

NISQUALLY RIVER BASIN PLAN

Executive Summary

ES.1 INTRODUCTION

This Nisqually River Basin Plan (Basin Plan) is intended to serve as a comprehensive guide to storm drainage and surface water management in the portions of the Nisqually River Basin that are under Pierce County's jurisdiction. The Basin Plan was prepared by Pierce County Public Works and Utilities, Surface Water Management (Surface Water Management), which is responsible for surface water management in unincorporated Pierce County. *Figure ES-1* shows the Nisqually River Basin planning area as delineated by Surface Water Management.

Surface Water Management prepares basin plans to identify and prioritize capital improvement projects and other Surface Water Management activities in individual drainage basins within Pierce County. Basin plans address the flooding, water quality and aquatic habitat aspects of surface water management in the major stream systems of the non-federal lands within unincorporated Pierce County. Surface Water Management uses the basin plans to develop its capital improvement, maintenance, repair, property acquisition, and program schedules and budgets for the next ten years.

ES.2 GOALS AND OBJECTIVES

Before embarking on the basin planning process, Surface Water Management prepared a basin planning guidance document to promote consistency among the basin plans. The goals and objectives for the Nisqually River basin plan, listed in *Table ES-1* below, are derived from the Surface Water Management guidance document. The goals and objectives listed in *Table ES-1* will form the basic criteria for selection and prioritization of the actions recommended in the basin plan. This will help ensure consistency and comparability with Water Program's other basin plans.

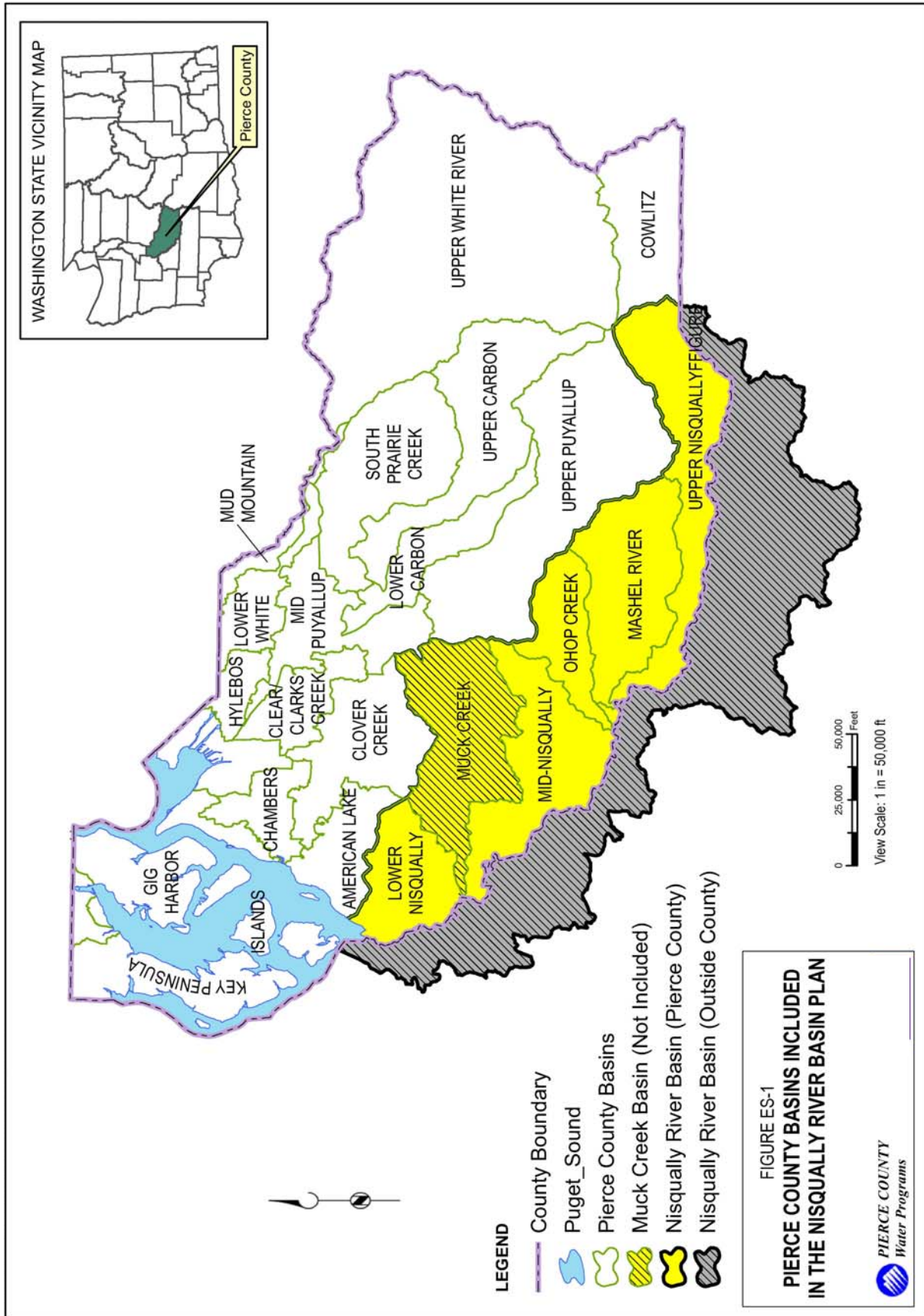


TABLE ES-1
Goals and Objectives of the Nisqually River Basin Plan

Goal	Objectives
Reduce flood hazards	<p>Property loss and repetitive damage are reduced.</p> <p>Streams will not be adversely impacted by flood events.</p> <p>Pierce County standing under the Federal Emergency Management Agency's Community Rating System is improved.</p> <p>New development is located outside of flood-prone areas.</p>
Improve fish habitat	<p>Number of stream miles available for wild, native fish populations is increased.</p> <p>Population numbers of species listed as endangered or threatened under the ESA are maintained or increased.</p> <p>Quality and quantity of available wetlands and riparian habitat is improved.</p>
Improve water quality	<p>State Surface Water Quality Standards (WAC 173-201a) are met.</p> <p>Number of impaired (303d listed) water bodies is reduced.</p> <p>Pierce County complies with its NPDES permit for stormwater by meeting permit terms and condition to the maximum extent practicable.</p> <p>Risk of groundwater contamination is reduced.</p> <p>Rates of erosion are reduced.</p>
Demonstrate coordinated and responsible use of public resources	<p>Cost of maintaining stormwater facilities are reduced.</p> <p>Project value is favorable when measured in terms of costs and benefits.</p> <p>Polls demonstrate that public awareness of flooding, fish habitat, and water quality issues has increased.</p> <p>Monitoring and enforcement programs demonstrate an increase in services per dollar spent.</p> <p>Basin plan implementation addresses elements of other Pierce County plans.</p> <p>Other agencies and jurisdictions use basin plan to support their surface water management activities.</p>
Influence location and methods for new development	<p>Low Impact Development techniques are widely used.</p> <p>Effective BMPs are identified and widely used.</p>

Source: *Guidance for Basin Planning, Pierce County Surface Water Management*, Pierce County Public Works & Utilities, Surface Water Management; Pierce County Storm Drainage and Surface Water Management Advisory Board, June 2005.

ES.3 NISQUALLY RIVER BASIN

The Nisqually River basin planning area encompasses approximately 240 square miles within the 760-square mile Nisqually River Watershed. The Nisqually River Basin Plan differs from the other Surface Water Management basin plans in several respects:

- **The Nisqually Plan addresses flooding issues on the mainstem of the river.** Surface Water Management' other basin plans do not address mainstem flooding, because flood hazard management plans have been developed for the other large rivers in Pierce County, but not for the Nisqually River. Flooding problems identified on the mainstem are larger in scale and typically more complex than flooding along tributaries and stormwater drainage systems.

To address this, the Nisqually River Basin Plan contains a number of recommended studies to obtain more detailed information that will enable the Pierce County Surface Water Management Division to develop the most appropriate projects to address the problems.

- **The planning area is relatively large.** The Nisqually planning area is more than five times larger than the next largest planning area and includes more than 500 miles of streams. Therefore, the basin characterization approach had to be adjusted to efficiently cover such a large area.
- **The planning area is mostly rural and new development is expected to be limited.** Existing flooding problems outside of the mainstem tend to be localized and isolated. For example, 60 out of the 89 flooding problems identified in through problem investigations were related to roadway flooding. A number of the problems are caused by beaver activity and debris accumulations. The Basin Plan recommends capital improvement projects for some of these problems, and programmatic measures for others.

Based on the current zoning and community plans, future development in the planning area is expected to be relatively low density. Effective impervious areas are not expected to increase very much; only five of the 23 subbasins projected to experience EIA increases of more than 1%. More intense development may occur in several small areas near Roy, Eatonville, and the Mount Rainier National Park boundary.

To reduce the potential for flooding and streambank erosion problems due to new impervious surfaces, the Basin Plan recommends several programmatic measures, such as low impact development and updating the *Pierce County Stormwater Manual*.

- **The planning area contains some of the best salmon habitat in the Puget Sound lowlands.** The Nisqually mainstem and its major tributaries provide high-quality habitat for a number of salmon species. The Nisqually Tribe and other agencies have been collecting field data and analyzing fish habitat conditions throughout the basin for nearly

30 years, creating a substantial body of information on river and stream conditions, problems, and restoration/preservation needs. The Nisqually River basin planning approach has been tailored to take full advantage of the river and stream data collected by the Tribe. The Basin Plan recommends an array of capital improvement projects, programmatic measures, and studies to restore and protect key aquatic habitat.

- **The Nisqually Basin planning area contains a large number of lakes.** The basin planning area encompasses more than 16 lakes, which present unique water quality issues. The Basin Plan addresses these issues by developing a recommendation for a lake water quality management plan.

ES.4 PROBLEMS, ANALYSIS, AND RECOMMENDATIONS

The problems identified through investigation were grouped into three general categories for analysis and development of recommendations: flooding and drainage, water quality, and aquatic habitat. A brief summary of the problems and recommended solutions for each of these categories is provided below.

ES.4.1 Flooding and Drainage Problems, Analysis and Recommendations

Flooding and drainage problems fell into three general types of flooding: mainstem flooding, local flooding (along tributaries and roadways), and Lake flooding.

Mainstem Flooding

The Nisqually mainstem flooding problems are complex and have the potential to cause extensive damage, particularly in the McKenna area, where between 60 and 68 privately owned parcels were flooded in a February 1996 event (personal communication with Dennis Dixon, Pierce County, 2006). Another area of concern in the Nisqually Park community near the Mount Rainier National Park boundary where County-maintained levees sustained extensive damage during a flood event in November 2006.

As discussed in Chapter Six, the existing hydrology data, hydraulic modeling, and floodplain mapping for the Nisqually River are outdated and insufficient for accurate evaluation, design, and implementation of sound flood hazard reduction measures. Mainstem flood control measures can be quite costly, and implementing ineffective measures could have serious consequences.

Therefore, this Basin Plan includes a programmatic recommendation that prescribes several actions and studies designed to fill the key data gaps and allow Surface Water Management to select the most appropriate and cost-effective measures.

The Lower Nisqually River Flood Mitigation Program (PRG11-01) recommends a series of actions including:

- Update Emergency Response Plan
- Nisqually River Hydrologic Study
- Revise Flood Hazard Mapping – McKenna Reach of Nisqually River
- Elevation Survey for Flood-prone Structures in McKenna
- McKenna Flood Mitigation Alternatives Analysis and Community Involvement
- Revise Flood Hazard Mapping – Wilcox Flats Reach of Nisqually River

The above listed actions will lead to specific flood mitigation recommendations for the community of McKenna. A placeholder CIP project has been included to allocate funds for flood mitigation projects stemming from these recommendations: McKenna Flood Mitigation Projects (CIP11-NIS-FLD01). The McKenna CIP could cost from \$6 to \$10.2 million, based on the property values in the flood hazard area. To be conservative, an estimated cost of \$10.2 million was assumed for this CIP. This estimate should be regarded as very preliminary and subject to change based on the outcome of the McKenna studies listed above.

The Upper Nisqually River Sediment and Floodplain Mapping Analysis (ST19-NIS-ST02) is recommended to help address channel aggradation and flooding issues in the upper Nisqually Valley near the Mount Rainier National Park boundary. Pierce County SWM would work with the Park, local residents, and other stakeholders to identify potential measures to avoid or mitigate hazards related to channel aggradation and flooding along the upper Nisqually River.

Local Flooding

Most of the local flooding problems identified were related to roadway flooding. An initial screening process was used to separate problems for analyses. Many problems were eliminated from further analysis because they were considered maintenance issues, located on private roads, or attributed to beaver activity. Of the remaining problems, hydrologic and hydraulic analyses found 11 under-sized culverts and recommended culvert replacements.

- Increase Inspections for Compliance with Stormwater Requirements and NPDES Permit
- Evaluate Beaver Management Policy

Lake Flooding

No new hydrologic studies were performed for the lakes where flooding was reported. Alternatively, available information was collected and outlet conditions were investigated in the field for several of the lakes. In general, lake flooding tended to be the result of blockages at the outlet caused by debris build-up, beavers, or invasive weeds. Programmatic recommendations contained in the basin plan that will address these issues include:

- Develop and Implement Nisqually Riparian Vegetation Management Plan
- Evaluate Beaver Management Policy

ES.4.2 Water Quality Problems, Analysis and Recommendations

Several water bodies within the Nisqually planning area have been identified as “polluted” by the Washington State Department of Ecology (DOE). Non-point sources, such as livestock pollution and septic systems, are the primary cause of the water quality problems. To address these problems, the Basin Plan prescribes a number of programmatic measures including public education, riparian area management, small farm planning, surface water monitoring, septic system inspection coordination, and support for the Nisqually River Council’s non-point source control program. Recommended programmatic measures include:

- Develop and Implement an Education, Outreach, and Technical Assistance Program
- Implement Elements of Shellfish Protection Program
- Develop and Implement a “Lake Water Quality Management Program”
- Coordinate with Tacoma-Pierce County Health Department to Address Reported Septic System Problems
- Implement Elements of Nisqually Bacteria “Total Maximum Daily Load” (TMDL) *Water Quality Implementation Plan*

ES.4.3 Aquatic Habitat Problems, Analysis and Recommendations

Much of the Nisqually mainstem is still in very good condition, especially compared to most other lowland Puget Sound rivers in urbanizing areas. The mainstem of the river is still a very productive habitat for all species of salmon that are currently found in the Nisqually. However, there have been some losses of habitat due to declines in channel stability, habitat diversity, food availability, and key habitat features.

The aquatic habitat problems have multiple causes that will require a range of solutions; from non-structural programmatic actions to structural measures. The solutions were tailored to address the main causes of habitat degradation as determined by field observations and analysis.

The capital improvement program projects developed to address habitat problems include:

- Wetland, channel migration zone, and floodplain preservation through property acquisition
- Removing fish passage barriers
- Wetland, instream, and riparian habitat restoration
- Revegetation projects

Programmatic measures are recommended to improve aquatic habitat and address problems:

- Develop and Implement a Lake Water Quality Management Program
- Develop and Implement Countywide Vegetation Management
- Nutrient Enhancement using Salmon Carcasses
- Enhance Nisqually River Council Capacity

ES.5 BASIN PLAN SUMMARY

The Nisqually River Basin Plan contains 42 capital improvement projects, 21 programmatic measures, and 21 studies. Capital improvement projects and programmatic measures have been divided into “High-Priority,” “Medium-Priority,” and “Low-Priority”¹ groups. Studies were not prioritized with the capital improvement projects and the programmatic measures. Estimated costs of recommendations by priority group are as follows:

“High-Priority” Recommendations: \$16,851,170²

“Medium-Priority” Recommendations: \$14,396,410

“Low-Priority” Recommendations: \$4,388,600

In addition, this Basin Plan recommends further studies to fill information gaps. The total estimated cost for these studies is **\$2,141,500**.

Table ES-2 presents the estimated cost of the Nisqually River Basin Plan recommendations by project type and priority group. *Tables ES-3, ES-4, and ES-5* list the capital projects and programmatic measures in each priority group. *Table ES-6* lists the recommended studies.

Problems identified in the Basin Plan are tabulated at the ends of Chapters 6, 7 and 8. These tables provide a cross reference between problems and recommendations.

TABLE ES-2			
Estimated Costs of Plan Recommendations			
Project Type	High-Priority	Medium-Priority	Low-Priority
Capital Improvement Projects	\$11,882,670 ²	\$14,079,410	\$4,388,600
Programmatic Measures	\$4,968,500	\$317,000	\$327,000
Studies	\$2,141,500		
Total Estimated Cost:	\$38,104,680²		

¹ “Low-Priority” does not mean “not a priority.” “No Priority” actions have already been excluded from this Basin Plan. Rather, “Low-Priority” means the project rated lower than other needs in the Basin.

² Total includes \$10.2 million for McKenna Flood Mitigation Projects. The cost was estimated based on property values, and should be regarded as very preliminary and subject to change based on the outcome of studies outlined in PRG11-01.

TABLE ES-3 High-Priority Recommended Projects			
ID Code	Project Title	Rating Score	Estimated Cost
PRG00-02	Update Stormwater Management Manual	385	\$1,000
PRG00-08	Develop and Implement a BMP Manual for Pierce County Surface Water Management Maintenance Activities	385	\$6,000
PRG00-04	Develop and Implement a Land Management Program for Flood Hazard Reduction, Water Quality, and Habitat Impact Mitigation	385	\$7,000
PRG00-06	Develop and Implement an Education, Outreach, and Technical Assistance Program	396	\$28,000
CIP08-RED-RST01	Red Salmon Slough Estuary Restoration Phase III	297	\$60,270
PRG00-05	Develop and Implement a Program to Enhance Degraded Riparian Habitat and Water Quality	291	\$92,000
PRG00-01	Implement a Low Impact Development Program	348	\$116,000
PRG00-13	Implement Elements of Shellfish Protection Program	310	\$116,000
PRG00-16	Develop and Implement Countywide Vegetation Management Program	325	\$136,500
PRG00-03	Increase Inspections for Compliance with Stormwater Requirements and NPDES Permit	398	\$170,000
PRG11-01	Lower Nisqually River Flood Mitigation Program	264	\$350,000
PRG00-09	Develop and Implement an Invasive Species Management Program	361	\$806,000
CIP11-TWU-AC01	Tanwax Creek Wetland Protection Phase 1	251	\$811,200
CIP11-TWU-AC02	Tanwax Creek Wetland Protection Phase 2	251	\$811,200
PRG00-15	Develop and Implement a Lake Water Quality Management Program	362	\$2,765,000
PRG11-03	Enhance Nisqually River Council Capacity	332	\$375,000
CIP11-NIS-FLD01	McKenna Flood Mitigation Projects	266	\$10,200,000
Total Estimated Cost:			\$16,851,170

Note: Total includes \$10.2 million for McKenna Flood Mitigation Projects. The cost was estimated based on property values, and should be regarded as very preliminary and subject to change based on the outcome of studies outlined in PRG11-01.

TABLE ES-4 Medium-Priority Recommended Projects			
ID Code	Project Title	Rating Score	Estimated Cost
PRG00-11	Beaver Management Policy	217	NA
PRG00-12	Encourage Installation of Permanent Buffer Markings and/or Signage	243	\$6,000
PRG00-14	Develop and Implement a Habitat Monitoring Program	196	\$6,000
PRG11-05	Implement Elements of Nisqually Bacteria TMDL Water Quality Implementation Plan	240	\$58,000
PRG11-04	Coordinate with Tacoma-Pierce County Health Department to Address Reported Septic System Problems	183	\$116,000
PRG00-07	Develop and Implement a Surface Water Monitoring Program	239	\$131,000
CIP20-MAL-RST01	Mashel Eatonville Reach Instream Restoration Phase II	242	\$149,215
CIP11-KRG-C01	Silver Lake Culvert Replacement	151	\$217,600
CIP11-NIS-AC04	Wilcox Flats Repetitive Loss Acquisition	198	\$222,300
CIP20-MAL-VC01	Mashel Eatonville Reach Riparian Revegetation	221	\$226,800
CIP19-ASH-C01	Culvert Replacement at 278 th Avenue East	147	\$288,100
CIP11-NIS-RST01	Nisqually Wilcox Side-Channel	148	\$302,300
CIP14-OHL-RST01	Lower Ohop Valley Restoration Phase 1 (Segments D, E, and F)	242	\$404,595
CIP11-BRI-C01	Upper Brighton Creek Culvert Replacements	180	\$448,300
CIP14-OHU-AC01	Upper Ohop Shoreline Protection (Hancock-Ohop) Phase 1	177	\$572,100
CIP14-OHU-AC02	Upper Ohop Shoreline Protection (Hancock-Ohop) Phase 2	177	\$572,100
CIP14-OHL-RST02	Lower Ohop Valley Restoration Phase 2 (Segments A, B, and C)	242	\$606,600
CIP14-OHL-AC04	Ohop Creek Repetitive Loss Property Acquisition	195	\$606,800
CIP14-OHL-AC01	Ohop Creek Property Acquisition Phase 1	241	\$617,800

TABLE ES-4 Medium-Priority Recommended Projects			
ID Code	Project Title	Rating Score	Estimated Cost
CIP14-OHL-AC02	Ohop Creek Property Acquisition Phase 2	174	\$618,900
CIP14-OHL-AC03	Ohop Creek Property Acquisition Phase 3	174	\$618,900
CIP20-MAL-AC01	Mashel River Property Acquisition	161	\$663,000
CIP11-NIS-RST03	Mainstem Off-Channel Restoration	148	\$747,200
CIP19-COP-AC01	Upper Nisqually Property Acquisition	213	\$748,300
CIP14-OHL-RST03	Lower Ohop Valley Restoration Phase 3 (Segments G, H, I, J, K, and L)	242	\$799,600
CIP20-MAL-AC02	Mashel Shoreline Buffer Acquisition	171	\$848,700
CIP11-NIS-AC01	Nisqually Mainstem Acquisition Phase 1	195	\$1,060,800
CIP11-NIS-AC02	Nisqually Mainstem Acquisition Phase 2	195	\$1,060,800
CIP11-NIS-AC03	Nisqually Mainstem Acquisition Phase 3	195	\$1,060,800
CIP20-MAL-AC03	Mashel Small Properties Acquisition	174	\$617,800
Total Estimated Cost:			\$14,396,410

TABLE ES-5 Low-Priority Recommended Projects			
ID Code	Project Title	Rating Score	Estimated Cost
PRG00-10	Require Flood Disclosure Statements on Property Titles	123	\$7,000
CIP11-CLR-C01	West Clear Lake Road Culvert	69	\$108,100
CIP11-HRN-FP01	Horn Creek Barrier Removal (waterfall at RM1.0)	114	\$126,100
CIP11-TWU-C02	Webster Road Culvert Replacement	102	\$136,600
CIP11-TWL-C01	Culvert Replacement at 365th Street East	76	\$180,100
CIP11-TWU-C03	Culvert Replacement at Thomas Road	82	\$196,800
CIP11-TWU-C01	Benbow Drive Culvert Replacement	143	\$198,600
CIP11-MUR-C01	Tisch Road South Culvert Replacement	60	\$230,700
CIP11-HRN-FP02	Horn Creek Barrier Removal (Hart Lake Loop Rd.)	136	\$282,500
CIP11-KRG-C02	Dean Kreger Road Culvert Replacement and Slope Stabilization	128	\$285,900
CIP11-HRT-C01	Hart's Lake Loop Road Culvert Replacement	139	\$288,300
PRG11-02	Nutrient Enhancement using Salmon Carcasses	81	\$320,000
CIP11-NIS-RST02	Wilcox Flats Off-Channel Restoration	142	\$384,500
CIP11-HRN-C01	364th Street East Culvert Replacement	76	\$443,100
CIP11-TWL-RST01	Lower Tanwax Riparian Enhancement	145	\$738,600
CIP11-BRI-FP01	Brighton Creek Culvert Replacement (Harts Lake Loop Rd.)	121	\$788,700
Total Estimated Cost:			\$4,715,600

Table ES-6 Studies and Costs		
Study Number	Name	Estimated Cost
ST11-BRI-ST01	Brighton Creek Barrier Removal Assessment (62nd Ave. S.)	\$5,500
ST11-HRN-ST01	Horn Creek Barrier Removal Assessment (368th St. S.)	\$5,500
ST11-HRT-ST01	Harts Creek / Harts Lake Habitat Assessment	\$75,000
ST11-MUR-ST01	Lower Murray Restoration Assessment	\$85,000
ST11-MUR-ST02	Murray, Brighton and Horn Creek Wetlands Restoration Assessment	\$275,000
ST11-MUR-ST03	Murray Creek Barrier Removal Assessment (48th Ave. S., RM 6.2)	\$5,500
ST11-MUR-ST04	Murray Creek Barrier Removal Assessment (pipeline crossing, RM 7.2)	\$5,500
ST11-MUR-ST05	Murray Creek Hydrologic Study and Flood Hazard Mapping	\$95,000
ST11-NIS-ST01	Mainstem Nisqually LWD Assessment and Restoration Plan	\$125,000
ST11-NIS-ST02	Channel Migration Zone Study for Lower Nisqually River	\$378,000
ST11-TWL-ST01	Cranberry and Rapjohn Lakes Assessment	\$75,000
ST11-TWL-ST02	Lower Tanwax Sediment Reduction Assessment	\$50,000
ST11-TWU-ST01	Tanwax Valley Restoration Assessment	\$275,000
ST11-TWU-ST02	Eatonville Cutoff Road Culvert Replacement Assessment (Mud Creek)	\$5,500
ST11-TWU-ST03	Eatonville Cutoff Road Culvert Replacement Assessment (Tanwax Creek)	\$5,500
ST11-TWU-ST04	Trout Creek at 352nd Street East Culvert Replacement Assessment	\$5,500
ST14-OHU-ST01	Clay City Sediment Reduction Assessment	\$70,000
ST19-NIS-ST01	Flood Hazard Mapping and Hydraulic Analysis - Upper Nisqually River	\$100,000
ST19-NIS-ST02	Upper Nisqually River Sediment and Floodplain Mapping Analysis	\$300,000
ST19-NIS-ST03	Analysis of Flooding at State Route 7 in Community of Elbe	\$150,000
ST20-LMR-ST01	Lower Mashel Restoration Assessment	\$50,000
Total Estimated Cost		\$2,141,500

