetland**, not just the part that is on your property. This Worksheet, along with information from the Land Use Intensity Worksheet, will help County planners determine the buffer width for your wetland. A buffer is the vegetated area adjacent to the boundary of a wetland that protects it from disturbance and inputs to protect water quality and habitat.

Applicant name (please print): Whidbey Conservation District **Date:** 6/01/2016

habitat score: 26 (from Page WBW:7 of this Worksheet) **Wetland ID:** Wetland B

Wetland Buffer: 75/110/150 feet

For county Use only

Confirmation Date: _____ **Confirmed By:** _____

describe and score the Wetland and Its surroundings

1. high priority Wetland type

Does all or part of your wetland meet the definition of any of the following wetland types? Maps showing known locations of these types are available from the County. However, not all locations are known, so you should evaluate your wetland independently to see if it meets these definitions.

___ Bog: A relatively undisturbed Wetland with at least seventy percent (70%) ground cover of mosses; or with water with a pH of less than 5.0; or with more than thirty percent (30%) cover of Sitka Spruce, Western Red Cedar, Western Hemlock or Lodgepole Pine; and a preponderance of plants that are listed as bog species in Table 3 of the 2004 Wetland Rating System prepared by the Washington State Department of Ecology; and having Peat or Muck soils at least sixteen (16) inches deep. Many Bogs are fed largely by precipitation. County maps identify the location of some but not all Bogs. See also Relict Bog. If the criteria are met, put an "X" the space at the beginning of this definition. Many Bogs have acidic conditions, low nutrient levels; soils classified as peat or muck; and are fed largely by precipitation.

___ coastal lagoon Wetland: A wetland located within a shallow water body adjacent to marine waters that is partly or completely separated from Puget Sound by a barrier beach. A Coastal Lagoon receives periodic influxes of salt water which may occur from storm surges or flow through porous beach sediments. The water in a Coastal Lagoon is saline or brackish (>0.5 ppt measured near the bottom) during most of the year. If the criteria are met, put an "X" in the space at the beginning this definition.

___ delta estuary Wetland: An Estuarine wetland located directly adjacent to or within a Delta Estuary. These wetlands are located on the north end of Camano Island adjacent to the mouth of the Skagit and Stillaguamish Rivers. If the criteria are met, put an "X" in the space at the beginning of this definition.

___ estuarine Wetland: A tidal wetland containing emergent vegetation that is usually semi-enclosed by land but has open or partly obstructed access to Puget Sound. If the criteria are met, put an "X" in the space at the beginning of this definition.

If the wetland meets one of the above, your buffer can be determined from the chart below; if not, please continue to the remaining questions.

The type of wetland you marked above gives a preliminary determination of the width of the buffer that may be recommended for a new Development Proposal. Select the largest applicable buffer from Table 1 below. **You are then done with this assessment.**

table 1				
Intensity level (Intensity Worksheet)	Bog	coastal lagoon wetland	delta estuary wetland	estuarine
low	125 ft	100 ft	40 ft	30 ft
Moderate	190 ft	150 ft	90 ft	55 ft
high	250 ft	200 ft	125 ft	90 ft

2. Vegetation Forms (maximum of 4 points):

Which kinds of plant forms cover more than 10% of the wetland's vegetated area? Mark each kind with a "1" in the line next to it.

- Aquatic Plants (e.g., coontail, pond lily) 1
- Herbs (e.g., grasses, wildflowers, ferns) 1
- Shrubs (e.g., willow, elderberry, alder, salmon berry) 1
- Trees (e.g., cedar, sitka spruce, hemlock) 1

sum the numbers and insert here (Maximum of 4 points): 4

3. non-native plant cover (maximum of 6 points)

Are non-native plants present in your wetland? Check all that apply.

non-native shrubs and Vines (a partial list):

- Himalayan Blackberry
- Evergreen Blackberry
- Holly
- Others. List: _____

non-native herbs (a partial list):

- Reed Canary Grass
- Velvetgrass
- Creeping Buttercup
- Yellow Iris
- Hairy Willow-herb
- English Ivy
- Canada Thistle, Bull Thistle
- Eurasian Milfoil
- Others. List: _____

* Note: This list is not comprehensive. You may wish to consult Flora of the Pacific Northwest (C. Leo Hitchcock and Arthur Cronquist, University of Washington Press)

Now estimate the approximate percent of the entire wetland's vegetated area covered by non-native species:

- Less than 5% (6 points; put "6" in the space to the left)
- From 5 to 50% (3 points; put "3" in the space to the left)
- More than 50% (0 points; put "0" in the space to the left)

Insert the point value here (Maximum of 6 points): 6

4. dead Wood (maximum of 2 points):

What kind of dead wood is found in the wetland? Insert the points at the beginning of all lines where applicable.

- Multiple large fallen logs greater than 4 inches in diameter at their base and longer than 6 ft (1 point)
- Multiple large standing dead trees greater than 4 inches in diameter at chest height (1 point)
- Neither of the above (0 points)

sum the numbers and insert here (Maximum of 2 points): 2

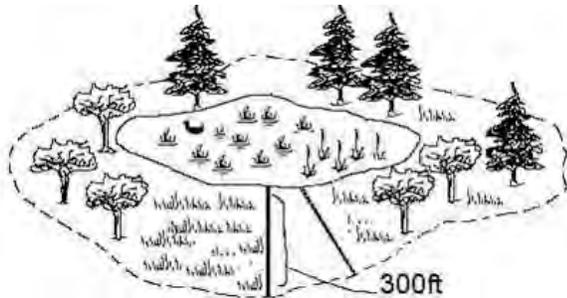
The following questions describe how wetlands on your property are connected with other natural areas. These questions are important because they help describe how your wetlands fit into larger ecosystems, and that in turn partly determines their importance to wildlife and plants. Maps and aerial photographs available online or at the counter of the Planning Department can assist you in answering these questions.

5. surrounding Vegetation (Maximum of 10 points):

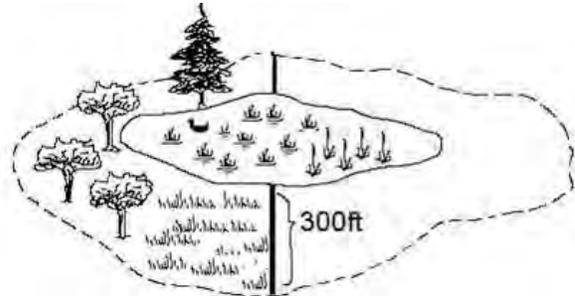
how much of the area surrounding the wetland is “naturally vegetated”?

“Naturally vegetated” means no pavement, buildings, lawns, bare soil, tilled soil, bedrock, or heavily-grazed pasture. Lightly-grazed or infrequently-mowed pasture is OK (mowed fewer than 4 times a year). Vegetation does not need to consist of native species.

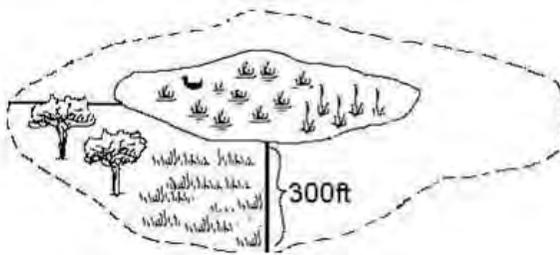
Circle the diagram below that best describes the **surrounding vegetation** of your wetland. If more than one diagram applies choose the one with the higher point score. **If none apply, give the wetland a 0.** Maps and aerial photographs available online or at the counter of the Planning Department can assist you in answering this question.



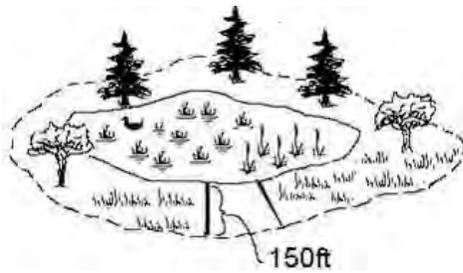
95% of 300ft upland area is naturally vegetated:
10 points



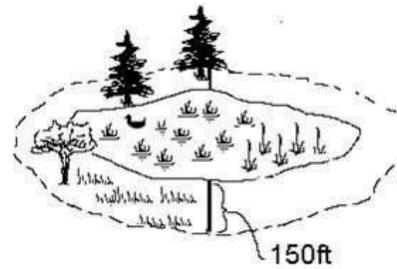
50% of 300ft upland area is naturally vegetated:
8 points



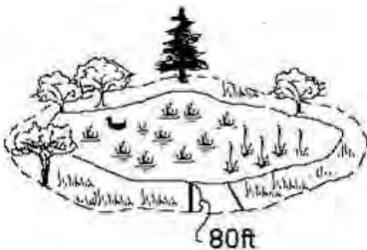
25% of 300ft upland area is naturally vegetated:
6 points



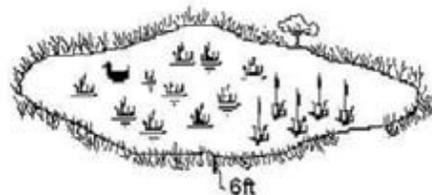
95% of 150ft upland area is naturally vegetated:
8 points



50% of 150ft upland area is naturally vegetated:
6 points



95% of 80ft upland area is naturally vegetated:
4 points



95% of 6ft upland area is naturally vegetated:
1 point

Insert the point value here (Maximum of 10 points): 1

6. Large Woodlands (Maximum of 10 points):

“Woodlands” are areas of trees or shrubs.

“Connected to” includes areas that are separated from each other or from the wetland by distances less than 100 ft. Include wooded areas within the wetland when summing the acreage.

a. how much woodland is connected to your wetland? Ignore all Roads

- More than 100 acres (5 points) _____
- Greater than 9 to 100 acres (3 points) _____
- From 1 to 9 acres (1 point) _____
- None of the above/any other condition (0 points) x_____

b. Assess this again, but this time consider roads as a disconnection. Roads don't include private driveways.

- More than 100 acres (5 points) _____
- Greater than 9 to 100 acres (3 points) _____
- From 1 to 9 acres (1 point) _____
- None of the above/any other condition (0 points) x_____

The above two questions can be answered most easily by consulting maps and aerial photographs at the Planning Department.

Add up the points from (a) and (b) and insert here (maximum of 10 points): 0

7. distance to lake or saltwater (maximum of 5 points):

how far is this wetland from the nearest lake or saltwater area? Select only the one condition with the highest score.

- ___ Within 300 ft (5 points)
- x Between 300 ft and 1/2 mile (3 points)
- ___ More than 1/2 mile (0 points)

This can be answered most easily by consulting maps and aerial photographs at the Planning Department

Insert the point value here (Maximum of 5 points): 3

8. nearby Wetlands (maximum of 5 points):

how many other county-mapped wetlands are within ½ mile of your wetland? This can be answered most easily by consulting maps and aerial photographs at the Planning Department. Insert the points on the line next to the one condition that gives the highest applicable points.

___ three or more, and **none** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (5 points)

X three or more, but **some** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (4 points)

___ one or two, and **none** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (3 points)

___ one or two, but **some** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (1 point)

___ none (0 points)

Insert the point value here (Maximum of 5 points): 4

9. Water persistence and pattern (maximum of 6 points):

Check and complete the section that describes your wetland in a normal year. Then add the additional points immediately beneath it if applicable.

More than 10% of wetland (or more than ¼ acre) contains more than 4 inches of standing water during the **entire year**. (4 points)

Add 2 points if:

- Water is mostly scattered throughout the wetland in multiple patches and most of it floods herbs, grasses, or the thin stems of shrubs during the growing season.
-

More than 10% of wetland (or more than ¼ acre) contains more than 4 inches of standing water for **part of the year, but not year-round**. (2 points)

Add 1 point if:

- Water is mostly scattered throughout the wetland and most of it floods herbs, grasses, or thin stems of shrubs during the growing season.
-

Other. (0 points)

Insert the total point value here (Maximum of 6 points): 6

Now add the points from questions 2 through 9 and record the total here: 26. this is your habitat score.

Are the points 22 or greater?

Yes. Answer the Wetland Outlet question below and proceed to Table 2 below to make a preliminary determination of the width of the buffer that may be recommended for a new Development Proposal. You are then done with this assessment.

No. Answer the Wetland Outlet question below and proceed to question #10.

Wetland outlet?

An outlet is a location where there is visible evidence of the discharge of surface water from a wetland at any season of the year. Although the presence or lack of an outlet does not affect habitat directly, wetlands without outlets tend to be more sensitive because any pollution that reaches them becomes confined and is not diluted significantly. If the presence of an outlet is unclear or uncertain, the wetland should be presumed to not have an outlet.

Does the wetland have an outlet? Select one:

No
 Yes

table 2					
Intensity level (Land Use Intensity Worksheet)	Wetland outlet	habitat score (Wetland Buffer Worksheet)			
		40 or higher	32-39	29-31	22-28
low	Yes	125 ft	75 ft	75 ft	75 ft
	No	150 ft	125 ft	100 ft	75 ft
Moderate	Yes	200 ft	110 ft	110 ft	110 ft
	No	225 ft	175 ft	150 ft	110 ft
high	Yes	250 ft	150 ft	150 ft	150 ft
	No	300 ft	200 ft	175 ft	150 ft

10. other priority Wetland types

Does all or part of the wetland meet the definition of any of the following wetland types? Maps showing known locations of some of these types are available from the County. However, not all locations are known, so you should evaluate your wetland independently to see if it meets these definitions.

 Mature Forested Wetland: A Wetland one (1) acre or larger in size in which the tree canopy within the vegetated part of the Wetland is comprised predominantly of trees having diameters eighteen (18) inches or larger measured at 4.5 feet above ground level or the oldest trees are 80-200 years old; crown cover may be less than 100%; and, decay, decadence, number of snags and quantity of downed material is generally less than found in old-growth forests. County maps will identify Mature Forested Wetlands as they are located through review of Development Proposals. If the criteria are met, put a "A" in the space that began this definition.

 Large ponded Wetland: A non-Estuarine Wetland with visible evidence of at least five (5) acres of standing surface water in any part of the Wetland during most of the Growing Season for a normal year. If the criteria are met, put a "B" in the space that began this definition.

 X **Wetland Associated With a Bog, coastal lagoon, or delta estuary:** A Wetland that has a wetland outlet that connects the Wetland directly to a Bog, Coastal Lagoon or Delta Estuary, or is within 500 feet of a Bog, Coastal Lagoon or Delta Estuary in a n uphill direction and within the same Contributing Area. If the criteria are met, put a "B" in the space that began this definition.

 Anadromous Fish stream Wetland: A Wetland that has a Wetland Outlet that connects the Wetland directly to an Anadromous Fish Stream or is within 500 feet of an Anadromous Fish Stream in an uphill direction and within the same Watershed. If the criteria are met, put a "B" in the space that began this definition.

 Resident salmonid stream Wetland: A Wetland that has a Wetland Outlet that connects the Wetland directly to an Resident Salmonid Stream or is within 500 feet of an Resident Salmonid Stream in an uphill direction and within the same Watershed. If the criteria are met, put a "c" in the space that began this definition.

 Mosaic Wetland: A group of two or more Wetlands, each less than one (1) acre in size; located, on average, less than one hundred (100) feet apart; and at least fifty percent (50%) of the surface area of Wetland and upland, taken together, is comprised of Wetlands. The group of Wetlands, including the upland area between the Wetlands, will be regulated as one Wetland. If the criteria are met, put a "c" in the space that began this definition.

 small ponded Wetland: A non-Estuarine Wetland with visible evidence of water forming a contiguous surface area of at least one (1) acre in any part of the Wetland during most of the Growing Season for a normal year. If the criteria are met, put a "d" in the space that began this definition.

 native plant Wetland: A Wetland with visible evidence that at least a majority of its vegetated surface area is covered by Native Species at some time of the year. If your wetland received a score of "6" or "3" for question 3 and if the criteria are met, put a "d" in the space that began this definition.

 (none of the Above). Put an "e" in the space to the left.

11. Using Table 3 below, do a preliminary determination of the width of the buffer for a new Development Proposal. Do so by considering its Wetland Type (from question 10), whether it has an outlet, and the assessment you did using the Land Use Intensity Worksheet. If more than one letter (column headings) applies, select the one resulting in the largest buffer.

table 3						
Intensity level (Intensity Worksheet)	Wetland outlet	Wetland type category (from question 10)				
		A	B	c	d	e
low	Yes	40 ft	35 ft	30 ft	25 ft	20 ft
	No	75 ft	50 ft	40 ft	35 ft	25 ft
Moderate	Yes	90 ft	65 ft	55 ft	45 ft	30 ft
	No	105 ft	90 ft	75 ft	60 ft	40 ft
high	Yes	125 ft	110 ft	90 ft	65 ft	40 ft
	No	175 ft	150 ft	125 ft	90 ft	50 ft

12. For Development Proposals on lots that are sloped between the proposed development and the wetland, increase the buffer recommendation in Table 3 using the multipliers in Table 4. However, a buffer wider than 300 feet will not be required.

table 4	
slope gradient	Additional Buffer Multiplier
5-14%	1.3
15-40%	1.4
>40%	1.5

Buffers may be decreased, averaged or increased based upon the buffer's condition and ability to perform its functions. the buffer as initially determined from the Land Use Intensity and Wetland Buffer Worksheets is subject to confirmation by the County.

If the wetland and/or buffer size leaves no room for the use of the property, there are options available to make sure that the wetland can be protected and still make your land usable for uses allowed under the zoning code. If this is your situation, please contact the Island county critical Areas planner to discuss your options.

<http://www.islandcounty.net/planning.htm>

Island county planning and community development

Wetland Buffer Worksheet

This Wetland Buffer Worksheet must be submitted with any development proposal related to a Single Family Home that involves property containing or affected by a wetland; or, at the single family homeowner's option, a Wetland Report including the elements of this Worksheet can be prepared by a Wetland Professional hired by the Single Family homeowner/applicant. A wetland report containing the elements of this worksheet, and prepared by a private wetland professional, will be required of all other applicants (non-residential or commercial) when the proposed development is on land that contains or is affected by a wetland or wetland buffer.

The following questions are designed to help you identify important characteristics of the wetland and the area surrounding it. Your answers should apply to the **entire wetland**, not just the part that is on your property. This Worksheet, along with information from the Land Use Intensity Worksheet, will help County planners determine the buffer width for your wetland. A buffer is the vegetated area adjacent to the boundary of a wetland that protects it from disturbance and inputs to protect water quality and habitat.

Applicant name (please print): Whidbey Conservation District **Date:** 6/01/2016

habitat score: 26 (from Page WBW:7 of this Worksheet) **Wetland ID:** Wetland C

Wetland Buffer: 75/110/150 feet

For county Use only

Confirmation Date: _____

Confirmed By: _____

describe and score the Wetland and Its surroundings

1. high priority Wetland type

Does all or part of your wetland meet the definition of any of the following wetland types? Maps showing known locations of these types are available from the County. However, not all locations are known, so you should evaluate your wetland independently to see if it meets these definitions.

___ Bog: A relatively undisturbed Wetland with at least seventy percent (70%) ground cover of mosses; or with water with a pH of less than 5.0; or with more than thirty percent (30%) cover of Sitka Spruce, Western Red Cedar, Western Hemlock or Lodgepole Pine; and a preponderance of plants that are listed as bog species in Table 3 of the 2004 Wetland Rating System prepared by the Washington State Department of Ecology; and having Peat or Muck soils at least sixteen (16) inches deep. Many Bogs are fed largely by precipitation. County maps identify the location of some but not all Bogs. See also Relict Bog. If the criteria are met, put an "X" the space at the beginning of this definition. Many Bogs have acidic conditions, low nutrient levels; soils classified as peat or muck; and are fed largely by precipitation.

___ coastal lagoon Wetland: A wetland located within a shallow water body adjacent to marine waters that is partly or completely separated from Puget Sound by a barrier beach. A Coastal Lagoon receives periodic influxes of salt water which may occur from storm surges or flow through porous beach sediments. The water in a Coastal Lagoon is saline or brackish (>0.5 ppt measured near the bottom) during most of the year. If the criteria are met, put an "X" in the space at the beginning this definition.

___ delta estuary Wetland: An Estuarine wetland located directly adjacent to or within a Delta Estuary. These wetlands are located on the north end of Camano Island adjacent to the mouth of the Skagit and Stillaguamish Rivers. If the criteria are met, put an "X" in the space at the beginning of this definition.

___ estuarine Wetland: A tidal wetland containing emergent vegetation that is usually semi-enclosed by land but has open or partly obstructed access to Puget Sound. If the criteria are met, put an "X" in the space at the beginning of this definition.

If the wetland meets one of the above, your buffer can be determined from the chart below; if not, please continue to the remaining questions.

The type of wetland you marked above gives a preliminary determination of the width of the buffer that may be recommended for a new Development Proposal. Select the largest applicable buffer from Table 1 below. **You are then done with this assessment.**

table 1				
Intensity level (Intensity Worksheet)	Bog	coastal lagoon wetland	delta estuary wetland	estuarine
low	125 ft	100 ft	40 ft	30 ft
Moderate	190 ft	150 ft	90 ft	55 ft
high	250 ft	200 ft	125 ft	90 ft

2. Vegetation Forms (maximum of 4 points):

Which kinds of plant forms cover more than 10% of the wetland's vegetated area? Mark each kind with a "1" in the line next to it.

- Aquatic Plants (e.g., coontail, pond lily) _____
Herbs (e.g., grasses, wildflowers, ferns) 1 _____
Shrubs (e.g., willow, elderberry, alder, salmon berry) _____
Trees (e.g., cedar, sitka spruce, hemlock) _____

sum the numbers and insert here (Maximum of 4 points): 1

3. non-native plant cover (maximum of 6 points)

Are non-native plants present in your wetland? Check all that apply.

non-native shrubs and Vines (a partial list):

- Himalayan Blackberry
 Evergreen Blackberry
 Holly
 Others. List: _____

non-native herbs (a partial list):

- Reed Canary Grass
 Velvetgrass
 Creeping Buttercup
 Yellow Iris
 Hairy Willow-herb
 English Ivy
 Canada Thistle, Bull Thistle
 Eurasian Milfoil
 Others. List: _____

* Note: This list is not comprehensive. You may wish to consult Flora of the Pacific Northwest (C. Leo Hitchcock and Arthur Cronquist, University of Washington Press)

Now estimate the approximate percent of the entire wetland's **vegetated area** covered by non-native species:

- Less than 5% (6 points; put "6" in the space to the left)
 From 5 to 50% (3 points; put "3" in the space to the left)
 More than 50% (0 points; put "0" in the space to the left)

Insert the point value here (Maximum of 6 points): 6

4. dead Wood (maximum of 2 points):

What kind of dead wood is found in the wetland? Insert the points at the beginning of all lines where applicable.

- Multiple large fallen logs greater than 4 inches in diameter at their base and longer than 6 ft (1 point)
 Multiple large standing dead trees greater than 4 inches in diameter at chest height (1 point)
 Neither of the above (0 points)

sum the numbers and insert here (Maximum of 2 points): 0

The following questions describe how wetlands on your property are connected with other natural areas. These questions are important because they help describe how your wetlands fit into larger ecosystems, and that in turn partly determines their importance to wildlife and plants. Maps and aerial photographs available online or at the counter of the Planning Department can assist you in answering these questions.

5. surrounding Vegetation (Maximum of 10 points):

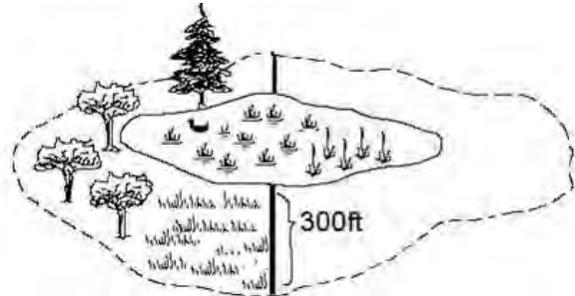
how much of the area surrounding the wetland is “naturally vegetated”?

“Naturally vegetated” means no pavement, buildings, lawns, bare soil, tilled soil, bedrock, or heavily-grazed pasture. Lightly-grazed or infrequently-mowed pasture is OK (mowed fewer than 4 times a year). Vegetation does not need to consist of native species.

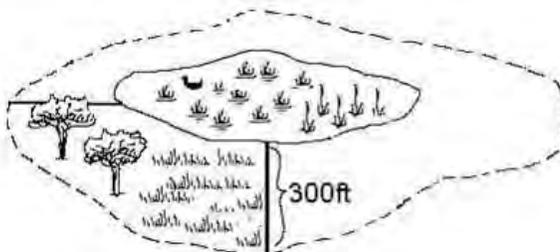
Circle the diagram below that best describes the **surrounding vegetation** of your wetland. If more than one diagram applies choose the one with the higher point score. **If none apply, give the wetland a 0.** Maps and aerial photographs available online or at the counter of the Planning Department can assist you in answering this question.



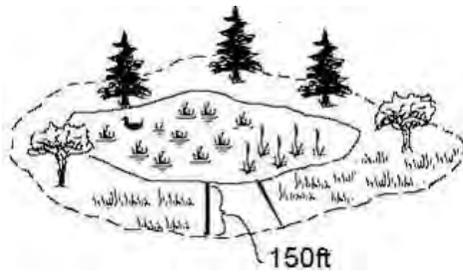
95% of 300ft upland area is naturally vegetated:
10 points



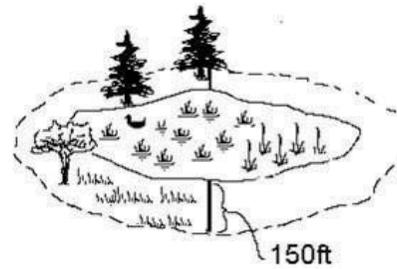
50% of 300ft upland area is naturally vegetated:
8 points



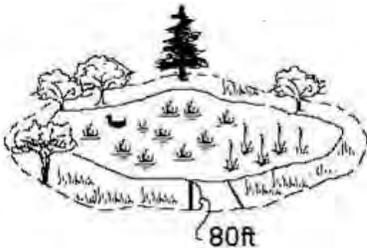
25% of 300ft upland area is naturally vegetated:
6 points



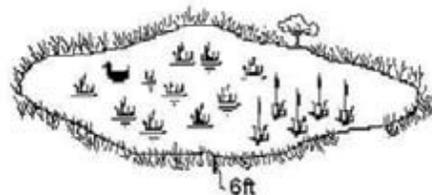
95% of 150ft upland area is naturally vegetated:
8 points



50% of 150ft upland area is naturally vegetated:
6 points



95% of 80ft upland area is naturally vegetated:
4 points



95% of 6ft upland area is naturally vegetated:
1 point

Insert the point value here (Maximum of 10 points): 6

6. Large Woodlands (Maximum of 10 points):

“Woodlands” are areas of trees or shrubs.

“Connected to” includes areas that are separated from each other or from the wetland by distances less than 100 ft. Include wooded areas within the wetland when summing the acreage.

a. how much woodland is connected to your wetland? Ignore all Roads

More than 100 acres (5 points) _____

Greater than 9 to 100 acres (3 points) _____

From 1 to 9 acres (1 point) _____

None of the above/any other condition (0 points) x _____

b. Assess this again, but this time consider roads as a disconnection. Roads don't include private driveways.

More than 100 acres (5 points) _____

Greater than 9 to 100 acres (3 points) _____

From 1 to 9 acres (1 point) _____

None of the above/any other condition (0 points) x _____

The above two questions can be answered most easily by consulting maps and aerial photographs at the Planning Department.

Add up the points from (a) and (b) and insert here (maximum of 10 points): 0

7. distance to lake or saltwater (maximum of 5 points):

how far is this wetland from the nearest lake or saltwater area? Select only the one condition with the highest score.

X Within 300 ft (5 points)

___ Between 300 ft and 1/2 mile (3 points)

___ More than 1/2 mile (0 points)

This can be answered most easily by consulting maps and aerial photographs at the Planning Department

Insert the point value here (Maximum of 5 points): 5

8. nearby Wetlands (maximum of 5 points):

how many other county-mapped wetlands are within ½ mile of your wetland? This can be answered most easily by consulting maps and aerial photographs at the Planning Department. Insert the points on the line next to the one condition that gives the highest applicable points.

___ three or more, and **none** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (5 points)

X three or more, but **some** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (4 points)

___ one or two, and **none** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (3 points)

___ one or two, but **some** are separated from this wetland by paved roads, lawns, bare soil, tilled soil, or heavily-grazed pasture (1 point)

___ none (0 points)

Insert the point value here (Maximum of 5 points): 4

9. Water persistence and pattern (maximum of 6 points):

Check and complete the section that describes your wetland in a normal year. Then add the additional points immediately beneath it if applicable.

More than 10% of wetland (or more than ¼ acre) contains more than 4 inches of standing water during the **entire year**. (4 points)

Add 2 points if:

- Water is mostly scattered throughout the wetland in multiple patches and most of it floods herbs, grasses, or the thin stems of shrubs during the growing season.
-

More than 10% of wetland (or more than ¼ acre) contains more than 4 inches of standing water for **part of the year, but not year-round**. (2 points)

Add 1 point if:

- Water is mostly scattered throughout the wetland and most of it floods herbs, grasses, or thin stems of shrubs during the growing season.
-

Other. (0 points)

Insert the total point value here (Maximum of 6 points): 2

Now add the points from questions 2 through 9 and record the total here: 24 . this is your habitat score.

Are the points 22 or greater?

Yes. Answer the Wetland Outlet question below and proceed to Table 2 below to make a preliminary determination of the width of the buffer that may be recommended for a new Development Proposal. You are then done with this assessment.

No. Answer the Wetland Outlet question below and proceed to question #10.

Wetland outlet?

An outlet is a location where there is visible evidence of the discharge of surface water from a wetland at any season of the year. Although the presence or lack of an outlet does not affect habitat directly, wetlands without outlets tend to be more sensitive because any pollution that reaches them becomes confined and is not diluted significantly. If the presence of an outlet is unclear or uncertain, the wetland should be presumed to not have an outlet.

Does the wetland have an outlet? Select one:

No
 Yes

table 2					
Intensity level (Land Use Intensity Worksheet)	Wetland outlet	habitat score (Wetland Buffer Worksheet)			
		40 or higher	32-39	29-31	22-28
low	Yes	125 ft	75 ft	75 ft	75 ft
	No	150 ft	125 ft	100 ft	75 ft
Moderate	Yes	200 ft	110 ft	110 ft	110 ft
	No	225 ft	175 ft	150 ft	110 ft
high	Yes	250 ft	150 ft	150 ft	150 ft
	No	300 ft	200 ft	175 ft	150 ft

10. other priority Wetland types

Does all or part of the wetland meet the definition of any of the following wetland types? Maps showing known locations of some of these types are available from the County. However, not all locations are known, so you should evaluate your wetland independently to see if it meets these definitions.

 Mature Forested Wetland: A Wetland one (1) acre or larger in size in which the tree canopy within the vegetated part of the Wetland is comprised predominantly of trees having diameters eighteen (18) inches or larger measured at 4.5 feet above ground level or the oldest trees are 80-200 years old; crown cover may be less than 100%; and, decay, decadence, number of snags and quantity of downed material is generally less than found in old-growth forests. County maps will identify Mature Forested Wetlands as they are located through review of Development Proposals. If the criteria are met, put a "A" in the space that began this definition.

 Large ponded Wetland: A non-Estuarine Wetland with visible evidence of at least five (5) acres of standing surface water in any part of the Wetland during most of the Growing Season for a normal year. If the criteria are met, put a "B" in the space that began this definition.

 X **Wetland Associated With a Bog, coastal lagoon, or delta estuary:** A Wetland that has a wetland outlet that connects the Wetland directly to a Bog, Coastal Lagoon or Delta Estuary, or is within 500 feet of a Bog, Coastal Lagoon or Delta Estuary in a n uphill direction and within the same Contributing Area. If the criteria are met, put a "B" in the space that began this definition.

 Anadromous Fish stream Wetland: A Wetland that has a Wetland Outlet that connects the Wetland directly to an Anadromous Fish Stream or is within 500 feet of an Anadromous Fish Stream in an uphill direction and within the same Watershed. If the criteria are met, put a "B" in the space that began this definition.

 Resident salmonid stream Wetland: A Wetland that has a Wetland Outlet that connects the Wetland directly to an Resident Salmonid Stream or is within 500 feet of an Resident Salmonid Stream in an uphill direction and within the same Watershed. If the criteria are met, put a "c" in the space that began this definition.

 Mosaic Wetland: A group of two or more Wetlands, each less than one (1) acre in size; located, on average, less than one hundred (100) feet apart; and at least fifty percent (50%) of the surface area of Wetland and upland, taken together, is comprised of Wetlands. The group of Wetlands, including the upland area between the Wetlands, will be regulated as one Wetland. If the criteria are met, put a "c" in the space that began this definition.

 small ponded Wetland: A non-Estuarine Wetland with visible evidence of water forming a contiguous surface area of at least one (1) acre in any part of the Wetland during most of the Growing Season for a normal year. If the criteria are met, put a "d" in the space that began this definition.

 native plant Wetland: A Wetland with visible evidence that at least a majority of its vegetated surface area is covered by Native Species at some time of the year. If your wetland received a score of "6" or "3" for question 3 and if the criteria are met, put a "d" in the space that began this definition.

 (none of the Above). Put an "e" in the space to the left.

11. Using Table 3 below, do a preliminary determination of the width of the buffer for a new Development Proposal. Do so by considering its Wetland Type (from question 10), whether it has an outlet, and the assessment you did using the Land Use Intensity Worksheet. If more than one letter (column headings) applies, select the one resulting in the largest buffer.

table 3						
Intensity level (Intensity Worksheet)	Wetland outlet	Wetland type category (from question 10)				
		A	B	c	d	e
low	Yes	40 ft	35 ft	30 ft	25 ft	20 ft
	No	75 ft	50 ft	40 ft	35 ft	25 ft
Moderate	Yes	90 ft	65 ft	55 ft	45 ft	30 ft
	No	105 ft	90 ft	75 ft	60 ft	40 ft
high	Yes	125 ft	110 ft	90 ft	65 ft	40 ft
	No	175 ft	150 ft	125 ft	90 ft	50 ft

12. For Development Proposals on lots that are sloped between the proposed development and the wetland, increase the buffer recommendation in Table 3 using the multipliers in Table 4. However, a buffer wider than 300 feet will not be required.

table 4	
slope gradient	Additional Buffer Multiplier
5-14%	1.3
15-40%	1.4
>40%	1.5

Buffers may be decreased, averaged or increased based upon the buffer's condition and ability to perform its functions. the buffer as initially determined from the Land Use Intensity and Wetland Buffer Worksheets is subject to confirmation by the County.

If the wetland and/or buffer size leaves no room for the use of the property, there are options available to make sure that the wetland can be protected and still make your land usable for uses allowed under the zoning code. If this is your situation, please contact the Island county critical Areas planner to discuss your options.

<http://www.islandcounty.net/planning.htm>

Appendix E: Ecology Wetland Rating Sheets

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 5/17/2016

Rated by Jeff Ninneamann Trained by Ecology? X Yes ___ No Date of training 11/2014

HGM Class used for rating Depressional Wetland has multiple HGM classes? X Y ___ N

NOTE: Form is not complete without the figures requested (figures can be combined).

Source of base aerial photo/map _____

OVERALL WETLAND CATEGORY I (based on functions X or special characteristics X)

1. Category of wetland based on FUNCTIONS

X Category I – Total score = 23 - 27

___ Category II – Total score = 20 - 22

___ Category III – Total score = 16 - 19

___ Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
<i>Circle the appropriate ratings</i>										
Site Potential	H	M	L	H	M	L	H	M	L	
Landscape Potential	H	M	L	H	M	L	H	M	L	
Value	H	M	L	H	M	L	H	M	L	
Score Based on Ratings	8			7			8			TOTAL 23

Score for each function based on three ratings (order of ratings is not important)

9 = H,H,H

8 = H,H,M

7 = H,H,L

7 = H,M,M

6 = H,M,L

6 = M,M,M

5 = H,L,L

5 = M,M,L

4 = M,L,L

3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	I

Wetland name or number A

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2

YES – the wetland class is **Tidal Fringe** – go to 1.1

- 1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – **Saltwater Tidal Fringe (Estuarine)**

YES – **Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3

YES – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

___At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4

YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

___The wetland is on a slope (*slope can be very gradual*),

___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

___The water leaves the wetland **without being impounded**.

NO – go to 5

YES – The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

___The overbank flooding occurs at least once every 2 years.

Wetland name or number A

NO – go to 6

YES – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS	
Water Quality Functions - Indicators that the site functions to improve water quality	
D 1.0. Does the site have the potential to improve water quality?	
D 1.1. <u>Characteristics of surface water outflows from the wetland:</u> Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. <u>The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions).</u> Yes = 4 No = 0	0
D 1.3. <u>Characteristics and distribution of persistent plants</u> (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > 1/10 of area points = 1 Wetland has persistent, ungrazed plants < 1/10 of area points = 0	5
D 1.4. <u>Characteristics of seasonal ponding or inundation:</u> <i>This is the area that is ponded for at least 2 months. See description in manual.</i> Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	4
Total for D 1	11

Rating of Site Potential If score is: 12-16 = H X 6-11 = M 0-5 = L Record the rating on the first page

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	1
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	1
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source _____ Yes = 1 No = 0	0
Total for D 2	3

Rating of Landscape Potential If score is: X 3 or 4 = H 1 or 2 = M 0 = L Record the rating on the first page

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (answer YES if there is a TMDL for the basin in which the unit is found)? Yes = 2 No = 0	2
Total for D 3	3

Rating of Value If score is: X 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?

<p>D 4.1. <u>Characteristics of surface water outflows from the wetland:</u></p> <p>Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4</p> <p>Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2</p> <p>Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1</p> <p>Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0</p>	2
<p>D 4.2. <u>Depth of storage during wet periods:</u> <i>Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.</i></p> <p>Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7</p> <p>Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5</p> <p>Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3</p> <p>The wetland is a "headwater" wetland points = 3</p> <p>Wetland is flat but has small depressions on the surface that trap water points = 1</p> <p>Marks of ponding less than 0.5 ft (6 in) points = 0</p>	7
<p>D 4.3. <u>Contribution of the wetland to storage in the watershed:</u> <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i></p> <p>The area of the basin is less than 10 times the area of the unit points = 5</p> <p>The area of the basin is 10 to 100 times the area of the unit points = 3</p> <p>The area of the basin is more than 100 times the area of the unit points = 0</p> <p>Entire wetland is in the Flats class points = 5</p>	3
Total for D 4	12

Add the points in the boxes above

Rating of Site Potential If score is: X 12-16 = H ___ 6-11 = M ___ 0-5 = L

Record the rating on the first page

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?

D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	1
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5	3

Add the points in the boxes above

Rating of Landscape Potential If score is: X 3 = H ___ 1 or 2 = M ___ 0 = L

Record the rating on the first page

D 6.0. Are the hydrologic functions provided by the site valuable to society?

<p>D 6.1. <u>The unit is in a landscape that has flooding problems. Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.</u></p> <p>The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds):</p> <ul style="list-style-type: none"> • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 <p>Flooding from groundwater is an issue in the sub-basin. points = 1</p> <p>The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. <i>Explain why</i> _____ points = 0</p> <p>There are no problems with flooding downstream of the wetland. points = 0</p>	0
<p>D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0</p>	0
Total for D 6	0

Add the points in the boxes above

Rating of Value If score is: ___ 2-4 = H ___ 1 = M X 0 = L

Record the rating on the first page

Wetland name or number A

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

Aquatic bed 4 structures or more: points = 4
 Emergent 3 structures: points = 2
 Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1
 Forested (areas where trees have > 30% cover) 1 structure: points = 0
If the unit has a Forested class, check if:
 The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

Permanently flooded or inundated 4 or more types present: points = 3
 Seasonally flooded or inundated 3 types present: points = 2
 Occasionally flooded or inundated 2 types present: points = 1
 Saturated only 1 type present: points = 0
 Permanently flowing stream or river in, or adjacent to, the wetland
 Seasonally flowing stream in, or adjacent to, the wetland
 Lake Fringe wetland **2 points**
 Freshwater tidal wetland **2 points**

3

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft².

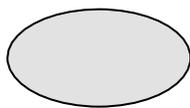
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

If you counted: > 19 species points = 2
 5 - 19 species points = 1
 < 5 species points = 0

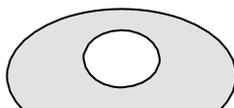
1

H 1.4. Interspersion of habitats

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



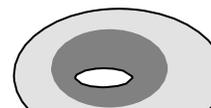
None = 0 points



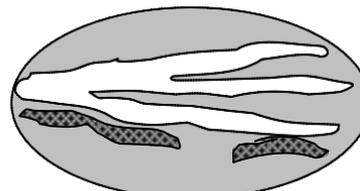
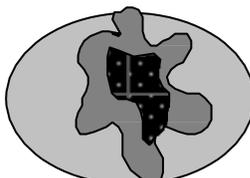
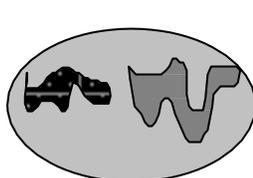
Low = 1 point



Moderate = 2 points



All three diagrams in this row are **HIGH** = 3points



3

Wetland name or number A

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>	2
<p>Total for H 1</p>	<p style="text-align: right;">Add the points in the boxes above</p> <p style="text-align: center;">10</p>

Rating of Site Potential If score is: 15-18 = H X 7-14 = M 0-6 = L *Record the rating on the first page*

<p>H 2.0. Does the landscape have the potential to support the habitat functions of the site?</p>	
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p><i>Calculate:</i> % undisturbed habitat <u>12</u> + [(% moderate and low intensity land uses)/2] <u>8</u> = <u>20</u> %</p> <p>If total accessible habitat is:</p> <p>> 1/3 (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = 1</p> <p>< 10% of 1 km Polygon points = 0</p>	2
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p><i>Calculate:</i> % undisturbed habitat <u>28</u> + [(% moderate and low intensity land uses)/2] <u>24</u> = <u>52</u> %</p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p>	3
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p>> 50% of 1 km Polygon is high intensity land use points = (- 2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p>	0
<p>Total for H 2</p>	<p style="text-align: right;">Add the points in the boxes above</p> <p style="text-align: center;">5</p>

Rating of Landscape Potential If score is: X 4-6 = H 1-3 = M < 1 = L *Record the rating on the first page*

<p>H 3.0. Is the habitat provided by the site valuable to society?</p>	
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <p><input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page)</p> <p><input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)</p> <p><input type="checkbox"/> It is mapped as a location for an individual WDFW priority species</p> <p><input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources</p> <p><input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan</p> <p>Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p>Site does not meet any of the criteria above points = 0</p>	2

Rating of Value If score is: X 2 = H 1 = M 0 = L *Record the rating on the first page*

Wetland name or number A

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** *This question is independent of the land use between the wetland unit and the priority habitat.*

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
<p>SC 1.0. Estuarine wetlands</p> <p>Does the wetland meet the following criteria for Estuarine wetlands?</p> <ul style="list-style-type: none"> — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt <p style="text-align: right;">Yes – Go to SC 1.1 No = Not an estuarine wetland</p>	
<p>SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?</p> <p style="text-align: right;">Yes = Category I No - Go to SC 1.2</p>	Cat. I
<p>SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?</p> <ul style="list-style-type: none"> — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i>, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. <p style="text-align: right;">Yes = Category I No = Category II</p>	Cat. I Cat. II
<p>SC 2.0. Wetlands of High Conservation Value (WHCV)</p> <p>SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?</p> <p style="text-align: right;">Yes – Go to SC 2.2 No – Go to SC 2.3</p> <p>SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p> <p>SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf</p> <p style="text-align: right;">Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV</p> <p>SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p>	Cat. I
<p>SC 3.0. Bogs</p> <p>Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i></p> <p>SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No – Go to SC 3.2</p> <p>SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No = Is not a bog</p> <p>SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?</p> <p style="text-align: right;">Yes = Is a Category I bog No – Go to SC 3.4</p> <p>NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.</p> <p>SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?</p> <p style="text-align: right;">Yes = Is a Category I bog No = Is not a bog</p>	Cat. I

Wetland name or number B

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland B Date of site visit: 5/17/2016
 Rated by Jeff Ninneamann Trained by Ecology? X Yes ___ No Date of training 11/2014
 HGM Class used for rating Depressional Wetland has multiple HGM classes? X Y ___ N

NOTE: Form is not complete without the figures requested (figures can be combined).
 Source of base aerial photo/map _____

OVERALL WETLAND CATEGORY I (based on functions X or special characteristics X)

1. Category of wetland based on FUNCTIONS

- X Category I – Total score = 23 - 27
- ___ Category II – Total score = 20 - 22
- ___ Category III – Total score = 16 - 19
- ___ Category IV – Total score = 9 - 15

Score for each function based on three ratings (order of ratings is not important)

9 = H,H,H
 8 = H,H,M
 7 = H,H,L
 7 = H,M,M
 6 = H,M,L
 6 = M,M,M
 5 = H,L,L
 5 = M,M,L
 4 = M,L,L
 3 = L,L,L

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
<i>Circle the appropriate ratings</i>										
Site Potential	H	M	L	H	M	L	H	M	L	
Landscape Potential	H	M	L	H	M	L	H	M	L	
Value	H	M	L	H	M	L	H	M	L	TOTAL
Score Based on Ratings	8			9			8			25

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	

Wetland name or number B

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2

YES – the wetland class is **Tidal Fringe** – go to 1.1

- 1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – **Saltwater Tidal Fringe (Estuarine)**

YES – **Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3

YES – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4

YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

The wetland is on a slope (*slope can be very gradual*),

The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

The water leaves the wetland **without being impounded**.

NO – go to 5

YES – The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

The overbank flooding occurs at least once every 2 years.

Wetland name or number B

NO – go to 6

YES – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number B

DEPRESSIONAL AND FLATS WETLANDS
Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?		
D 1.1. <u>Characteristics of surface water outflows from the wetland:</u> Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch.	points = 3 points = 2 points = 1 points = 1	2
D 1.2. <u>The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions).</u> Yes = 4 No = 0		0
D 1.3. <u>Characteristics and distribution of persistent plants</u> (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area Wetland has persistent, ungrazed, plants > 1/2 of area Wetland has persistent, ungrazed plants > 1/10 of area Wetland has persistent, ungrazed plants < 1/10 of area	points = 5 points = 3 points = 1 points = 0	5
D 1.4. <u>Characteristics of seasonal ponding or inundation:</u> <i>This is the area that is ponded for at least 2 months. See description in manual.</i> Area seasonally ponded is > 1/2 total area of wetland Area seasonally ponded is > 1/4 total area of wetland Area seasonally ponded is < 1/4 total area of wetland	points = 4 points = 2 points = 0	4
Total for D 1	Add the points in the boxes above	11

Rating of Site Potential If score is: 12-16 = H X 6-11 = M 0-5 = L Record the rating on the first page

D 2.0. Does the landscape have the potential to support the water quality function of the site?		
D 2.1. Does the wetland unit receive stormwater discharges?	Yes = 1 No = 0	1
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland?	Yes = 1 No = 0	1
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source _____	Yes = 1 No = 0	0
Total for D 2	Add the points in the boxes above	3

Rating of Landscape Potential If score is: X 3 or 4 = H 1 or 2 = M 0 = L Record the rating on the first page

D 3.0. Is the water quality improvement provided by the site valuable to society?		
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list?	Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list?	Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (answer YES if there is a TMDL for the basin in which the unit is found)?	Yes = 2 No = 0	2
Total for D 3	Add the points in the boxes above	3

Rating of Value If score is: X 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number B

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?

<p>D 4.1. <u>Characteristics of surface water outflows from the wetland:</u></p> <p>Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4</p> <p>Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2</p> <p>Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1</p> <p>Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0</p>	2
<p>D 4.2. <u>Depth of storage during wet periods:</u> <i>Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.</i></p> <p>Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7</p> <p>Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5</p> <p>Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3</p> <p>The wetland is a "headwater" wetland points = 3</p> <p>Wetland is flat but has small depressions on the surface that trap water points = 1</p> <p>Marks of ponding less than 0.5 ft (6 in) points = 0</p>	7
<p>D 4.3. <u>Contribution of the wetland to storage in the watershed:</u> <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i></p> <p>The area of the basin is less than 10 times the area of the unit points = 5</p> <p>The area of the basin is 10 to 100 times the area of the unit points = 3</p> <p>The area of the basin is more than 100 times the area of the unit points = 0</p> <p>Entire wetland is in the Flats class points = 5</p>	3
Total for D 4	12

Add the points in the boxes above

Rating of Site Potential If score is: X **12-16 = H** **6-11 = M** **0-5 = L**

Record the rating on the first page

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?

<p>D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0</p>	1
<p>D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0</p>	1
<p>D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0</p>	1
Total for D 5	3

Add the points in the boxes above

Rating of Landscape Potential If score is: X **3 = H** **1 or 2 = M** **0 = L**

Record the rating on the first page

D 6.0. Are the hydrologic functions provided by the site valuable to society?

<p>D 6.1. <u>The unit is in a landscape that has flooding problems.</u> <i>Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.</i></p> <p>The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds):</p> <ul style="list-style-type: none"> • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 <p>Flooding from groundwater is an issue in the sub-basin. points = 1</p> <p>The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. <i>Explain why</i> points = 0</p> <p>There are no problems with flooding downstream of the wetland. points = 0</p>	2
<p>D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0</p>	0
Total for D 6	2

Add the points in the boxes above

Rating of Value If score is: X **2-4 = H** **1 = M** **0 = L**

Record the rating on the first page

Wetland name or number B

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

4

- Aquatic bed 4 structures or more: points = 4
 - Emergent 3 structures: points = 2
 - Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1
 - Forested (areas where trees have > 30% cover) 1 structure: points = 0
- If the unit has a Forested class, check if:*
- The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

H 1.2. Hydroperiods

3

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

- Permanently flooded or inundated 4 or more types present: points = 3
- Seasonally flooded or inundated 3 types present: points = 2
- Occasionally flooded or inundated 2 types present: points = 1
- Saturated only 1 type present: points = 0
- Permanently flowing stream or river in, or adjacent to, the wetland
- Seasonally flowing stream in, or adjacent to, the wetland
- Lake Fringe wetland** **2 points**
- Freshwater tidal wetland** **2 points**

H 1.3. Richness of plant species

1

Count the number of plant species in the wetland that cover at least 10 ft².

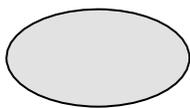
*Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. **Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

- If you counted: > 19 species points = 2
- 5 - 19 species points = 1
- < 5 species points = 0

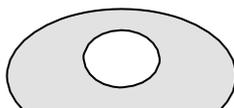
H 1.4. Interspersion of habitats

3

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



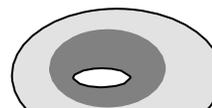
None = 0 points



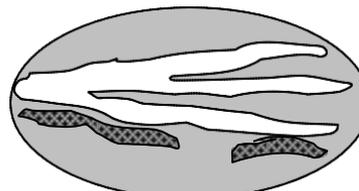
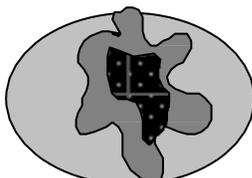
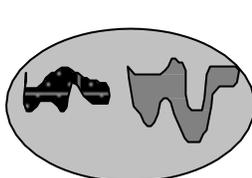
Low = 1 point



Moderate = 2 points



All three diagrams in this row are **HIGH** = 3points



Wetland name or number B

<p>H 1.5. Special habitat features:</p> <p>Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i></p> <p><input checked="" type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).</p> <p><input checked="" type="checkbox"/> Standing snags (dbh > 4 in) within the wetland</p> <p><input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)</p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>)</p> <p><input checked="" type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>)</p> <p><input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>	4
<p>Total for H 1</p> <p style="text-align: right;">Add the points in the boxes above</p>	15

Rating of Site Potential If score is: **X** 15-18 = **H** ___ 7-14 = **M** ___ 0-6 = **L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>).</p> <p><i>Calculate:</i> % undisturbed habitat <u>12</u> + [(% moderate and low intensity land uses)/2] <u>8</u> = 20 %</p> <p>If total accessible habitat is:</p> <p>> 1/3 (33.3%) of 1 km Polygon points = 3</p> <p>20-33% of 1 km Polygon points = 2</p> <p>10-19% of 1 km Polygon points = 1</p> <p>< 10% of 1 km Polygon points = 0</p>	2
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.</p> <p><i>Calculate:</i> % undisturbed habitat <u>28</u> + [(% moderate and low intensity land uses)/2] <u>24</u> = 52 %</p> <p>Undisturbed habitat > 50% of Polygon points = 3</p> <p>Undisturbed habitat 10-50% and in 1-3 patches points = 2</p> <p>Undisturbed habitat 10-50% and > 3 patches points = 1</p> <p>Undisturbed habitat < 10% of 1 km Polygon points = 0</p>	3
<p>H 2.3. Land use intensity in 1 km Polygon: If</p> <p>> 50% of 1 km Polygon is high intensity land use points = (- 2)</p> <p>≤ 50% of 1 km Polygon is high intensity points = 0</p>	0
<p>Total for H 2</p> <p style="text-align: right;">Add the points in the boxes above</p>	5

Rating of Landscape Potential If score is: **X** 4-6 = **H** ___ 1-3 = **M** ___ < 1 = **L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i></p> <p>Site meets ANY of the following criteria: points = 2</p> <p><input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page)</p> <p><input checked="" type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)</p> <p><input type="checkbox"/> It is mapped as a location for an individual WDFW priority species</p> <p><input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources</p> <p><input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan</p> <p>Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1</p> <p>Site does not meet any of the criteria above points = 0</p>	2

Rating of Value If score is: **X** 2 = **H** ___ 1 = **M** ___ 0 = **L** *Record the rating on the first page*

Wetland name or number B

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** *This question is independent of the land use between the wetland unit and the priority habitat.*

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number B

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
<p>SC 1.0. Estuarine wetlands</p> <p>Does the wetland meet the following criteria for Estuarine wetlands?</p> <ul style="list-style-type: none"> — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt <p style="text-align: right;">Yes – Go to SC 1.1 No = Not an estuarine wetland</p>	
<p>SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?</p> <p style="text-align: right;">Yes = Category I No - Go to SC 1.2</p>	Cat. I
<p>SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?</p> <ul style="list-style-type: none"> — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i>, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or unmowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. <p style="text-align: right;">Yes = Category I No = Category II</p>	Cat. I Cat. II
<p>SC 2.0. Wetlands of High Conservation Value (WHCV)</p> <p>SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?</p> <p style="text-align: right;">Yes – Go to SC 2.2 No – Go to SC 2.3</p> <p>SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p> <p>SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf</p> <p style="text-align: right;">Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV</p> <p>SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p>	Cat. I
<p>SC 3.0. Bogs</p> <p>Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i></p> <p>SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No – Go to SC 3.2</p> <p>SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No = Is not a bog</p> <p>SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?</p> <p style="text-align: right;">Yes = Is a Category I bog No – Go to SC 3.4</p> <p>NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.</p> <p>SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?</p> <p style="text-align: right;">Yes = Is a Category I bog No = Is not a bog</p>	Cat. I

Wetland name or number _____

<p>SC 4.0. Forested Wetlands <i>This page left blank intentionally</i></p> <p>Does the wetland have at least <u>1 contiguous acre</u> of forest that meets one of these criteria for the WA Department of Fish and Wildlife’s forests as priority habitats? <i>If you answer YES you will still need to rate the wetland based on its functions.</i></p> <ul style="list-style-type: none"> — Old-growth forests (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. — Mature forests (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). <p style="text-align: right;">Yes = Category I No = Not a forested wetland for this section</p>	<p>Cat. I</p>
<p>SC 5.0. Wetlands in Coastal Lagoons</p> <p>Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?</p> <ul style="list-style-type: none"> — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (<i>needs to be measured near the bottom</i>) <p style="text-align: right;">Yes – Go to SC 5.1 No = Not a wetland in a coastal lagoon</p> <p>SC 5.1. Does the wetland meet all of the following three conditions?</p> <ul style="list-style-type: none"> — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than 1/10 ac (4350 ft²) <p style="text-align: right;">Yes = Category I No = Category II</p>	<p>Cat. I</p> <p>Cat. II</p>
<p>SC 6.0. Interdunal Wetlands</p> <p>Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? <i>If you answer yes you will still need to rate the wetland based on its habitat functions.</i></p> <p>In practical terms that means the following geographic areas:</p> <ul style="list-style-type: none"> — Long Beach Peninsula: Lands west of SR 103 — Grayland-Westport: Lands west of SR 105 — Ocean Shores-Copalis: Lands west of SR 115 and SR 109 <p style="text-align: right;">Yes – Go to SC 6.1 No = not an interdunal wetland for rating</p> <p>SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?</p> <p style="text-align: right;">Yes = Category I No – Go to SC 6.2</p> <p>SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?</p> <p style="text-align: right;">Yes = Category II No – Go to SC 6.3</p> <p>SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?</p> <p style="text-align: right;">Yes = Category III No = Category IV</p>	<p>Cat I</p> <p>Cat. II</p> <p>Cat. III</p> <p>Cat. IV</p>
<p>Category of wetland based on Special Characteristics</p> <p>If you answered No for all types, enter “Not Applicable” on Summary Form</p>	<p>Cat I</p>

Wetland name or number C

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland C Date of site visit: 5/17/2016

Rated by Jeff Ninneamann Trained by Ecology? Yes No Date of training 11/2014

HGM Class used for rating Depressional Wetland has multiple HGM classes? Y N

NOTE: Form is not complete without the figures requested (figures can be combined).

Source of base aerial photo/map _____

OVERALL WETLAND CATEGORY I (based on functions or special characteristics)

1. Category of wetland based on FUNCTIONS

_____ Category I – Total score = 23 - 27

Category II – Total score = 20 - 22

_____ Category III – Total score = 16 - 19

_____ Category IV – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
<i>Circle the appropriate ratings</i>										
Site Potential	H	<u>M</u>	L	H	<u>M</u>	L	H	M	<u>L</u>	
Landscape Potential	<u>H</u>	M	L	<u>H</u>	M	L	<u>H</u>	M	L	
Value	<u>H</u>	M	L	H	M	<u>L</u>	H	<u>M</u>	L	
Score Based on Ratings	8			6			6			TOTAL 20

Score for each function based on three ratings (order of ratings is not important)

9 = H,H,H

8 = H,H,M

7 = H,H,L

7 = H,M,M

6 = H,M,L

6 = M,M,M

5 = H,L,L

5 = M,M,L

4 = M,L,L

3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	<u>I</u> II
Wetland of High Conservation Value	<u>I</u>
Bog	<u>I</u>
Mature Forest	<u>I</u>
Old Growth Forest	<u>I</u>
Coastal Lagoon	I <u>II</u>
Interdunal	<u>I</u> II III IV
None of the above	

Wetland name or number C

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (<i>can be added to map of hydroperiods</i>)	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream (<i>can be added to another figure</i>)	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland (<i>can be added to another figure</i>)	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of dense trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of dense, rigid trees, shrubs, and herbaceous plants (<i>can be added to figure above</i>)	S 4.1	
Boundary of 150 ft buffer (<i>can be added to another figure</i>)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2

YES – the wetland class is **Tidal Fringe** – go to 1.1

- 1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – **Saltwater Tidal Fringe (Estuarine)**

YES – **Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3

YES – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;

___At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4

YES – The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?

___The wetland is on a slope (*slope can be very gradual*),

___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,

___The water leaves the wetland **without being impounded**.

NO – go to 5

YES – The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?

___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,

___The overbank flooding occurs at least once every 2 years.

Wetland name or number C

NO – go to 6

YES – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7

YES – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8

YES – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number C

DEPRESSIONAL AND FLATS WETLANDS	
Water Quality Functions - Indicators that the site functions to improve water quality	
D 1.0. Does the site have the potential to improve water quality?	
D 1.1. <u>Characteristics of surface water outflows from the wetland:</u> Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch.	1 points = 3 points = 2 points = 1 points = 1
D 1.2. <u>The soil 2 in below the surface (or duff layer) is true clay or true organic (use NRCS definitions).</u> Yes = 4 No = 0	0
D 1.3. <u>Characteristics and distribution of persistent plants</u> (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area Wetland has persistent, ungrazed, plants > ½ of area Wetland has persistent, ungrazed plants > 1/10 of area Wetland has persistent, ungrazed plants < 1/10 of area	5 points = 5 points = 3 points = 1 points = 0
D 1.4. <u>Characteristics of seasonal ponding or inundation:</u> <i>This is the area that is ponded for at least 2 months. See description in manual.</i> Area seasonally ponded is > ½ total area of wetland Area seasonally ponded is > ¼ total area of wetland Area seasonally ponded is < ¼ total area of wetland	2 points = 4 points = 2 points = 0
Total for D 1	8 Add the points in the boxes above

Rating of Site Potential If score is: 12-16 = H X 6-11 = M 0-5 = L Record the rating on the first page

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges?	Yes = 1 No = 0 1
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0 1
D 2.3. Are there septic systems within 250 ft of the wetland?	Yes = 1 No = 0 1
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source _____	Yes = 1 No = 0 0
Total for D 2	3 Add the points in the boxes above

Rating of Landscape Potential If score is: X 3 or 4 = H 1 or 2 = M 0 = L Record the rating on the first page

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list?	Yes = 1 No = 0 0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list?	Yes = 1 No = 0 1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (answer YES if there is a TMDL for the basin in which the unit is found)?	Yes = 2 No = 0 2
Total for D 3	3 Add the points in the boxes above

Rating of Value If score is: X 2-4 = H 1 = M 0 = L Record the rating on the first page

Wetland name or number C

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?		
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0		0
D 4.2. Depth of storage during wet periods: <i>Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.</i> Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0		3
D 4.3. Contribution of the wetland to storage in the watershed: <i>Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.</i> The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5		3
Total for D 4		6

Rating of Site Potential If score is: 12-16 = H X 6-11 = M 0-5 = L *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?		
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0		1
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0		1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0		1
Total for D 5		3

Rating of Landscape Potential If score is: X 3 = H 1 or 2 = M 0 = L *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?		
D 6.1. The unit is in a landscape that has flooding problems. Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met. The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): <ul style="list-style-type: none"> • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. <i>Explain why</i> points = 0 There are no problems with flooding downstream of the wetland. points = 0		0
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0		0
Total for D 6		0

Rating of Value If score is: 2-4 = H 1 = M X 0 = L *Record the rating on the first page*

Wetland name or number C

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class. Check the Cowardin plant classes in the wetland. Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

0

- Aquatic bed 4 structures or more: points = 4
 - Emergent 3 structures: points = 2
 - Scrub-shrub (areas where shrubs have > 30% cover) 2 structures: points = 1
 - Forested (areas where trees have > 30% cover) 1 structure: points = 0
- If the unit has a Forested class, check if:*
- The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

H 1.2. Hydroperiods

2

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

- Permanently flooded or inundated 4 or more types present: points = 3
- Seasonally flooded or inundated 3 types present: points = 2
- Occasionally flooded or inundated 2 types present: points = 1
- Saturated only 1 type present: points = 0
- Permanently flowing stream or river in, or adjacent to, the wetland
- Seasonally flowing stream in, or adjacent to, the wetland
- Lake Fringe wetland** **2 points**
- Freshwater tidal wetland** **2 points**

H 1.3. Richness of plant species

1

Count the number of plant species in the wetland that cover at least 10 ft².

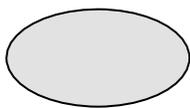
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle

- If you counted: > 19 species points = 2
- 5 - 19 species points = 1
- < 5 species points = 0

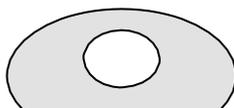
H 1.4. Interspersion of habitats

0

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



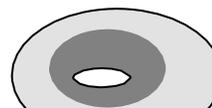
None = 0 points



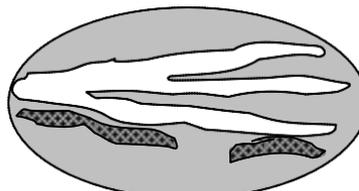
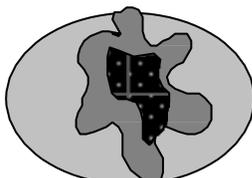
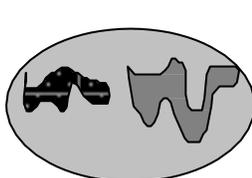
Low = 1 point



Moderate = 2 points



All three diagrams in this row are **HIGH** = 3points



Wetland name or number C

<p>H 1.5. Special habitat features: Check the habitat features that are present in the wetland. <i>The number of checks is the number of points.</i> <input type="checkbox"/> Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). <input type="checkbox"/> Standing snags (dbh > 4 in) within the wetland <input type="checkbox"/> Undercut banks are present for at least 6.6 ft (2 m) and/or overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) <input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (<i>cut shrubs or trees that have not yet weathered where wood is exposed</i>) <input type="checkbox"/> At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (<i>structures for egg-laying by amphibians</i>) <input checked="" type="checkbox"/> Invasive plants cover less than 25% of the wetland area in every stratum of plants (<i>see H 1.1 for list of strata</i>)</p>	1
<p>Total for H 1 Add the points in the boxes above</p>	4

Rating of Site Potential If score is: 15-18 = H 7-14 = M X 0-6 = L *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
<p>H 2.1. Accessible habitat (include <i>only habitat that directly abuts wetland unit</i>). <i>Calculate:</i> % undisturbed habitat <u>12</u> + [(% moderate and low intensity land uses)/2] <u>8</u> = <u>20</u> % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0</p>	2
<p>H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. <i>Calculate:</i> % undisturbed habitat <u>28</u> + [(% moderate and low intensity land uses)/2] <u>24</u> = <u>52</u> % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0</p>	3
<p>H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0</p>	0
<p>Total for H 2 Add the points in the boxes above</p>	5

Rating of Landscape Potential If score is: X 4-6 = H 1-3 = M < 1 = L *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
<p>H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? <i>Choose only the highest score that applies to the wetland being rated.</i> Site meets ANY of the following criteria: points = 2 <input type="checkbox"/> It has 3 or more priority habitats within 100 m (see next page) <input type="checkbox"/> It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) <input type="checkbox"/> It is mapped as a location for an individual WDFW priority species <input type="checkbox"/> It is a Wetland of High Conservation Value as determined by the Department of Natural Resources <input type="checkbox"/> It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0</p>	1

Rating of Value If score is: 2 = H X 1 = M 0 = L *Record the rating on the first page*

Wetland name or number C

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. <http://wdfw.wa.gov/publications/00165/wdfw00165.pdf> or access the list from here: <http://wdfw.wa.gov/conservation/phs/list/>)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: **NOTE:** *This question is independent of the land use between the wetland unit and the priority habitat.*

- **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- **Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.
- **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- **Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number C

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type	Category
<i>Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.</i>	
<p>SC 1.0. Estuarine wetlands</p> <p>Does the wetland meet the following criteria for Estuarine wetlands?</p> <ul style="list-style-type: none"> — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt <p style="text-align: right;">Yes – Go to SC 1.1 No = Not an estuarine wetland</p>	
<p>SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?</p> <p style="text-align: right;">Yes = Category I No - Go to SC 1.2</p>	Cat. I
<p>SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?</p> <ul style="list-style-type: none"> — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are <i>Spartina</i>, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. <p style="text-align: right;">Yes = Category I No = Category II</p>	Cat. I Cat. II
<p>SC 2.0. Wetlands of High Conservation Value (WHCV)</p> <p>SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?</p> <p style="text-align: right;">Yes – Go to SC 2.2 No – Go to SC 2.3</p> <p>SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p> <p>SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf</p> <p style="text-align: right;">Yes – Contact WNHP/WDNR and go to SC 2.4 No = Not a WHCV</p> <p>SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?</p> <p style="text-align: right;">Yes = Category I No = Not a WHCV</p>	Cat. I
<p>SC 3.0. Bogs</p> <p>Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? <i>Use the key below. If you answer YES you will still need to rate the wetland based on its functions.</i></p> <p>SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No – Go to SC 3.2</p> <p>SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?</p> <p style="text-align: right;">Yes – Go to SC 3.3 No = Is not a bog</p> <p>SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?</p> <p style="text-align: right;">Yes = Is a Category I bog No – Go to SC 3.4</p> <p>NOTE: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.</p> <p>SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy?</p> <p style="text-align: right;">Yes = Is a Category I bog No = Is not a bog</p>	Cat. I

*Appendix F: Alternatives Analysis and Conceptual Design
Report: Greenbank Beach and Boat Club, Inc.
Drainage and Habitat Improvement Project.*

**Alternatives Analysis and
Conceptual Design Report**

**Greenbank Beach and Boat Club, Inc.
Drainage and Habitat Improvement Project**

Prepared for:

Greenbank Beach and Boat Club, Inc.

Prepared by:

**Whidbey Island Conservation District
Coupeville, WA**

November 2013

DRAFT

Executive Summary

This report documents the development of conceptual engineering options for improving drainage and natural habitat conditions at the Greenbank Beach and Boat Club, Inc.'s (GBBC) property at Holmes Harbor in Greenbank, Washington. GBBC officers identified four general goals for addressing ongoing drainage maintenance issues at the site:

1. Determine what responsibility GBBC may have for ongoing operation and maintenance (O&M) of the tidegate and associated infrastructure
2. Investigate the technical feasibility of discontinuing the O&M of the system
3. Maintain GBBC members' recreational access to the boat ramp and beach
4. Maintain or improve ecological conditions in the lagoon area.

Whidbey Island Conservation District (WICD) formulated specific technical objectives to use to identify and evaluate engineering options for addressing GBBC's Goals No. 2, 3 and 4. We believe that Goal No.1 is a legal issue that is outside the scope of the present study.

During September and October, 2013, WICD did field measurements and a review of public agency databases in order to develop a preliminary characterization of relevant site baseline conditions, including topography, existing drainage infrastructure, ecological and land use conditions, hydrology, tidal ranges, and coastal geomorphic conditions. Based on the preliminary data, WICD developed five conceptual-level options for achieving the specific technical objectives. The options represent a range of approaches from straight-forward modifications of the existing tidegate and drain outfall, to more aggressive reconfiguration of the drainage system that would allow partial or full restoration of tidal flow across the site, to arranging for the county to assume partial or full responsibility for drainage at the site. These options are:

- Option 1 Outfall Deflection Structure
- Option 2. Tidegate Replacement
- Option 3 Partial Restoration of Tidal Flow
- Option 4 Full Restoration of Tidal Flow
- Option 5 Divestment to Island County

Conceptual level engineering design drawings for Option Nos. 1 – 4 are presented in Appendix 1.

The report then evaluates each of the options using four basic screening criteria so that the relative advantages and disadvantages of each can be compared on a consistent basis. The evaluation criteria are: 1) effectiveness in meeting the specific objectives, 2) community acceptance, 3) regulatory permitting needs and 4) overall project cost. The following table summarizes the results of the evaluation:

Evaluation Summary

Option	Effectiveness	Community Acceptance	Permitting Requirements	Project Cost
1. Outfall Deflector	Low	Positive	Moderate	\$28,000
2. Replace Tidegate	Low-moderate	Positive	Low	\$37,000
Combined 1 and 2	Moderate	Positive	Moderate	\$53,000
3. Partial Tidal Restoration	Moderate-high	Moderate-negative	Moderate-high	\$426,000
4. Full Tidal Restoration	High	Negative	High	\$523,000
5. Divestment to Island County	TBD*	TBD	TBD	TBD

*To be determined pending on whatever arrangement can be reached between GBBC and Island County.

At this stage, WICD did not recommend a preferred option. We would be happy to work with GBBC officers and Island County government officials to evaluate the various options in more detail, or to formulate different options that may be more effective in addressing GBBC's general interests at the project site.

Report prepared by:

Tom Slocum, PE

Washington Conservation Districts
Northwest Region Engineer

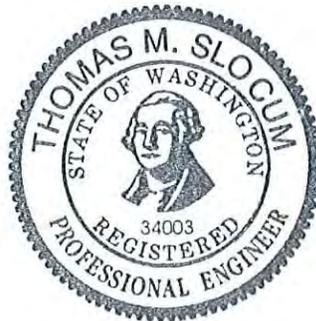


Table of Contents

1	Purpose	4
2	Background	4
2.1	Description of the Project Area.....	4
2.2	Land Use and Ecology	5
2.3	Hydrology and Drainage Issues.....	7
2.4	Tidal Datum and Coastal Morphology	10
3	Goals and Specific Objectives	11
4	Conceptual Options for Achieving the Objectives	12
4.1	Option 1: Outfall Deflector Structure	12
4.2	Option 2: Tidegate Replacement	13
4.3	Option 3: Partial Restoration of Tidal Flow.....	14
4.4	Option 4: Full Restoration of Tidal Flow	15
4.5	Option 5: Divestment to Island County	16
5	Evaluation of Options.....	16
5.1	Effectiveness in Meeting the Specific Objectives	16
5.2	Community Acceptance	18
5.3	Regulatory Permitting Needs.....	19
5.4	Overall Project Cost	20
5.5	Summary	21
6	Preferred Alternative	21
7	Disclaimers	21

APPENDIX ONE – CONCEPTUAL DESIGN DRAWINGS

1 Purpose

Whidbey Island Conservation District (WICD) asked the Washington Conservation District Northwest Region Engineering Program to provide engineering services related to developing and evaluating conceptual design options for maintaining drainage capacity and improving nearshore habitat conditions at the Greenbank Beach and Boat Club, Inc.'s (GBBC) beachfront property on Holmes Harbor in Greenbank, Washington. GBBC is the homeowner's association that represents the mutual interests of the residents of the Holmes Harbor Estate subdivision. Based on preliminary field observations completed in October 2013, correspondence with GBBC officers and Island County Department of Public Works staff, and previous experience in designing and permitting nearshore projects of this type, WICD is providing the following conceptual design recommendations for achieving GBBC's goals in a manner that will minimize the need for future maintenance and that will support Island County and State of Washington environmental protection and restoration policies.

2 Background

2.1 Description of the Project Area

GBBC owns an approximately 3.0-acre property consisting of three parcels¹ located on the shore of Holmes Harbor near the intersection of Shoreline Drive and North Bluff Road in Greenbank, Washington. The property is used by GBBC's members for recreation, and is developed with a gravel driveway and parking lot and a concrete boat ramp. Other site development includes an earthen berm, an earth and cobble dike, ditches, a tide gate and a drainage outfall pipe. These features reportedly were constructed by settlers in the early 1900s to convert the land from estuary and marsh to farm land. The drainage system now serves primarily to convey stormwater runoff from an approximately 480 acre drainage area surrounding the site. Details on the drainage system are provided in Section 2.3. Sheet 1 in the attached drawings shows the existing site features.

Privately-owned residential properties border the site on the north and south sides. A preliminary review of Island County property records indicates that the GBBC property abuts state-owned aquatic land (SOAL) on its east (shoreline) side. The precise boundary between the SOAL and GBBC's property was not determined for this preliminary study, but the county's internet-based records indicate that the property line runs approximately along the crest of the barrier beach, several feet inland from the mean higher high water (MHHW) on the beach. Island County's right of way for North Bluff Road forms the western boundary of the site. Approximate locations of the property boundaries are shown on Sheet 1. Figure 1 shows an aerial photograph of the project site.

¹ Parcel ID Nos. 263510, 263422 and 263431

Figure One: Aerial Photo of the Project Site
 Photo credit Washington Department of Ecology



2.2 Land Use and Ecology

Land cover in the project area consists of open beach, dune, meadow, salt marsh, fresh water wetland and open water tidal lagoon. Vegetation varies with the elevation across the site approximately as follows:

Vegetation Community	Elevation Range (feet NAVD88) ²	Comment
Open Beach	-2' to 10'	
Barrier beach dune grasses	10' to 13'	
High marsh/salt meadow	9' to 12'	Behind the barrier beach and parking lot fill
Low salt marsh	5.5' to 9'	Surrounding the lagoon, behind the cobble dike
Tidal lagoon	3.5' to 5.5'	
Freshwater emergent wetland	5.5' to 9'	West of North Bluff Road

The approximate elevations ranges are based on WICD's preliminary tidal research and elevation survey data (see discussion in Section 2.4). The vegetation communities represent distinct ecological zones at the site and appear to be remnants of the extensive tidal marsh that predominated in the area prior to

² NAVD88 refers to the "North American Vertical Datum of 1988", which is currently the most common vertical datum used for reporting elevations on the continent.

settlement in the late 19th Century. The approximate boundaries of the marsh are shown in Figure 2, which is an image from the 1888 U.S. Coast and Geodetic Survey “T Sheet.” Figure 3 shows this shoreline overlaid onto a contemporary aerial photo.³

Figure 2: 1888 Shoreline Chart

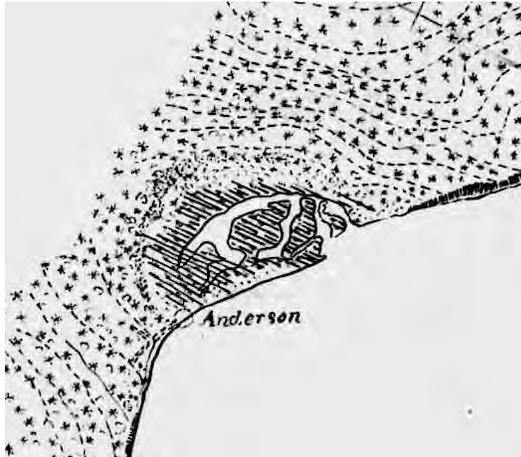


Figure 3: Historic Shoreline Overlay on Contemporary Conditions



The current salt water lagoon is impounded behind the dike and headwall system in the center of the site, as shown Figures 4 and 5, as well as in the Existing Site Plan (Sheet 1) in Appendix 1. At the estimated ordinary high water (OHW) elevation of approximately 7.0' NAVD88, this feature covers about 0.52 acres. The lagoon is connected to the larger fresh water “Greenbank Marsh” by a 30” diameter culvert running beneath North Bluff Road. Greenbank Marsh extends south and west to the Greenbank Farm property. WICD estimates that there are about 9.5 acres of open water in the marsh at the OHW elevation. The USDA soil survey characterizes 20.6 acres of land in the lagoon and marsh complex as wetland soils.⁴

Both wetland features would be characterized as “wetland” under the jurisdiction of the relevant Clean Water Act regulatory definitions (33 CFR 328.3).⁵ Furthermore, it is likely that both wetlands would be categorized as Category 1 under the Washington Department of Ecology’s (WDOE) functions and values assessment classification.

³ Source: WDOE “Washington State Coastal Atlas”, 2013. URL <https://fortress.wa.gov/ecy/coastalatlus/>

⁴ USDA NRCS Web Soil Survey, URL <http://websoilsurvey.sc.egov.usda.gov>

⁵ This assessment is based on WICD’s preliminary field observations of vegetation, soils and hydrology.

Figure 4: Lagoon and Headwall



Figure 5: Earth and Cobble Dike



Salmon Recovery Context

Island County's salmon recovery plan identifies various geographic areas and land forms in the county as being of special interest for supporting its goal of recovering stocks of wild salmon that are listed as threatened or endangered under the Federal Endangered Species Act (ESA). The shoreline of Saratoga Passage, including Holmes Harbor and the vicinity of the project site, is classified as the second tier geographic priority area for supporting recovery of ESA-listed Puget Sound Chinook salmon stocks. Within this area, marshes and "pocket estuaries" are the highest priority habitat areas because of their value in providing rearing habitat for juvenile salmon migrating out of the Skagit, Stillaguamish and Snohomish rivers.⁶ Within this context, the small lagoon and salt marsh on GBBC's property, as well as the larger Greenbank Marsh across North Bluff Road, have potential to provide substantial benefit to supporting the county's salmon recovery goals, provided that their tidal connection with the open water in Holmes Harbor can be improved.

2.3 Hydrology and Drainage Issues

Hydrology Modeling

The project site lies at the base of an approximately 480-acre catchment area. Runoff from the hills to the south, west and north drains through various field ditches, road culverts and overland flow into the Greenbank Marsh, then through the culvert under North Bluff Road to the tidal lagoon, and then into GBBC's outfall pipe to discharge into Holmes Harbor. The lagoon also receives runoff directly from the system of culverts and open ditch line along the east side of North Bluff Road.

WICD estimated peak runoff volumes from the watershed under various precipitation event recurrence intervals. Using soils data, topography and land cover characteristics from available public on-line sources, WICD compared the outputs of preliminary runs of the following hydrology models:

⁶ *WRIA 6 Multi-Species Salmon Recovery Plan*. Island County Water Resources Advisory Committee, May 2005.

- USDA Natural Resources Conservation Service “Win TR-55” model
- Washington Department of Ecology “Western Washington Hydrology Model 4.0”
- U.S. Geological Survey “Streamstats” model

Peak runoff estimates from the various models are as follows.

Model	Precipitation Event Recurrence Interval				
	2 year	10 year	25 year	50 year	100 year
Win TR-55	3.2 cfs*	7.7 cfs	19.9 cfs	49.2 cfs	83.7 cfs
WWHM 4.0	8.0 cfs	19.2 cfs	27.8 cfs	36.0 cfs	45.8 cfs
Streamstats	7.9 cfs ±56%	13.7 cfs ±53%	16.8 cfs ±53%	19.5 cfs ±53%	28.3 cfs ±54%

*Cubic feet per second

The low permeability of the glacial till soils and fairly steep terrain that characterize the catchment area account for the relatively high runoff. The USDA soil survey classifies the majority of the soils as Group D, indicating slow infiltration and high runoff potential. At the present time, insufficient field data is available to verify the soil and land cover and to calibrate the modeling assumptions, so these runoff estimates are considered provisional.

Drainage Infrastructure Capacity

WICD compared the provisional peak flow estimates with the conveyance capacity of the stormwater outfall at GBBC’s project site. We measured a slope of approximately 0.011 feet/foot (1.1 percent) on the 24-inch diameter ceramic pipe. Under ideal conditions, this pipe would have capacity to convey a maximum of about 21.0 cfs, suggesting that it could handle peak runoff from a 25-year runoff event⁷, more or less. Several factors reduce the actual capacity of the pipe, including backwatering of the outfall by the tide, increased roughness on the pipe walls by marine growth, and especially the quantity of gravel filling the outfall. Figure 6 shows the outfall during a site visit in April 2013, when gravel filled about 85 percent of the pipe’s cross section area. Under these conditions, the maximum flow capacity of the outfall was estimated to be only 2.0 cfs, and was probably actually substantially less.

The existing tidegate at the project site also significantly impacts the capacity of the site’s drainage system. The tidegate is a Tideflex Technologies/Red Valve Company “duck bill” bladder-type structure that was reportedly installed in 1998. This tidegate is shown in Figure 7. The 24-inch diameter aperture onto which the tidegate is installed was fitted onto a steel plate that blocks the outlet of the rectangular-shaped, concrete outlet culvert from the lagoon. Both the tidegate and the steel plate are presently in poor condition. The tidegate material has become rigid and encrusted with barnacles so that it can open only a fraction of its design width, and corrosion around the seal of the steel mounting

⁷ A “25-year” recurrence event refers to a runoff event that has a 4% statistical probability of occurring in any given year. A 2-year event and a 100-year event have a 50% and 1% probability, respectively, of occurring in any year.

plate and concrete headwall allows substantial leakage. No attempt was made to estimate the actual flow capacity of the tidegate, but it is assumed to be no greater than that of the gravel-clogged outfall.

Figure 6: Drainage Outfall, April 2013



Figure 7: Tidegate, October 2013



Ownership and Maintenance of the Drainage Infrastructure

During a site meeting on August 20, 2013 GBBC officers and Island County DPW's surface water manager Mr. Phil Cohen discussed the issue of the roles and responsibilities between GBBC and the county for maintaining the site's existing drainage infrastructure. GBBC did not construct the drain outfall and tidegate system, but took control of it when it purchased the property. GBBC members reported that they are under the impression that the system was built in the early 1900s for the purpose of draining the surrounding marsh to allow for cattle grazing.⁸ Members currently maintain the system on an as-needed basis, particularly clearing accumulated gravel from the outfall pipe outlet after storms.

Island County for its part installed and owns the culvert under North Bluff Road, which routes water to the tidegate and outfall. The county also reportedly paid for half of the cost of installing the current tidegate in 1998,⁹ but has not identified having any formal drainage easement to the site. Mr. Cohen reported that Island County is willing to consider negotiating a formal cost-sharing arrangement with GBBC to maintain the drainage system, but at present no details of this arrangement have been discussed.

Likewise, no records of drainage easements have been identified between GBCC and the owners of the private properties along the east side of North Bluff Road, whose system of private ditches and culverts feeds storm runoff into GBBC's drainage system. GBBC officers stated to WICD that they do not believe that GBBC has an affirmative duty to provide drainage either for these private parcels or for other land in the catchment area lying outside of the Holmes Harbor Estates subdivision. A detailed analysis of

⁸ Personal communication with Ms. Judi Moore, August 2013

⁹ Ibid.

GBBC’s and Island County’s legal rights, responsibilities and liabilities regarding the drainage situation is beyond the scope of the present study.

2.4 Tidal Datum and Coastal Morphology

Tidal Datum

WICD reviewed available on-line information from the National Oceanic and Atmospheric Administration (NOAA) to estimate the tidal range at the project site. The following estimated elevation range, which is based on an interpolation between the published data for NOAA’s Sandy Point and Crescent Harbor tidal stations¹⁰, is believed to be a reasonable preliminary approximation for the site. A more precise identification of the actual tidal range at the site would be needed for completing any detailed design of drainage or habitat improvements.

Estimated Tidal Elevations

Tide Stage	Station Data		
	Sandy Point	Crescent Harbor	GBBC Site Estimate
MLLW	-1.87 ft.	-2.21 ft.	-2.0 ft.
NAVD88	0.00 ft.	0.00 ft.	0.00 ft.
MHHW	9.39 ft.	9.45 ft.	9.4 ft.
Extreme High Water ¹¹			12.5'±0.5'

The available LiDAR and survey monument data that were used in the conceptual design options are referenced to the NAVD88 elevation datum, so this datum is used consistently throughout the study. The conversion between conventional tide table predictions, which are referenced to mean lower low water (MLLW) = 0.0’ and the NAVD88 datum is approximately +2.0 feet. For example, a tide prediction reported as 10.0’ MLLW in the tide tables is equivalent to 8.0’ NAVD88. The estimated MLLW and mean higher high water (MHHW) lines are shown in Sheet 1.

Site Elevations

WICD measured the elevations of key site features by surveying transects across the site from the MLLW line to the wetland west of North Bluff Road. We calibrated these measurements by surveying a level line transect from WSDOT’s elevation control benchmark No. GP15525—28, located near the intersection of North Bluff Road and SR 525, using a laser level and rod technique. The elevation of this benchmark is reported as 121.424’ NAVD88. We then established a provisional elevation benchmark on the concrete headwall near the tidegate vault, which we estimate to be at elevation 11.82’ NAVD88. WICD field checked our surveyed site elevations against the reported LiDAR data and observed tidal conditions at the site and concluded that the estimates are reasonably accurate for the purposes of this

¹⁰ NOAA COOPS,1983-2001 epoch. URL = <http://www.co-ops.nos.noaa.gov/datums.html?id=9447856>

¹¹ US Army Corps of Engineers Seattle District tidal datum for Crescent Harbor station. . URL = <http://www.nws.usace.army.mil/About/Offices/Engineering/HydraulicsandHydrology/HistoricalDatumRegions/WhidbeyIsland.aspx> This estimate is provided as a reference only and is not intended to represent the actual condition at the project site.

conceptual design report. However, it is important to note that this work was not done by a licensed surveyor and the accuracy is limited by the limitations of our equipment and technique. For any subsequent detailed design work, elevation control must be established on site by a licensed surveyor.

Sediment Transport Patterns

Sediment transport along the shoreline of Holmes Harbor is a key physical factor that affects the function of the existing drainage outfall as well as the design of drainage and habitat improvement options for the site. A 2005 county-wide survey of shoreline sediment transport patterns concluded that sediment moves from the south to the north (left to right as facing the shoreline from the water) along the Greenbank shore.¹² Field observations at the site show that particle sizes up to approximately 2-inch diameter coarse gravel are routinely transported along the shore. Among other implications, the constant movement of sand and gravel tends to bury much of the length of the concrete boat ramp and fill most of the outlet of the outfall pipe. The combined effect of the boat ramp and the outflow of the pipe tend to obstruct sediment drift along the shore slightly, and as a result have formed a subtle alluvial fan-like feature rising a few inches above the surrounding beach grade at that location.

Tidal Connection to the Lagoon

As discussed in Section 2.3, corrosion around the edges of the tidegate mounting plate in the tidegate vault allows a portion of the flow from the lagoon to bypass the tidegate. It also allows sea water to flow back into the lagoon when the tide level is above the invert of the lagoon outlet pipe. WICD estimates that sea water back-flows into the lagoon when the tide reaches an elevation of about 3.3' NAVD88 (about 5.3' above MLLW). This backflow through the vault is important for maintaining the ecological conditions in the lagoon and surrounding salt marsh.

3 Goals and Specific Objectives

During meetings with WICD on April 23, 2013 and August 20, 2013, GBBC officers identified the following general goals for addressing ongoing drainage maintenance issues at the project site.

1. Determine what responsibility GBBC may have for ongoing operation and maintenance (O&M) of the tidegate and associated infrastructure,
2. Investigate the technical feasibility of discontinuing O&M of the system,
3. Maintain GBBC members' recreational access to the boat ramp and beach, and
4. Maintain or improve ecological conditions in the lagoon area.

WICD has developed the following specific technical objectives to use to identify and evaluate engineering options for addressing GBBC's goals.

1. Maintain or improve the capacity to route stormwater runoff from the lagoon to Holmes Harbor, compared with current conditions. Do not impair drainage or otherwise cause impacts on adjacent properties or the county road right of way

¹² Johannessen, Jim. "Island County Feeder Bluff and Accretion Shoreform Mapping: Final Report." Prepared for Island County Marine Resources Committee, Nov. 30, 2005

2. Reduce or eliminate the effort and cost required for maintaining drainage capacity, compared with current conditions.
3. Maintain safe and convenient motor vehicle access for boat launching and parking at the existing or better level of service. Maintain safe and convenient walking access to the beach at the existing level or better.
4. Maintain or improve the ecological function and value of the lagoon and salt marsh, as well as the freshwater wetland located west of North Bluff Road, compared with the existing condition.

Addressing goal #1, a determination of GBBC's legal responsibility for ongoing operation or the drainage infrastructure, is a legal evaluation that is outside the scope of WICD's present study.

4 Conceptual Options for Achieving the Objectives

Based on our study of the site baseline conditions and our understanding of GBBC's general goals, WICD identified five conceptual options for achieving the specific objectives. The options represent a range of approaches that we believe would be feasible and, to varying degrees, effective in achieving the objectives. These options are not intended to be exclusive, as several other, different approaches might also be feasible. Each of the options is summarized in the following sections. A conceptual-level engineering design for each option is included in the plan sets in Appendix 1.

4.1 Option 1: Outfall Deflector Structure

Sheet 3 of the plan set shows a sample conceptual design for a simple deflector structure that could be constructed around the existing drain outfall to reduce the accumulation of gravel that currently blocks the pipe outlet. Key design features of this structure include:

- It is angled oblique to the typical direction of waves hitting the beach and to the direction of along-shore sediment transport, in order to deflect some of the force that currently pushes gravel into the pipe outlet.
- The walls extend a short distance above the surrounding beach grade to serve as a partial barrier to sand and gravel moving northward along the beach
- The interior walls are sloped to roughly form a "V" shape, which serves to constrict the outflow of water from the pipe, and in that way concentrate the shear force of the flowing water into the bottom of the structure, where it will more effectively sweep out accumulated sediment.
- The interior floor of the structure is designed to accommodate the width of a typical shovel, to allow for convenient removal of accumulated sediment by hand.

WICD has no record of a structure of this design being used for this purpose, but we have seen some of the design elements employed to varying degrees of success on other beach outfalls on Whidbey Island. Figure 8 shows an example of curbing constructed around the outfall of the Admirals Cove lagoon to reduce sediment entrainment. Figure 9 shows the outfall of the Maxwellton lagoon oriented oblique to the general direction of waves and along shore drift.

Figure 8: Curbing at Admirals Cove Outfall



Figure 9: Oblique Orientation of Maxwellton Outfall



4.2 Option 2: Tidegate Replacement

Sheet 3 of the plan set shows a conceptual design for replacing the existing Tideflex tidegate with an aluminum, side-hinged tidegate that will not restrict drainage from the lagoon, as is currently the case with the existing tidegate. It takes very little flow from the upstream side to open a well-balanced, side hinged tidegate, and the gate will stay open until the water surface elevation on the downstream side rises above that of the upstream side. Installing a new gate would involve removing the existing gate and mounting plate and installing a new aluminum mounting plate and the tidegate as a single unit. The corroded concrete around the existing mounting plate would be patched with hydraulic cement.

WICD worked with a tidegate vendor to retrofit Whidbey Island Dike District No. 2's tidegate vault at the mouth of Maxwellton Creek with this kind of a side-hinged gate. The new gate system has operated well since 2006. Figures 10 and 11 show photos of this installation.

Figure 10: Side-hinged Tidegate at Maxwellton



Figure 11: Installation of Side-Hinged Gate



In order to meet the specific objective of maintaining or improving the ecological function of the lagoon, this design option should include a way to allow a small flow of tidal water to enter the lagoon, as currently occurs through the leaks in the vault. The conceptual design on Sheet 3 includes a 6" diameter aperture through the mounting plate. The final design would determine the precise sizing and location of the aperture by balancing the quantity of saltwater backflow needed to maintain healthy ecological conditions in the lagoon against the quantity of out flow needed to open the tidegate.

4.3 Option 3: Partial Restoration of Tidal Flow

Option 3 takes a more aggressive approach for achieving the project objectives by removing the existing tidegate and outfall pipe and replacing it with an open channel and a new "muted tidal regulated" tidegate system. Sheet 4 in Appendix 1 shows a conceptual design of this option. This option includes the following basic features:

- An approximately 120-foot long open channel starting on the beach near the end of the existing boat ramp and extending to the edge of the parking lot. The channel's sides would be armored with riprap to protect the boat ramp and to reduce sediment entrainment from shoreline drift. The cross section area of the channel would be sized to concentrate the flow of water, so that the shear force of flowing water would help sweep entrained sediment out to Holmes Harbor.
- A 20' long x 10' wide x 8' deep concrete box culvert beneath the parking lot, which houses a muted tidal regulated (MTR) tidegate. This tidegate design has a float mechanism that closes it at a predetermined tidal height, so that it will allow a portion of the daily tidal prism to flow into the lagoon, but then close when the water level in the lagoon reaches the desired level. For example, the tidegate could be set to close when the water surface in the lagoon reaches the existing "ordinary high water" level of about 7.0' NAVD88¹³. This level is 2.4 feet below the MHHW level, so the tidal prism would substantially "muted," compared to the natural tide range. The top of the box culvert would be covered with a heavy grating to allow vehicles to drive over it and concrete barriers would be placed to separate the channel from parking areas.
- About 280 lineal feet of open channel from the tidegate back to the existing lagoon outlet. The sides of this channel would not be armored, but would have the appearance of a natural, meandering marsh channel. The existing tidegate vault would be removed, but the concrete headwalls and dike would remain in place.
- Planting of native salt marsh vegetation in the marsh and a hedge of Nootka rose or other dense shrub along the channel banks.
- A simple flap gate would be installed on the outlet of the culvert in the road side ditch at the adjoining property to the south, so that salt water will not back up into the ditch. The ditch water would drain as usual when the water level in the lagoon falls on each ebb tide.

¹³ At the OHW level of 7.0', the lagoon is about 3.6' deep at its deepest point.

4.4 Option 4: Full Restoration of Tidal Flow

Option 4 allows for a full restoration of tidal flow between Holmes Harbor and the lagoon/salt marsh on the GBBC property as well as the large wetland west of North Bluff Road. Sheet 5 in Appendix 1 shows a conceptual design of this option. This design option includes the following basic features:

- About 500 lineal feet of meandering channel running from the lagoon, through the beach crest, to the beach about 50 feet south of the boat ramp. The channel alignment follows the lowest-lying points of the existing ground surface, which corresponds roughly with the alignment of a historical tidal channel depicted in the 1888 USCGS chart. The channel would be wider than the one proposed in Option 3, reflecting the typical width of natural marsh channels found at reference sites in Island and San Juan counties. The channel seaward of the beach crest would be armored with rock to prevent it from migrating towards the boat ramp; landward of the beach crest the channel design would match natural reference conditions.
- The existing outfall pipe, tidegate vault and concrete headwalls would be removed. The existing soil berm and the soil and cobble dike would be removed. The footprints of the berm and the dike would be planted with native marsh vegetation.
- A new dike would be constructed along the south property boundary to prevent tidal water from impacting properties to the south. This dike would be constructed to approximate elevation 12.0' NAVD88.¹⁴ This elevation is equivalent to the "extreme high water" level prediction used by US Army Corps of Engineers planning. By comparison, WICD's preliminary survey measured the lowest point in the existing cobble dike at about 11.8' NAVD88, and the lowest point in the existing beach crest at about 10.3'. At the MHHW elevation of roughly 9.4', there would be 2.6 feet of freeboard between the water surface and dike top. The new dike would connect to the shoulder of North Bluff Road at the south west corner of the property, where the edge of pavement is at elevation 11.0'. The dike would then curve north, parallel to the road, so as to raise the road shoulder to elevation 12.0'. A new culvert and flap gate would be run under the dike, along the existing ditch line, to allow the road ditch to drain out on ebb tides.
- Additional soil fill would be placed on the parking lot and the last 300 or so lineal feet of the driveway to raise their grade to 12.0' NAVD88 as well. Not only would this keep the parking lot and driveway from flooding at high tides, but it also would serve as a dike to protect the adjacent, low-lying private property to the north of GBBC's property.

It is assumed that the tidal prism would be allowed to flow freely into Greenbank Marsh once the water surface in the lagoon rose above the invert elevation of the county's culvert (about 5.7' NAVD88). At the MHHW level, the water depth in the deepest point in the marsh would be about 3.7 feet deep. If subsequent detailed design studies were to show that this would create drainage problems or otherwise impact property, a tidegate could be installed on the county's culvert to block tidal flow into the marsh.

¹⁴ This dike elevation could be increased to provide additional flood protection, but flooding of North Bluff Road to the south of the project site would occur regardless by tidal flow over the natural beach crest .

4.5 Option 5: Divestment to Island County

Option 5 involves negotiating an agreement between GBBC and Island County government by which the county would either share or assume sole responsibility for maintenance and improvement of the drainage system at the GBBC property. The county reportedly paid half the cost of installing the existing tidegate in 1998, and Mr. Phil Cohen stated that the Department of Public Works would consider similar cost-sharing arrangements in the future.¹⁵ If GBBC wished to completely divest itself of responsibility for maintaining the drainage system, Mr. Cohen speculated that the county might be in a position to take on this responsibility, on condition that it could exercise control over public access to the site and carry-out natural habitat restoration activities, such as increasing tidal connection with the lagoon.¹⁶

5 Evaluation of Options

WICD evaluated each of the options using four basic screening criteria so that the relative advantages and disadvantages of each could be compared on a consistent basis. Each criterion is crucial to consider when deciding on a course of action for meeting GBBC's drainage and habitat improvement goals.

- effectiveness in meeting the specific objectives
- community acceptance
- regulatory permitting needs
- overall project cost

A summary of the evaluation is presented below.

5.1 Effectiveness in Meeting the Specific Objectives

As described in Section 3, the specific technical objectives for addressing GBBC's goals at the site are:

1. Maintain or improve the capacity to route stormwater runoff from the lagoon to Holmes Harbor, compared with current conditions. Do not impair drainage or otherwise cause impacts on adjacent properties or the county road right of way.
2. Reduce or eliminate the effort and cost required for maintaining drainage capacity, compared with current conditions.
3. Maintain safe and convenient motor vehicle access for boat launching and parking at the existing or better level of service. Maintain safe and convenient walking access to the beach at the existing level or better.
4. Maintain or improve the ecological function and value of the on-site lagoon and salt marsh, as well as the large freshwater wetland located west of North Bluff Road, compared with the existing condition.

A discussion of how well each option meets these objectives follows.

¹⁵ Personal communication with Phil Cohen, November 18, 2013.

¹⁶ Ibid.

Option 1

Option 1 would be expected to somewhat improve the conveyance capacity of the existing outfall pipe, compared with the existing condition, but the drainage capacity would still be severely constrained by the existing Tideflex tidegate. This option would not be expected to have any negative impacts on adjacent properties or on GBBC's existing level of recreational use of the site. The maintenance needs would be lower compared to the existing condition, although gravel would still have to be shoveled out of the outlet structure on a regular basis. It would not be expected to have a significant positive or negative effect on the ecological function of the lagoon or marsh.

Option 2

Option 2 would greatly improve the drainage capacity at the lagoon outlet, but flow through the outfall pipe would still be constrained by gravel obstructing the pipe outlet. Combining Option 1 with Option 2 would have a much greater effect on drainage capacity, since they would remove the obstructions of both the non-functioning duck bill tidegate and the gravel blockage at the pipe outlet. WICD estimates that if these two obstructions can be removed, the existing drainage system would be able to handle typical peak runoff flows from the entire catchment area¹⁷

Option 2 would have a positive impact on maintaining/improving ecological function in the lagoon and salt marsh if the small aperture is included in the tidegate mounting plate to allow for a small backflow of tidal water into the lagoon. If the aperture were not included, then Option 2 would negatively impact the lagoon ecology, because the current leakage of salt water through the corroded mounting plate would be eliminated. Maintenance costs for Option 2 would be equivalent to the cost of maintaining the current tidegate. Option 2 would not impact use of the boat ramp or parking lot.

Option 3

Option 3 would greatly increase the site's capacity to drain stormwater from the surrounding watershed. When the tide falls below the water level in the lagoon, the new MTR tidegate would open wide and allow standing water in the lagoon and marsh to drain out quickly. The channel would be designed to be self-cleaning, with the ebb of the tide from the lagoon sweeping out accumulated sediment, so ideally the channel would be maintenance free. The tidegate closure setting would be designed so as not to cause impacts to the surrounding properties or public roads. The tidegate would require occasional maintenance, equivalent to the maintenance costs for the existing tidegate.

Vehicle access to the boat ramp would be maintained, but the new channel would take up a portion of the parking lot. The channel would obstruct foot access along the upper beach, but this could be mitigated by including stepping stones or a similar method for helping people cross the channel. Ecological function of the lagoon, salt marsh, and fresh water marsh across North Bluff Road would be substantially improved by greatly increasing the degree of salt water exchange, compared with the existing condition. The MTR tidegate would also allow for limited fish passage into the lagoon and marsh, which would support Island County's salmon recovery goals.

¹⁷ Refer to the discussion in Section 2.3.

Option 4

Option 4 would be expected to have both greater disadvantages and greater advantages compared with Option 3. The drainage capacity of the outlet channel would be able to handle any anticipated runoff from the watershed, and would be naturally self-maintaining. Special consideration would be needed to assure that the elevated water level in the lagoon at high tide did not impact septic systems at adjacent properties. Foot access would be more difficult where the channel crosses the beach, and a larger portion of the parking lot would be lost to the new channel. Raising the parking lot to the level of the extreme high water tide prediction level would keep it from being flooded at high tides. This option would have the highest benefits for improving ecological functions and values in the lagoon, salt marsh and freshwater marsh. With unrestricted tidal exchange, these features would likely quickly evolve into highly productive natural habitat for Juvenile salmon and other marine animals.

Option 5

The potential effectiveness of Option 5 depends on the detailed arrangements that would be the outcome of negotiations between GBBC and Island County.

5.2 Community Acceptance

Over the years WICD has worked with many community groups on conservation projects involving drainage, habitat restoration, and other natural resource management issues on Whidbey Island. Although each member of the community has his or her own individual opinions and preferences, we have found some common trends among Whidbey Islanders' reactions to conservation projects in shoreline areas. People commonly favor the general idea of improving the ecological function and values of lagoons, marshes and other nearshore habitats, provided that it does not substantially affect their customary use of the site or have a negative impact on their own private property. When planning work such as at the GBBC property, it is essential to actively solicit input from all stakeholders and to include their opinions in the decision making process.

Options 1 and 2

Options 1 and 2 have negligible impact on GBBC members' use of the site and would not be expected to have a negative impact on other private property. The outfall diversion structure would detract somewhat from the current view of the beach. The improved drainage situation would actually benefit adjacent private properties. Weighing the pros and the cons, it is likely that Options 1 and 2 would have fairly positive community acceptance.

Option 3

It is likely that many people would object to the channel across the beach and the loss of a few parking spaces that would result from Option 3. These objections could be mitigated somewhat by building some manner of a crossing structure across the channel and by expanding the parking lot to compensate for the area lost to the new channel. While the substantially improved drainage capacity would generally benefit other private properties, neighbors would object if the water level in the lagoon at high tides were to impact their septic drain fields. The potential impacts would need to be evaluated and addressed in the detailed project design. Weighing the pros and the cons, it is likely that Option 3 would have a moderately negative community acceptance, at least initially.

Option 4

Option 4 would substantially change the way GBBC members used the beach and parking area, and these impacts would need to be compensated for in the project design. Likewise, potential impacts on nearby drain fields caused by the daily tidal flow into the lagoon and Greenbank Marsh (if any) would need to be mitigated in the project design. While many community members would approve of the substantial ecological benefit of restoring tidal exchange to Greenbank Marsh, it is likely that the more typical community reactions to such drastic changes would range from wary to strongly negative.

Option 5

No attempt is made to gauge the community acceptance of divesting maintenance of the drainage system to Island County government because it will likely depend on whatever conditions are agreed to between GBBC and the county.

5.3 Regulatory Permitting Needs

The primary regulatory permitting requirements that affect the implementation of the various project options are the shoreline and wetland protection requirements under Section 404 of the federal Clean Water Act and development restrictions under Washington's Shoreline Management Act (SMA) and Growth Management Act (GMA). Other permitting requirements, such as the Washington Department of Fish and Wildlife's "Hydraulic Project Approval" and Washington State SEPA review, are relatively straight-forward.

Options 1 and 2

The work proposed in Options 1 and 2 is consistent with the SMA and GMA, involving primarily the replacement or upgrade of existing structures. Building the outfall diversion structure will require an "individual" Section 404 permit from the U.S. Army Corps of Engineers, which will likely entail independent review by the Washington Department of Ecology under its Section 401 water quality certification authority. In view of this, the permitting requirements for Option 2 can be considered to be "low," while the requirements for Option 1 can be considered to be "moderate."

Option 3

The work proposed in Option 3 would be considered to be a "substantial shoreline development" under the SMA and would require extensive review and public comment by Island County. The construction of the new channel will require extensive review by the county under the "critical areas ordinance" provisions of the GMA. Because much of the intent of Option 3 is to improve the ecological function of the lagoon, the project may qualify for a programmatic "nationwide" Section 404 permit,¹⁸ which involves reduced permitting requirements compared to the "individual" permit that would likely be required for Option 1. Overall, the permitting requirements for Option 3 can be considered to be "moderate to high."

Option 4

Construction the channel and dikes in Option 4 will require extensive shorelines and critical areas review by Island County. Even though the work will restore aquatic habitat, the scale of the project might make

¹⁸ U.S. Army Corps of Engineers Nationwide Permit No. 27 for aquatic habitat restoration or enhancement.

it ineligible for a Nationwide Permit 27, so an individual U.S. Army Corps of Engineers Section 404 may be required. Overall, the permitting requirements for Option 4 will likely be “high.”

Option 5

No permitting will be required for Option 5.

5.4 Overall Project Cost

WICD developed preliminary, conceptual level costs for designing, permitting and constructing each of the options. The costs are summarized in the following table.

Conceptual Level Project Cost Summary

Option	Design and Project Management	Permitting	Construction	Total Project Cost
1. Outfall Deflector	\$11,000	\$10,000	\$7,000	\$28,000
2. Replace Tidegate	\$9,000	\$5,000	\$23,000	\$37,000
1. and 2. combined	\$13,000	\$10,000	\$30,000	\$53,000
3. Partial Tidal Restoration	\$100,000	\$15,000	\$311,000	\$426,000
4. Full Tidal Restoration	\$170,000	\$25,000	\$328,000	\$523,000
5. Divestment to Island County	TBD ¹⁹	TBD	TBD	TBD

Project management, engineering and permitting constitute a large part of the overall project cost of Options 1 and 2. For this cost estimate, WICD assumed a rate of \$100/hour, which corresponds to a typical average hourly fee for local private consulting firms. This cost could be reduced if the work were done by public agency staff, such as staff of WICD. WICD based its construction cost estimates on cost estimates and construction bids for similar projects that it has designed in the past. The estimates include a 15 percent “contingency” to account for unanticipated issues that may arise.

Because of its high benefit for supporting Island County’s ESA-listed salmon recovery goals, it is likely that State of Washington grant funding would be awarded for construction of Option 4. To a lesser degree, Option 3 would also benefit the county’s salmon recovery goals, and may also be eligible for at least partial grant funding from the state.

¹⁹ To be determined. The specific costs and outcomes depend on whatever arrangement can be reached between GBBC and Island County.

5.5 Summary

A summary of the evaluation is presented in the following table.

Evaluation Summary

Option	Effectiveness	Community Acceptance	Permitting Requirements	Project Cost
1. Outfall Deflector	Low	Positive	Moderate	\$28,000
2. Replace Tidegate	Low-moderate	Positive	Low	\$37,000
Combined 1 and 2	Moderate	Positive	Moderate	\$53,000
3. Partial Tidal Restoration	Moderate-high	Moderate-negative	Moderate-high	\$426,000
4. Full Tidal Restoration	High	Negative	High	\$523,000
5. Divestment to Island County	TBD	TBD	TBD	TBD

6 Preferred Alternative

WICD has not attempted to identify a preferred alternative at this point. We would be happy to work with GBBC officers and Island County government officials to evaluate the various options in more detail, or to formulate different options that may be more effective in addressing GBBC's general interests at the project site.

7 Disclaimers

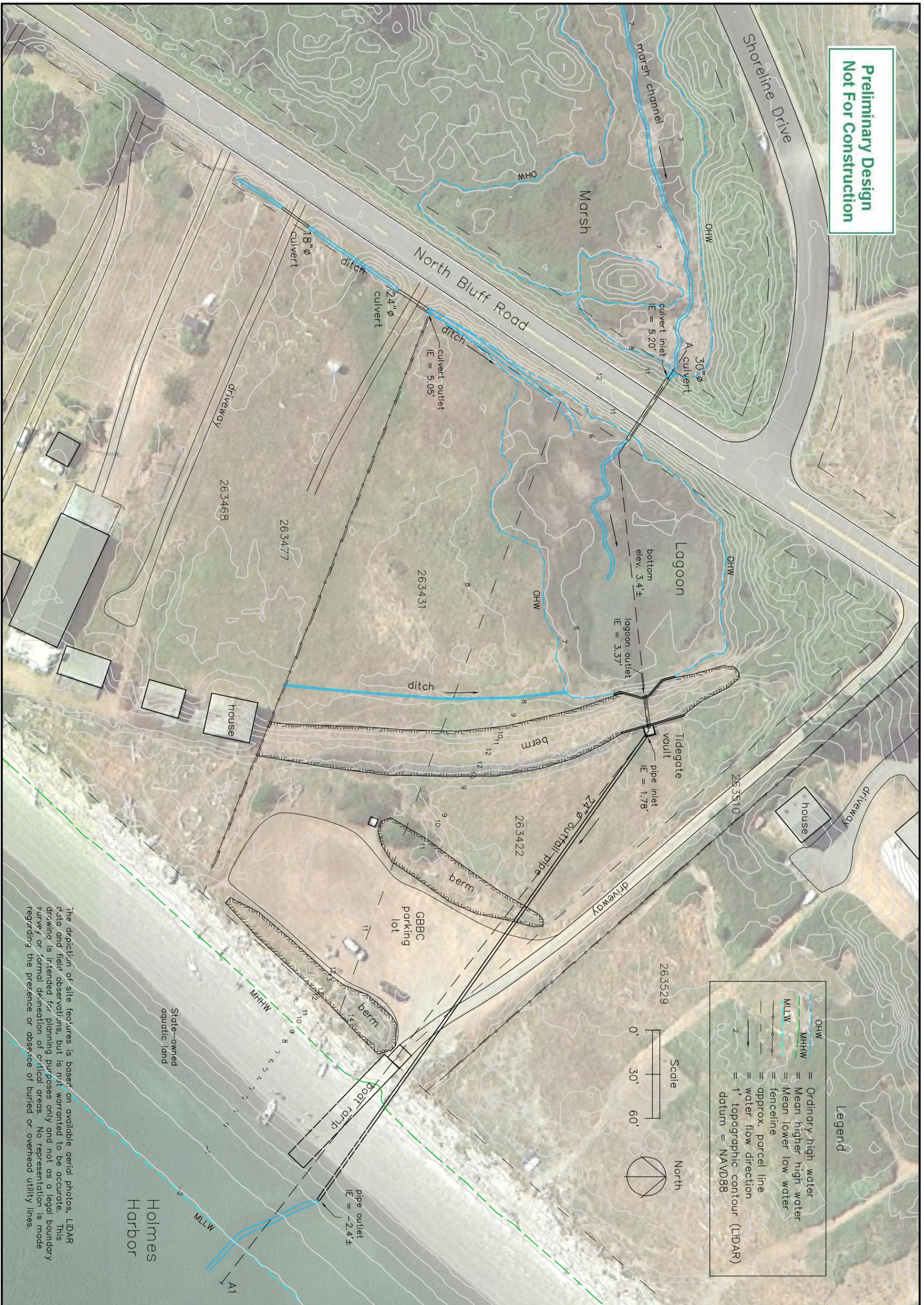
The evaluations and conclusions in this report are based on WICD's preliminary field observations, review of available public information sources, and our experience with designing, permitting and constructing similar projects on Whidbey Island. It is our experience that planning and construction of hydraulic projects in shoreline areas is technically complex and controversial. Many factors can have large influence on the decision making and cost, including geotechnical and soil conditions, shoreline hydraulics, groundwater and water table conditions, unforeseen buried utility lines, property title and easements, community acceptance, and other issues. WICD has not evaluated any of these issues in detail at this point, and does not make any representations as to how they may or may not affect GBBC's choice of which option(s) to pursue, or the final design of the selected option.

All photographs used in this report are ©Tom Slocum unless noted otherwise. Please reference when using them.

APPENDIX ONE
CONCEPTUAL DESIGN DRAWINGS

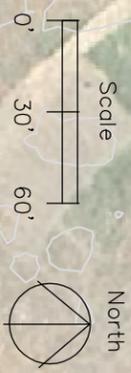
DRAFT

**Preliminary Design
Not For Construction**



Legend

- OHW = Ordinary high water
- MHHW = Mean higher high water
- MLLW = Mean lower low water
- = fence line
- = approx. parcel line
- = water flow direction
- = 1' topographic contour (LIDAR) datum = NAVD88



The depiction of site features is based on available aerial photos, LIDAR data and field observations, but is not warranted to be accurate. This drawing is intended for planning purposes only and not as a legal boundary survey or formal delineation of critical areas. No representation is made regarding the presence or absence of buried or overhead utility lines.



Revisions

Greenbank Beach & Boat Club Drainage Evaluation Existing Site Plan

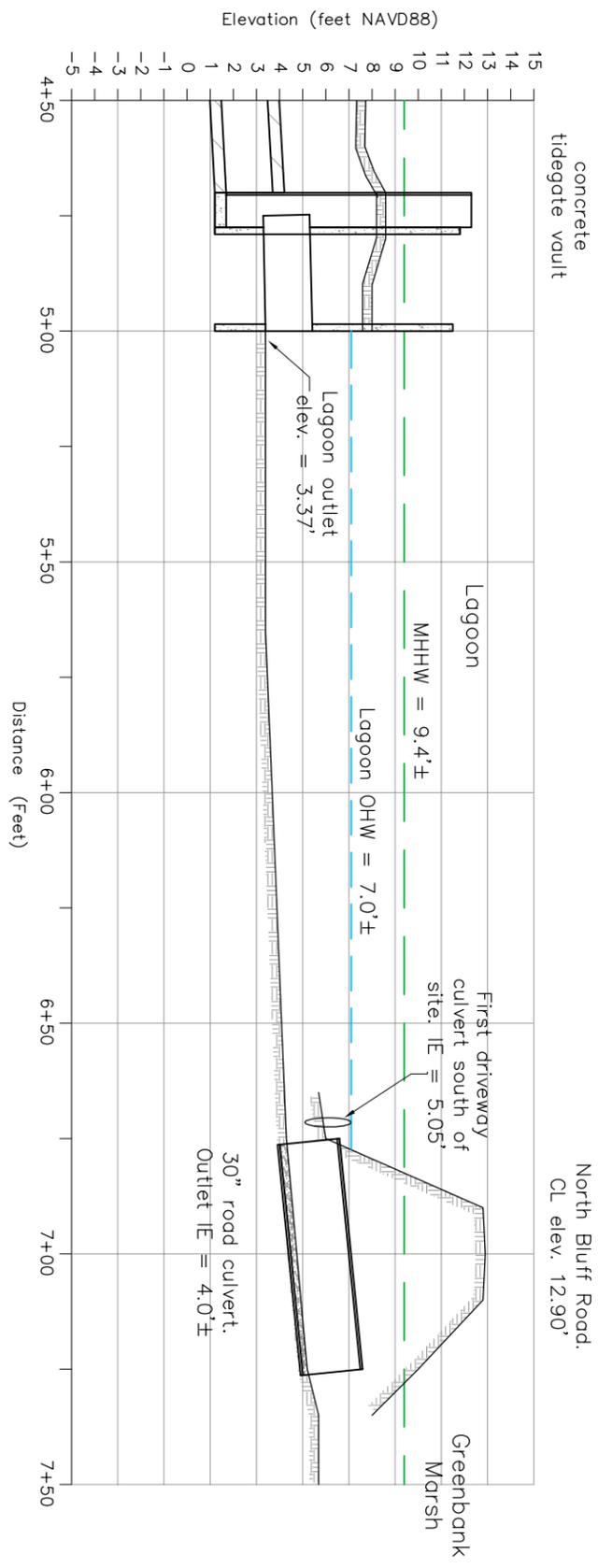
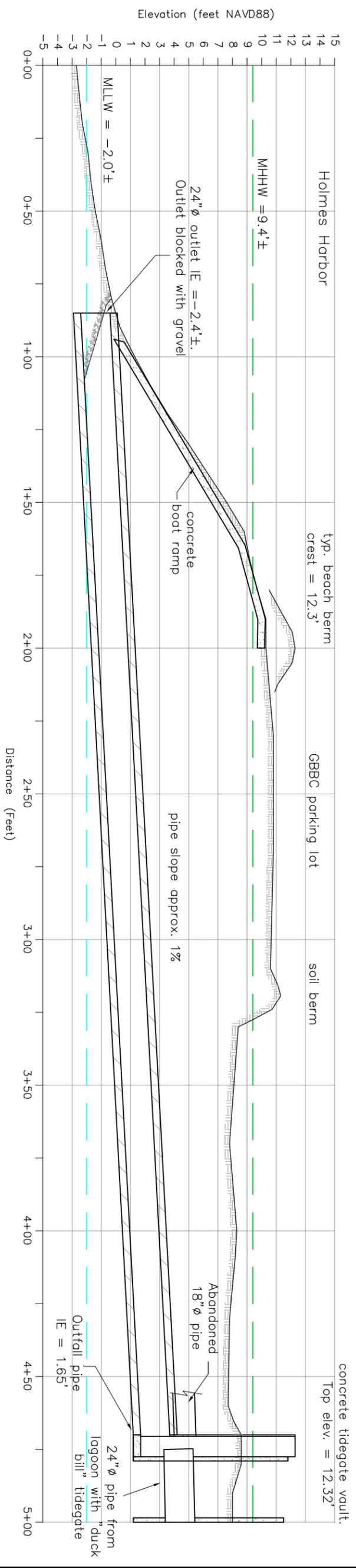
Prepared for:
Greenbank Beach &
Boat Club, Inc.
PO Box 75
Greenbank, WA 98253

Prepared by:
Whidbey Island
Conservation District
PO Box 490
Coupeville, WA 98239
(360) 678-4708

Date: 11-22-13
Scale: 1" = 60'
Sheet # 1 of 5

**Preliminary Design
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Section A-A1: MLLW to the Tidegate — Scale 1'V = 5'H



Section A-A1: Tidegate to the Greenbank Marsh — Scale 1'V = 5'H



Revisions

Greenbank Beach & Boat Club
Drainage Evaluation
Existing Site Profile A-A1

Prepared for:
Greenbank Beach &
Boat Club, Inc.
PO Box 75
Greenbank, WA 98253

Prepared by:



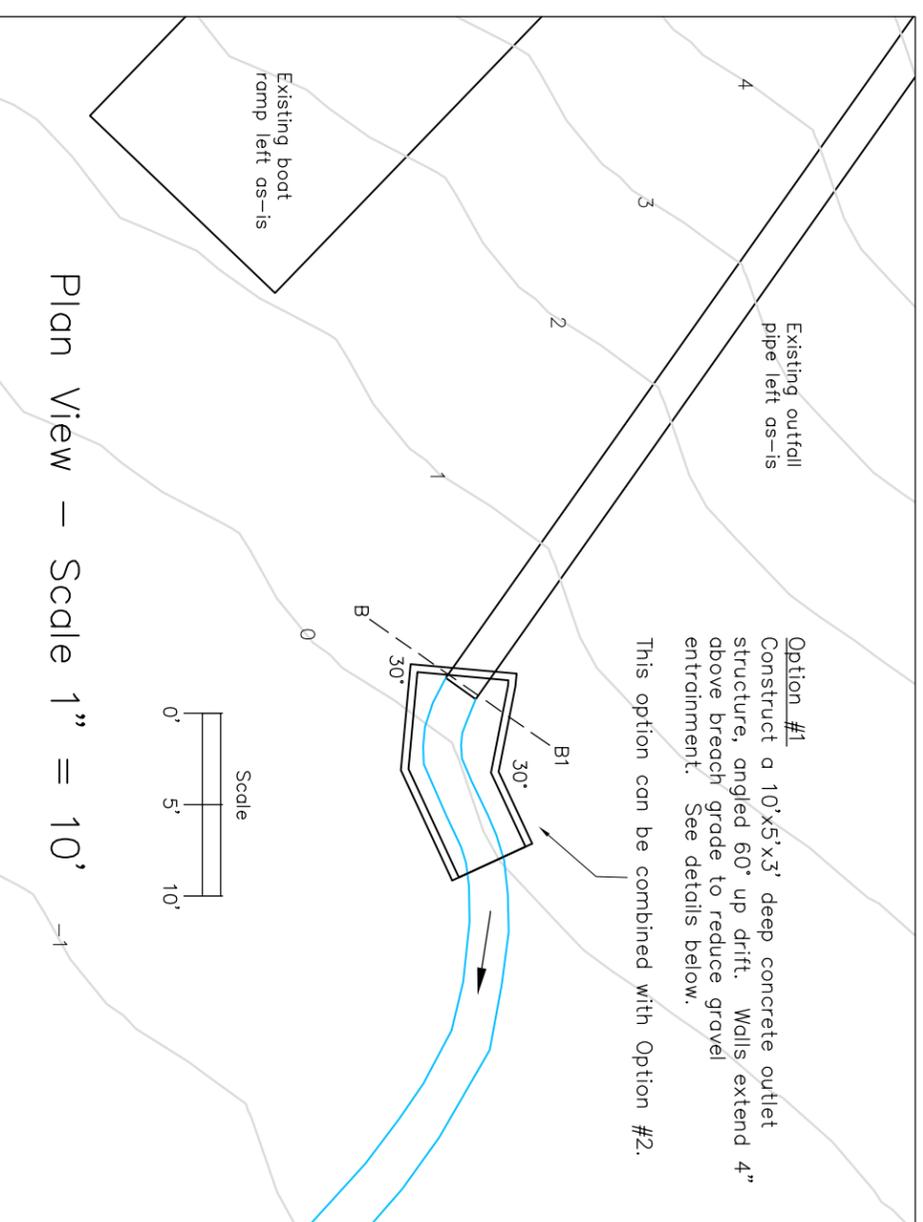
PO Box 490
Coupeville, WA 98239
(360) 678-4708

Date: 11-22-13

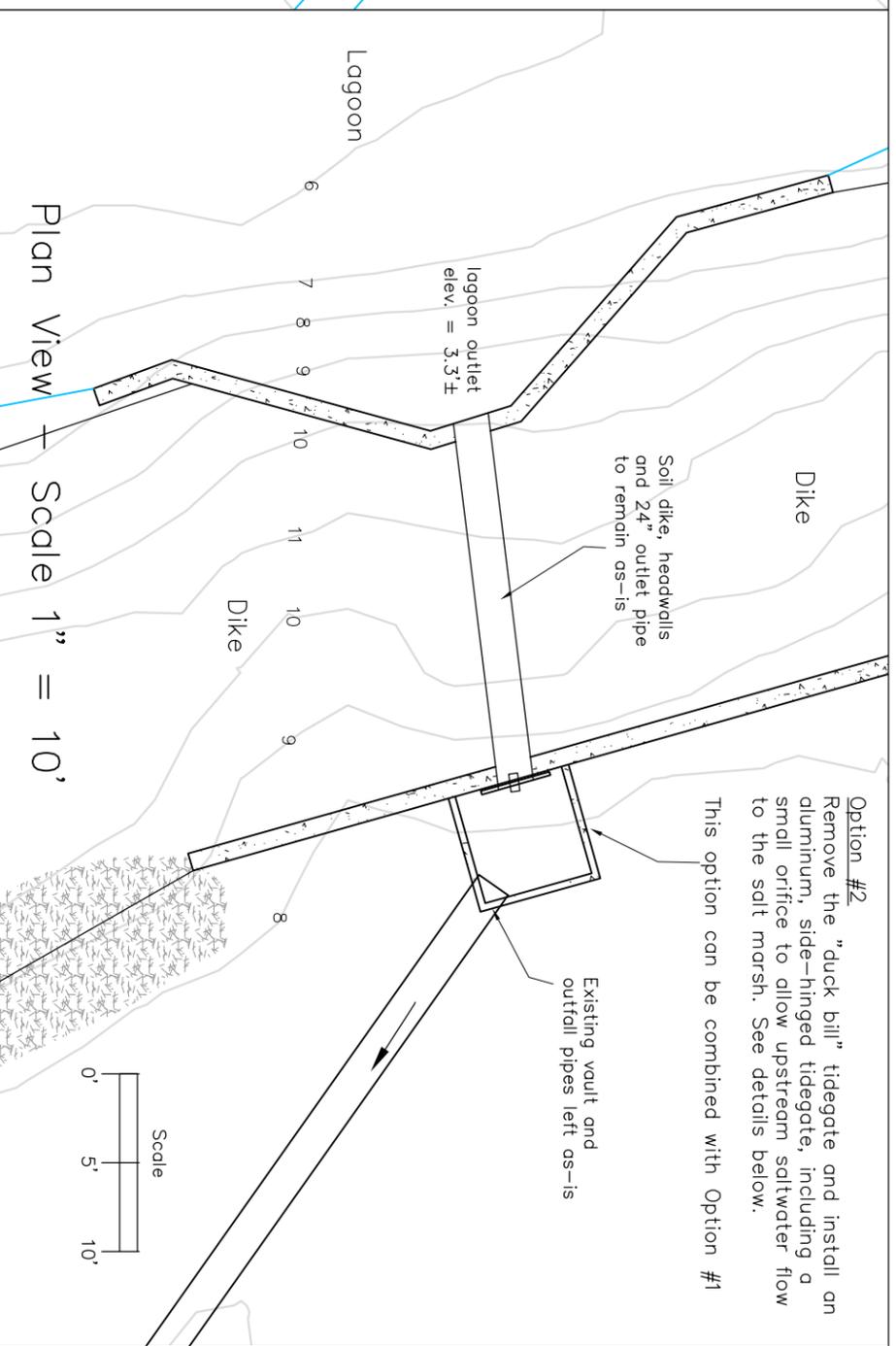
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Sheet # 2 of 5

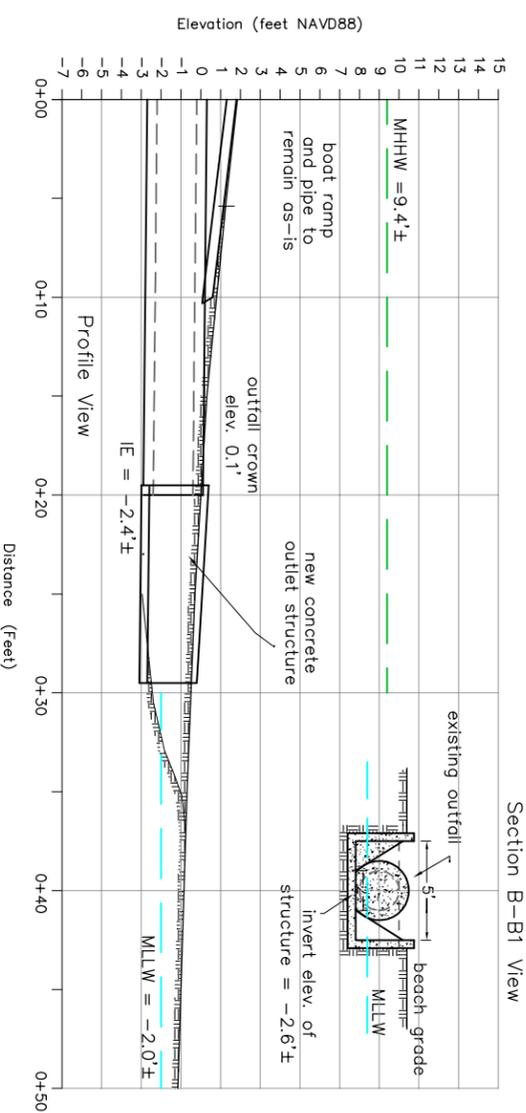
Option 1: New Outlet Structure



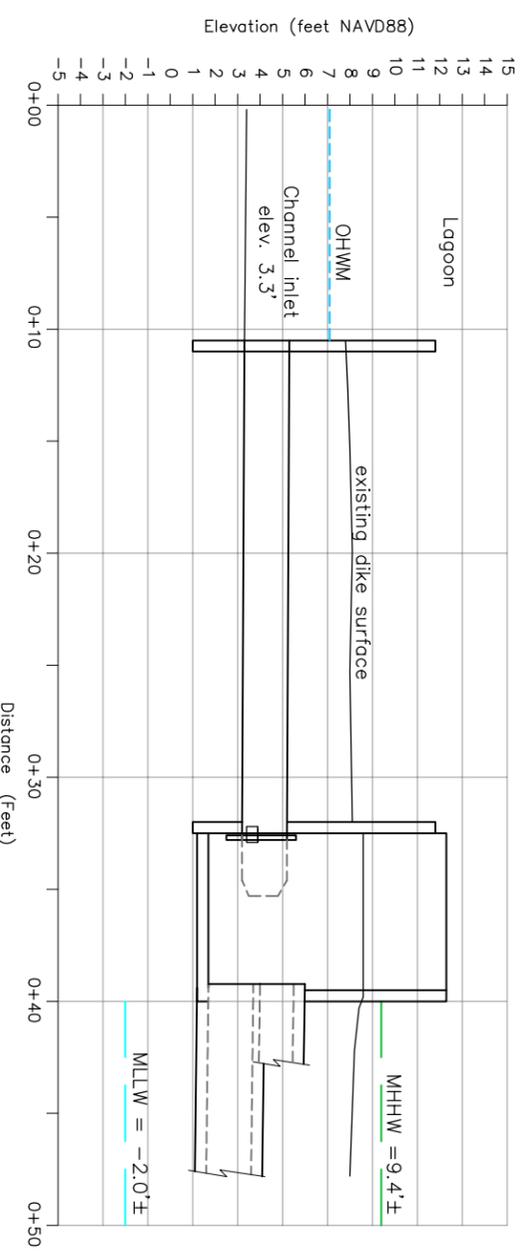
Option 2: New Side-Hinged Tide Gate



Section and Profile Views of New Outlet Structure



Profile Views of New Side-Hinged Tidegate



Greenbank Beach & Boat Club Drainage Evaluation Options 1 & 2 Conceptual Designs



Revisions

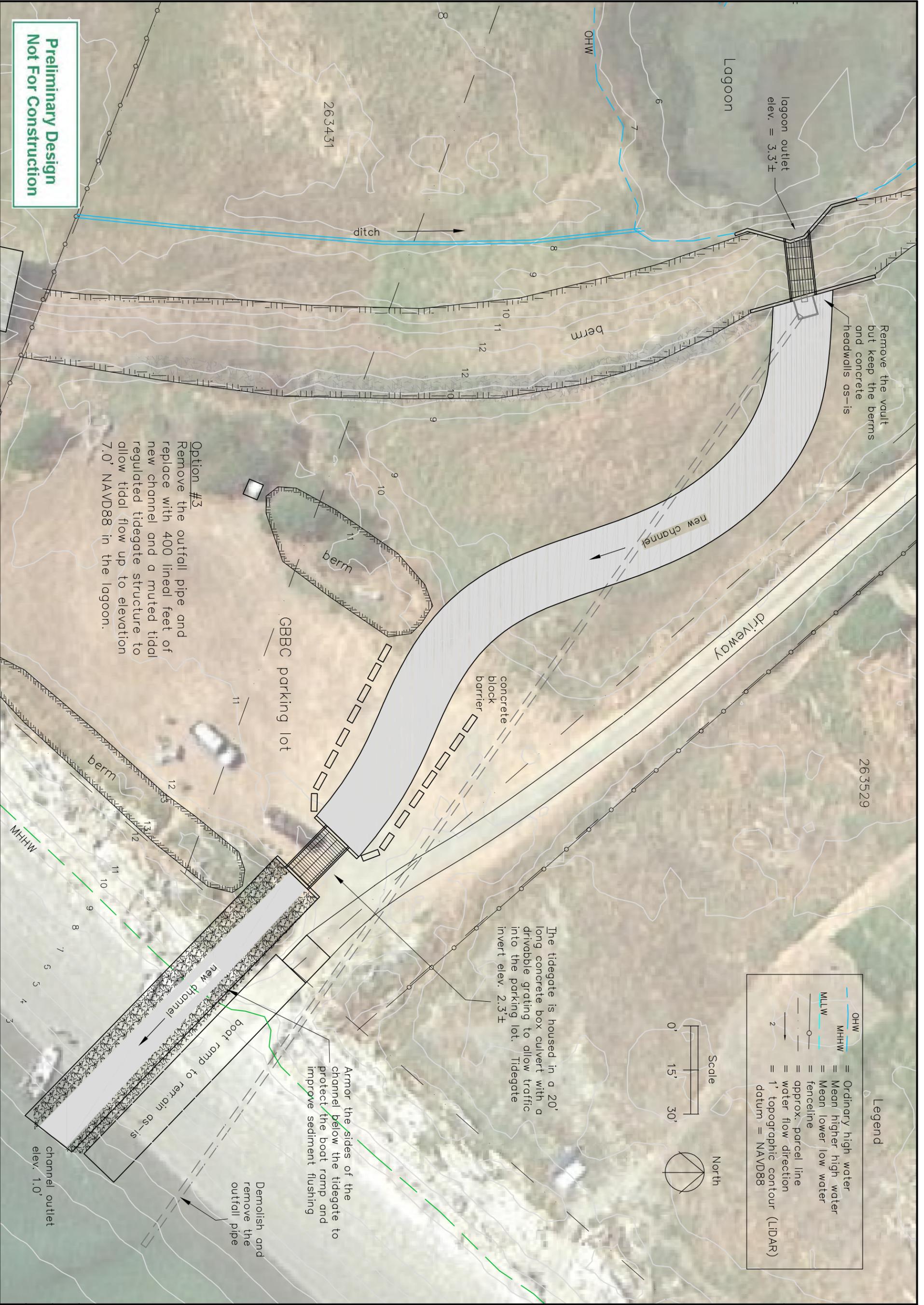
Prepared for:
Greenbank Beach &
Boat Club, Inc.
PO Box 75
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Prepared by:
Whidbey Island
Coastal Conservation
District
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Coupeville, WA 98239
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Date: 11-22-13

Scale: 1" = 10'

Sheet # 3 of 5



**Preliminary Design
Not For Construction**

Option #3
Remove the outfall pipe and replace with 400 lined feet of new channel and a muted tidal regulated tidegate structure to allow tidal flow up to elevation 7.0' NAVD88 in the lagoon.

Remove the vault but keep the berms and concrete headwalls as-is

The tidegate is housed in a 20' long concrete box culvert with a drivable grating to allow traffic into the parking lot. Tidegate invert elev. 2.3'±

Armor the sides of the channel below the tidegate to protect the boat ramp and improve sediment flushing

Demolish and remove the outfall pipe

Legend

- OHW = Ordinary high water
- MHHW = Mean higher high water
- MLLW = Mean lower low water
- = approx. parcel line
- = water flow direction
- = 1' topographic contour (LIDAR) datum = NAVD88

Scale

0' 15' 30'

North



Revisions

Greenbank Beach & Boat Club Drainage Evaluation Option 3 Conceptual Site Plan

Prepared for:
Greenbank Beach &
Boat Club, Inc.
PO Box 75
Greenbank, WA 98253

Prepared by:

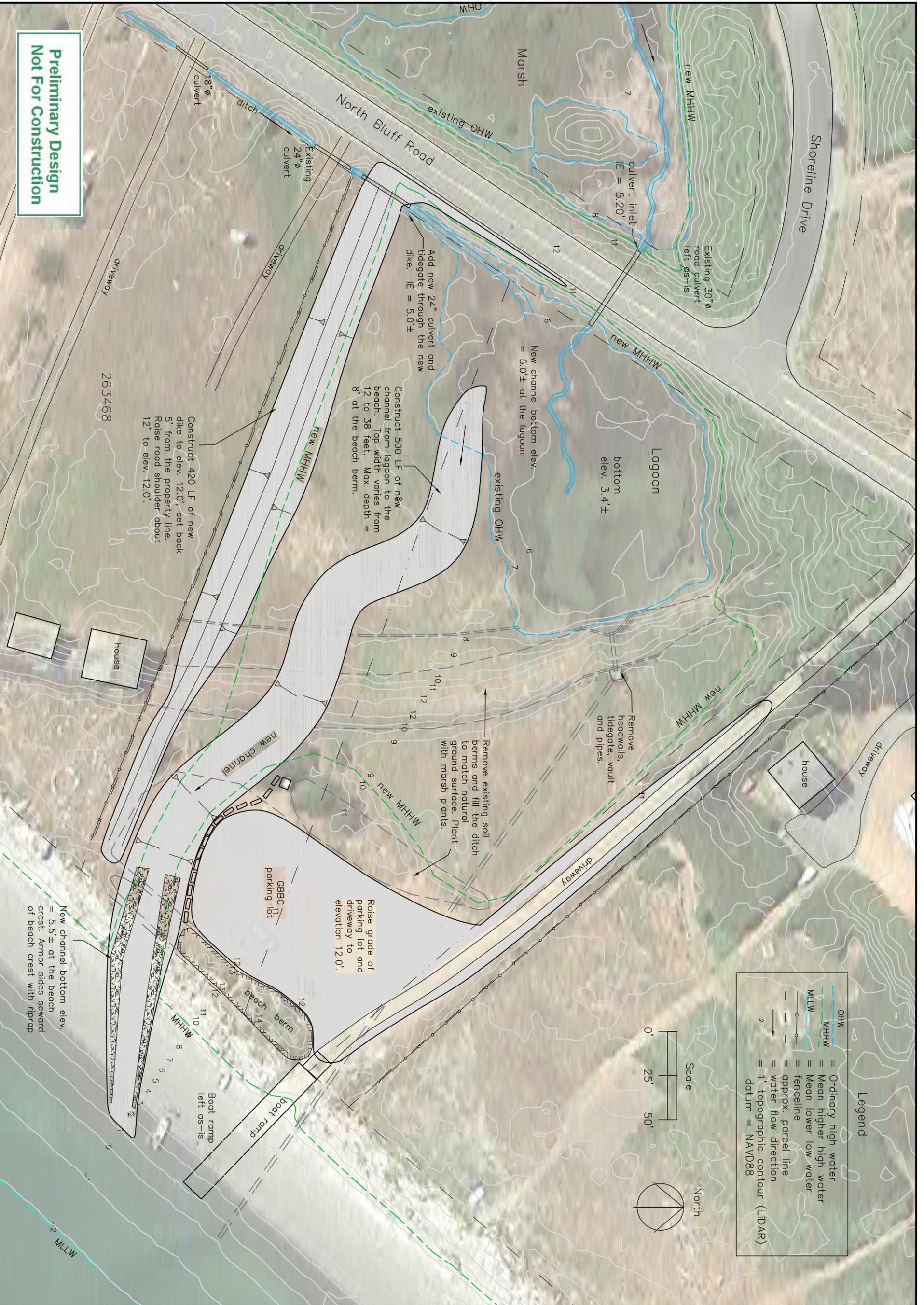


PO Box 490
Coupeville, WA 98239
(360) 678-4708

Date: 11-22-13

Scale: 1" = 30'

Sheet # 4 of 5



**Preliminary Design
Not For Construction**

Legend

- OHW = Ordinary high water
- MHHW = Mean higher high water
- MLLW = Mean lower low water
- = approx. parcel line
- = fenceline
- = water flow direction
- = 1' topographic contour (LIDAR) datum = NAVD88

Scale

0' 25' 50'

North



Revisions

Greenbank Beach & Boat Club Drainage Evaluation Option 4 Conceptual Site Plan

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Scale: 1" = 50'

Sheet # 5 of 5