

**Methodology to a Watershed Based  
Approach to Clean Water and Natural  
Resource Management**

**Part IV**

**Assess Potential Sites within the  
Context of the Landscape**



#### **PART IV. ASSESS POTENTIAL SITES WITHIN THE CONTEXT OF THE LANDSCAPE**

The results of Part II and III are combined to assess the potential sites within the context of the landscape (Part IV). The resulting products comprise natural resource sites that were ranked for restoration opportunities and natural resource sites identified for preservation.

To complete this assessment, Thurston County evaluated the DAUs in the study area were evaluated based on their potential to maintain natural processes, and thus to create habitat that can support aquatic species. Following a watershed characterization of the five ecological processes, DAUs were identified as “not properly functioning”, “at risk,” and “properly functioning” for each of the five ecological processes based on values in the MPI (Table 2), the rules and assumptions developed in Tables 3 to 8, and the natural resource rankings developed in (Tables 15 to 17).

Results from the characterization of physical processes were used to define ecological process score and rank:

- Movement of Water
- Movement of Wood
- Movement of Sediments
- Movement of Pollutants
- Movement of Heat
- Habitat Connectivity

The following summarizes the landscape indicators used for each process:

##### **Human alteration to the natural movement of water**

- Percent TIA
- Percent forest land
- Percent wetlands cover
- Percent floodplain decoupled
- Percent stream channel straightened

##### **Human alteration to the natural movement of large wood**

- Percent forested riparian
- Number of stream crossings per kilometer of stream
- Percent floodplain decoupled
- Percent stream channel straightened

**Human alteration to the natural movement of sediment**

- Percent bare soils
- Road density
- Percent unstable slopes (as defined by Thurston County Critical Areas Ordinance)
- Percent stream channel straightened
- Percent floodplain decoupled

**Human alteration to the natural movement of pollutants**

- Extent of 303(d) listed water bodies for nutrients, toxicants, bacteria, and temperature
- Condition and extent of wetlands
- Percent 67 meter riparian zone with mature canopy

**Human alteration to the natural movement of heat**

- Extent of 303(d) listed water bodies for nutrients, toxicants, bacteria, and temperature
- Percent 67 meter riparian zone with mature canopy

**Habitat Connectivity**

- Habitat connectivity for forest and prairie landscapes using FRAGSTATS

**Step 1. Determine the Ecological Conditions of the DAU**

This step identified DAUs within the study area having ecological processes that are considered “at risk” under current land use conditions. To maximize environmental benefit, there is growing evidence (Booth et al. 2004) that mitigation efforts should target areas where ecological processes have been altered at a low to moderate level, rather than targeting “the worst first” or a random selection of mitigation sites. Further, DAUs in the “at risk” category for multiple key ecological processes are assumed to provide the greatest potential to maximize environmental benefits when natural resource sites are restored.

The final ranking of each DAU yielded an existing baseline condition of ecological health for each DAU, using the assessment of individual ecological process and biological element. All DAUs within the study area with ecological processes considered “At Risk” (AR) under current land use conditions were flagged for further consideration. DAUs in the AR category for multiple key ecological processes were assumed to provide the greatest potential to maximize environmental benefits when natural resource sites are restored.

All DAUs were assigned an “ecological benefit score,” using the following weightings (Table 13). The movement of water was weighted highest, given the importance of that ecological process in a built landscape. Ecological processes and habitat connectivity that have been identified as “At Risk” were further considered based upon the potential for enhancement from restored/rehabilitated marginal function levels. These ecological process scores were then ranked with the values for each DAU assigned to one of these categories labeled High, Moderate, or Low (Table 14).

**Table 11. Weight criteria to rank DAUs**

<b>Ecological Process/ Habitat Connectivity in “At Risk” Condition</b>	<b>Score Weight</b>	<b>Total Score</b>
Movement of Water	1 X 3	3
Local Theme – Movement of Large Wood	1 X 3	3
Movement of Sediment	1 X 1	1
Movement of Pollutants	1 X 1	1
Movement of Heat	1 X 1	1
Upland Habitat Connectivity	1 X 1	1
<b>Maximum score for a DAU when all processes are “At Risk”</b>		<b>10</b>

**Table 12. Convert Ecological Process Score to Categories**

<b>Ecological Process Score</b>	<b>Category</b>
7, 8, 9, 10 points	High
3, 4, 5, or 6 points	Moderate
0, 1, or 2 points	Low

## **Step 2. Determine the Potential Environmental Benefit of Resource Sites**

To determine the potential environmental benefit of resource sites; wetlands, riparian, and floodplain with restoration potential were identified. These datasets differed significantly from existing natural resource data, such as local and state agencies provided, in that they were intended to identify potential restoration sites rather than inventorying existing wetlands, riparian areas, and present floodplain areas. These potential restoration sites included existing wetlands, degraded, or destroyed wetlands that have the highest potential, if restored, to maintain ecological function, while also meeting restoration and/or enhancement needs of local governments.

The natural resource sites were evaluated based on the attributes assigned during site assessment. Some specific attributes included scores on vegetation alterations, hydrologic

alterations, and adjacency to public lands. The specific details are in the following Tables 15 to 17. Once all the attributes were scored, the following ranking criteria were used to rank the sites High, Moderate, and Low, as detailed in Tables 18 to 20, using natural breaks in the data range.

**Table 13. Potential Wetland Restoration Site Environmental Benefits Ranking Criteria**

Scoring Criteria	Points	Rationale
1) Site has good level of restoration potential (If criteria for #1 are met, skip #2)	2	
2) Site has some restoration potential	1	
3) Site has good mitigation potential (If criteria for #3 are met, skip #4)	2	
4) Site has some mitigation potential	1	
5) Site has extensive hydrologic alteration (Hydro_alt = 2) (If criteria for #5 are met, skip #6)	2	Loss of hydrology can mean the total conversion of the site from wetland to upland. Sites with extensive hydrologic alteration have the greatest potential to restore many of the recognized wetland functions. Restoring hydrologic alteration results in added flood storage desynchronization and flow control, as well as other functions specific to the site.
6) Site has some hydrologic alteration (Hydro_alt = 1)	1	Sites with some hydrologic alteration still function as a wetland, at some level. Mitigation credits are gained for only the functions restored, not maintained. Restoring natural hydrology results in an increase in flood storage /flow control function.
7) Site has extensive vegetation alteration (Veg_alt = 2) (If criteria for #7 are met, skip #8)	2	Sites with extensive forest clearing have potential to restore some flood storage/flow control, water quality, temperature maintenance, and organic export functions.
8) Site has experienced some vegetation alteration (Veg_alt = 1)	1	Sites with some forest clearing have potential to restore that portion of the flood storage / flow control, water quality, temperature maintenance, and organic export functions affected by forest clearing.
9) More than 50 percent of site has Hydro Code A or B soils	1	Site has increased potential to provide groundwater recharge function.
10) Site has surface hydrology connection to river/stream Sw_connect = 1	1	Improves site's ability to provide impacted functions and priorities from Local Plans.

Scoring Criteria	Points	Rationale
11) Stream reach access = 1	1	Identified in SSHIAP as current or historic presence and in WADNR stream typing data layer as modeled fish habitat defined in WAC 222-16-030.
12) Floodplain intersection = 1	1	Provides refuge from high flows
13) More than 33 percent of site on Orcas peat, Seattle muck, Shalcar muck, Mukilteo muck, Tukwila muck, etc	1	Site has bog or fen characteristics that make it a unique wetland type.
14) Site intersects publicly owned land	1	Additional social or educational benefits. Utilization of existing public property
15) Local Priority local_priority = y	1	Site has been identified by other entities as priority site for restoration, mitigation and/or acquisition.
<b>Ranking Criteria:</b>	<b>Maximum Score</b>	
Environmental Benefit Criteria		15

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**Table 14. Potential Riparian Restoration Site Environmental Benefits Ranking Criteria**

<b>Scoring Criteria</b>	<b>Points</b>	<b>Rationale</b>
1) Site has good level of restoration potential (If criteria for #1 are met, skip #2)	2	
2) Site has some restoration potential	1	
3) Site has good mitigation potential (If criteria for #3 are met, skip #4)	2	
4) Site has some mitigation potential	1	
5) Site reconnects two large forest patches Mend_rip = y	1	Maximizes potential to reduce habitat fragmentation/increase connectivity.
6) Site adds to an existing forest patch Add_rip = y	1	Has potential to reduce habitat fragmentation/increase connectivity.
7) Site has 67 meter buffer CTS = 2	1	Reforestation of 67 meter buffer has potential to provide maximum temperature attenuation, water quality treatment, stream habitat value, and wood recruitment.
8) More than 50 percent of site has Hydro Code C or D soils	1	The recharge potential of outwash soils precludes substantial increase in flow control if the site is reforested. Riparian reforestation on till or bedrock areas are assumed to provide greater flow control potential.
9) Site intersects publicly owned land Does not intersect = 0 Intersects = 1	1	Additional social or educational benefits. Utilization of existing public property.
10) Local Priority local_priority = y	1	Site has been identified by other entities as priority site for restoration, mitigation and/or acquisition.
<b>Ranking Criteria:</b>	<b>Maximum Score</b>	
Environmental Benefit Criteria	10	

**Table 15. Potential Floodplain Restoration Site Environmental Benefits Ranking Criteria**

<b>Scoring Criteria</b>	<b>Points</b>	<b>Rationale</b>
1) Site has good level of restoration potential (If criteria for #1 are met, skip #2)	2	
2) Site has some restoration potential	1	
3) Site has good mitigation potential (If criteria for #3 are met, skip #4)	2	
4) Site has some mitigation potential	1	
5) Site is decoupled from floodplain Decoupled = y	1	Sites having lost connectivity to the floodplain provide maximum potential for the recovery of floodplain functions.
7) Site hydrologically reconnects two large floodplain patches Mend_fdpln = y	1	Reestablishes floodplain hydrologic connectivity.
8) Site adds to an existing floodplain patch Confined = n	1	Adds to floodplain hydrologic connectivity.
9) Site intersect with wetlands	1	Sites that can also restore wetland areas have potential to improve floodplain function.
10) Channel migration potential Ch_mig_pot = y	1	Sites with channel migration potential have greater potential to restore and maintain diverse floodplain functions.
11) Site intersects publicly owned land Intersects = 1	1	Additional social or educational benefits. Utilization of existing public property.
12) Local Priority local_priority = y	1	Site has been identified by other entities as priority site for restoration, mitigation and/or acquisition.
<b>Ranking Criteria:</b>	<b>Maximum Score</b>	
Environmental Benefit Criteria	11	



**Table 16. Convert Wetland Environmental Process Score to Process Rank**

<b>Environmental Process Score</b>	<b>Environmental Process Rank</b>
7 to 15 points	High
4 to 6 points	Moderate
0 to 3 points	Low

**Table 17. Convert Riparian Environmental Process Score to Process Rank**

<b>Environmental Process Score</b>	<b>Environmental Process Rank</b>
6 to 10 points	High
3 to 5 points	Moderate
0 to 2 points	Low

**Table 18. Convert Floodplain Environmental Process Score to Process Rank**

<b>Environmental Process Score</b>	<b>Environmental Process Rank</b>
9 to 11 points	High
7 to 8 points	Moderate
6 points	Low

### **Step 3. Assess Potential Sites within the DAU**

This section presents the results of a ranking process for all potential natural resource restoration sites within the DAU. This ranking of a natural resource restoration site was based on a combination of each individual site's rank combined with the ranking of the DAU within which the restoration site was located. The result of this combination was a final score from 0 to 6, with a score of 6 representing those sites with the greatest potential for environmental benefit if restored. Table 21 shows the scores used to rank the natural resource sites in the context of the DAU. The Ecological Benefit (in each DAU) and the Environmental Benefit (Resource Sites) were ranked to provide a final score from 0 to 6. The results were displayed on maps and listed in tables in the resulting report for the study area.

**Table 19. Combined DAU and Site Score Ranking**

<b>Ecological Processes</b>	<b>Resource Sites</b>	<b>Total Score</b>
High	High	6
High	Moderate	5
Moderate	High	4
Moderate	Moderate	3
Low	High	2
Low	Moderate	1
N/A	Low	0

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