

**PART IV**

**CHAPTER 10**

**FINAL**

**SUPPLEMENTAL**

**ENVIRONMENTAL**

**IMPACT**

**STATEMENT**



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April 17, 2003

Dear Interested Party:

Attached is the *Final Supplemental Environmental Impact Statement (FSEIS) for the Muck Creek Basin Plan*, pursuant to the State Environmental Policy Act (SEPA), Chapter 43.21C Revised Code of Washington (RCW) and the Pierce County Environmental Regulations (Pierce County Code Title 18D). The FSEIS revises the Draft Supplemental Environmental Impact Statement (DSEIS), dated February 12, 2003, in response to comments received during the 30-day comment period. A new section (Comments Received on the Draft SEIS and Responses) has been added.

The Pierce County Department of Public Works and Utilities, Water Programs, is proposing to update the *Pierce County Storm Drainage and Surface Water Management Plan* by adopting and implementing a basin-specific update for the Muck Creek Basin. The FSEIS is issued with the Final Draft Basin Plan. The Final Draft Muck Creek Basin Plan (Basin Plan) identifies existing conditions influencing surface water and storm drainage within the Muck Creek drainage basin. The Basin Plan identifies problems, potential solutions, analyzes multiple contributing factors to problems, and recommends both structural and nonstructural solutions to address problems.

This FSEIS is prepared as a nonproject environmental impact statement per Washington Administrative Code, Chapter 197-11-442. Many proposed actions covered in the FSEIS will be subject to project-specific environmental review when implementation alternatives have been identified.

Public interest and participation in the environmental review process for this proposal was encouraged through a 30-day public comment period (February 12, 2003 through March 14, 2003). Two public meetings were held on the Basin Plan and DSEIS on March 3, 2003, at the Roy Library, and on March 5, 2003, at the Graham Library.

The Final SEIS provides a general discussion of the probable significant adverse environmental impacts of the Proposed Action and the No Action Alternative. It identifies mitigation measures which can reduce or eliminate the impacts. It also includes comments and addresses comments received during the comment period.

There is no comment period for this FSEIS. An appeal of the adequacy of the FSEIS may be filed at the Pierce County Development Center, at the Pierce County Public Services Building, 2401 S. 35<sup>th</sup> Street, Tacoma, WA, 98409 by filing a Notice of Appeal and associated \$1050 filing fee by 4:30 p.m. Friday, May 2, 2003. More information regarding the appeal of an FSEIS and the associated fees may be obtained at the Development Center.



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Copies of the FSEIS and the Basin Plan are also available for review at the Pierce County Library, the Pierce County Planning and Land Services Department at 2401 South 35<sup>th</sup> Street, Tacoma, Washington and at Pierce County Water Programs, 9850 64<sup>th</sup> Street West, University Place, Washington. Copies of the FSEIS and the Basin Plan are available for purchase for the cost of printing at both the Planning and Land Services and Water Programs offices. A short summary of the Basin Plan and FSEIS are available free of charge.

For additional information regarding the FSEIS, call Adonais Clark at (253) 798-7165. For information about the Muck Creek Basin Plan, call Janine Redmond at 253-798-7569.

Sincerely,



*for* CHARLES F. KLEEBERG  
Director

CK:ld  
4FSEISMuckCreekInterestedPartyLtr.doc

**FINAL**

**SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT**

**for the**

**MUCK CREEK BASIN PLAN**

**Prepared in compliance with the State Environmental Policy Act**

**April 17, 2003**

**PIERCE COUNTY**

**PUBLIC WORKS AND UTILITIES DEPARTMENT**

Brian Ziegler, P.E., Director

9850 64<sup>th</sup> Street West, University Place, WA 98467-1078

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## FACT SHEET

<b>Title &amp; Description of Proposed Action</b>	<p><b><i>Final Draft Muck Creek Basin Plan.</i></b> Pierce County is proposing to update its 1991 Storm Drainage and Surface Water Management Plan and Capital Improvement Program (1991 Plan) by adopting and implementing a Basin Plan for Muck Creek.</p> <p>The 1991 Plan has served as a guide for the identification, design, construction and implementation of surface water management facilities throughout the County.</p> <p>The Muck Creek Basin Plan provides specific strategic direction on solving flooding, water quality, and habitat problems within the Muck Creek Basin.</p> <p>The No Action Alternative would be to continue capital project selection on the 1991 Plan list and as annually modified.</p> <p>The FSEIS adds information to the 1991 <i>Draft and Final Environmental Impact Statement</i> on the 1991 Plan.</p>
<b>Location of Proposal</b>	Unincorporated Pierce County, in the Muck Creek Basin, located within the southwest area of the County, extending roughly between Graham and Roy.
<b>Proponent</b>	Pierce County Public Works and Utilities, Water Programs Division
<b>Proponent Contact</b>	Janine Redmond, Senior Planner Public Works and Utilities, Water Programs 9850 64 <sup>th</sup> Street West University Place, WA 98467-1078 (253) 798-7569
<b>Lead Agency</b>	Pierce County Planning and Land Services
<b>Lead Agency Contact</b>	Adonais Clark, Senior Planner Environmental Designee Pierce County Planning and Land Services 2401 S. 35 <sup>th</sup> Street Tacoma, WA 98409-7490 (253) 798-7165
<b>Tentative Adoption Date</b>	Public meetings and hearings on the proposed Basin Plan are expected to be held at the Pierce County Council for adoption by ordinance in spring 2003.

<b>List of Permits &amp; Approvals Required</b>	None for the Proposed Action. Permits for work in and adjacent to water (e.g., Hydraulic Project Approvals, shoreline permits, Section 404 permits, others) will be required for specific capital projects at the time they are proposed.
<b>Authors &amp; Principal Contributors</b>	Janine Redmond, Hans Hunger, Harold Smelt, Marsha Huebner, Dan Wrye, Barbara Ann Smolko CH2MHill
<b>Date of DSEIS Issuance</b>	February 12, 2003
<b>Written Comments Due</b>	March 14, 2003
<b>Date of FSEIS Issuance</b>	April 17, 2003
<b>Public Meetings &amp; Hearings</b>	Informational meetings on the Draft Basin Plan and SDEIS were held in Roy on March 3, 2003 and Graham on March 5, 2003.  A hearing is scheduled on April 23, 2003 at 7:00 p.m. before the Pierce County Planning Commission, at the Pierce County Public Services Building, located at 2401 South 35 <sup>th</sup> Street, Tacoma, WA 98409.
<b>Date of Final Action</b>	Action by the Pierce County Council is expected in spring of 2003.
<b>Subsequent Environmental Review</b>	Project specific environmental review for various construction projects and programmatic actions will be performed when implementation occurs.
<b>Location of FEIS on "1991 Plan"</b>	9850 64 <sup>th</sup> Street West, University Place, WA 98467-1078, (253) 798-2725; or Pierce County Planning and Land Services Department, located at 2401 S. 35 <sup>th</sup> St., Tacoma, WA, 98409, (253) 798-7210.
<b>Cost of FSEIS</b>	The FSEIS may be purchased for print cost at: Pierce County Public Works and Utilities Environmental Services Building, 9850 64 <sup>th</sup> St. West, University Place, WA 98467-1078, (253)798-2725 or Pierce County Planning and Land Services Department, 2401 S. 35 <sup>th</sup> St., Tacoma, WA 98409, (253)798-7210  Information regarding the Muck Creek Basin Plan may also be found at the following internet address: <a href="http://www.co.pierce.wa.us/pc/services/home/envIRON/watermenu">www.co.pierce.wa.us/pc/services/home/envIRON/watermenu</a> , Select "New Basin Plans" "Muck Creek"

## Summary

Pierce County is proposing to adopt and implement the Muck Creek Basin Plan (Basin Plan or Plan). If adopted, the Basin Plan would be an amendment to the County's 1991 Storm Drainage and Surface Water Management Plan (1991 Plan).

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires that an Environmental Impact Statement (EIS) be prepared for proposed actions that could result in probable significant adverse environmental impacts. An EIS was prepared for the original 1991 Plan to provide full disclosure of potential impacts. The EIS compared a No Action Alternative against the measures identified in the 1991 Plan.

This Final Supplemental EIS (FSEIS) is prepared for the Muck Creek Basin Plan to determine whether substantial changes in County programs resulting from Plan implementation would result in "significant adverse environmental impacts" and to take into account "significant new information" that has been developed over the past 12 years (WAC 197-11-405(4)). The FSEIS compares the implementation of the Muck Creek Basin Plan with a "No Action" alternative. The "No Action" alternative would be the continued implementation of the 1991 Plan.

This Basin Plan is one of several basin plans Pierce County is preparing to update the 1991 Plan. The 1991 Plan was adopted to provide a surface water management program. It evaluated 26 drainage basins within non-federal lands and unincorporated areas of Pierce County and identified storm water and surface water management measures. The basins were evaluated at different levels, depending upon whether they were considered to be urban or rural. The eight urban and urbanizing areas were studied in more detail. Muck Creek Basin was studied as an urbanizing area, but was determined at that time to be rural in character, meaning that projects within that Basin were less urgent for immediate implementation.

Since the original 1991 Plan was prepared, surface water management has increased in complexity. Growth in the County has made development impacts more widespread and obvious. In the early 1990s the State Growth Management Act led to the establishment of environmentally sensitive areas ("Critical Areas"), such as wetlands and streams, a requirement for protection of adjacent buffer areas, and the adoption of the Pierce County Comprehensive Plan.

There has been a growing emphasis on the protection of water quality and streams, wetlands and other environmentally sensitive areas. In the mid-1990's, jurisdictions with populations over 100,000, including Pierce County, were required to create stormwater programs under the federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program. In the late 1990s the federal government listed Chinook salmon, bull trout and other fish species found in Pierce County waters under the Endangered Species Act. Any impact to a listed species is considered to be significant.

These factors led Pierce County to propose the Muck Creek Basin Plan. This Basin Plan evaluates current conditions and problems and prioritizes recommended projects. It addresses changes in policies and planning efforts needed to meet the requirements of the Clean Water Act, the Endangered Species Act and the Growth Management Act.

The purpose of the Basin Plan is to create a basin specific, comprehensive approach to reducing flood hazards, improving fish and wildlife habitat, and improving water quality

throughout the Basin. The Plan provides a more detailed analysis of flooding and drainage and water quality problems within the Basin than the 1991 Plan. The Plan also addresses fish habitat concerns. Citizens within the Basin provided input to the Plan at public meetings, and their concerns regarding water quality and quantity in the creek were addressed within the Plan.

The Plan proposes several projects to reduce flooding and drainage problems within the Basin. It also proposes projects to improve water quality and improve fish habitat through a series of stream and riparian restoration projects. Some projects will be part of the Water Programs CIP, others may be completed as part of a maintenance program or by other agencies. The list includes:

- Twelve culvert improvements
- Two infiltration basins
- Increasing the height of one road
- Local drainage improvements
- Up to as much as 5.6 miles of riparian habitat restoration/protection projects

The first four sets of measures address existing flooding and drainage problems in the Basin. The last set of measures address fish habitat and water quality needs of the streams. In addition, recommendations for programmatic measures, Best Management Practices (BMPs) and public involvement options are presented. There are also recommendations for additional studies to address issues that could not be resolved within the scope of the planning effort. Actions by other agencies and interested parties which are supportive of the Plan are identified. Future Basin land uses and growth, according to existing planning documents, are reviewed and determined to be compatible with the maintenance of stream hydrologic conditions. A long-term monitoring plan is also presented to document the effectiveness of Basin management actions and allow for adaptive management to meet changing conditions.

## **FSEIS Supplements 1991 EIS; Non-project and Phased Environmental Review**

This FSEIS is based on information provided in the 1991 Plan EIS. However, because some of the information provided in the 1991 EIS has changed or was not complete, this SEIS provides new and additional information to assess the impacts of the Basin Plan. Many potential impacts from Plan implementation were evaluated within the original 1991 EIS and will not be addressed again here. Copies of the 1991 Storm Drainage and Surface Water Management Plan and the 1991 Environmental Impact Statement are available for review at the Pierce County Water Programs office located at 9850 64<sup>th</sup> Street West, University Place, WA 98467-1078, (253) 798-2725 and at Pierce County Planning and Land Services Department, located at 2401 S. 35<sup>th</sup> St., Tacoma, WA, 98409, (253) 798-7210.

This Plan is considered a non-project proposal, per WAC 197-11-704 and WAC 197-11-774. The environmental review in this FSEIS is programmatic, and future project-specific SEPA review will be required, as appropriate, as specific recommendations are implemented.

## Format of FSEIS

This FSEIS is a section of the overall Muck Creek Basin Plan (Part IV). Because much of the Plan includes detailed descriptions of the environmental components of the Plan, the FSEIS frequently summarizes and/or refers to the three other sections in the Plan:

Part I of the Muck Creek Basin Plan is the “*Basin Characterization Report*.” This Report describes the environmental attributes throughout the Watershed focusing on stream reaches, associated wetlands, sensitive areas, listed and non-listed fish habitat, areas of localized flooding, and future land use changes as related to environmental degradation. Therefore, the Affected Environment sections of the SEIS summarize and refer to specific sections of the “*Basin Characterization Report*”, where appropriate. Other environmental elements not addressed in the Basin Plan are summarized based on the 1991 EIS and any new information.

Part II of the Muck Creek Basin Plan is the “*Basin Plan Analysis*.” This part includes analysis of the potential benefits and impacts of proposed storm water and surface water management measures. Therefore, the Impact Analysis section of the SEIS will summarize and refer to specific sections of the “*Basin Plan Analysis*”, where appropriate. The remaining environmental elements not addressed in the Basin Plan are included in the FSEIS.

Part III is the actual “*Muck Creek Basin Plan*” itself. The Description of Alternatives section in the SEIS will summarize and refer to the Basin Plan, where appropriate.

This table summarizes potential impacts to elements of the environment, as discussed in the Alternatives, Significant Impacts and Mitigation Sections of this FSEIS. It is assumed that any activities that occur are conducted in accordance with applicable land use, development and environmental regulations.

**Table 10-1: Comparison of Impacts**

Element	Proposed Action	Probable Significant Adverse Environmental Impact?	No Action Alternative	Probable Significant Adverse Environmental Impact?
Water Resources	<ul style="list-style-type: none"> <li>• Temporary reductions in water quality associated with culvert replacement projects during construction.</li> <li>• Net improvement in flooding and drainage conditions.</li> <li>• Potential for temporary water quality impacts during the removal of fish migration barriers or stream restoration projects.</li> <li>• Water quality would be improved by projects and actions.</li> </ul>	No	<ul style="list-style-type: none"> <li>• Temporary reductions in water quality associated with culvert replacement projects during construction.</li> <li>• Many flooding problems would continue to occur.</li> <li>• Development impacts could increase flood flows and flooding.</li> <li>• Potential for temporary water quality impacts during removal of fish migration barriers or stream restoration projects.</li> <li>• Water quality violations of stream temperature, nutrient and pathogen standards would likely continue.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential</li> </ul>
Fishery Resources	<ul style="list-style-type: none"> <li>• Potential for short-term increase in stream sediment during construction of culvert replacements and stream restoration projects.</li> <li>• County stream restoration and enhancement projects and programs will improve salmon habitat.</li> <li>• Livestock access to streams would be reduced, reducing habitat impacts.</li> <li>• Stream culvert capacity would be increased</li> </ul>	No	<ul style="list-style-type: none"> <li>• Potential for short-term increase in stream sediment during construction of culvert replacements and stream restoration projects.</li> <li>• Habitat improvements would be carried out mainly by others.</li> <li>• Problems with habitat degradation and low channel flows are expected to worsen.</li> <li>• Long term impacts to streambanks and</li> </ul>	Potential

Element	Proposed Action	Probable Significant Adverse Environmental Impact?	No Action Alternative	Probable Significant Adverse Environmental Impact?
			habitat due to livestock access are expected to continue. <ul style="list-style-type: none"> <li>• Fish habitat would continue to be degraded due to loss of riparian vegetation from development and grazing livestock.</li> </ul>	
Vegetation	<ul style="list-style-type: none"> <li>• Stream banks would be revegetated to improve habitat, reduce water temperatures and improve water quality.</li> <li>• Temporary impacts to vegetation may occur during construction activities.</li> <li>• Improvements to riparian buffers will result in a net increase in riparian area and vegetation.</li> </ul>	No	<ul style="list-style-type: none"> <li>• Vegetation will continue to be impacted in developing areas of the Basin with no coordinated plan for protection.</li> <li>• Temporary impacts to vegetation may occur during construction activities</li> <li>• No improvements to existing condition</li> </ul>	No
Wildlife	<ul style="list-style-type: none"> <li>• During construction activities wildlife may be temporarily displaced.</li> <li>• Removal of invasive and non-native plants species during restoration projects may result in temporary displacement of wildlife species due to loss of cover.</li> <li>• Habitat acquisition and enhancement will aid wildlife.</li> </ul>	No	<ul style="list-style-type: none"> <li>• During construction activities wildlife may be temporarily misplaced</li> <li>• Removal of invasive and non-native vegetation during restoration projects by others may result in temporary displacement of wildlife species due to loss of cover</li> <li>• No improvement to existing habitat programs</li> </ul>	No
Land and Shoreline Use	<ul style="list-style-type: none"> <li>• Development would be directed away from floodplains and valuable habitat resources toward areas with fewer constraints.</li> <li>• Stormwater facility</li> </ul>	Potential	<ul style="list-style-type: none"> <li>• Continued reduction of riparian corridor.</li> <li>• Stormwater facility development would be consistent with adopted policy and regulation.</li> </ul>	Potential

Element	Proposed Action	Probable Significant Adverse Environmental Impact?	No Action Alternative	Probable Significant Adverse Environmental Impact?
	<p>development would be consistent with adopted policy and regulation.</p> <ul style="list-style-type: none"> <li>• Basin Plan information will guide and/or support development of land use plans that reduce impacts to water resources.</li> <li>• The Basin Plan is proactive in reducing development related impacts.</li> </ul>		<ul style="list-style-type: none"> <li>• Development impacts to water resources would continue, the Master Plan emphasis is on CIP development., support for land use decisions is not provided.</li> <li>• The existing program is reactive to development related impacts.</li> </ul>	
Aesthetic, Historic and Cultural Resources	<ul style="list-style-type: none"> <li>• Temporary aesthetic impacts associated with tree/vegetation removal for construction of infiltration ponds, detention facility and other projects.</li> </ul>	No	<ul style="list-style-type: none"> <li>• Temporary aesthetic impacts associated with tree/vegetation removal for construction of infiltration ponds, detention facility and other projects.</li> </ul>	No
Public Services and Utilities	<ul style="list-style-type: none"> <li>• During facility construction roads/lanes could be closed temporarily, resulting in potential delays for emergency vehicles.</li> <li>• Upgrades of under-capacity culverts would reduce the incidence of road closures due to flooding.</li> <li>• Implementation of projects and programs will improve public safety and reduce the need for some public services.</li> </ul>	No	<ul style="list-style-type: none"> <li>• During facility construction roads/lanes could be closed temporarily, resulting in potential delays for emergency vehicles.</li> <li>• Limited upgrades of several under-capacity culverts would reduce, somewhat, the incidence of road closures due to flooding.</li> <li>• Public safety and the need for some public services will be minimally improved.</li> </ul>	Potential

# Alternatives, Including Proposed Action

## Introduction and Background

This section describes alternatives to achieve the long term goals of the 1991 Pierce County Storm Drainage and Surface Water Management Plan (the 1991 Plan). The alternatives evaluated are the **Proposed Action**, adoption of a Basin Plan for the Muck Creek Basin (Plan) and the **No Action Alternative**, continued use of the Capital Improvements Program element of the 1991 Plan as the basis for project implementation. This section also provides background on the original 1991 Plan that would be altered by the Muck Creek Basin Plan.

### Background—Pierce County Storm Drainage and Surface Water Management Plan (1991 Plan)

The Pierce County Council established the County's Surface Water Management Utility in March 1988 by Ordinance 87-205. In 1991, the County adopted the original Stormwater Drainage and Surface Water Management Plan (1991 Plan). The 1991 Plan was intended to provide a comprehensive program for surface water management operations, funded by service charges. A Surface Water Management Utility was established pursuant to Chapters 36.89 and 39.34 RCW (Authorizes surface water management fees, and provides for cooperation between local agencies, respectively). It was also prepared to satisfy Washington State Department of Ecology requirements for a Comprehensive Flood Control Management Plan (WAC 173-145).

The 1991 Plan addressed all 26 of the drainage basins in Pierce County, to varying degrees. Urban areas were studied in more detail than rural basins. Eight basins were studied in detail: Gig Harbor, Hylebos Creek, Clear/Clarks Creek, Clover/Steilacoom Creek, Chambers Bay, Tacoma West/Browns-Dash Point, Muck Creek and American Lake.

The 1991 Plan includes recommendations for both structural and non-structural means of accomplishing goals and objectives. The non-structural recommendations tend to be broad and county-wide rather than Basin or study area specific. Finally, the 1991 Plan focused primarily on projects aimed at addressing then-existing flooding problems. Specific flooding projects were recommended in the 1991 Plan for a Capital Improvement Program (CIP).

The long term goals were to be goals for the life of the program. The goals are shown in Table 10-2:

**Table 10-2**  
**Goals of Pierce County Storm Drainage and Surface Water Management Plan (1991)**

Goal	Description	Objectives
1.) Loss Prevent the Loss of Life, the Creation of Public Health or Safety Problems and the Loss or Damage of Public and Private Property.	Prevent the loss of life or property due to flooding events.	<p>Nonstructural measures should be preferred over structural measures. Protection of existing facilities and structures should take preference over the protection of undeveloped lands.</p> <p>Land use and related regulations and zoning should reflect the natural constraints of the streams, floodplains, meander zones, and riparian habitat zones. Together, this plan, program and codes should present consistent goals and objectives.</p>

Goal	Description	Objectives
2.) Establish and Adopt a Systematic and Comprehensive Approach	Storm water management should occur in the context of an ongoing, systematic and comprehensive approach to solving existing problems and preventing future problems.	<p>Continue the role of the Citizens Advisory Committee or similar body in an advisory role to the Utility. The body should represent the entire County and citizens with a variety or [sic] reasons for their interest in surface water management.</p> <p>Strategies for surface water management should balance engineering, economic, environmental, and social factors in relationship to stated comprehensive planning goals and objective.</p> <p>Public understanding of the various capabilities and limitation associated with storm water management should be improved through a variety of educational efforts.</p> <p>The goals and objectives of the Master Plan should be evaluated at regular intervals (i.e., every 5 years) to maintain consistency with other related programs affecting the environment.</p>
3) Minimize Expenditure of Public Funds	The need for emergency measures should be reduced or prevented through planning, and the use of structural and nonstructural measures.	A stable, adequate, and publicly acceptable long-term source of financing should be established and maintained for the Utility and the comprehensive management program.
4) Maintain the Varied Uses of the Existing Natural Drainage System Within the County	Storm water management in Pierce County should occur in the context of the varied uses associated with the natural drainage systems within the County. These include agricultural, commercial, industrial and residential, fish and wildlife habitat, water supply, open space, and recreation.	<p>Storm water management measures should preserve to the fullest extent possible opportunities for other uses.</p> <p>Structural flood control measures should not obstruct fish passage.</p> <p>Structural flood control measures should preserve or enhance existing flow characteristics for fisheries, and other uses of the riparian zone.</p> <p>Flood control activities should not result in a net loss of, or damage to fish and wildlife resources, but wherever possible develop or improve the diversity of habitat.</p>

Goal	Description	Objectives
	Preserve to the fullest extent possible, the scenic, and ecological qualities of the natural drainage system in harmony with those uses which are deemed essential to the life of its citizens, and wherever possible, enhance the instream and riparian uses of the streams, wetland and lakes of Pierce County.	Changes in land use should try to restore the lands natural character to the natural state whenever possible.
5) Prevent the degradation of the quality of both surface water and the water entering the regions aquifers.	Urbanization normally leads to a degradation in the quality of storm water runoff. This can become a problem both for the wildlife which depends on the stream system and the local populace.	<p>The use of the natural drainage system is preferred over the use of pipelines or enclosed detention systems. The preservation of natural wetland, floodplains and streams is to be actively pursued.</p> <p>The County will apply for a NPDES permit and will strive to be in compliance with the requirements for the preservation of water quality.</p> <p>All storm water runoff from impervious surfaces should be treated before it is allowed to enter the natural drainage system, infiltrate into the ground or enter Puget Sound.</p>
6) Coordinate with Public and Private Sectors	Storm water management measures should be compatible with the various public and private sectors affected.	<p>Planning and design/construction of stormwater management measures should include opportunity for comment by the general public and interested agencies. The Master Plan and its updates shall provide opportunity for identification of acceptable storm water management measures.</p> <p>The Citizens Advisory Committee should provide input on existing or pending regulations which are incompatible with the goals of the Master Plan. Efforts should be made to work with the Cities towards standardization of regulations which impact storm water management.</p>

Pursuit of these goals is still ongoing, and many of the objectives have been met. Most of the goals were strongly related to the planning, construction, operation and maintenance of storm drainage facilities. In addition to the Goals, the 1991 Plan established objectives for each of the 26 study areas (i.e., basins). There are four surface water management objectives for the Muck Creek Basin:

- 1) Prevent existing flooding problems from becoming worse;
- 2) Prevent stormwater problems before they occur;
- 3) Improve the quality of surface waters; and
- 4) Eliminating existing flooding problems.

## **Use of the 1991 Plan As Principal Focus of CIP Has Evolved**

The 1991 Plan has been used as a basis for Capital Improvement Program (CIP) proposals since 1991. Projects are selected every year and adopted by the County Council as part of the County's six-year Capital Facilities Plan under the County's Comprehensive Plan. Although many of the projects still come from the original 1991 Plan, there are also many that have been developed as the result of more recent information and that were not contained within the 1991 Plan. Additionally, since the 1991 Plan was developed, the cities of University Place, Lakewood and Edgewood have incorporated and thus the County's responsibility for capital projects in those areas has been eliminated. Other cities such as Roy, Bonney Lake, and Fife have annexed adjoining areas, also diminishing the County's responsibilities. Project funding, planning, construction and maintenance activities have been affected by these changes.

The 1991 Plan was also developed before the adoption of the County Comprehensive Plan which was developed pursuant to the Growth Management Act. Zoning and other land use regulations have changed development patterns in some areas of the County, and the future growth estimates used to develop the 1991 CIP list are no longer valid. Several of the smaller projects, such as culvert replacement or maintenance activities within road rights-of-way, were completed by the Transportation Services Section of Public Works and Utilities.<sup>1</sup>

Finally, many of the projects proposed as part of the plan have been constructed, while others could not be constructed because development patterns have made acquisition of construction sites prohibitively expensive.

## **Proposed Action: Muck Creek Basin Plan**

The proposed action is adoption and implementation of a Basin Plan for surface water management of the Muck Creek Basin. The Plan documents the existing condition of the Basin's water resources, identifies water resource problems and issues, and recommends a plan to improve conditions in the Basin. It includes recommendations for capital projects and programmatic activities designed to remedy existing problems and to prevent future water resource problems. Plan goals are translated into a comprehensive list of Basin needs and action recommendations, including projects, programs, and policies to address the water quality, flooding, and habitat problems identified in the Plan. Projects included in the Basin Plan would append and update the 1991 Capital Improvement Plan. Programmatic recommendations would augment the nonstructural recommendations contained in the 1991 Plan. The Basin Plan will provide guidance for Pierce County's future Capital Improvement Projects (CIPs), capital expenditures, water resource protection policies, and public education programs in the Muck Creek Basin.

The Muck Creek Basin Plan provides strategic water resource management direction within the Basin by assessing problems, proposing structural and non-structural solutions, and recommending monitoring and evaluation programs. Additionally, the Plan enables cross-basin water resource management coordination by utilizing standard protocols and evaluation criteria that transcend Basin boundaries.

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<sup>1</sup> A determination was made after the adoption of the 1991 Plan that Transportation Services would be responsible for stormwater facilities located within road-rights-of-way, SWM is responsible for all others.

The Muck Creek Basin Plan has been developed in accordance with the framework document “Guidance for Basin Planning” prepared by Pierce County Water Programs (2000). The guidance document contains a list of prescribed tasks for preparation of a basin plan, as well as direction for completing the tasks.

The Muck Creek Basin Plan has identified the following water resource management issues and potential solutions: Recommended construction projects include:

- Twelve culvert improvements
- Two infiltration basins
- Increasing the height of one road
- Local drainage improvements

In addition, the Basin Plan includes provisions for habitat protection and improvement within the Basin, including, but not limited to, such activities as property acquisition, reed canary grass removal, fencing to limit animal access, riparian re-vegetation and stream channel habitat enhancement.

Future land use for the Basin is designated almost entirely as low density and is not expected to significantly impact stream flows. Most of the development will be concentrated in the northeast portion of the Basin in the Graham area. Low impact development techniques are recommended for new developments in this area. Onsite infiltration of stormwater is encouraged, as well.

The Basin Plan also recommends programmatic measures. Among them are:

- A habitat protection, acquisition and restoration program
- A public education, outreach and technical assistance program
- Implementation of a Low Impact Development program
- A “Best Management Practices” manual for surface water management facilities
- An invasive-species control program
- An effectiveness monitoring program

Nearly all of the perennially flowing portions of the main stem of Muck Creek are located on Fort Lewis. Long-term plans call for very little Fort development within the Muck Creek Basin. Critical salmon spawning areas in this portion of the Basin, notably Johnson Springs, Exeter Springs and the lower portion of Muck Creek are currently protected. Improvements in the operation of the Chambers Lake Dam, upstream of Roy, may help to improve flow conditions somewhat. (There have been instances where flow from the lake has been restricted and the downstream creek flow in Roy has suddenly dropped to very low levels.) The Fort is developing detailed flow and stream habitat data for that portion of the stream within its boundaries. There is the opportunity for the County and the Fort to work cooperatively in implementing stream and riparian improvements.

The Basin Plan contains recommendations for public education and a number of the habitat CIPs that provide opportunities for public involvement. The Plan also provides recommendations for long-term monitoring to document the improvements to habitat and water quality.

Finally, each project and programmatic action is prioritized in the Basin Plan through evaluation against standard criteria. The prioritization involves assignment of points related to the accomplishment of program goals and objectives. Each project or programmatic recommendation is evaluated against a series of criteria (see Appendix M of this document).

In summary, those criteria include:

- Flood reduction (level and frequency)
- Water quality improvement (source reduction)
- Natural resource improvement (restoration and protection)
- Recreational and multiple use opportunities
- Aesthetics

## No Action Alternative

The “No Action” Alternative would be to continue Water Programs activities as they currently exist, using the 1991 CIP as the basis for considering its annual capital public works and work plan. As the list of high priority projects gets completed, and as the CIP becomes more dated, the County will increasingly rely upon more opportunistic means of identifying and prioritizing capital projects, such as citizen complaints and judgment of County staff.

Most of the problems within the Muck Creek Basin identified in the 1991 Plan are related to the loss of flood storage areas and undersized culverts. For the Muck Creek Basin, the 1991 CIP identified project costs totaling \$1,829,000, of which \$715,000 were for high priority projects (Five culvert replacements costing \$343,000, and \$372,000 for miscellaneous, undefined projects.) None of the projects have been completed as part of the Water Programs CIP. It appears that at least one of the listed medium priority projects and one of the low priority projects, both culvert replacements, have been completed by the Pierce County Transportation Services Division.

**Table 10-3 1991 CIP High Priority Projects in the Muck Creek Basin**

MC-LA-6	Schudy Road crossing of Lacamas Creek
MC-MK-18S	SR 161 crossing of one of the South Fork tributaries
MC-MK-13S	288 <sup>th</sup> Street E crossing of one of the South Fork tributaries
Mc-Mk-8SD	A second crossing of 288 <sup>th</sup> Street E by one of the South Fork tributaries
MC-MK-7NA	Culvert under a gravel road, North Fork of Muck Creek

## Comparison of Alternatives

Table 10-4 summarizes major characteristics of the Proposed Muck Creek Basin Plan and the No Action Alternative:

**Table 10-4 Comparison of the Alternatives**

Feature	Proposed Action	No Action Alternative
Flooding Solutions	X	X
Water Quality Solutions	X	
Habitat Solutions	X	
Annual Capital Facilities Element	X	X
Comprehensive, strategic	X	
Focus on specific projects		X
Focus on Basin problems	X	
Countywide programmatic or non-structural solutions	X	X
Basin-specific programmatic or non-structural solutions	X	
Prioritizes within Basin	X	
Prioritizes countywide		X

# Affected Environment, Significant Impacts, and Mitigation Measures

## Water Resources

### Affected Environment

Muck Creek drains a 90-square mile area of southwestern Pierce County. In terms of geographic area, it is the largest tributary of the Nisqually River, accounting for one-seventh of that river basin. The average flow at Roy is 45,000 acre-feet per year (64 cubic feet per second). Two primary tributaries, the North Fork and the South Fork, join to form the Main Stem of Muck Creek. The Main Stem forms the lower 14 miles of this stream system, nearly all of it lying within Fort Lewis. The North Fork is perennial. However, nearly all of the South Fork and much of the Main Stem cease flowing during the drier portions of the year, typically July through mid-October. The presence of highly infiltrative soils throughout the center of the Basin appears to be the major reason for this phenomenon. The lower 2-3 miles of the main stem generally flow throughout the year as a result of inflow from springs. Lacamas Creek is a final major tributary, joining Muck Creek at Roy. The middle and lower portions of this stream also flow the year-round.

The water quality in the streams is good for most of the measured parameters. However, the state standards for temperature and coliforms are commonly exceeded. Low levels of dissolved oxygen occasionally occur. Riparian tree cover is lacking along long segments of the streams in this Basin, contributing to higher stream temperatures. Much of the central portion lies within a prairie where tree cover is naturally limited. Livestock practices also commonly contribute to water quality degradation. Direct access of animals to streams has resulted in severe stream bank erosion along a number of reaches in the Basin. In addition there are several instances of animal confinement areas located adjacent to streams, where there is direct runoff of animal waste to the creek. These practices contribute nutrient (nitrogen and phosphorus) and pathogens to the streams. This also results in higher levels of sediment deposition in the stream bottom that are often observed immediately downstream.

There are about a half dozen undersized road culverts where streams may overtop the roads during higher flow events. Otherwise, there are relatively few problems with direct flooding from the major streams in the Basin. The majority of the flooding problems occur due to shallow ponding in localized depressions. Further information on existing water resource conditions and problems can be found in Sections 4.4, 4.5, 5.2, 5.3 and 5.4, and Chapters 6 and 7.

## Significant Impacts and Mitigation Measures

### Proposed Action

The Basin Plan identifies a series of Capital Improvement Program (CIP) projects to relieve flooding and drainage problems. These include twelve culvert improvements, two infiltration basins, increasing the elevation of one road and local drainage improvements. The long-term effects of these projects would be a net improvement in the flooding and drainage

conditions in the Basin. Culvert replacement projects would result in stream crossings that meet current county road standards and substantially reduce road flooding in the Basin. None of the undersized culverts form a major upstream inundation. The stream channels downstream of these locations show no signs of serious erosion or flooding problems. Therefore, the increased culvert capacities resulting from these projects would not result in significant impacts.

The two proposed infiltration basins would be located in areas where stormwater currently naturally infiltrates. The ponds would direct surface flows to controlled areas, avoiding recurring flood damages, but would not result in a substantial increase in infiltration. These infiltration basins would not significantly change groundwater recharge or its distribution within the Muck Creek Basin.

Local drainage improvement projects generally involve the installation of short lengths of storm pipe and ditches to improve local drainage. None of these projects will have a significant long-term impact upon streams in the Basin.

As discussed in Section 9.3, water quality problems will be addressed through the riparian and stream habitat improvement projects. CIP projects are proposed that involve the establishment of riparian buffers along stream segments that are largely or totally lacking in buffer or tree cover. At several locations where there has been severe damage, stream bank restoration would occur. These measures would reduce the incidence of direct inflow of animal waste to the streams. In addition, a functioning riparian buffer would provide additional filtering and infiltration for runoff from adjacent farm or other land use activities. The effect would be a reduction in nutrients, pathogens and sediment reaching the streams and an improvement in water quality.

The tree cover associated with new riparian buffers would provide shade for the streams, lowering the water temperature increases experienced in the streams during the warmer days of the summer and early fall. This would be particularly true for the perennially flowing North Fork and Lacamas Creek, where most of the riparian restoration projects would occur. Temperature fluctuations in the streams would also be reduced. The beneficial nutrient, pathogen and sediment reductions would occur in the first several years as the ground cover within the riparian buffer became established. The beneficial stream shading effects would take several decades to take full effect as the planted trees grew to maturity.

Many of the CIP projects would have short-term water quality impacts, particularly those constructed within or adjacent to the streams. Culvert replacement would disturb the streambanks and bottom. Stream restoration, stream bank stabilization and riparian revegetation projects would also disturb streams and adjacent areas. Where these disturbed areas came in contact with flowing waters, sediment would be mobilized and quickly carried downstream, temporarily reducing water quality. Subsequent deposition of sediment could also harm fish habitat. Standard erosion control measures would be implemented to avoid serious sedimentation problems. Work adjacent to or within streams will be limited to low flow periods, typically the summertime. Stream flows could be temporarily diverted and pumped around the active project site, avoiding the disturbed areas. Standard erosion control measures such as silt fencing, coverage of exposed earth and permanent seeding of disturbed areas following construction will further reduce temporary sediment and water quality impacts. Each project will be required to meet County construction and erosion control requirements, as well as applicable state and federal requirements. For instance, those projects taking place within a stream will require a

Hydraulic Project Approval (HPA) from the State Department of Fish and Wildlife. The standard requirements for control of erosion and other construction related pollutants, such as fuels and lubricants, assure that the water quality impacts will be short-term and not significant.

As discussed in Section 9, no major development is planned for that portion of the Muck Creek Basin lying within Fort Lewis. This portion of the Basin will continue to be used for troop maneuvers and no significant future water resources impacts are expected to occur. Fort Lewis has a continuing program of riparian and wetland restoration projects that will continue to improve the flow regime and water quality within the Main Stem of Muck Creek. There appears to be an opportunity for the Fort to improve its management of flow releases from Chambers Lake. Monitoring in Roy has shown sharp, sudden reductions in flow in June of the past two years as the Fort has reduced outflow from the lake in anticipation of the summer low flow period. A more gradual reduction of lake outflows in the late spring and early summer would reduce, somewhat, the periods of very low or no flow experienced on the Main Stem of Muck Creek downstream in Roy, resulting in a beneficial effect.

Future growth and land uses within the Muck Creek Basin are discussed in Section 5 of the Basin Plan and in the Land Use Section of this document. Given the relatively low density of land uses throughout the Basin, the direct impacts upon water resources are not expected to be significant. Low Impact Development concepts have potential for application for commercial and residential development in the Roy and Graham areas. LID incorporated into new development could reduce the potential for significant future drainage problems without the need for these areas to develop major stormwater collection systems. As stated in Section 7.1, the two major water uses in the Basin are agricultural and domestic. These uses are drawn almost entirely from groundwater. Future water use in the Basin is not projected to increase substantially and will represent about 7 percent of the groundwater recharge. Therefore, water uses in the Basin are not expected to significantly impact the Basin's ground or surface water resources.

As a result of the generally level topography throughout much of the Basin, local drainage problems due to ponding of stormwater runoff are a common occurrence. Several recommended studies (Section 9) would give the county more effective information for identifying these types of problems: development of 2-foot topography throughout the Basin and aerial photos taken after a large storm event. These measures would aid the County in identifying local flood areas, allowing more effective mitigation against existing and future problems.

A low-lying area along the South Fork, upstream of SR 7, appears to be prone to flood damage during high flow events on this stream. A detailed flood study of this reach would be useful in developing specific mitigation measures to reduce this flooding.

Available information suggests that much of the groundwater which recharges in the northeast portion of the Basin (the Graham area) may move northwest, beyond the Muck Creek Basin boundaries and into the Clover/Chambers Basin to the north. Portions of the Clover/Chambers Basin experience high groundwater and flooding conditions following periods of high rainfall.

Patterson Springs is the major water source for the perennially flowing North Fork. The extensive wetlands along its upper reach are also important to its flow regime. The future development of these springs for other uses or their reduction or loss would result in a significant impact to Basin water resources. The acquisition and/or permanent protection of this critical area and the extensive wetlands comprising the upper portion of the North Fork,

as recommended in this plan, will assure the preservation of this important Basin water resource. The Cascade Land Conservancy currently owns about 100-acres in this area and is actively seeking to acquire more, including the land comprising much of the Patterson Springs.

The Basin Plan recommends a stormwater compliance assurance program, including increased inspection, technical assistance, and enforcement. This is expected to improve surface water protection.

The public education program recommended in the Basin Plan would raise the level of awareness on the part of the residents regarding the important resource that Muck Creek and its tributaries represent. Residents would also become more aware of the effects that their personal actions can have on the streams. Of particular importance in this Basin is the education of rural residential property owners to maintain and/or establish buffers alongside streams that flow across their properties. This concept can avoid further degradation of water quality and has the potential to improve water quality if embraced by a substantial portion of the rural population. The enlistment of residents to participate in stream and riparian restoration projects is also highly effective as an education tool. The Conservation District's farm water quality improvement program, focused in part on the recommendations of this Basin Plan, would also contribute to beneficial water quality effects.

Overall, implementation of the Muck Creek Basin Plan is expected to result in a major long-term benefit to the quality and water resource conditions within the Basin. No significant adverse environmental impacts are likely.

### **No Action Alternative**

Under the No Action Alternative, stormwater would continue to be managed in the Muck Creek Basin as it is today. County efforts would continue to focus on serious drainage complaints rather than assuming a more proactive, comprehensive approach. Periodic maintenance of ditches, culverts and other county drainage facilities by County crews would continue. Up to four undersized culverts on the South Fork and the Lacamas stream systems would eventually be replaced under the existing CIP. Short-term impacts and mitigation measures from these projects are similar to capital facilities impacts discussed under the Basin Plan alternatives. However, road flooding problems could continue to occur in the Basin unless other measures are identified and taken. As further development in the Graham area occurs, drainage problems would intensify. The area east of the existing commercial center along 224<sup>th</sup> Street SE currently provides stormwater infiltration for much of the area. Its development would result in flooding problems in this area.

Ongoing riparian restoration projects carried out by Fort Lewis and the Pierce Conservation District would result in modest improvements in water quality over the long term. The farm water quality management program of the latter would also redress some of the more severe livestock water quality degradation and stream observed in the Basin over the long term. However, without a more comprehensive approach, water quality violations of stream temperature and pathogen standards would likely continue to occur throughout most of the Basin.

## **Fishery Resources**

### **Affected Environment**

Muck Creek supports four species of salmonids including chum salmon, resident and anadromous (steelhead) rainbow trout, and resident and sea-run cutthroat trout. Chinook salmon are not known to exist in the Muck Creek drainage area. Chum salmon are the most numerous of the anadromous fish. The run in Muck Creek typically comprises about one-third of the chum salmon run to the entire Nisqually River system. However, annual runs can vary dramatically. Muck Creek experienced extremely low flow during the fall and winter of 2000/2001. As a result, escapement to Muck Creek was essentially zero. In contrast, the 2001/2002 season had a large run of over 10,000. Only small numbers of steelhead and few, if any, Coho currently utilize Muck Creek. No federally protected fish species are present in the Muck Creek drainage, although two protected salmonid species are present in the Nisqually system (i.e. Chinook salmon and bull trout).

Anadromous fish spawning is confined almost entirely within the middle and lower reaches of the Main Stem of Muck Creek. The lower two to three miles of Muck creek has numerous pools and provides good fish habitat. Much of the rest of the stream system in the Basin provides only limited fish habitat for a variety of reasons, among them: historically dredged channels, lack of riparian buffer, lack of large woody debris, sediment deposition, channels choked with reed canary grass and no stream flow during much of the dry season. Additional information on existing conditions can be found in Section 4.6 and 5.5 and Chapter 8.

## **Significant Impacts and Mitigation Measures**

### **Proposed Action**

Implementation of the Basin Plan would increase the capacity of six stream culverts within the Basin. When undersized culverts are replaced, detention on the upstream sides is typically offset by improved upstream migratory passage by salmonids. During and following construction, the freshly disturbed stream channel has the potential for sediment delivery due to erosion processes. Erosion would be controlled through the application of BMP's. Using properly implemented and appropriate BMP's, short-term impacts to fish habitat would be minor. The culverts would have gravel bottoms and be engineered to meet fish passage requirements. Their installation would therefore result in a net long-term benefit to fish habitat.

Stream restoration projects are recommended in the Basin Plan CIP for the purpose of enhancing salmon habitat. Stream restoration consists of channel enhancement measures which include bank stabilization, large woody debris installation, channel relocation (meander creation), or channel widening. Stream restoration projects would also include riparian vegetation planting, extending away from the streambanks for a distance of 100' feet, wherever possible. The objective of stream restoration is to create complex habitat with adequate pools and riffles along with in-water and overhead cover in the form of LWD and riparian trees. Other objectives include shading to reduce peak water temperatures and stream bank stabilization to reduce sedimentation.

Because of the close proximity of streambanks to surface water flow, there is considerable potential for sediment delivery to streams during the first year or two following construction

activities. Whenever in-channel work is done, water would be diverted around the construction zone in a pipeline. The construction zone would be isolated with upstream and downstream barriers made of sandbags in combination with membrane water barriers. Pumps would typically be employed just downstream of the upstream barrier to insure the effective de-watering of the construction zone. Construction of this type would be done during the driest months of the year (July, August, and September) to minimize the possibility of flooding the construction area. Construction during this period also has the least impact upon resident and migratory fish.

After earthwork is completed, additional BMP's for erosion control would be employed. For instance, jute matting, coir logs, fascines, and/or hydro seeding (native wetland mix) would be used. Temporary irrigation may be employed through the first summer and fall to ensure a high-degree of survival of grass, forbes, shrubs, and tree plantings. All of these BMP's are designed to minimize erosion and subsequent sedimentation processes. All disturbed stream bottom area would be restored to clean gravel or cobble. In areas where the stream bottom disturbance results in potential deposition of fine grain materials, suitable clean rounded gravel would be placed over the stream bottom to maximize downstream sediment transport during subsequent wet seasons.

Riparian planting projects differ from stream restoration in that no disturbance occurs within the channel except the upper portion of streambanks. Treatments would include the planting of willow stakes and containerized stock such as Sitka spruce, western hemlock, western red cedar, Pacific ninebark, salmonberry, red osier dogwood, and other species. Except for the willows and dogwoods, the remaining species would be planted at or above the ordinary high water mark. As the result of the noninvasive techniques used in riparian plantings, no significant short-term impacts are expected. Over the long term, substantial fishery benefits would accrue. The tree and brush canopy would provide some cover and reduce the incidence of high summer water temperatures which are potentially harmful to fish. Eventually, wood fall into the stream would provide a permanent supply of large woody debris, offering habitat complexity beneficial to fish species.

The Basin Plan recommends the establishment of an invasive-species control program. This program would result in an inventory and operations manual for use in annual control plans. A number of the CIP projects involve removal of reed canary grass as a major component. This exotic species is highly invasive, particularly in shallow, inundated areas. In the past, severe infestations appear to have blocked fish migration into Lacamas Creek and within portions of the Main Stem of Muck Creek. Reduced channel capacity has also led to flooding in the Roy area.

Temporary impacts would occur during and shortly following grass removal projects. Physical excavation would mobilize sediments which would cause temporarily high turbidity and likely redeposit a short distance downstream. Use of a herbicide would cause a temporary spike in the concentration of this contaminant in the water. All these effects would be temporary, generally lasting no more than a few days or weeks following completion of the project. Herbicides would be a short-lived type, such as Rodeo, approved by the State Department of Ecology for use in streams. As a result of the increased channel capacity following the project, deposited sediment would tend to flush out of the stream system during higher winter flows and should generally be gone within a few years.

A proven method for permanent suppression of reed canary grass is to shade it out with a thick overhead canopy. Therefore, riparian plantings proposed for the restoration projects would be the key to permanent elimination of reed canary grass from a project site. A

conifer (evergreen) canopy is the most effective, but willow plantings and native brush species would also suppress the grass.

Most of the riparian restoration projects would involve the installation of fencing to keep livestock away from streams. The installation of the fencing would have minimal stream impact. In addition to water quality benefits, fish habitat would be enhanced by the protection of streamside vegetation. Grazing livestock often eat riparian vegetation. It is common to have entire riparian communities stripped of all vegetation over time. Collapsed streambanks represent serious damage to salmon habitat. The physical damage resulting from livestock access to streambanks and channels would be largely eliminated. Stream habitat, both onsite and downstream, would improve. Some projects may allow for continued stream access for livestock. In these cases the access would be limited to short lengths of stream where the banks have been reconstructed to resist erosion, minimizing downstream sedimentation.

Implementation of the Basin Plan would result in long-term benefits to fish habitat within the Muck Creek Basin. Short-term impacts would be minor and would last only a short period following construction. No significant adverse environmental impacts are likely.

### **No Action Alternative**

Under the No Action Alternative, riparian restoration and reed canary grass abatement projects would continue to be carried out by Fort Lewis and by the Pierce Conservation District. As a result, improvements in fish habitat would occur in the Basin. However, problems with habitat degradation and channel blockage by reed canary grass are expected to continue. This has been a particular problem in Lacamas Creek near Roy. Permanent control of reed canary grass will only occur through extensive revegetation of the streambanks and riparian area with trees which provide permanent stream shading. Recurring maintenance during the first years following revegetation is also necessary to assure survival of the new plants to a point where they can out-compete the reed canary grass. The current level of stream and riparian restoration is not sufficient to meet this need.

Long-term impacts to streambanks and habitat due to widespread livestock access to streams in the Basin are expected to continue. The absence of streamside vegetation and the accelerated input of sediment would continue to result in degraded fish habitat.

Short-term impacts and mitigation measures associated with capital facilities projects listed in the 1991 CIP are similar to those discussed under the Basin Plan Alternative. Significant adverse environmental impacts may occur from lack of activity.

## **Vegetation**

### **Affected Environment**

The plant communities in the Muck Creek Basin can be grouped into four habitat types: conifer forests, oak/mixed oak woodlands, prairies and riparian/wetland. Brief upland habitat descriptions are as follows. Further information can be found in Section 4.7.

Conifer Forests. Three semi-distinct forest types are contained within the Basin; western red cedar, Douglas fir, and ponderosa pine.

The western red cedar type occupies the moist soil regimes within the Basin, with hemlock scattered within this habitat type. The upper watershed is the area where it usually dominates.

Douglas fir dominates the majority of conifer habitats in the Basin at this time. This forest type grows in the variety of habitat conditions (soil moisture, topography) between the cedar and prairie ecotones. Douglas fir dominance within the Basin has increased at least in part due to the absence of burning practices once used to maintain the prairie habitats. This encroachment has reduced the amount of the unique prairie habitat within the Basin.

Scattered ponderosa pine forest types are present in ridge lines with pure stands accompanying dry soil conditions associated with prairie habitats. They are primarily adjacent to or within the borders of the Fort Lewis Military Reservation. These unique ponderosa pine stands are the only native stands in Western Washington.

Nearly all of the Basin's historical conifer forests are either in second growth or have been lost to agricultural and residential land uses.

Oak/Mixed Oak Woodlands. Oak woodlands range from communities of pure Oregon white oak to a mix of oak, conifer, and deciduous trees. Pure oak stands are found on the prairie edges.

Prairies. Traditional prairie habitat exists in the Basin, but in limited quantities. It is found in areas of dry soils, mostly within or adjacent to Fort Lewis lands. Land development, primarily agricultural forms such as dairies and pasture uses for livestock, have modified the traditional prairie vegetation species. As stated above, fire suppression within the Basin has resulted in the encroachment of Douglas fir, resulting in a substantial reduction in prairie habitat over the past half century or more.

Riparian/Wetland. Riparian, or stream-associated habitat lies along many of the streams within the Basin. Wetlands can be found throughout the Basin (see Figure 4-1). They are often associated with the streams. However, large numbers of wetlands occur within topographic depressions which can pond during the Wet Season. This habitat is particularly productive for wildlife and there are County regulations to protect it from development. However historic agricultural practices and past development have greatly reduced both the quality and the amount of this habitat.

Agriculture and fire suppression have significantly modified the species composition in the Basin. With these changes in land use invasive plants have establish themselves throughout the Basin, most notably Scot's broom and bent grass.

The Muck Creek Basin contains White-top Aster (*Aster curtus*), a Washington Sensitive Species and federal Candidate Species. Four other state sensitive species occur within the Basin, they are: 1) bristly sedge, 2) green-fruited sedge, 3) small flowered trillium, and 4) golden paintbrush.

## **Significant Impacts and Mitigation Measures**

### **Proposed Action**

Many of the CIP projects involve upgrades to the local ditch and culvert drainage system and would have minimal impacts on vegetation. The culvert upgrades proposed for several of the stream road crossings may impact some riparian vegetation adjacent to the creek. These disturbed areas would be restored and revegetated upon construction completion.

Two infiltration basins (CIP12MS-INF02 and CIP12NF-INF01) are proposed. More than half of this area is occupied by second growth forest, predominantly Douglas fir. This is a very common vegetation type in the Basin and its removal would not have significant impacts to its overall abundance.

CIP projects involve upgrading or restoring a riparian buffer up to approximately 14,000 linear feet of stream. The actual amount will be determined by availability of funds and willing landowners. If fully implemented, this would result in potentially 5.6 miles of significant additional riparian area in the Basin. This type of habitat is badly lacking in Muck Creek Basin (as described in Section 10.3.2) and its establishment would have a substantial beneficial effect. Some of the CIPs are located in current or former prairie areas. Integration of oak woodlands and prairie vegetation complexes into the riparian restoration plans for these projects would be beneficial in light of the limited amount of this type of habitat.

The County would develop a plan for acquiring existing riparian areas, wetlands and associated springs in areas such as the upper portion of the North Fork, around Patterson Springs. Preservation of this environmentally sensitive area would be a beneficial effect of the Basin plan. The Plan would include processes for coordination with non-profit agencies.

Portions of some stream/riparian restoration projects lie partially within wetland areas. Their construction would likely impact wetlands temporarily. However, many of these areas have undesirable species such as reed canary grass or have been heavily impacted by livestock or other agricultural activity. The CIPs would be designed to enhance and restore wetland areas which are associated with the riparian buffers. This would, once again, result in a beneficial environmental effect. Also, the invasive-species control program recommended in the Plan would significantly improve opportunity for native species growth within the Basin.

CIP12LC-RD01 would involve raising the road grade through an existing wetland for a distance of up to 1,700 feet. Implementation of this project would result in the permanent loss of wetlands. Alternatively, low, vertical walls could be used to minimize or perhaps avoid wetland loss. Pierce County regulations require that lost wetland be replaced. Should this CIP proceed, a wetland mitigation plan will be developed to assure that there are no significant impacts.

Overall, no significant adverse impacts to vegetation are expected to occur.

### **No-Action Alternative**

Development will generally continue at the rural densities currently seen within the Muck Creek Basin. Major changes in the vegetation patterns resulting from long-term development in the Basin are not likely to occur, except possibly in the developing Graham area in the northeast portion of the Basin. The past trend of transition of prairie areas to forest may continue to occur. Some increase in riparian and wetland habitat will occur as a result of current County and Fort Lewis restoration efforts, although at a slower rate than under the Basin plan. Significant and Mitigation Measures of capital facilities projects are similar to the Basin Plan Alternative.

## Wildlife

### Affected Environment

The Muck Creek Basin yields a mosaic of wildlife habitat. The variety of habitat types results from the marine influence off Puget Sound, the glacial plains (soils) and associated vegetation, and various hydrological and topographic features in the Basin.

In the Muck Creek Basin there are: 53 mammal species, 164 bird species, 9 reptile species, and 11 amphibian species. Black bear, cougar, blacktail deer, elk, raccoon, coyote, and a variety of bats and rodent species commonly inhabit the forests. Prairie habitats provide food and cover for small to medium sized mammals such as mice, shrew, voles, cottontail rabbits, and coyotes with occasional blacktail deer. Oak woodlands offer critical habitat for band-tail pigeons, western gray squirrel and great-horned owls.

Prairie habitat contains raptors of several species (redtail, northern harrier, etc.) to the American robin to the migrant violet-green swallow. Waterfowl, primarily geese and ducks, inhabit prairie communities as foraging grounds. Of particular interest is the recovering Western bluebird population, a state designated Monitor Species, within the Basin. Extensive nesting box management has helped provide adequate nesting habitat for this species, which depends greatly upon open grasslands (prairies) to forage.

A number of species are in decline and have special state or federal designation, also referred to as Species of Concern. These include 3 mammal, 9 bird, 1 reptile, and 2 amphibian species. The peregrine falcon, bald eagle, northern spotted owl and marbled murrelet are federally listed as threatened species. Further information can be found in Section 4.7 of the Basin Plan.

### Significant Impacts and Mitigation Measures

#### Proposed Action

Adoption and implementation of the Basin Plan would not have a major negative effect upon the habitat conditions within the Muck Creek Basin (See Section 10.3.3.2 of the Plan). The Basin Plan would result in the permanent removal of a small amount of upland forest which is in plentiful supply within the Basin, would also result in improvements in the quality and amount of critical habitats, particularly wetlands and riparian areas. Animals dependant upon these areas would likely benefit.

No significant adverse impacts to wildlife are expected to occur as a result of implementation of the Basin Plan.

#### No-Action Alternative

Long-term development will for the most part remain at the rural levels currently seen in the Basin. Some decrease in wildlife numbers may occur, particularly in the Graham area, where much of the future Basin development is likely to be concentrated. As the prairie areas continue to decline, wildlife associated with this habitat can be expected to decline, also.

No significant adverse impacts to wildlife are expected to occur as a result of the No Action Alternative.

# Land and Shoreline Use

## Affected Environment

### Land Use

Existing land uses within the Basin are primarily of a rural residential character. The Basin is within the designated Rural area of the Pierce County Comprehensive Plan (Comprehensive Plan) which was prepared pursuant to the State Growth Management Act (RCW 36.70A). Approximately 25% of the Basin is within the jurisdiction of Ft. Lewis, a very small portion is within the City of Roy. Approximately 32% of the remaining Basin area was shown as residential development on 2001 County maps of existing land use, with another 37% being, agricultural, resource and open space lands. The zoning map for the area, developed as part of the Comprehensive Plan shows that almost 53% of the Basin is zoned "Rural 10" (maximum of 2.5 units per 10 acres, if 75% of the property is designated as open space), 11.2% is zoned "Rural 5" (maximum density of 2 units per 5 acres when 50% of the land is designated as open space), and 9.3% is zoned "Agricultural" (maximum residential density of one unit per 10 acres). A small portion of the Basin (0.6%) is zoned "Reserve Ten", in the northern area of Graham. This designation is to recognize lands at the edge of the Urban Growth Area, that might become "Urban" in the future. Although the maximum density allowed while it is "Rural" is one unit per 10 acres, the maximum lot size if it is subdivided is 12,500 square feet in area. The remainder of the tract is to be set aside for future development. Zoning maps designate approximately 0.8% of the Basin as commercial use areas.

The amount of existing impervious surface area within the Basin, estimated from the maps of existing land use (Figure 4-3 in the Plan), averages 7.3% (including Ft. Lewis and Roy). Impervious surface area calculations, performed for the four main sub-basins (Muck Creek Mainstem, Lacamas, South Fork Muck Creek, and North Fork Muck Creek) range from an average of 6.3% to 10%. The highest density development is around Roy (12%) and Graham (10%). If the Basin were to be developed in accordance with existing zoning, calculations indicate that impervious surface areas should increase by only 1.6%.

### Shoreline Master Program and Shoreline Management Use Regulations

Approximately 6 miles of the South Fork of Muck Creek, starting in the SW 1/4 of Section 8, Township 17 North, Range 4 East and ending at the Ft. Lewis boundary, are subject to Pierce County Shoreline Management Use Regulations. The stretch of creek has been designated as "Rural", which is a designation intended to protect agricultural land from urban expansion, restrict intensive development along undeveloped shorelines, and encourage the preservation of open spaces and opportunities for recreational uses compatible with agricultural activities (Shoreline Master Program for Pierce County, 1974).

A very short stretch of Muck Creek, at the city limits of Roy, extending to Muck Lake is designated as Rural-Residential, as is Muck Lake (Shoreline Master Program for Pierce County). The Rural Residential Environment designation is assigned to allow for a natural transition between sometimes incompatible intensive land uses of urban area and the agricultural uses, recreational uses, and open space found in the rural environment (Shoreline Master Program for Pierce County). Construction activities within the defined shoreline jurisdiction are subject to review and permitting requirements of the Pierce County Shoreline Management Use Regulations, Title 20 of the Pierce County Code.

## Comprehensive Plan

The Comprehensive Plan for Pierce County Washington (Comprehensive Plan) contains land use and planning policies. The following planning and stormwater management policies are derived from Comprehensive Plan policies:

- Provide urban level facilities and services only within the designated Urban Growth Area.
- Maintain the adopted level of service standard (LOS) for stormwater facilities. According to the Capital Facilities Element of the Comprehensive Plan, stormwater conveyance is to be designed for a 25-year, 24-hour design storm. Holding facilities for runoff are to be designed for a 100-year, 24-hour design storm or a 100-year, 7-day design storm, whichever result in a larger facility. Water quality treatment is to be designed for a 6-month, 24-hour design storm. Stormwater runoff projections used for forecasting future stormwater facility and identifying non-structural alternatives in the basin plans are based on the LOS in the Comprehensive Plan.
- Maintain compatibility between facilities and adjacent land uses.
- Foster and retain community character.
- Nonstructural measures should be preferred over structural measures.
- Involve the public and others with a stake in the outcome in water quality and stormwater management planning.
- Use of natural drainage systems for runoff is preferred over construction of facilities.
- Manage and plan water resources on a watershed basis.
- Support community education to conserve water resources.
- Provide for buffers of undisturbed vegetation in all new facility developments next to streams, ponds, lakes and Puget Sound.
- Pursue public acquisition of critical fish and wildlife habitat areas.
- Map all flood hazard areas.
- Maintain existing flood control structures on Pierce County rivers and streams.
- Evaluate the effectiveness of existing requirements for on-site stormwater retention and detention and revise where flooding issues are not adequately addressed.
- Pursue public acquisition of flood hazard areas.
- Protect, conserve and enhance the historic and cultural heritage of Pierce County.
- Upgrade and maintain existing capital facilities.

## Significant Impacts and Mitigation Measures

### Proposed Action

Implementation of the Basin Plan would not be expected to significantly impact land or shoreline use in the Basin. The recommendations of the Basin Plan are consistent with or do not interfere with the policies and guidance provide above. No significant adverse impacts or cumulative impact to land or shoreline use are expected to result from the implementation of the recommendations in the Basin Plan.

### No Action Alternative

Implementation of the No Action Alternative would not significantly impact land use in the Basin. However, there is an inherent inconsistency of the action recommended in the 1991 Plan (“No Action”) in that the document was prepared before the County adopted its current Comprehensive Plan. The “No Action” Alternative would continue that inherent inconsistency.

## Aesthetic, Historic and Cultural Resources

### Affected Environment

The Muck Creek Basin contains several aesthetic views of both natural and manmade features, particularly those properties that overlook lakes and river valleys and other water bodies. The Basin also includes several parks and natural areas that provide views and open space. Two parks are located in the Basin: Frontier County Park and Roy Street Park. A search of the Office of Archaeology and Historic Preservation’s (OAHP) database was conducted to determine if any areas within the Muck Creek Basin were registered as historic places. No federal or state listings were found to occur within the Basin. The Pierce County Historic Preservation Program Coordinator was contacted to determine if any properties within Muck Creek Basin were listed in the Pierce County Register of Historic Places; no listed properties were found. In addition, the Pierce County Cultural Resources Inventory was searched for properties within Muck Creek Basin. That search did not identify any properties that are listed in the Pierce County register, but did identify 70 properties that are eligible to be listed in the Pierce County register. No known cultural resources are located within the Muck Creek Basin.

## Significant Impacts and Mitigation Measures

### Proposed Action

The Basin Plan includes a collection of recommendations to manage stormwater within the Muck Creek Basin. Many of these recommendations include regulatory action, stormwater BMPs, studies and public education programs that would likely not affect aesthetic, historic, and cultural resources in the Muck Creek Basin. The proposed Capital Improvement Program (CIP) includes a list of specific projects, ranging from culvert improvements to stream/riparian habitat improvements that would involve some type of construction activity. Culvert replacement and curbing would not cause significant impacts. Stream and riparian habitat restoration would add vegetation alongside water bodies and would improve the aesthetic views of those areas. The three proposed infiltration ponds would remove vegetation, generally second-growth forest. This would have a short-term impact. However, these sites would be revegetated and landscaped, as appropriate, to mitigate any aesthetic impacts. No significant adverse impacts to park views are expected.

No known cultural resources are located in the Muck Creek Basin. However there is a potential to encounter cultural resources during construction. If any cultural resources are

discovered during construction activities, the County would immediately consult with the OAHP in Olympia and other appropriate officials regarding appropriate measures. These would include conducting investigations of cultural resources that could be affected on the project site and identifying appropriate mitigation prior to proceeding with any work that could adversely affect cultural resources.

### **No Action Alternative**

Under the No Action Alternative, stormwater would continue to be managed in the Muck Creek Basin as it is today. A limited number of culvert upgrades would eventually be constructed. No significant adverse impacts to Aesthetic, Historic, or Cultural resources would be expected. If any cultural resources are discovered during construction activities, the County would immediately consult with the OAHP in Olympia and other appropriate officials regarding appropriate measures.

## **Public Services and Utilities**

### **Affected Environment**

#### **Schools**

The project area is served by the following school districts: Bethel School District, Eatonville School District, and a small portion of the Orting School District. Although attendance boundaries have been established for schools within these districts, students may attend other schools within the system. The service area of each school varies with the area's population density and the schools grade level. The majority of Muck Creek Basin lies within the Bethel School District.

Medical services within Muck Creek Basin are limited to fire stations, which generally consist of fire fighters/paramedics and ambulances that transport patients to nearby hospitals. No hospitals exist within the Muck Creek Basin. The nearest hospitals include the Madigan Army Medical Center (located on Fort Lewis just south of Lakewood), Saint Clare Hospital in Lakeview, and Good Samaritan Community Hospital in Puyallup.

Fire protection and other emergency services within the Muck Creek Basin are provided by Pierce County Fire Districts #17 and #21. District #17 has two fire stations within the Muck Creek Basin, which includes its headquarters located in the City of Roy, and another station located near 8<sup>th</sup> Ave. South and 298<sup>th</sup> Street South. Graham Fire and Rescue (District #21) has a total of 5 fire stations, including its headquarters, which is located at Mountain Highway and 340<sup>th</sup> Street East, within the Muck Creek Basin.

Police protection within the Muck Creek Basin is provided by the Pierce County Sheriffs Department. The Roy Police Department in cooperation with the Mountain Detachment police station serves the entire Muck Creek Basin, including Graham, Roy, and South County areas. The Roy Police department is located in Roy (within the Basin), the Mountain Detachment station is located just outside the Muck Creek Basin, near the corner of 404<sup>th</sup> Street East and Meridian Avenue East (SR 161). The Mountain Detachment consists of a sergeant, deputies, and an office assistant.

#### **Water**

Domestic drinking water and fire protection water within the Muck Creek Basin is provided by the McKenna Water District, Rainier View Water Company, Roy Water Company Inc., the City of Roy and Graham Hill Mutual Water Company Inc. The Roy and Graham Hill systems are the two largest in the Basin and are discussed in more detail in Section 4.4. Drinking water within the Muck Creek Basin comes from three watersheds: Naches, Duwamish, and

Puyallup. It is important to mention that many of the residents within the Muck Creek Basin utilize private wells as a source for drinking water.

### **Solid Waste**

Solid waste collection and recycling within the Muck Creek Basin is provided by three different franchises. The majority of the Basin is served by Pierce County Refuse (LeMay Enterprises). The portion of Muck Creek Basin which includes Fort Lewis, is served by Fort Lewis. A small portion of the eastern edge of the Basin is served by Murrey's Disposal. The solid waste collection rates and services are regulated by the Washington Utilities and Transportation Commission (WUTC). One solid waste landfill is located within the Muck Creek Basin, at 304<sup>th</sup> Street and Meridian Ave. East (SR 161). The Land Recovery Inc., landfill takes non-municipal solid waste including industrial, inert and demolition wood waste, and other types of non-hazardous solid wastes.

### **Electrical Power**

Energy within the Muck Creek Basin is provided by Puget Sound Energy (PSE) and Tacoma Power.

### **Natural Gas**

Natural gas is supplied to portions of the Muck Creek Basin by PSE.

### **Telecommunications**

A variety of cellular communication towers exist within Pierce County, however, none of the cellular towers are located within the Muck Creek Basin. Cable television service is provided by AT&T Broadband. Telephone service within the Basin is provided by QWEST.

## **Significant Impacts and Mitigation Measures**

### **Proposed Action**

Implementation of some of the CIP projects would have short-term impacts upon public safety. The culvert upgrade projects and several of the local drainage projects would require road construction. Local roads may be shut down for limited periods of time during construction. However, this is not expected to last for more than a few days. Long-term public safety would be enhanced as a result of these projects. The incidence of road flooding and closures during the rainy season within the Basin would be substantially reduced. The elimination of nuisance ponding conditions would also benefit public safety and mobility in the Basin.

Because the Basin is outside the Urban Growth Area, designated by the Pierce County Comprehensive Plan, sanitary sewer service will not be extended without a Comprehensive Plan amendment.

The Plan recommends the construction of two groundwater infiltration basins. These basins would be constructed in the same areas where stormwater currently infiltrates, but would result in more controlled conditions, eliminating flooding problems. As a result, no significant impact upon the groundwater aquifers or the water systems that draw from these aquifers, would occur.

The Proposed Action would have no adverse significant impacts upon public services or utilities.

**No Action Alternative**

Under the No Action Alternative, up to four undersized road culverts, including one along SR 161, would be replaced. This would reduce the incidence of road flooding in the Basin and improve emergency services such as medical, police and fire. However, other existing road flooding problems would continue to impact emergency services during periods of high rainfall. No significant adverse impacts to public services and utilities are expected.

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## Distribution List

- Washington State Department of Ecology
- City of Roy
- Ft. Lewis
- Nisqually Tribe
- Pierce Conservation District
- Nisqually River Council
- Graham Community Planning Board
- Graham Land Use Advisory Commission
- Pierce County Library
- Washington State Department of Transportation
- Pierce County Transportation Services Division
- Washington State Department of Fish and Wildlife
- David Stroud, FEMA
- Kirk Sinclair, Washington State Department of Ecology
- Pierce County Master Builders Association
- Tahoma Audubon
- Jim Harpel
- Cindy Byrd
- Laurie Bischof
- Leland Weaver
- Buck McFadder
- Michelle Berryessa
- Herb Stumpf
- Dick Rough
- Linda Keen
- Bob DuBois
- Bud Rehberg
- Gineua Tuller
- Perkins
- Steve Thomas
- Joyce Moss
- Bryan Dorner
- Viki Steiner
- Barbara A. Rice
- Warren Olsen
- Donna Thompson
- Gerald Harlow
- Mark Weed
- Jeanette Dorner
- Roy Lampson
- Lucille Hart
- Box Holder
- Danny Rouser
- Tony Rotinlo

- L Schilter
- Don Olsen
- Arlene Haveland
- John Coulthard
- Dan Cardwell
- Dave Clouse
- George Walter
- Steve Wamback
- Don Clever
- Norma E. Woodward
- Linda Stumpf
- Bob & Becky Anderson
- Roger & Chris Dinelt
- Lee & George Cathcart
- Allan Malcom
- John Marshall
- Chip Nevins, Cascade Land Conservancy