

# Puget Sound Nearshore Ecosystem Restoration Project

Strategic Restoration Conceptual Engineering – Design Report

## **Appendix A: Action Characterization Report Results**

March 2011



Action Name		Big Beef Causeway Replacement and Estuary Restoration	Black Point Lagoon	Cattail Causeway Replacement and Estuary Restoration	Devil's Hole Creek	Duckabush Causeway Replacement and Estuary Restoration	Hamma Hamma Causeway Replacement and Estuary Restoration	Lilliwaup Causeway Replacement and Estuary Restoration	Point Whitney	Big Quilcene Delta Cone Removal
Action ID #		1256	1261	1271	1286	1012	1047	1346	1379	1074, 1076, 1077, 1078
<b>1</b>	<b>Fata Flaw Criteria</b>									
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Fatal Flaw</b>		<b>Yes</b>	<b>Yes</b>	<b>Yes</b>					
<b>2</b>	<b>Additional Criteria</b>									
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	Yes	No			Yes	Yes	Yes	Yes	Yes
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	Yes	No			Yes	Yes	Yes	Yes	Yes
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	Yes	Yes			Yes	No	No	Yes	No
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	Yes	Yes			Yes	Yes	Yes	Yes	Yes
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	Yes	No			Yes	Yes	Yes	Yes	Yes
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	Yes	Yes			Yes	Yes	Yes	Yes	Yes
	<b>Recommendation</b>	<b>Go</b>	<b>No Go</b>	<b>No Go</b>	<b>No Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>

Action Name		Tahuya Causeway Replacement and Estuary Restoration	Twanoh State Park Beach Restoration	Kilisut Harbor / Oak Bay Reconnection	Chuckanut Estuary Restoration	Deer Harbor Estuary Restoration	Nooksack River Estuary	Harper Estuary Restoration Design and Construction	Beaconsfield Feeder Bluff Restoration	Deschutes River Estuary Restoration
Action ID #		1401	1421	1552	1642	1648	1055	1505	1499	1003
<b>1</b>	<b>Fata Flaw Criteria</b>									
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Fatal Flaw</b>										
<b>2</b>	<b>Additional Criteria</b>									
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Recommendation</b>		<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>

Action Name		Garfield Creek Delta Restoration	Indian/Moxlie Creek Delta Restoration	Mission Creek Estuary Reconnection	WDNR Marine Lab Bulkhead Softening	Chambers Bay Estuarine and Riparian Enhancement	John's Creek Estuary Restoration Project	Sequalitchew Creek Culvert	Snow Creek and Salmon Creek Estuary Restoration	Washington Harbor Tidal Hydrology Restoration Project
Action ID #		1004	1005	1457	1684	1801	1447	1467	1230	1237
<b>1</b>	<b>Fata Flaw Criteria</b>									
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Fatal Flaw</b>		<b>Yes</b>								
<b>2</b>	<b>Additional Criteria</b>									
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	No	No	Yes	Yes	Yes	Yes	No	Yes	No
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
<b>Recommendation</b>		<b>NoGo</b>	<b>No Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>

Action Name		Nearshore Restoration Strategy for Twin Rivers	Dugualla Bay Restoration	Livingston Bay - Diked Farmland & Nearshore Habitat	Deepwater Slough Phase 2	McGlenn Island Causeway	Milltown Island	North Fork Levee Setback	Telegraph Slough 1 & 2	Everett Marshland Tidal Wetland Restoration
Action ID #		1190	1609	1618	1101	1092	1091	1102	1633, 1635	1126
<b>1</b>	<b>Fata Flaw Criteria</b>									
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Fatal Flaw</b>										
<b>2</b>	<b>Additional Criteria</b>									
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	Yes	No	Yes	Yes	Yes	No	Yes	Yes/No	Yes
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Recommendation</b>		<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>

Action Name		Everett Riverfront Wetland Complexes	Maulsby Swamp Mudflats/Enhanced Connection	Quilceda Estuary Restoration Hibulb Natural History Preserve	Smith Island Estuary Restoration	Snohomish Estuary Main Stem Connectivity	Spencer Island Restoration
Action ID #		1127	1131	1136	1142	1805	1149
<b>1</b>	<b>Fata Flaw Criteria</b>						
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	Yes	Yes	Yes	Yes	Yes	Yes
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	Yes	Yes	Yes	Yes	Yes	Yes
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	Yes	Yes	Yes	Yes	Yes	Yes
<b>Fatal Flaw</b>							
<b>2</b>	<b>Additional Criteria</b>						
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	Yes	No	Yes	Yes	Yes	Yes
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	Yes	No	Yes	Yes	Yes	Yes
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	Yes	Yes	Yes	Yes	Yes	Yes
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	Yes	No	Yes	Yes	Yes	Yes
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	Yes	Yes	Yes	Yes	No	Yes
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	Yes	Yes	Yes	Yes	Yes	Yes
<b>Recommendation</b>		<b>Go</b>	<b>No Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>	<b>Go</b>



# **Puget Sound Nearshore Estuary Restoration Project**

10% Conceptual Design Contract – Go/ No Go Summary

DRAFT  
December, 2010



## **South Puget Sound**

### **Site Name: Budd Inlet**

#### **Action Name: Garfield Creek Delta Restoration (PSNERP ID #1004)**

##### **Summary**

Garfield Creek is a degraded stream located in a heavily urbanized area. The stream flows are affected by the surrounding urban watershed. Flows are very low to intermittent during the late summer and fall. Garfield Creek conveys untreated stormwater to Puget Sound. The forested ravine and open stream channel west of West Bay Drive may provide some buffering and pollutant removal; however, typical contaminants from single family urban development are a concern. . These factors contributed to a NO response on Criteria 2c.

The small and urbanized watershed, seasonally low stream flows, and long culvert under the former lumber mill site and West Bay Drive is not conducive supporting salmon spawning and rearing, and prevents downstream movement of wood and sediment. As a result, the coastal inlet and nearshore zone do not receive the benefit of these inputs from the surrounding watershed. Justifiably, the response to Criteria 2d is NO.

In addition, the total restored area would be limited to roughly one acre, meaning that the contribution of this action to the health of Budd Inlet and Puget Sound would be small. Thus, the response to Criteria 2e is NO.

Garfield Creek has minimal direct ecological connection to the Deschutes Estuary, so it does not have a strong tie to PSNERP's river delta strategy. This fatal flaw along with three NO responses, means we cannot recommend that this action move forward to 10% design. Restoration of the Garfield Creek lower reach and delta may be consistent with other local or regional restoration objectives, but does not fit PSNERP's process-based restoration strategy.

### **Site: Normandy Park Shoreline**

#### **Action: Beaconsfield Feeder Bluff Restoration (#1499)**

##### **Summary**

The Beaconsfield property is encompassed within a long drift cell with dense residential development of the shore. The PSNERP Strategic Needs Assessment evaluated this process unit as most degraded in the process evaluation framework. Many properties are armored, making the restoration of sediment supply that much more necessary, although this appears to make the

site not part of “contiguous large patch that is well connected to a surrounding terrestrial and marine landscape”. This action meets the criteria and is recommended for 10% design.

**Site Name: Budd Inlet**

**Action: Indian/Moxlie Creek Delta Restoration (PSNERP ID # 1005)**

**Summary**

The action could restore some ecosystem processes within a portion of the historic footprint of the head of the bay, but would not restore a substantial portion. The long culvert and huge volume of fill over the head of the historic bay constitute a significant interruption in the continuity of habitat structure and habitat forming processes. Portions of the contributing basin, including the entire lower basin are highly urbanized and are not anticipated to provide flood discharge, wood recruitment, organism dispersal and sediment supply to the restoration area. The restoration site is surrounded by urban areas that fragment the upland habitat. The aquatic and nearshore habitat is fragmented by a dredged channel and a marina. Riparian habitat is generally low quality. We believe the full restoration option could meet the criteria, but the partial restoration alternative would not. Lack of support for the full restoration option would tend to indicate a No Go recommendation.

**Site Name: Oakland Bay**

**Action: John's Creek Estuary Restoration Project (PSNERP ID #1447)**

**Summary**

This action meets the criteria. We recommend that this action move forward to 10% design.

**Site Name: Budd Inlet**

**Action: Deschutes River Estuary Restoration (1003)**

**Summary**

This action meets the criteria thus we are recommending it for 10% design.

**Site Name: Budd Inlet**

**Action Name: Mission Creek Estuary Restoration (PSNERP ID #1457)**

**Summary**

The Mission Creek action area is relatively small, so it did not pass the ‘large patch’ criterion. Since this small site is directly adjacent to a contiguous large patch that includes Priest Point

Park and Ellis Cove, we recommend that this action move forward to 10% design.

**Site Name: Chambers Bay**

**Action: Chambers Bay Estuarine and Riparian Enhancement (PSNERP ID #1801)**

**Summary**

In response to the “contributing basin” criterion: The Chambers Creek watershed is the contributing watershed basin for this action. This basin is extensively modified by urban residential land use modifications, within the cities of Tacoma, Lakewood and Fircrest. Urban stormwater runoff from impervious surfaces is widespread in this watershed. Fortunately, the lower portion of the creek runs through a forested ravine that is in public ownership. This ravine provides most of the ecological processes mentioned in this criterion. We recommend that this action move forward to 10% design.

**Site Name: Budd Inlet**

**Action: WDNR Marine Lab Bulkhead Softening (1684)**

**Summary**

We recommend this action move forward to 10 % design. Note that Go determination for this action is based upon shifting the strategy from an embayment restoration to a sediment transport restoration. The merit of the new strategy is high as the down-drift barrier estuary is likely degraded as the result of limited sediment supply resulting from the groin-like effect of the armored fill area.

**South Central Puget Sound**

**Site Name: Harper Estuary**

**Action: Harper Estuary Restoration Design and Construction (PSNERP ID # 1505)**

**Summary**

This action meets the criteria. We recommend that this action move forward to 10% design.

**Site Name: Sequatchew Creek Estuary**

**Action: Sequatchew Creek Culvert (PSNERP ID # 1467)**

**Summary**

In response the “contributing basin” criterion: The contributing basin has been highly modified with respect to stream flows in Sequalitchew Creek. Most of the historic stream flow is diverted out of the ravine where the action is as a result of Fort Lewis operations. For the “contiguous patch” criterion: The partial restoration alternative is not well connected to the marine landscape. However the full restoration is well connected. The full and partial restoration are well connected to the terrestrial landscape of the ravine. The patch size of the action area is relatively small, particularly for partial restoration. We recommend that this action move forward to 10% design.

## **Hood Canal**

### **Site Name: Cattail Creek and Devil’s Hole Estuaries**

#### **Action: Cattail Causeway Replacement and Estuary Restoration (1271)**

##### **Summary**

The owner, the US NAVY, has indicated that they plan to implement the project as without participation by PSNERP and suggested that the site visit was not necessary. Therefore, this project is a directed “No Go” without a detailed Phase 1 evaluation.

### **Site Name: Devil’s Hole Estuary (#1286)**

#### **Action: Devil’s Hole Creek**

##### **Summary**

The owner, the US Navy, has indicated that they plan to implement the project as without participation by PSNERP and suggested that the site visit was not necessary. Therefore, this project is a directed “No Go” due to the “fatal flaws” of lack of participation with the local proponent and also the lack of a well defined alternative and the site has not been considered for a full evaluation.

### **Site: Lilliwaup River and Sund Creek Estuaries**

#### **Action: Lilliwaup Causeway Replacement and Estuary Restoration (1346)**

##### **Summary**

Explanation for NO Answer to Criterion 2c: The watershed and upstream 0.5 mile of Lilliwaup Creek has experienced significant aggradation due to deposition of gravels resulting from landslides, which were caused by watershed disturbances. The concern is that the excess sediment may move as a slug and affect the restored area, and there is a possibility of additional

events. The severity or importance of this risk factor has not been evaluated. The risk is greatly reduced if the creek restoration proposed by LLTK is implemented either as part of the PSNERP action or separately. We therefore recommend that this action move forward to 10% design, with the caveat that upstream restoration may be required and or that a sediment study be conducted.

**Site Name: Black Point Lagoon**

**Action: Black Point Lagoon (1261)**

**Summary**

The proposed restoration action may not substantially change the existing conditions. This is because the feature behind the barrier is an unusual deep lagoon, and therefore the level of stress resulting from the obstruction may not be great. However, the historic condition is not clear due to the unique (odd) morphology resulting from the geologic formation (kettle) and the apparent disturbance as early as the time of the 1883 map. Therefore, it is not clear this action is appropriate from a restoration standpoint, other than the roadway and culvert are clearly unnatural.

The feature is not large and the connection to the sound is narrow due to the geology, with private property immediately adjacent on both sides. We do not recommend that the project move forward through 10% design.

**Site Name: Twanoh Drift Cell**

**Action: Twanoh State Park Beach Restoration (PSNERP ID #1421)**

**Summary:**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site: Quilcene River**

**Action: Quilcene River Delta (ID #s 1074, 1076, 1077, 1078)**

**Summary**

The main external issue (also within the action area) is shellfish aquaculture issues raised by WDFW and proponent particular on the south side of the existing main channel. Many of these issues are in conflict with processes this action is intended to restore. Nevertheless, we recommend this action move forward to 10% design.

**Site Name: Point Whitney**

**Action: Point Whitney Lagoon (1379)**

**Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site Name: Hamma Hamma River**

**Action: Hamma Hamma River Delta (PSNERP ID #1047)**

**Summary:**

The main external issue (2c) (also within the action area) is shellfish aquaculture issues raised by proponent and landowner. These issues may conflict with processes this action is intended to restore. Nevertheless, we recommend this action for 10% design.

**Site Name: Big Beef Creek Estuary**

**Action: Big Beef Causeway Replacement and Estuary Restoration (#1256)**

**Summary**

The Big Beef causeway replacement and estuary arrest rate in action meets the criteria and is recommended as a GO for development of the 10% design.

**Site Name: Tahuya River Estuary**

**Action: Tahuya Causeway Replacement and Estuary Restoration (PSNERP ID # 1404)**

**Summary:**

We recommend that this action move forward to 10% design.

**Site Name: Duckabush River Delta**

**Action: Duckabush Causeway Replacement and Estuary Restoration (#1012)**

**Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

## **Whidbey**

### **Site Name: Skagit River Delta**

#### **Action: Deepwater Slough Phase 2 (1101)**

##### **Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

### **Site Name: Snohomish River delta**

#### **Action: Maulsby Swamp Mudflats/Enhanced Connection (1131)**

##### **Summary**

Maulsby Swamp receives a “no” for three of the screening criteria. These negative responses are related to Maulsby Swamp’s proximity to other ecosystem stressors that would not be addressed as part of a restoration project at this action area. As stated in the ACR, “given the overall alteration to the area, and larger scale changes to the Lower Snohomish Estuary, we are unlikely to achieve a full restoration of pre-disturbance processes in this location.” Although this one of very few opportunities to restore intertidal marsh in this portion of the nearshore, Maulsby Swamp is located in a highly degraded, long, drift cell in a highly urbanized area of Puget Sound. The only way to potentially achieve process-based restoration at this location is to acquire the Port of Everett property located on the waterward side of Marine Drive. Acquiring the Port property could create greater interaction with the nearshore and provide a larger, more contiguous habitat patch at this location, but full restoration of processes is unlikely. Also, because acquisition of Port land was not part of the proponent’s vision for this action, we do not know if it is feasible. Also, current landowners in the southern portion of the project area have specifically indicated unwillingness to participate in restoration planning for the site. Requests for site access here were denied, and the conceptual design team was unable to gain access to the preferred location for restoring tidal connectivity to the site. For these reasons, we recommend this action not move forward as part of PSNERP’s 10% design effort. Restoration of Maulsby Swamp likely has merit according to other criteria, but does not fit with PSNERP’s restoration objectives.

**Site Name: Snohomish River Delta**

**Action: Quilceda Estuary Restoration Hibulb Natural History Preserve (1136)**

**Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site Name: Snohomish River Delta**

**Action: Spencer Island Restoration (1149)**

**Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site Name: Livingston Bay**

**Action: Livingston Bay – Dike Farmland & Nearshore Habitat (1618)**

**Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site Name: Skagit River Delta**

**Action: Milltown Island (PSNERP ID #1091)**

**Summary**

In response to fatal flaw second criterion, additional evaluation is needed in coordination with the proponent during the Phase II 10% design to define the full (and partial) restoration limits for quantities definition. This will include defining the optimum limits of dike breaching and the most feasible methods of implementation to provide the targeted increase in density of sustainable tidal dendritic channels consistent with nearby reference sites. For the partial restoration alternative, the fifth and sixth additional criteria (2e and 2f) may not be fully satisfied from a process mitigation perspective. That said, we recommend that this action move forward to 10% design.

**Site Name: Skagit River Delta**

**Action: McGlinn Island Causeway (1092)**

**Summary**

This action is linked to actions restoring habitat in Padilla Bay, in particular the Telegraph Slough projects.

Criterion 2C, the success of the McGlinn Island Causeway Action depends on the implementation of the Telegraph Slough Action. The Telegraph Slough Action will distribute that freshwater flow to secondary distributary channels beyond the Swinomish Channel achieving the process-based objective of distribution of tidally-influenced freshwater inputs across the historic tidal marsh to Padilla Bay. In addition Telegraph Slough itself will provide additional rearing habitat in Padilla Bay for juvenile Skagit River Chinook benefiting from the McGlinn Island Causeway Action. We recommend that this action move forward to 10% design.

**Site Name: Skagit River Delta**

**Action: North Fork Levee Setback (1102)**

**Summary**

This action meets the criteria and should move forward to 10% design.

**Site Name: Everett Riverfront**

**Action: Everett Riverfront Wetland Complexes (1127)**

**Summary**

This action meets the criteria. We recommend that this action move forward to 10% design.

**Site Name: Lower Snohomish Estuary**

**Action: Snohomish River Mainstem Connectivity Project (1805)**

**Summary**

Taken individually, the mainstem connectivity actions meet all criteria except for the "large patch" metric. When viewed as a project intended to provide connectivity between regionally significant restoration projects, this action appears to meet the overall intent of the PSNERP effort. Several of the potential action areas appear to overlap with other PSNERP or other ongoing projects, so these are not recommended to proceed ahead under this action. Some of the projects are small scale, and highly constrained, so these appear to be a lower priority.

The remaining actions (historical slough on the north side of Smith Island, historical slough north of Langus Park, south side of Smith Island) are recommended to proceed to 10% design.

**Site Name: Snohomish River Delta**

**Action: Everett Marshland Tidal Wetland Restoration (PSNERP ID #1126)**

**Summary**

This action meets the criteria and we recommend it move forward to 10% design.

**Site Name: Snohomish River Delta**

**Action: Smith Island Estuary Restoration (PSNERP ID #1142)**

**Summary**

This action meets the criteria. We recommend it move forward for 10% design.

**Site Name: Dugualla Bay**

**Action: Dugualla Bay Restoration (PSNERP ID #1609)**

**Summary**

The contributing basin including Whidbey NAS has had significant removal of forest cover and wood recruitment will be very limited. Wood recruitment is more likely to occur from marine environment including Skagit River discharges that affect the area. Nevertheless, we recommend this action move forward to 10% design.

**Site Name: Skagit River Delta**

**Action: Telegraph Slough Phases 1 and 2 (PSNERP ID #1633 and 1635)**

**Summary**

This action is interdependent on McGlenn Island Causeway Action (1092) to satisfy the primary objection of increased freshwater input to Padilla Bay.

Under Criterion 2C, the obvious or significant problem external to the action area is the important linkage to the McGlenn Island Causeway Action to provide added freshwater inputs to the Swinomish Channel (as noted above). The Telegraph Slough Action on its own will not accomplish that objective. If improved freshwater input can be achieved external to this action area, then the Telegraph Slough Action will distribute that flow to secondary distributary channels beyond the Swinomish Channel including the primary Telegraph Slough (easterly) distributary channel, achieving the process-based objective of added connectivity and

distribution of tidally-influenced freshwater inputs across the historic tidal marsh to Padilla Bay.

The response to Criterion 2D is listed as both Yes and No since that objective would primarily be achieved by McGlenn Island Causeway Action, and if so, the Telegraph Slough Action will distribute those inputs to the restored marsh area, but likely would only partially emulate the historic processes due to the Swinomish Channel management that occurs between those actions. It is not anticipated that wood recruitment would occur from the Swinomish Channel, and conveyance of adequate sediment supply to Telegraph Slough is questionable. The local Telegraph Slough watershed is likely not robust enough to provide those inputs either.

The response to Criterion 2F is listed as Yes, but the SR 20 highway and BNSR railroad barriers across the Telegraph Slough estuary, even if restored at distributary channel crossings, would not fully restore the internal connectivity for movement of organisms, water, and sediment within the historic estuary. Full restoration of those processes would require a re-route of the highway and railroad, which are constraints along with regionally-significant buried and underground utilities along that corridor. We recommend that the action be carried forward to 10 percent design.

## **Strait of Juan de Fuca**

**Site Name: Discovery Bay**

**Action: Snow Creek and Salmon Creek Estuary Restoration (1230)**

### **Summary**

The action is consistent with the criteria. We recommend that this action move forward to 10% design.

**Site Name: Sequim Bay**

**Action Name: Washington Harbor Tidal Hydrology Restoration (PSNERP ID #1237)**

### **Summary**

The Bell Creek watershed is the contributing watershed basin for Washington Harbor. This basin is extensively modified by agricultural and urban land use modifications, including some of the City of Sequim (Todd et al, 2006). Clearing, urban stormwater runoff, and stream channelization are widespread in this watershed. The lower portion of this watershed is less developed than some of the upper portion, allowing for some of the ecological processes this criterion is targeting. We recommend that this action move forward to 10% design.

**Site Name: Twin Rivers Fill Removal (#1190)**

**Action: Nearshore Restoration Strategy for Twin Rivers**

**Summary**

The Twin Rivers fill removal meets the criteria and is recommended to be brought forward into the 10% design phase.

**San Juan/Georgia Strait**

**Site Name: Deer Harbor, Orcas Island**

**Action: Deer Harbor Estuary Restoration (#1648)**

**Summary**

This action meets the criteria. We recommend it move forward to 10% design.

**Site: Nooksack River**

**Action: Nooksack River Estuary (#1055)**

This action meets the criteria. We recommend that the Nooksack action be carried forward to 10 percent design.

**Site Name: Chuckanut Estuary**

**Action: Chuckanut Estuary Restoration (PSNERP ID #1642)**

**Summary**

In response to the “contributing basin” criterion: The Chuckanut Creek watershed is the contributing watershed basin for this action. This basin is modified by Interstate 5 and residential development. Urban stormwater runoff from impervious surfaces is widespread in this watershed. Fortunately, the lower portion of the creek runs through a forested ravine. This ravine provides most of the ecological processes mentioned in this criterion. We recommend that this action move forward to the 10% design phase.

**North Puget Sound**

**Site Name: Oak Bay**

**Action: Kilisut Harbor/ Oak Bay Reconnection (#1552)**

**Summary**

The site is recommended for a GO for development of the 10% design as there are no fatal flaws or other No responses to additional criterion.

# South Puget Sound

**Site Name: Budd Inlet**

**Action Name: Garfield Creek Delta Restoration (PSNERP ID #1004)**

Local Proponent	City of Olympia
Delta Process Unit	Delta DES
Strategy(ies)	1: River Delta
Restoration Objectives	Remove barrier to tidal hydrology and freshwater input to restore intertidal area and allow stream delta processes to support development of mosaic marsh habitats along a salinity and elevation gradient
Process-based Management Measures	Topography Restoration; Hydraulic Modification; Channel Rehabilitation/Creation
Additional Management Measures	Debris Removal; Revegetation; Contaminant Removal/Remediation

## Description of the Action

The action entails reintroducing tidal inundation to a portion of the Deschutes Estuary mudflats that were previously filled for a now abandoned industrial facility and railroad. Through topographic restoration, the action will restore tidal hydrology and freshwater inputs to the southern portion of the nearshore fill. Restoration will support development of estuarine marsh, which is scarce in Lower Budd Inlet. In addition, Garfield Creek will be “daylighted” as will a smaller stream and seeps, providing conditions for the development of a new stream and more complex tidal channel network. This action differs from the proponent’s description in that it would not include filling the mudflat to create a stream delta and salt marsh. Instead, the proposed action is more inclusive of all freshwater sources, and expanded to remove fill to restore intertidal area and allow stream delta processes to support development of mosaic marsh habitats along a salinity and elevation gradient. The proponent’s proposal focuses on daylighting a stream channel, and does not emphasize the range and gradation of habitats that could develop through restoring tidal hydrology, topography, and channel development in this setting. However, the proponent stated at the site visit that their objective is to restore a pocket estuary near the mouth of the Deschutes Estuary, which accomplishes a similar objective as PSNERP’s process-based objectives.



**Figure 1 - Garfield Creek Action Area**

## **Status in Design Process**

Restoration planning and design for the Garfield Creek Delta is in the assessment stage. The most recent work at the Budd Inlet scale includes some incremental progress toward a Budd Inlet habitat restoration plan by the Squaxin Island Tribe working with other stakeholders (NWIFC 2010).

Consideration of some limited daylighting at the existing Garfield Creek culvert outfall was included in early planning for West Bay Park Phase 1. However, the scope of Phase 1 did not include this portion of the undeveloped park property.

West Bay Park Phase 1 is located immediately north of the Garfield Creek restoration action. West Bay Park Phase I was completed in summer of 2010. Phase I included upland and sediment remediation, and intertidal habitat restoration. The intertidal habitat restoration actions included limited topographic restoration, piling removal, debris removal, salt marsh habitat restoration, riparian habitat restoration, and placement of large woody debris (Anchor QEA 2009).

## **Site Description and Context**

### ***Historic Conditions***

Topographic sheet (T-sheet) maps from the late 19th century show Garfield Creek emerging from a wooded ravine into a small, narrow coastal inlet that opened to the mudflats and tidal channels of the Deschutes River. Subsequent land use changes included construction of a railroad spur; extensive fill placement to support industrial development for a sawmill and other forest products manufacturing; and regrading of the hillside to support construction of West Bay Drive (Anchor 2007; Parametrix 2004a, 2004b, 2007; U.S. Coast and Geodetic Survey 1873). These activities also resulted in culverting of Garfield Creek under West Bay Drive and the adjacent industrial land.

### ***Natural Environment***

Garfield Creek is a perennial stream that flows through a steep, approximately half-mile-long, wooded ravine surrounded by residential development. The stream's watershed is heavily modified by urbanization and urban stormwater runoff; however, the entire ravine maintains a forested condition except at one road crossing. A smaller ravine approximately one-third the length of Garfield Creek is located immediately to the south, and the two drainages are

separated by a narrow ridge. The south ravine appears to support a smaller creek, whose outlet is also visible along undeveloped park shoreline (USGS 1994; Duncanson Company 2007). Other groundwater seeps from the hillsides along West Bay Drive also support small freshwater wetlands at the south end of the undeveloped West Bay Park site. These wetlands are interspersed with stands of more xeric weedy vegetation such as Scot's broom and Himalayan blackberry.

The eastern shore of the undeveloped park site consists of an intertidal mudflat and tidal channels formed by the Deschutes River. Above this mudflat is a gravel/cobble beach resulting from erosion of fill materials placed for railroad and industrial development. Salt marsh vegetation has colonized a narrow band of the upper intertidal zone above this beach. On the south side of the action area, a more extensive salt marsh is well established in an embayment with mudflats and tidal channels. This embayment is artificial and is separated from the main estuary/mudflat by the abandoned railroad bed. This salt marsh was restored as part of the mitigation for the 4th Avenue Bridge construction (Haub 2010, pers. comm.). Tidal hydrology is provided by gaps in the railroad bed. Fish use in Garfield Creek has not been documented and the culvert outfall is perched due to erosion of an escarpment above the beach. This condition represents at least a partial barrier to fish access during low tides. The surface of the fill appears to be above the 100-year floodplain on Federal Emergency Management Agency (FEMA) maps within the action area (FEMA 1982). However, the City of Olympia has identified elevation 18 feet (mean lower low water [MLLW] datum) as the highest observed tide, and some areas of existing fill surface in the action area may be in this elevation range (City of Olympia 2007; Duncanson Company 2007).

#### ***Human Environment***

This 16-acre former industrial site, railroad bed, and mudflat are now owned by the City of Olympia Parks, Arts, and Recreation Department. The southern extent of this ownership needs to be verified. The action area has been extensively filled as previously mentioned to support a now abandoned railroad, and former industrial site. In addition West Bay Drive is an important arterial road now serving mostly residential and some commercial areas along the west side of Budd Inlet. Numerous dolphins (piling structures) occur along the east side of the action area in the mudflat. These appear to be associated with past log rafting in conjunction with lumber mills.

As mentioned previously, the area north of Garfield Creek culvert has been developed into Phase I of West Bay Park and includes a two-lane access drive, small parking lot, paved pathways, and

lawn and viewing areas, with access to the beach in two locations.

A 36-inch concrete culvert conveys Garfield Creek from the bottom of the ravine under the West Bay Drive fill prism and undeveloped park site to Budd Inlet (Duncanson Company 2007). The culvert sections have separated at the outfall, and the asphalt and fill have eroded a 9-foot vertical escarpment. Other utilities in West Bay Drive include overhead power, a water main, and a sewer force main.

### **Opportunities for Process-based Restoration**

The action area contains the following primary stressors: nearshore fill, impervious surfaces, and stream crossing (culvert). The remnant railroad bed is also a stressor and will be discussed under constraints below. Removal of the stressors would result in a benefit area of approximately 7 acres, and would support the following habitat-forming processes: tidal hydrology and freshwater input. Other processes restored would include tidal channel formation and maintenance, detritus import and export, exchange of aquatic organisms, and solar incidence. Some limited sediment input, as well as sediment erosion and accretion, may also result. Other secondary stressors include land cover development, and overwater structures (piles/dolphins). Land cover development is addressed by removal of the other stressors. Piling and dolphin removal would provide some limited benefits to the mudflat in a spatially separate area (east side of action area).

Design refinements for 10% design include confirmation of the culvert invert on the upstream side of West Bay Drive.

### **Potential Design Alternatives**

Full restoration entails extensive topographic restoration that will allow for routing a daylighted Garfield Creek to the existing salt marsh and mudflat at the south end of the action area. This alternative also allows for intercepting the maximum amount of seepage and small stream freshwater inputs available in the action area. These freshwater inputs support marsh development and channel formation and saltwater/freshwater mixing in mudflat to the south. The general approach to topographic restoration would entail fill removal beginning at existing salt marsh and mudflat and gradually rising up to the invert elevation of the culvert where it emerges from under the West Bay Drive road fill prism. In addition, the full restoration includes removing all piles/dolphins from the east side of the action area. The full restoration alternative removes the stressors of nearshore fill, stream crossing (culvert in former industrial fill), impervious area, and overwater structures (piles/dolphins) and land cover development

within the action area. No changes to the culvert under the West Bay Drive fill prism are proposed.

Partial restoration results in a smaller area of topographic restoration to intertidal stream delta and marsh on the east shore of the undeveloped park. This topographic restoration would occur in the vicinity of the location where the current culvert outfalls to the mudflat, and would extend into the industrial fill area. No changes to the culvert under the West Bay Drive fill prism are proposed. The restored area would improve tidal hydrology and freshwater input to a larger area that is now filled. The restoration of these processes would support marsh development and tidal channel formation, but channel length and total area would be significantly smaller (estimated at approximately a quarter the length and area of the full restoration alternative). However, this alternative provides opportunity to directly connect shore restoration from the park north to the restored stream mouth. The partial restoration alternative removes the stressors of nearshore fill, stream crossing (culvert industrial fill), impervious area, and land cover development, but to a much lesser extent than the full restoration alternative.

#### **Local Proponent Requirements**

The West Bay trail is being planned through the park, extending to downtown Olympia and further north along the west side of Budd Inlet. Waterfront access has strong public support in Olympia and 8.6 acres of the park site are designated as “open space” for the West Bay trail corridor (City of Olympia 2010). The trail may follow the railroad alignment, but some alignment for the trail through the restored area is a proponent requirement.

#### **Potential Design Constraints**

The ownership of the property by the City of Olympia Parks, Arts, and Recreation Department is a constraint in that the property was purchased for park and recreation purposes. No master plan for the site has been completed yet; however, such a master plan is identified in the City of Olympia’s new park and recreation plan (City of Olympia 2010).

The abandoned railroad bed is not a constraint in the existing former industrial fill area, as long as another trail alignment is provided in a north/south direction through this area. However, south of the industrial fill pad, where the railroad bed extends over the existing mudflat, it is a constraint because of its intended use for trail purposes. However, this constraint exists primarily south of the action area.

West Bay Drive and the culvert beneath it are constraints because the culvert sets the upstream

elevation of topographic restoration. Bridging this road crossing was not considered because the stream bed on the upstream side of the road appears to be significantly higher than the intertidal range.

The topography of the hillside above West Bay Drive is also a constraint on the size of the project.

### **Uncertainties and Risks**

The action is vulnerable to the risk of sea level rise due to the limited area available, the topographic constraints, and other uncertainties. It is uncertain whether the creek's sediment supply would be substantial enough to offset sea level rise in this location. The Olympia area's sea level rise risk is exacerbated in part due to subsidence occurring there (City of Olympia 2007).

There are uncertainties concerning the need for contaminate removal / remediation at this site. Past use of the site and the need for remediation work on the adjacent West Bay Park properties suggest that there is a reasonable likelihood of encountering soil or groundwater contamination during the restoration implementation.

The affects of sediment discharges from the Deschutes River restoration have been modeled and appear to affect the west side of Lower Budd Inlet very little (George et al. 2006). However, there is some uncertainty about the actual results of this action on the Garfield Creek restoration.

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# Criteria For Go / No Go Determination

**Fatal Flaws:** A No on any question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	x	
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	x	
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.		x

**Additional Criteria:** A No response one or more questions means the action may not be suitable for 10% design and requires a more detailed explanation and rationale by the CDT. If the action has no No responses, the determination is Go.

2	Criterion	Yes	No
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	x	
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	x	
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.		x
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.		x
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.		x
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	x	

## Summary

Garfield Creek is a degraded stream located in a heavily urbanized area. The stream flows intermittently-- generally during rainy periods, and like many urban streams conveys contaminated stormwater to Puget Sound. These factors contributed to a NO response on Criteria 2c.

The culvert under West Bay Drive blocks salmon from migrating upstream and prevents downstream movement of wood and sediment. As a result, the costal inlet and nearshore zone do not receive the benefit of these inputs from the surrounding watershed. Justifiably, the response to Criteria 2d is NO.

In addition, the total restored area would be limited to roughly one acre, meaning that the contribution of this action to the health of Budd Inlet and Puget Sound would be small. Thus, the response to Criteria 2e is NO.

Garfield Creek has minimal direct ecological connection to the Deschutes Estuary, so it does not have a strong tie to PSNERP's river delta strategy. This fatal flaw along with three NO responses, means we cannot recommend that this action move forward to 10% design. Restoration of the Garfield Creek lower reach and delta may be consistent with other local or regional restoration objectives, but does not fit PSNERP's process-based restoration strategy.

# South Puget Sound

**Site Name: Budd Inlet**

**Action: Indian/Moxlie Creek Delta Restoration (PSNERP ID # 1005)**

Local Proponent	City of Olympia
Delta Process Unit	DES
Shoreline Process Unit(s)	NA
Strategy(ies)	4: Coastal Inlets (River Delta?)
Restoration Objectives	Remove fill to partially restore tidal hydrology, freshwater input, tidal channel formation and maintenance, and solar incidence and create estuarine marsh terrace to support the detritus import and export
Process-based Management Measures	Topography Restoration; Armor Removal/Modification, Hydraulic Modification
Additional Measures	Revegetation, Large Wood Placement; Substrate Modification; Debris Removal

## Description of the Action

Most of the historic estuarine marsh habitat at the Deschutes River Estuary/Lower Budd Inlet has been lost to a combination of urbanization, dredging, and filling, as well as construction of the Capitol Lake dam. This project would attempt to restore some of the estuarine marsh habitat in Lower Budd Inlet. The proposed action would include removing fill, a short portion of local road, and culvert between two city blocks south of the existing mudflat. It would also include filling mudflat areas at the head of East Bay to raise the grade and create a marsh terrace and improved riparian zone. Removing any streets and upland fill is not consistent with the local sponsor's description of the action. Placing dredged material to create a marsh terrace and riparian area is consistent with the proponent's description of the action and could be a companion project to the Deschutes River Estuary Restoration action. The Deschutes River Estuary action is anticipated to produce a large quantity of sediment suitable for beneficial re-use in a locale such as this.

## Status in Design Process

No design work has been completed to date.

Indian /Moxlie Creek Delta Restoration



**Figure 1 - Indian/Moxlie Action Area**

## Site Description and Context

### *Historic Conditions*

Lower Budd Inlet has been significantly altered by dredging, filling, and urbanization dating back to the initial platting in 1850 (NWAA 2008). Early maps from 1856 show a peninsula that has marsh on the east and roads and buildings on the west separating the East and West Bay portions of Lower Budd Inlet. Historically, East Bay extended about 2,000 feet further south than its current location and was fed by two streams: Indian Creek and Moxlie Creek. The 1873 topographic sheet (T-sheet) shows the presence of a distributary channel system in West Bay from the Deschutes River and a sinuous, convoluted shoreline around East Bay with a mixture of urban area, salt marsh, and deciduous forest. The action area is part of a historic mudflat formed by the Deschutes River that extended approximately 0.75 mile north and 1 mile west of the action area, with the peninsula described above separating East and West Bay. In the intervening years, the landscape around the action area has been transformed, and downtown Olympia has grown out over much of the historic mudflat and all of the historic marsh, and the lower portion of Indian and Moxlie Creek have been culverted under the eastern edge of downtown. The peninsula separating East Bay and West Bay has grown 0.75 mile to the north, and is 2,000 feet wide. Significant dredging and marina construction has occurred in East Bay. The sediment supply from the Deschutes River that created the mudflat and historic marsh has been cut off by the dam to create Capitol Lake. Historically Budd Inlet supported a large native oyster population (WDFW, 2010).

### *Natural Environment*

Indian and Moxlie Creeks extend south and east of the action area. Moxlie Creek originates south of I-5 in a wooded ravine. Indian Creek begins in a plateau east of East Bay at a small lake and wetland complex. It has a much larger watershed than Moxlie Creek and runs south and then west, crossing I-5 twice before its confluence with Moxlie Creek at the southeast edge of downtown Olympia. The site has an extensive lower, intertidal mudflat with a complex channel network. The tidal channel system consists of a braided channel carrying low tide stream flows and an extensive network of dendritic blind channels. The edges of the mudflat consist of dredged channel to the north, and steep fill slopes on the east, south, and west. Marsh vegetation has colonized a narrow elevation band on the fill slopes showing some minor erosion around the edge of East

Bay. Upland vegetation includes mature street trees on the south and west, and a combination of mostly invasive trees and shrubs on the east side with a few native deciduous trees. Stream flows from the connection to Indian Creek and Moxlie Creek provide freshwater, nutrient, and detritus import. East Bay has water quality issues connected with poor tidal circulation resulting in anaerobic conditions (Haub 2010). Native oysters are being reintroduced to Budd Inlet but the locations relative to this action are unclear (WDFW 2010).

### ***Human Environment***

The action is on downtown Olympia waterfront and the surrounding landscape is highly urbanized. Fill depths are in the 20-foot range (Haub 2010). The majority of the uplands are dominated by impervious surfaces with little vegetation canopy; this is especially true to the west and south of the site. The open channel reaches of Indian and Moxlie creeks are connected to the site by a 3700-foot-long, 72 to 84-inch diameter culvert. This structure does allow fish passage under certain conditions but is a major stressor on nearshore process. Eleven abandoned wood piles are located in the mudflat. Contamination of the mudflat sediments is anticipated due to contamination of the fill surrounding the mudflat (Haub 2010).

The tidelands are owned by Washington Department of Natural Resources (WDNR). The uplands consist of a combination of public street rights-of-way and private parcels.

It is anticipated that in addition to stormwater, there are other utilities in Olympia Avenue NE, which delineates the south edge of the action area. These utilities are expected to include water, sewer, electrical, communication, and storm drainage.

### **Opportunities for Process-based Restoration**

Opportunities for process-based restoration are limited at this site. The stressors at this action area include nearshore fill, nearshore roads, impervious surfaces, stream crossings, and land cover development. Removing these stressors would restore tidal hydrology and freshwater input. However, in this location, it would also disrupt urban infrastructure in the downtown area. The local proponent's proposal would create a sediment bench for marsh colonization using clean dredged material from the Deschutes River and Capitol Lake. This approach is expected to be successful given the presence of

this marsh vegetation around the relatively steep fill slopes surrounding East Bay. The successful establishment of this estuarine marsh vegetation would support the process of detritus import and export, but would not remove the primary stressors.

Refinements in the 10% design would include determining with the City of Olympia if any upland fill removal, including a short segment of Olympia Avenue NE and land to the south, is possible. It is also anticipated that this fill removal would involve adjacent parcels whose owners have not been identified. The second issue to be determined in 10% design is permitting and landowner feasibility issues associated with placing clean dredged material on WDNR tidelands in this location.

### ***Potential Design Alternatives***

Full restoration would include removal of a limited amount of fill and stream culvert from Olympia Avenue NE south to State Avenue NE. This fill and culvert removal would occur along the Chestnut Street right-of-way but, due to the depths of fill, would likely involve adjacent parcels on the east and west sides to provide space for transitional slopes. Olympia Avenue NE is not proposed to be rebuilt as a bridge over this restored channel because State Avenue NE is located one block away to the south and traffic could be rerouted to it. This restoration action would remove the stressors of nearshore fill, impervious surface, a stream crossing, and land cover development from a small portion of the former mudflat. The processes of tidal hydrology, freshwater input, tidal channel formation and maintenance, and solar incidence would be restored to a small area that is now covered.

In addition, the full restoration alternative would include piling removal and placement of clean dredged material from the Deschutes River Estuary restoration on the upper eastern side of the mudflat to create a marsh terrace. This action depends on the Deschutes River Estuary restoration action for this dredged material supply. The marsh terrace could also be designed to create a more natural transition to upland elevations and include riparian vegetation restoration. The marsh terrace and fill placement action would restore detritus import and export processes.

The partial restoration alternative would include only piling removal and placement of the clean dredged material to create a marsh terrace and riparian habitat. It would not address the primary stressors of nearshore fill, impervious area, stream crossings, and

land cover development. It would not restore the target processes of tidal hydrology or freshwater inputs, but would improve detritus import and export.

### ***Local Proponent Requirements***

Stormwater drainage and conveyance capacity must be maintained and the risk of flooding cannot be increased. The proponent is interested in exploring how the project could be used to address local flooding risks associated with sea level rise. While not a definite requirement, the proponent is not endorsing removal of streets and upland fill to support restoration in this location.

### **Potential Design Constraints**

The site is in a highly urbanized area. Removing fill, roads, and utilities is expected to be disruptive and is not expected to be supported by the local proponent, the City of Olympia. Without removing these stressors, the ability to restore processes at this location is very limited.

The water quality issues (anaerobic conditions) in East Bay limit the potential ecological benefits of performing restoration in this location.

Native oyster restoration efforts in Budd Inlet should be considered prior to implementing this action.

### **Uncertainties and Risks**

The willingness of both public (City of Olympia and WDNR) and private landowners to allow fill removal in the uplands and fill placement in the tidelands is uncertain. Permitting associated with fill placement to create marsh terraces has some uncertainties.

The site is located in a low-lying area of Olympia that is subject to coastal flooding over time in response to sea level rise. Sea level rise could require continued placement of dredged material to adjust grades for target marsh and riparian habitats. Conversely, sea level rise could also adversely impact much of downtown Olympia over a 50- to 100-year timeframe, putting many of the roads, utilities, and urban development at risk.

The risk of encountering contaminants in the uplands is high according to the local

proponent. There is also a likelihood of encountering contaminants in the sediments. However, placement of clean dredge material may provide a net ecological benefit if existing mudflats are contaminated.

Recontamination of clean dredge material with urban stormwater runoff from the 84-inch outfall is also a risk, depending on the City of Olympia's source control program within the Indian Moxlie Watershed.

Lower Budd Inlet and present day Olympia have an extensive pre-Euroamerican settlement history of Native American use (NWAA 2008). Encountering cultural resources is a risk with any excavation below the hydraulic fill placement-native sediment interface.

## References

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# Criteria For Go / No Go Determination

**Fatal Flaws:** A No on any question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	X	
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	X	
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	X	

**Additional Criteria:** A No response one or more questions means the action may not be suitable for 10% design and requires a more detailed explanation and rationale by the CDT. If the action has no No responses, the determination is Go.

2	Criterion	Yes	No
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.		X
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	X	
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.		X
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.		X
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.		X
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	X	

## Summary

The action could restore some ecosystem processes within a portion of the historic footprint of the head of the bay, but would not restore a substantial portion. The long culvert and huge volume of fill over the head of the historic bay constitute a significant interruption in the continuity of habitat structure and habitat forming processes.

Portions of the contributing basin, including the entire lower basin are highly urbanized and are not anticipated to provide flood discharge, wood recruitment, organism dispersal and sediment supply to the restoration area. The restoration site is surrounded by urban areas that fragment the upland habitat. The aquatic and nearshore habitat is fragmented by a dredged channel and a marina. Riparian habitat is generally low quality. We believe the full restoration option could meet the criteria, but the partial restoration alternative would not. Lack of support for the full restoration option would tend to indicate a No Go recommendation.

DRAFT

# Whidbey

**Site Name: Snohomish River delta**

**Action: Malsby Swamp Mudflats/Enhanced Connection (1131)**

Local Proponent	City of Everett
Delta Process Unit	Delta SNH
Shoreline Process Unit(s)	SPU 8055
Strategy(ies)	1: River Delta
Restoration Objectives	Remove barriers to tidal action to enhance connection(s) between Malsby Swamp and the Lower Snohomish Estuary
Process-based Management Measures	Armor Removal or Modification; Channel Rehabilitation/Creation; Hydraulic Modification; Topography Restoration; Contaminant Removal/Remediation
Additional Management Measures	Debris Removal; Property Acquisition/Conservation

## **Description of the Action**

The action will be to remove artificial fill and allow for greater tidal flux into and out of a wetland that is separated from surrounding mudflats by a road and railroad embankment. The PSNERP action appears to be very similar to the project proponent's vision for the site.

## **Status in Design Process**

No formal design work has been completed to-date.

## **Site Description and Context**

### ***Historic Conditions***

Historical mapping from the early GLO surveys is minimal in this area. The mapping with the most detail in this area (ca. 1884) shows the surrounding bluff topography, and there is a thin area designated as 'Pine' near the current road alignment. The area of the swamp is designated as fenced, but has no specific land cover denoted. The earliest aerial photos of the area (ca. 1938) show significant log rafting, and the beginnings of piers and intertidal fill on the shore side of the railroad. Within the swamp, the 1938 aerial photo shows relict tidal channels, along with the roads and linear drainage ditches. The orientation of the channels is not immediately apparent, and no distinct openings below the railroad are visible.



**Figure 1 - Mulsby Swamp Action Area**

***Natural Environment***

The Mulsby Swamp action area covers approximately 30 acres within the Lower Snohomish Estuary, on the mainland side facing Jetty Island. Mulsby Swamp occurs in a low area from

the toe of the bluff to a road embankment. Maulsby Swamp is currently connected to the nearshore via a 36 inch concrete pipe with the outlet partially buried on the mudflat. The wetland appears to get muted tidal action, but water levels are likely seasonal, rather than tidally, dominated. There is limited tributary area to Maulsby Swamp, consisting only of the steep forested hillsides on the bluff that surrounds the Swamp. The wetland includes linear drainage ditches around the interior and perimeter of the site. No outlet on the northern portion of the Swamp is apparent.

The overall sediment dynamics of the nearshore have been altered from the historical condition. The action area is mapped as part of a long right to left drift cell that extends from Seattle north to Everett. In this area, net shore drift has been interrupted by the elements of the Port of Everett that extend into the nearshore. Jetty Island, which has been created using placed dredge materials, is located adjacent to the action area. The Snohomish River also delivers sediment to this location, and the overall sediment load has been reduced via maintenance dredging that occurs within the mainstem.

#### ***Human Environment***

The nearshore has undergone a number of human alterations in the area surrounding Maulsby Swamp. The Swamp is separated from the nearshore by West Marine Drive (a state highway) and a BNSF rail line. The road alignment also includes a separated paved trail along the waterfront. Erosion along the shoreline is apparent along portions of the trail.

The nearshore has been filled to create upland area with water access. This has resulted in two generally rectangular platforms extending over the mudflat extending out to the navigation channel. The southerly area is owned by Jen-Weld, and the northern area is owned by the Port of Everett.

As noted above, the main facilities of the Port of Everett are located south (updrift) from the action area. Port facilities at this location include marinas and fill within the historical nearshore.

#### **Opportunities for Process-based Restoration**

The primary stressors in this area include: (1) shoreline armoring, (2) nearshore fill, (3) tidal barriers at the culvert connection to the Swamp, and (4) impervious surfaces. There are opportunities for process-based restoration in this location to partially address these stressors at Maulsby Swamp. However, given the overall alteration to the area, and larger scale changes to

the Lower Snohomish Estuary, we are unlikely to achieve a full restoration of pre-disturbance processes in this location.

### ***Potential Design Alternatives***

The full restoration alternative for this area was developed with the assumption that both the Jen-Weld property and the BNSF and West Marine Drive will remain in their current locations.

A full restoration alternative for this area restores tidal hydrology/exchange to the maximum extent feasible and includes:

1. Hydraulic modification by increasing the size of the existing opening below the road and railroad embankment.
2. Hydraulic modification by installing a new opening on the north side of the Swamp.
3. Topographic restoration by removing and reshaping fill from the Port of Everett site to re-create mudflat and marsh.
4. Channel rehabilitation by filling the interior drainage ditches and connecting historical channels.
5. Armor modification and potentially beach nourishment to stabilizing the existing eroding shoreline near the outlet south of the Jen-Weld site.

A partial restoration alternative would include elements 1, 4, and 5 of the full restoration alternative. The partial project would result in only one opening from the Swamp to the nearshore, and would not include work on the Port of Everett site.

### ***Local Proponent Requirements***

There is public access (parking lot and trail) to the shoreline near the existing opening that the proponent needs to maintain.

### **Potential Design Constraints**

Soil contamination within the action area has been detected as part of ongoing sampling in Port Gardner by the Department of Ecology. This contamination would need to be addressed prior to restoration work in this area. The length of time required to clean up the site and the feasibility of the remediation effort would need to be better understood to fully evaluate constraints at this location.

Property acquisition and/or easements would be required to accomplish either restoration alternative.

The BNSF rail line and West Marine Drive will influence the design of the new or upgraded openings between the Swamp and the nearshore. The Jen-Weld site is not currently part of the action area, so this fill is assumed to remain adjacent to the site. The project would need to avoid adverse impacts to that property.

### **Uncertainties and Risks**

The historical condition for Mulsby Swamp is not well documented. Given the alterations to overall sediment dynamics in this area, both updrift and in the Lower Snohomish, the trajectory of a restored site will be more difficult to predict.

For the full restoration alternative, design judgment will be required to determine the initial grading for the Port of Everett location. The habitats (mudflat and marsh) created there would need to function within an altered nearshore environment, so simply recreating historical conditions may not be sustainable.

Shoreline erosion is a current issue, and there a likely reduction in sediment delivery to this area. Restoration design can partially address this issue, but may require ongoing maintenance to achieve project goals.

DRAFT

## Criteria For Go / No Go Determination

**Fatal Flaws:** A No on any question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	x	
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	x	
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	x	

**Additional Criteria:** A No response one or more questions means the action may not be suitable for 10% design and requires a more detailed explanation and rationale by the CDT. If the action has no No responses, the determination is Go.

2	Criterion	Yes	No
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.		x
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.		x
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	x	
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.		x
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	x	
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	x	

## Summary

Maulsby Swamp receives a “no” for three of the screening criteria. These negative responses are related to Maulsby Swamp’s proximity to other ecosystem stressors that would not be addressed as part of a restoration project at this action area. As stated in the ACR, “given the overall alteration to the area, and larger scale changes to the Lower Snohomish Estuary, we are unlikely to achieve a full restoration of pre-disturbance processes in this location.” Although this one of very few opportunities to restore intertidal marsh in this portion of the nearshore, Maulsby Swamp is located in a highly degraded, long, drift cell in a highly urbanized area of Puget Sound. The only way to potentially achieve process-based restoration at this location is to acquire the Port of Everett property located on the waterward side of Marine Drive. Acquiring the Port property could create greater interaction with the nearshore and provide a larger, more contiguous habitat patch at this location, but full restoration of processes is unlikely. Also, because acquisition of Port land was not part of the proponent’s vision for this action, we do not know if it is feasible. For these reasons, we recommend this action not move forward as part of PSNERP’s 10% design effort. Restoration of Maulsby Swamp may have merit according to some other criteria, but does not fit with PSNERP’s restoration objectives.

DRAFT

# Hood Canal

**Site Name: Black Point Lagoon**

**Action: Black Point Lagoon (1261)**

Local Proponent	Hood Canal Coordinating Council, Jefferson County Public Works
Delta Process Unit	NA
Shoreline Process Unit(s)	2098
Strategy(ies)	4 – Coastal Inlet (lost embayment)
Restoration Objectives	Restore processes by removing obstruction formed by roadway that changes hydraulics and sediment transport, and other processes
Process-based Management Measures	Berm or Dike Removal or Modification, Hydraulic Modification
Additional Measures	Property Acquisition/Conservation

## Description of the Action

Reestablish historic tidal connection to lagoon by replacing undersized culvert with bridge or other opening. This description is the same as the sponsors. In addition, other modifications will be considered: (1) grading to change the channel connecting the lagoon and (2) modification of the inlet.

## Status in Design Process

A description of the proposed action reportedly exists but was not available. The description is expected to be very conceptual at this stage, without design.

## Site Description and Context

### *Historic Conditions*

Lagoon may be a glacial kettle (large glacial ice chunk that slowly melted, leaving a depression behind). This results in an odd morphology, defined by the hillsides.

The 1883 T-sheet shows that the lagoon was being used, presumably for transport of logs with a road accessing the western side of the lagoon. At the time of the survey, a linear channel connected the lagoon to Hood Canal. A marsh or wetland was clearly present on either sides of the channel with mixed forest at higher elevations. It is not clear if the channel was created or

modified following settlement of the area, but it is evident that the lagoon was being used at the time of the survey. Trails led to the lagoon bank (now called Fulton Lake), and it appears that water was then used as an access to hood canal, possibly explaining a straight channel cut through the marsh. The area outboard of the channel inlet was characterized a gravel and boulders.



**Figure 1- Black Point Lagoon Action Area**

### ***Natural Environment***

The lagoon and channel connecting to Hood Canal are currently tidal with the tidal inundation at the lagoon limited by the existing culvert and roadway embankment. Tidal marsh vegetation (pickle weed and salt grasses) is currently present on the north and south sides of the channel. This connecting linear channel passes through a narrow, hardened opening before opening to a sinuous channel through the beach adjacent to Hood Canal.

The mouth is tidal with an intertidal sill about 12' wide composed of coarse shore sediments. It is not clear whether modifications have allowed or have maintained the opening and tidal channel, or if the tidal prism and runoff are sufficient to scour through the littoral ridge naturally. The 1883 map shows a smaller kettle-formation to the north, with an intact barrier ridge and back-ridge marsh and open water lagoon. An analysis of the watershed discharge and effective tidal prism may provide a better easement as to whether the feature was a perched, non-tidal fresh brackish lagoon with an ephemeral or perennial drainage outlet or a tidal salt lagoon.

The lagoon is reportedly about 40 ft deep with a thermocline typically around 10' below the surface.

Salinities measured with a refractometer were at 21 ppt just east of the roadway, rising to 24 ppt near the outlet and 26 ppt in Hood Canal. This indicates tidal salt water conditions.

### ***Human Environment***

A county roadway embankment separates the lagoon from the tidal inlet channel. A culvert (approx. 6 ft nominal diameter, about 5.5 ft internal diameter) through the roadway allows flow in and out of the lagoon. The land at the action site is privately owned; one owner owns the lagoon and channel and a separate owner owns the land near the inlet at Hood Canal. The lagoon is presently used for commercial seed oyster operation. A home and outbuildings are located immediately adjacent to the both banks of the inlet at Hood Canal.

### **Opportunities for Process-based Restoration**

Replacement of the existing culvert with a larger opening would potentially increase tidal prism and ecologic connection between the lagoon and the elongated marsh-channel. To the extent the existing tide is muted, tide range would increase, resulting in an incremental increase in the inlet and water and nutrient exchange.

### **Potential Design Alternatives**

There are two design alternatives for this area:

- 1) Restoration as a salty tidal lagoon and salt marsh: Remove road or replace with bridge or arch culvert that allows large wood debris to migrate through opening. Grade marsh to develop more sinuous and complex main and tributary channels.
- 2) Restoration as a non-tidal, back barrier lagoon and fresh / brackish wetland: Remove road or replace with bridge or arch culvert that allows large wood debris to migrate through opening. Grade shore to have a higher, closed beach berm consistent with fluvial drainage. Restore channel to natural morphology, which will probably consist of several smaller distributary channels.

### **Local Proponent Requirements**

The primary local requirements are that Black Point Road must remain functional and the oyster operations in the lagoon must be maintained.

### **Potential Design Constraints**

There are minimal design constraints at this site. The main issue would be maintaining vehicular access during constructions.

### **Uncertainties and Risks**

The primary uncertainty is the natural condition to restore to. An assessment of likely equilibrium condition (either salty tidal or on-tidal, fresh-brackish drainage) as well as desired habitat should lead to one of the two design alternatives. Other areas of uncertainty are:

- Is the lagoon / lake hydraulically constricted? This can be evaluated approximately by comparing the estimated runoff and tidal discharges to the culvert dimensions and elevation.
- Will the property owners support restoration actions outside county road right of way?
- Are there archeological resources in the action area as suggested by the disturbance shown in 1883 map?

### **References**

None.

# Criteria For Go / No Go Determination

**Fatal Flaws:** A No on either question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.	X	
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.	X	
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.		X

**Additional Criteria:** A No response one or more questions means the action may not be suitable for 10% design and requires a more detailed explanation and rationale by the CDT. If the action has no No responses, the determination is Go.

2	Criterion	Yes	No
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.		X
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.		X
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.	X	

2	Criterion	Yes	No
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	X	
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.		X
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	X	

## Summary

The proposed restoration action may not substantially change the existing conditions. This is because the feature behind the barrier is an unusual deep lagoon, and therefore the level of stress resulting from the obstruction may not be great. However, the historic condition is not clear due to the unique (odd) morphology resulting from the geologic formation (kettle) and the apparent disturbance as early as the time of the 1883 map. Therefore, it is not clear this action is appropriate from a restoration standpoint, other than the roadway and culvert are clearly unnatural.

The feature is not large and the connection to the sound is narrow due to the geology, with private property immediately adjacent on both sides. We do not recommend that the project move forward through 10% design.

# Hood Canal

**Site Name: Cattail Creek and Devil’s Hole Estuaries**

**Action: Cattail Causeway Replacement and Estuary Restoration (1271)**

Local Proponent	Hood Canal Coordinating Council
Delta Process Unit	NA
Shoreline Process Unit(s)	2001
Strategy(ies)	4 – Coastal Inlet
Restoration Objectives	Restore processes by removing obstruction formed by roadway that changes hydraulics and sediment transport, and other processes
Process-based Management Measures	Berm or Dike Removal or Modification, Hydraulic Modification,
Additional Measures	NA

## **Description of the Action**

The goal of this action is to restore salt marsh and lagoon habitat and restore fish passage at the mouth of Cattail Creek by removing the existing roadway and replacing it with an elevated structure.

## **Status in Design Process**

The US Navy recently reported that they are pursuing design and plan to implement the project without participation by PSNERP (Wall, 2010).

## **Site Description and Context**

### ***Historic Conditions***

The 1878 T-Sheet shows a small open water and marsh basin behind a coastal barrier. The coastal barrier is a littoral spit / beach ridge that extends from the northeast shore to the southern hillside control, with a very small inlet: The inlet is so small that it could have been an ephemeral tidal inlet or drainage outlet. The map symbology appears to be salt marsh. A small creek discharges into the lagoon / estuary.



**Figure 1- Cattail Causeway Action Area**

***Natural Environment***

A site visit was not conducted.

***Human Environment***

Maps and photographs show a road crossing near the historic beach barrier.

**Opportunities for Process-based Restoration**

No evaluation has been made, but it is presumed that removal of the road or installation of a bridge would enhance the shore form by reestablishing hydraulics and geomorphology, and restore the beach and inlet processes.

***Potential Design Alternatives***

No evaluation has been made.

***Local Proponent Requirements***

**Potential Design Constraints**

Navy has indicated that the project is moving forward without PSNERP involvement.

**Uncertainties and Risks**

No evaluation.

**References**

Wall, Lynn CIV NAVFAC NW, EV1, email to Tanner, Curtis D (DFW), Subject:FW: 46 projects  
Lynn Wall, September 24, 2010

# Criteria For Go / No Go Determination

**Fatal Flaws:** A No on either question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.		X
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.		X
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	X	

**Additional Criteria:** A No response one or more questions means the action may not be suitable for 10% design and requires a more detailed explanation and rationale by the CDT. If the action has no No responses, the determination is Go.

2	Criterion	Yes	No
2a	There is an alternative for this action that could restore ecosystem processes to a substantial portion of their historic (less degraded) state.	X	
2b	The restored action area will support a broad representation of nearshore ecosystem components appropriate for that geomorphic setting.	X	
2c	There are no obvious and significant problems external to the action area that would jeopardize the restoration outcome.		X
2d	The contributing basin provides for flood discharge, wood recruitment, organism dispersal and sediment supply to support the restored system.	X	
2e	The restored action area will form a contiguous large patch that is well connected to a surrounding terrestrial and marine landscape.	X	
2f	The restored ecosystem components within the action area will be internally connected in a way that allows for the unconstrained movement of organisms, water, and sediments.	X	

## **Summary**

The owner, the US NAVY, has indicated that they plan to implement the project as without participation by PSNERP and suggested that the site visit was not necessary. Therefore, this project is a directed “No Go” without a detailed Phase 1 evaluation.

DRAFT

# Hood Canal

**Site Name: Devil's Hole Estuary (#1286)**

**Action: Devil's Hole Creek**

Local Proponent	Hood Canal Coordinating Council
Delta Process Unit	NA
Shoreline Process Unit(s)	2002
Strategy(ies)	3 – Barrier Embayment
Restoration Objectives	Restore processes by removing obstruction formed by roadway that precludes natural tidal flow, sediment transport, and other processes.
Process-based Management Measures	Berm or Dike Removal or Modification, Topographic Restoration, Armor Removal
Additional Measures	Revegetation

## Description of the Action

The goal of this action is to restore tidal flushing into a barrier embayment by removing the existing causeway and replacing it with an elevated structure.

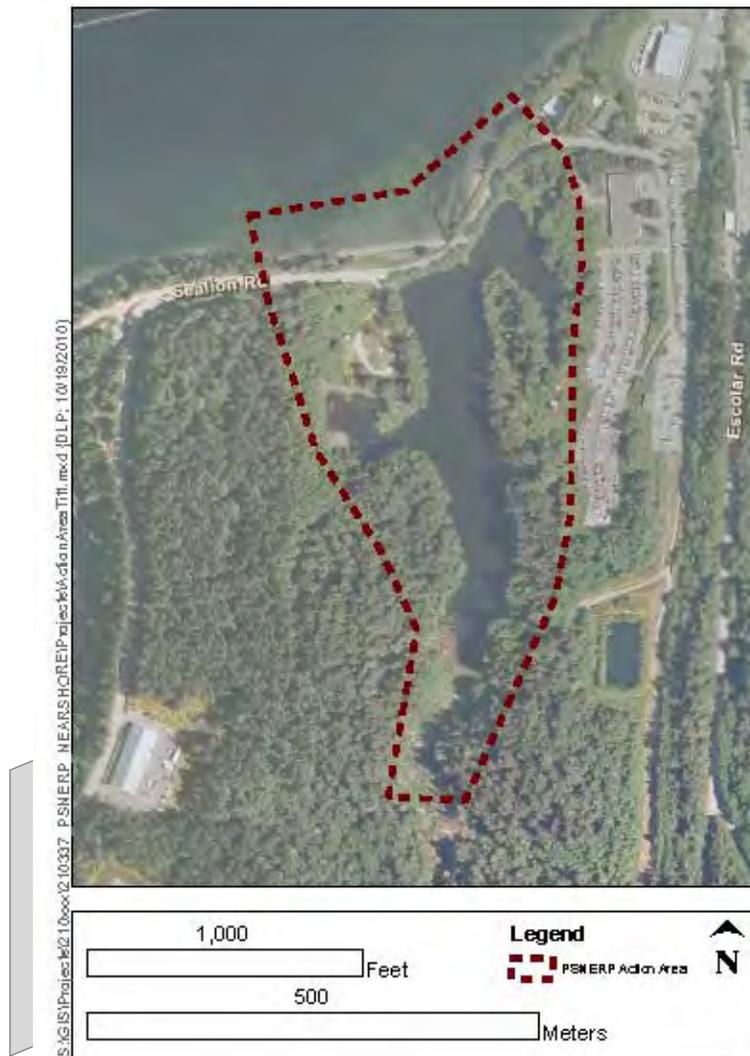
## Status in Design Process

The US Navy recently reported that they are pursuing full design development and plan to implement the project without participation by PSNERP (Wall 2010).

## Site Description and Context

### *Historic Conditions*

Devil's Hole Creek flows into Bangor Lake or Devil's Hole Lake, which was created in the 1940s when Sea Lion Road was constructed. Historically the lake was an estuarine embayment created by two converging barrier spits bisected by a narrow tide channel (USCGS 1878). Currently the primary outlet is a vertical, rectangular concrete shaft, approximately 9 feet high, which is connected to a concrete bulkhead on shore. The surface area of the lake or embayment measures approximately 6.4 acres. A fishway was constructed at the lake outlet in 1979 to provide access for salmonids (Volkhardt et al. 2000).



**Figure 1- Devil's Hole Action Area**

***Natural Environment***

A site visit was not conducted.

Anadromous salmonids are known to utilize Devil's Hole Lake and Creek and the five unnamed tributaries that flow into the creek. WDFW concluded that the single largest impact on salmonid use in the Devil's Hole watershed is the dam/fishway at the mouth of the embayment (Volkhardt et al. 2000).

**Devil's Hole Estuary**

### ***Human Environment***

Maps and photographs show Sea Lion Road crossing over the top of both of the historic spits that extended from each side of the embayment mouth, and also crossing the historic tidal channel.

### **Opportunities for Process-based Restoration**

No evaluation has been conducted, but it is presumed that removal of the road or removal and installation of a bridge over the center of the embayment mouth would enhance the embayment by reestablishing tidal flow, tide channel formation and maintenance, detritus import and exchange, exchange of aquatic organisms, erosion and accretion of sediments as well as beach and inlet processes.

### ***Potential Design Alternatives***

No evaluation has been conducted.

### ***Local Proponent Requirements***

### **Potential Design Constraints**

The Navy has indicated that the project is moving forward through design and implementation without PSNERP involvement.

### **Uncertainties and Risks**

No evaluation has been conducted.

### **References**

US Coast and Geodetic Survey, 1878. T-sheet No. 1556 Hood's Canal: Port Gamble to Hazel Pt, Washington Territory.

Volkhardt, G., P. Topping, and D. Seiler, 2000. Assessment of Factors Limiting Salmon Production in Devil's Hole Creek. Prepared for The Department of the Navy Submarine Base, Bangor, Washington. Science Division, Fish Program, Washington Department of Fish and Wildlife, Olympia, Washington. 72p.

Wall, Lynn CIV NAVFAC NW, EV1, email to Tanner, Curtis D (WDFW), Subject: FW: 46 projects Lynn Wall, September 24, 2010.

# Criteria For Go / No Go Determination

Fatal Flaws: A No on either question results in a No Go determination. Otherwise the action is recommended for 10% design

1	Criterion	Yes	No
1a	The local proponent has not precluded PSNERP's involvement in the concept design.		X
1b	The candidate action is sufficiently described and spatially defined to enable us to design restoration alternatives and determine quantity estimates.		X
1c	The candidate action is consistent w/ one or more PSNERP restoration strategy, and an alternative can be described which addresses one or more of the associated restoration objectives.	X	

## Summary

The owner, the US Navy, has indicated that they plan to implement the project as without participation by PSNERP and suggested that the site visit was not necessary. Therefore, this project is a directed "No Go" due to the "fatal flaws" of lack of participation with the local proponent and also the lack of a well defined alternative and the site has not been considered for a full evaluation.