

# *2008 Stormwater Needs Assessment*

## **Executive Summaries**



Clark County Clean Water Program  
*Protecting water through stormwater management*





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# 2007 Stormwater Needs Assessment Program

## Executive Summaries

Clark County Public Works Clean Water Program





# 2007 Stormwater Needs Assessment Program

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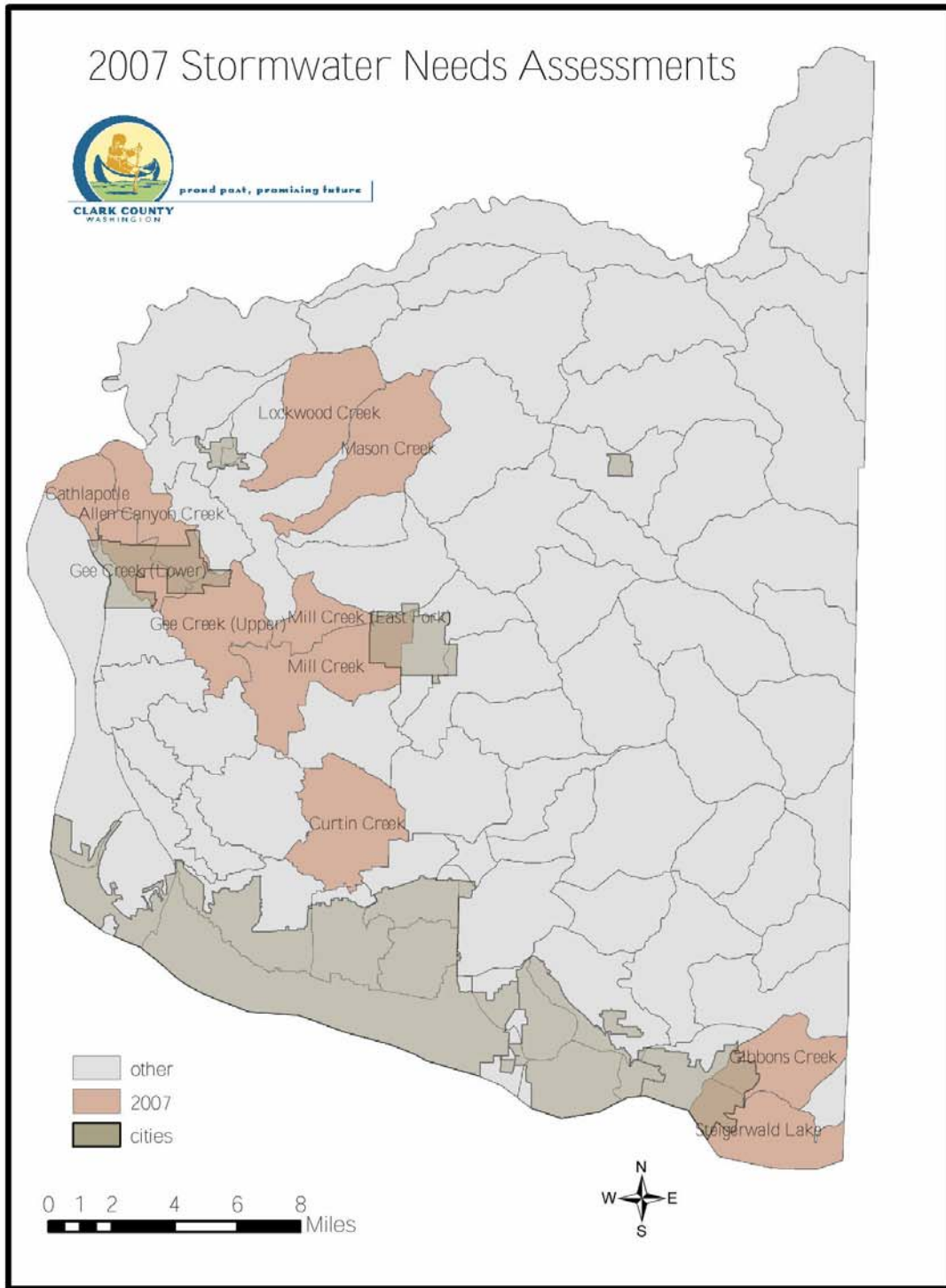
# 2007 Stormwater Needs Assessment Program

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# 2007 Stormwater Needs Assessment Program

## Map of Subwatersheds Assessed in 2007



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# 2007 Stormwater Needs Assessment Program

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## Allen Canyon Creek Executive Summary

### Study Area

This Stormwater Needs Assessment report includes the Allen Canyon Creek subwatershed in northwestern Clark County, a tributary to the Lewis River.

### Intent

Stormwater Needs Assessment reports compile summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. The assessments are conducted at a subwatershed scale, providing a greater level of detail than regional Water Resource Inventory Area (WRIA) or Endangered Species (ESA) plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

### Findings

#### Watershed Conditions

The table on the following page summarizes conditions in the Allen Canyon Creek watershed based on available data, including water quality, biological health, habitat, hydrology, and the stormwater system.

#### Ongoing projects and involvement

There are no Clark County Clean Water Program stormwater projects in Allen Canyon Creek under the 2007-2012 Stormwater Capital Improvement Program.

The Clark County Legacy Lands Program and Conservation Futures are active in the subwatershed through property acquisition projects near Mud Lake.

There are currently no major projects sponsored by other regional entities such as Lower Columbia Fish Recovery Board, Clark Public Utilities, Clark County Transportation Improvement Program, and the Department of Ecology.

## 2007 Stormwater Needs Assessment Program

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Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	Poor (based on model prediction) Unknown Unknown Unknown
<b>Biological</b> Benthic macroinvertebrates Anadromous fish Resident fish	Unknown Presumed presence of Coho and winter steelhead, below Mud Lake only; low regional recovery priority Unknown
<b>Habitat</b> Reference condition NOAA Fisheries criteria Riparian Wetland	No available reference habitat data Forest cover, road density, and impervious area percentage fall into the Non-Functioning category Riparian forest canopy largely intact from mouth to 289 <sup>th</sup> Street Invasive vegetation predominant as understory Uplands largely cleared Primarily limited to narrow, near-stream floodplains
<b>Hydrology and Geomorphology</b> Overall hydrology Channel stability Future condition	No hydrology data available Often dry or very low summer flows above Mud Lake Generally stable, with simplified stream geometry Projected impervious area in headwater areas will cause increased rate of channel incision unless adequate runoff controls are in place
<b>Stormwater (Unincorporated areas)</b> System description Inventory status System adequacy Condition	Infrastructure is minimal; primarily field drains and road-side ditches I-5 and NW 289 <sup>th</sup> Street contribute a significant percentage of overall stormwater 8 stormwater facilities currently mapped, all private Complete (estimated >95 percent) Adequate control and inadequate treatment Projected impervious area indicates need for updated control standards with considerable investment in new infrastructure, particularly in headwater areas Condition largely undocumented, presumed good

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Projects listed in the SNAP report represent only a small part of those required to protect and restore Allen Canyon Creek. Immediate priorities based on current conditions and local program capabilities are listed. Numerous opportunities exist for stormwater-related watershed improvement, including the following:

- Focused stormwater outreach and education to streamside landowners, particularly along NW 41<sup>st</sup> Avenue north of 289<sup>th</sup> Street, regarding livestock access, riparian enhancement, and limitation of vehicle crossings
- Consider use of WSDOT Clean Water fees to address a failing outfall within the I-5 corridor.
- Evaluation of potential wetland enhancement or advanced mitigation projects within tax-exempt parcels
- Evaluation of one potential stormwater detention facility location
- Technical assistance visits to landowners with potential source control and water quality ordinance issues.
- Promotion of riparian enhancement projects

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to the Allen Canyon Creek watershed include:

- Encourage the use of Low Impact Development techniques for new development
- Confirm that county ditch maintenance practices minimize vegetation removal; provide education for private landowners on appropriate ditch maintenance.
- Replace missing or deteriorated stream name signs at road crossings.
- Encourage removal of invasive plants and riparian restoration through education, technical assistance and/or financial assistance.
- Emphasize conservation of undeveloped and forested areas
- Promote protection of first-order tributary streams. Consider the use of habitat buffers, establishment of conservation easements, and increased control of existing stormwater and agricultural runoff.
- Encourage soil conservation practices to reduce sediment and nutrient loads to the MS4 from agricultural lands.

## 2007 Stormwater Needs Assessment Program

**Table 5. Likely Water Quality Concerns, Sources, and Solutions for Allen Canyon Creek**

<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential WC Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps	<b>Storm sewer screening for source identification and removal</b>
		livestock, wildlife	overland runoff storm sewers/ditches direct access	<b>Education programs</b> Agricultural Best Management Practices Septic system inspection and maintenance
Water temperature	Salmonid rearing (anadromous)	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b>
	Salmonid spawning and rearing (resident)	ponds	direct solar radiation stagnation	<b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b>
		low summer flows	decreased resistance to thermal inputs	<b>Education programs</b> Pond removal or limitation
Turbidity	Salmonid spawning, rearing, and migration; Aesthetic enjoyment	<i>erosion (development projects; land clearing; cropland; impervious surfaces; channel erosion)</i>	overland runoff storm sewers/ditches channel dynamics	Erosion control regulations <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices Stream bank stabilization/rehabilitation
		algae	in-stream growth due to excess nutrients	<b>Storm water outfall/facility retrofits to reduce flow-induced channel erosion</b>
Total phosphorus	Aesthetic enjoyment	natural groundwater	groundwater seeps	Erosion control regulations
		fertilizers (Tri-Mtn golf course and other sources)	overland runoff storm sewers/ditches	Septic system inspections and maintenance <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b>
		erosion	(see turbidity)	Agricultural Best Management Practices
		livestock, wildlife	(see bacteria)	<b>Education programs (reduced fertilizer use)</b>
		failing septic systems	(see bacteria)	

# 2007 Stormwater Needs Assessment Program

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## Curtin Creek

### Executive Summary

#### Study Area

This Stormwater Needs Assessment report includes the Curtin Creek subwatershed, tributary to Salmon Creek in west central Clark County.

#### Intent

Stormwater Needs Assessment reports compile summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. The assessments are conducted at a subwatershed scale, providing a greater level of detail than regional Water Resource Inventory Area (WRIA) or Endangered Species Act (ESA) plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

#### Findings

##### Watershed Conditions

The table on the following page summarizes conditions in the Curtin Creek subwatershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

##### Ongoing activities and involvement

Clark County CWP participates in the Total Maximum Daily Load (TMDL) process through implementation of the National Pollution Discharge Elimination System (NPDES) permit, provides water quality monitoring, and supports various local organizations working within the Curtin Creek area. The watershed continues to benefit from the efforts of these groups.

Clark County is currently constructing a large stormwater facility to meet a variety of stormwater management requirements. The stormwater facility referred to as Curtin Creek Enhancement Area Project is in the Curtin Creek subwatershed east of NE 72<sup>nd</sup> Avenue and south of NE 119<sup>th</sup> Street. The facility is constructed to meet the stormwater requirements of two major road projects, St. Johns Road (NE 50<sup>th</sup> Avenue to NE 72<sup>nd</sup> Avenue) and NE 72<sup>nd</sup> Avenue (NE 99<sup>th</sup> Street to St. Johns) with substantial residual capacity. Potential uses include providing stormwater capacity for additional county road projects or for private commercial/industrial development.

There are also several potentially significant Transportation Improvement Program (TIP) projects on the County's Capital Improvement Program (CIP) list within Curtin Creek subwatershed, including NE 99<sup>th</sup> Street (72<sup>nd</sup> Avenue to NE 94<sup>th</sup> Avenue), NE 99<sup>th</sup> Street (NE 94<sup>th</sup> Avenue to SR-503), NE 94<sup>th</sup> Avenue (Padden Parkway to NE 119<sup>th</sup> Street).

# 2007 Stormwater Needs Assessment Program

Category	Status
<p><b>Water Quality</b></p> <p>Overall</p> <p>Fecal coliform bacteria</p> <p>Temperature</p> <p>Sediment</p>	<ul style="list-style-type: none"> <li>• Poor</li> <li>• Curtin Creek has Category 5 (requiring TMDL for DO and pH) and Category 4 segments (included in Salmon Creek fecal coliform TMDL).</li> <li>• Out of compliance with the state criterion (100 cfu/100mL).</li>   <li>• Among the cooler streams monitored by Clark County</li> <li>• No data</li> </ul>
<p><b>Biological</b></p> <p>Benthic macroinvertebrates</p> <p>Anadromous fish</p> <p>Resident fish</p>	<ul style="list-style-type: none"> <li>• Moderate to poor biological integrity</li> <li>• Presumed use by Coho.</li> <li>• Moderate regional recovery priority (LCFRB Tier 4).</li> <li>• Unknown</li> </ul>
<p><b>Habitat</b></p> <p>NOAA Fisheries criteria</p> <p>Riparian</p> <p>Wetland</p>	<ul style="list-style-type: none"> <li>• Forest cover, road density, and impervious area percentage fall into the Non-Functioning category.</li> <li>• Stream crossing density falls into the Functioning category</li> <li>• Very limited large woody debris recruitment potential.</li> <li>• Very low overall shade</li> <li>• Excellent wetland restoration potential exists throughout the floodplain areas downstream (north) of NE 90<sup>th</sup> Street.</li> </ul>
<p><b>Hydrology and Geomorphology</b></p> <p>Overall hydrology</p> <p>Future condition</p>	<ul style="list-style-type: none"> <li>• Relatively good; typical of a mixed rural/urban or unforested rural watershed</li> <li>• Significant groundwater component especially downstream of NE 119<sup>th</sup> Street.</li> <li>• Projected impervious area should remain at levels that do not result in significant alteration of hydrologic conditions.</li> </ul>
<p><b>Stormwater (Unincorporated areas)</b></p> <p>System description</p> <p>Inventory status</p> <p>System adequacy</p> <p>System condition</p>	<ul style="list-style-type: none"> <li>• The stormwater conveyance to Curtin Creek and its tributaries is mainly via piped outfalls that drain treated stormwater from engineered stormwater treatment facilities or untreated stormwater directly from the source.</li> <li>• 85 publicly owned stormwater facilities</li>   <li>• 80%+ of stormwater infrastructure mapping is completed</li> <li>• Likely inadequate treatment.</li>   <li>• No outfall screening was performed.</li> <li>• 80% of facility objects in compliance with maintenance standards at the time of assessment</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Projects listed in the SNAP report represent a small part of those required to protect and restore Curtin Creek. Potential project opportunities were identified based on the results of the Feature Inventory conducted in the Curtin Creek subwatershed. Immediate priorities based on current conditions and local program capabilities are listed. Numerous opportunities exist for stormwater-related watershed improvement, including the following:

- Focused outreach.
- Several stormwater facility capital improvement projects to provide flow control and water quality treatment.
- Repair and maintenance of existing stormwater infrastructure.
- Large-scale channel/watershed restoration project opportunity.
- Inspection of five (5) problem areas to address flooding hazard, erosion/sediment transport into stream.
- Potential capital improvement projects including ditch retrofits, swale retrofits, riparian enhancements, and flow control facilities.
- Updates to stormwater infrastructure database.
- Identification of several Referral Projects for other Groups/Agencies.

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to the Mill Creek subwatershed include:

- Seek coordination and leveraging opportunities with groups and agencies active in Curtin Creek improvement.
- Encourage the use of Low Impact Development techniques for new development.
- Confirm that county ditch maintenance practices minimize vegetation removal; provide education for private landowners on appropriate ditch maintenance.
- Encourage removal of invasive plants and riparian restoration through education, technical assistance and/or financial assistance.
- Promote protection of first-order tributary streams. Consider the use of habitat buffers, establishment of conservation easements, and increased control of existing stormwater and agricultural runoff.
- Pursue future collaborative stormwater activities between Clark County, Vancouver-Clark Parks and Recreation in the upper watershed.

## 2007 Stormwater Needs Assessment Program

**Table 6: Known Water Quality Concerns, Sources, and Solutions for Curtin Creek**

<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b> <b>Storm water facility designs/retrofits to optimize bacteria reduction (see Schueler, 1999)</b> Agricultural Best Management Practices Septic and sanitary sewer system inspection and maintenance
		sanitary sewer leaks	groundwater seeps storm sewers	
		livestock, pets, wildlife	overland runoff storm sewers direct access	
Dissolved Oxygen	Core summer habitat	high groundwater contributions	seeps	In-stream habitat enhancements
		limited oxygen entrainment	low stream gradient little turbulent mixing	
Inorganic nitrogen	Aesthetic enjoyment	groundwater	underlying geology	Agricultural Best Management Practices <b>Education programs</b> Septic and sanitary sewer system inspection and maintenance <b>Storm sewer screening for source identification and removal</b>
		fertilizers	overland runoff leaching to groundwater	
		leaking septic or sewer infrastructure	overland runoff storm sewers leaching to groundwater	

# 2007 Stormwater Needs Assessment Program

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## Gee Creek

### Executive Summary

#### Study Area

This Stormwater Needs Assessment report includes the upper Gee Creek, Gee lower Creek, and Cathlapotle subwatersheds in northwestern Clark County. Assessment effort focused on the unincorporated areas, primarily located in the upper watershed.

#### Intent

Stormwater Needs Assessment reports compile summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. The assessments are conducted at a subwatershed scale, providing a greater level of detail than regional WRIA or ESA plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

#### Findings

##### Watershed Conditions

The table on the following page summarizes conditions in the Gee Creek watershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

##### Ongoing Projects and Involvement

The Gee Creek Watershed Enhancement Committee, US Fish and Wildlife, Friends of Ridgefield Wildlife Refuge, local school children and landowners have adopted the cause of improving and protecting Gee Creek. The watershed continues to benefit from the efforts of these groups.

Major highway construction projects are underway at the 219<sup>th</sup> Street interchange and planned for SR502 between I-5 and Battle Ground.

There are currently no major projects sponsored by other regional entities such as Lower Columbia Fish Recovery Board, Clark County Legacy Lands Program, Clark Public Utilities, Clark County Transportation Improvement Program, and the Department of Ecology.

There are no Clark County Clean Water Program stormwater projects in Gee Creek under the 2007-2012 Stormwater Capital Improvement Program.

## 2007 Stormwater Needs Assessment Program

Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	<ul style="list-style-type: none"> <li>• Poor to Very Poor</li> <li>• TMDL required</li> <li>• Does not meet state criteria</li> <li>• High turbidity and higher than desirable sediment load</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish Resident fish	<ul style="list-style-type: none"> <li>• Low biological integrity</li> <li>• Very limited use; low regional recovery priority</li> <li>• Low cutthroat trout population</li> </ul>
<b>Habitat</b> Reference condition  NOAA Fisheries criteria  Riparian   Wetland	<ul style="list-style-type: none"> <li>• Overall habitat similar to a Category C (degraded) Willamette Valley reference stream</li> <li>• Forest cover, road density, and impervious area percentage fall into the Non-Functioning category</li> <li>• Forest cover limited to narrow bands along streams</li> <li>• Invasive vegetation predominant as understory</li> <li>• Large woody debris is limited with low recruitment potential</li> <li>• Primarily limited to near-stream floodplains</li> <li>• Potential headwater wetlands east of I-5</li> </ul>
<b>Hydrology and Geomorphology</b> Overall hydrology  Channel stability  Future condition	<ul style="list-style-type: none"> <li>• Impacted: typical of a flashy urban or unforested rural watershed</li> <li>• Most stream reaches are incised but relatively stable at present; many are susceptible to future erosion</li> <li>• Projected impervious area will cause increased rate of channel incision, bank failures, and accelerated channel migration in various areas unless adequate runoff controls are in place</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description  Inventory status System adequacy   Condition	<ul style="list-style-type: none"> <li>• Primarily field drains and road-side ditches, with limited piped infrastructure in headwaters and near I-5 corridor</li> <li>• 21 public and private stormwater facilities currently mapped</li> <li>• Incomplete (estimated 75 percent)</li> <li>• Inadequate control and treatment</li> <li>• Projected impervious area indicates need for updated control standards with considerable investment in new and retrofit infrastructure</li> <li>• 61 percent of public stormwater facility components in compliance with state standards at time of inspection</li> <li>• 86 public outfalls discharging to critical areas; one causing significant erosion</li> <li>• 115 stormwater outfalls inspected for illicit discharges; one significant bacteria source discovered and removed</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Projects listed in the SNAP report represent only a small part of those required to protect and restore Gee Creek. Immediate priorities based on current conditions and local program capabilities are listed.

Numerous opportunities exist for stormwater-related watershed improvement, including the following:

- Focused stormwater outreach and education to streamside landowners in the headwaters within Vancouver UGA.
- Consider use of WSDOT Clean Water fees to address a number of failing outfalls within the I-5 corridor.
- Focused source control outreach to address fecal coliform pollution in targeted stream reaches.
- Potential retrofits to existing public stormwater facilities, including roadside ditches, for enhanced control or treatment.
- Repair and maintenance of existing stormwater infrastructure.
- Evaluation of potential wetland enhancement or advanced mitigation projects within tax-exempt parcels and areas identified as potential mitigation banks.
- Evaluation of potential fish barriers in the lower watershed.
- Elimination of one significant illicit connection in the upper watershed.
- Inspection of several potentially at risk earthen dams.
- Evaluation of several small stormwater capital improvements for submittal to SCIP.
- Inspection of one potentially failing private stormwater facility.
- Technical assistance visits to landowners with potential source control and water quality ordinance issues.
- Updates to stormwater infrastructure database.
- Promotion of riparian enhancement projects, particularly in the upper watershed.

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to the Gee Creek watershed include:

- Complete the stormwater infrastructure inventory.
- Coordinate and leverage opportunities with groups and agencies active in Gee Creek improvement.
- Encourage the use of Low Impact Development techniques for new development, and runoff reduction techniques for existing development.
- Increase maintenance of stormwater swales to ensure adequate vegetation coverage.
- Confirm that county ditch maintenance practices minimize vegetation removal; provide education for private landowners on appropriate ditch maintenance.
- Replace missing or deteriorated stream name signs at road crossings.
- Encourage removal of invasive plants and riparian restoration through education, technical assistance and/or financial assistance.

## 2007 Stormwater Needs Assessment Program

**Table 6: Known Water Quality Concerns, Sources, and Solutions for Gee Creek**

Characteristic	Beneficial Use Affected	Potential Sources	Mechanism	Solutions (bold indicates direct Clean Water Program involvement)
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b> <b>Storm water facility designs/retrofits to optimize bacteria reduction (see Schueler, 1999)</b> Agricultural Best Management Practices Septic and sanitary sewer system inspection and maintenance
		sanitary sewer leaks	groundwater seeps storm sewers	
		livestock, pets, wildlife	overland runoff storm sewers direct access	
Water temperature	Salmonid rearing (anadromous)	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b> <b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b> <b>Education programs</b> Pond removal or limitation
	Salmonid spawning and rearing (resident)	ponds	direct solar radiation stagnation	
		low summer flows	decreased resistance to thermal inputs	
Turbidity	Salmonid spawning, rearing, and migration; Aesthetic enjoyment	erosion ( <i>development projects; land clearing; cropland; impervious surfaces; channel erosion</i> )	overland runoff storm sewers channel dynamics	Erosion control regulations <b>Storm sewer system cleaning and maintenance</b> <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices Stream bank stabilization/rehabilitation <b>Storm water outfall/facility retrofits to reduce flow-induced channel erosion</b>
		algae	in-stream growth due to excess nutrients	
Total phosphorus	Aesthetic enjoyment	natural groundwater	groundwater seeps	Erosion control regulations Septic system inspections and maintenance Sanitary sewer leak identification and removal <b>Storm sewer system cleaning and maintenance</b> <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices <b>Education programs (reduced fertilizer use)</b>
		fertilizers	overland runoff storm sewers	
		erosion	(see turbidity)	
		livestock, pets, wildlife	(see bacteria)	
		failing septic systems	(see bacteria)	
		sanitary sewer leaks	(see bacteria)	

# 2007 Stormwater Needs Assessment Program

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## Gibbons Creek / Steigerwald Executive Summary

### Study Area

This Stormwater Needs Assessment report includes the Gibbons Creek and Steigerwald subwatersheds in southeastern Clark County. Assessment effort focused on the unincorporated areas.

### Intent

Stormwater Needs Assessment reports compile summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. The assessments are conducted at a subwatershed scale, providing a greater level of detail than regional Water Resource Inventory Area (WRIA) or Endangered Species Act (ESA) plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

### Findings

#### Watershed Conditions

The table on the following page summarizes conditions in the Gibbons Creek watershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

#### Ongoing Projects and Involvement

Gibbons Creek and Steigerwald combine to form a multi-jurisdictional watershed including US Fish and Wildlife property, the City of Washougal, and Clark County. Ecology is also involved in Gibbons Creek through an ongoing Total Maximum Daily Load (TMDL); all of the above-listed jurisdictions, as well as the Clark Conservation District, are actively participating in TMDL implementation and adaptive management activities.

There are currently no major projects sponsored by other regional entities such as Lower Columbia Fish Recovery Board, Clark County Legacy Lands Program, and Clark County Transportation Improvement Program.

There are no Clark County Clean Water Program stormwater projects in Gibbons Creek under the 2007-2012 Stormwater Capital Improvement Program.

## 2007 Stormwater Needs Assessment Program

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Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	<ul style="list-style-type: none"> <li>• Fair to good</li> <li>• TMDL implementation ongoing; does not meet state criteria</li> <li>• Does not meet state criteria</li> <li>• High turbidity</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish  Resident fish	<ul style="list-style-type: none"> <li>• Moderate biological integrity</li> <li>• Presumed Coho salmon and winter steelhead use; low regional recovery priority</li> <li>• Status unknown</li> </ul>
<b>Habitat</b> Reference condition NOAA Fisheries criteria  Riparian   Wetland	<ul style="list-style-type: none"> <li>• No available reference habitat data</li> <li>• Forest cover, road density, stream crossing density, and impervious area percentage meet or nearly meet criteria for Functioning streams</li> <li>• Forest cover relatively intact</li> <li>• Invasive vegetation predominant as understory</li> <li>• Large woody debris and shade presumed moderate to good in Gibbons; poor in Steigerwald</li> <li>• Almost non-existent in Gibbons; Steigerwald is primarily wetland area</li> <li>• Restoration and protection of Steigerwald wetlands dependent on upstream protection of Gibbons Creek.</li> </ul>
<b>Hydrology and Geomorphology</b> Overall hydrology Channel stability Future condition	<ul style="list-style-type: none"> <li>• No hydrology data available</li> <li>• Most stream reaches are stable</li> <li>• Projected impervious area places Gibbons Creek in a category of uncertain channel stability</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description  Inventory status System adequacy   Condition	<ul style="list-style-type: none"> <li>• Infrastructure almost non-existent; stormwater sources are roads and overland flow draining to road-side ditches</li> <li>• No known public stormwater facilities; one private facility</li> <li>• Nearly complete (estimated 95 percent)</li> <li>• Marginally adequate control and inadequate treatment</li> <li>• Projected impervious area indicates little future change in unincorporated areas. Development within Washougal UGA indicates need for updated control standards with investment in new and retrofit infrastructure</li> <li>• Condition largely undocumented, presumed good</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Projects listed in the SNAP report represent only a small part of those required to protect and restore Gibbons Creek. Immediate priorities based on current conditions and local program capabilities are listed. Several opportunities exist for stormwater-related watershed improvement, including the following:

- Focused stormwater outreach and education to streamside landowners based on assessment results.
- Retrofits to roadside ditches for enhanced control or treatment under the SCIP.
- Evaluation and removal of potential fish barriers.
- Investigation of one potential illicit discharge.
- Technical assistance visits to landowners with potential source control and water quality ordinance issues.
- Promotion of riparian enhancement projects.
- Treatment of Japanese Knotweed infestations at four locations.
- Cleanup of one near-stream dump site.
- Implementation of an additional feature inventory to locate potential bacteria sources and other stormwater-related issues within the Washougal UGA.

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to the Gibbons Creek watershed include:

- Coordinate and leverage opportunities with groups and agencies active in Gibbons Creek improvement, particularly through TMDL implementation.
- Replace missing or deteriorated stream name signs at road crossings.
- Encourage removal of invasive plants, particularly the identification and reporting of Japanese Knotweed, and riparian restoration through education, technical assistance and/or financial assistance.

## 2007 Stormwater Needs Assessment Program

<b>Table 8: Known Water Quality Concerns, Sources, and Solutions for Gibbons Creek</b>				
<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b>
		sanitary sewer leaks	groundwater seeps storm sewers	<b>Storm water facility designs/retrofits to optimize bacteria reduction</b> Agricultural Best Management Practices
		livestock, pets, wildlife	overland runoff storm sewers direct access	Septic and sanitary sewer system inspection and maintenance
Water temperature	Salmonid rearing (anadromous)	vegetation removal	direct solar radiation	<b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b> <b>Education programs</b>
	Salmonid spawning and rearing (resident)	low summer flows	decreased resistance to thermal inputs	
Turbidity	Salmonid spawning, rearing, and migration; Aesthetic enjoyment	erosion (development projects; land clearing; cropland; impervious surfaces; channel erosion)	overland runoff storm sewers channel dynamics	Erosion control regulations <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices Stream bank stabilization/rehabilitation <b>Storm water outfall/facility retrofits to reduce flow-induced channel erosion</b>
		algae	in-stream growth due to excess nutrients	

# 2007 Stormwater Needs Assessment Program

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## Lockwood Creek Executive Summary

### Study Area

This Stormwater Needs Assessment report focuses on Lockwood Creek, tributary to the East Fork Lewis River. The entire subwatershed is in unincorporated Clark County.

### Intent

Stormwater Needs Assessment reports compile and provide summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. Assessments are conducted at a subwatershed scale, providing a greater level of detail than regional Water Resource Inventory Area (WRIA) or Endangered Species Act (ESA) plans. Stormwater Needs Assessments are not intended to take the place of comprehensive watershed plans or stormwater basin plans, but can provide a good foundation for developing them at the subwatershed scale.

### Findings

#### Watershed Conditions

The table on the following page summarizes conditions in the Lockwood Creek subwatershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

#### Ongoing projects and involvement

Lockwood Creek is well known as part of ongoing work to protect and restore fish habitat within the East Fork Lewis River watershed. Currently, there is a group of habitat restoration projects underway in lower Lockwood Creek.

The Washington Department of Ecology is developing Total Maximum Daily Load (TMDL) for bacteria and temperature in the East Fork Lewis River watershed.

## 2007 Stormwater Needs Assessment Program

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Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	<ul style="list-style-type: none"> <li>• Fair</li> <li>• TMDL required</li> <li>• TMDL not required but included in EF Lewis River temperature TMDL</li> <li>• No data</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish	<ul style="list-style-type: none"> <li>• Moderate to poor biological integrity</li> <li>• Coho and winter steelhead use. Moderate regional recovery priority</li> </ul>
<b>Habitat</b> NOAA Fisheries criteria  Riparian  Wetland	<ul style="list-style-type: none"> <li>• Forest cover and road density fall into the Non-Functioning category.</li> <li>• Stream crossing density and estimated effective impervious area fall into the Properly Functioning category</li> <li>• Forest cover is about 40 percent and is found in stream valleys and some upland areas.</li> <li>• Large woody debris recruitment potential is good in the upper basin and poor in the lower stream reaches.</li> <li>• Primarily limited to riparian areas</li> </ul>
<b>Hydrology and Geomorphology</b> Overall hydrology  Future condition	<ul style="list-style-type: none"> <li>• No hydrologic data is available but likely typical for a partly forested rural watershed</li> <li>• Projected impervious area should remain at levels that do not alter hydrology if forest cover is retained or expanded.</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description  Inventory status System adequacy  System condition	<ul style="list-style-type: none"> <li>• Primarily field drains and road-side ditches.</li> <li>• No public stormwater facilities exist</li> <li>• Largely incomplete</li> <li>• Adequate treatment is probably provided by vegetation in ditches.</li> <li>• No flow control other than infiltration in ditches</li> <li>• No outfall screening was performed.</li> <li>• Largely undocumented but presumed functional</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Few projects were identified by the assessment due to the absence of public land to site them. The main project needs appeared to be for riparian and wetland habitat restoration, undersized culvert replacement, and fish passage barrier removal.

Examples of opportunities for stormwater-related watershed improvement include:

- Focused stormwater outreach and education to streamside landowners in the headwaters areas
- Focused monitoring to determine if fecal coliform sources are present
- Repair of any erosion problems in county road ditches
- Promotion of riparian enhancement projects, particularly in the upper watershed

Non-project stormwater management recommendations address areas where CWP programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to Lockwood Creek subwatershed include:

- The Lower Columbia Fish Recovery Board is planning an effort to identify restoration projects in the East Fork Lewis River below Lewisville Park. The Lockwood Creek subwatershed SNAP report will be forwarded to the LCFRB for review.
- Washington Department of Ecology TMDL development for bacteria and temperature coordination will include Clark County.
- For new construction, emphasize stormwater management practices that focus on reduction of runoff and diffuse infiltration.
- Erosion control BMPs are an important measure to protect streams from land disturbing activities.
- Examine the use of small projects to improve stormwater retention and treatment in roadside ditches.
- While no specific wetland or habitat restoration projects are proposed by the SNAP due to the absence of public land to place projects, restoring headwater wetlands should be a priority to improve hydrologic functions.
- Preserving and restoring riparian functions to improve fish habitat is a priority in Lockwood Creek.
- Fish barrier removal projects in the upper watershed should be considered as existing roads and culverts are upgraded or replaced.
- Develop a system to provide education about appropriate ditch maintenance practices to rural landowners.

## 2007 Stormwater Needs Assessment Program

<b>Table 5: Known Water Quality Concerns, Sources, and Solutions for Lockwood Creek</b>				
<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b> <b>Storm water facility designs/retrofits to optimize</b> <b>bacteria reduction (see Schueler, 1999)</b> Agricultural Best Management Practices Septic and sanitary sewer system inspection and maintenance
		sanitary sewer leaks	groundwater seeps storm sewers	
		livestock, pets, wildlife	overland runoff storm sewers direct access	
Water temperature	Salmonid rearing (anadromous)	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b> <b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b> Education programs Pond removal or limitation
	Salmonid spawning and rearing (resident)	ponds	direct solar radiation stagnation	
		low summer flows	decreased resistance to thermal inputs	

# 2007 Stormwater Needs Assessment Program

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## Mason Creek

### Executive Summary

#### Study Area

This Stormwater Needs Assessment report focuses on Mason Creek, tributary to the East Fork Lewis River. The entire subwatershed is in unincorporated Clark County.

#### Intent

Stormwater Needs Assessment reports compile and provide summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. Assessments are conducted at a subwatershed scale, providing a greater level of detail than regional Water Resources Inventory Area (WRIA) or Endangered Species Act (ESA) plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

#### Findings

##### Watershed Conditions

The following table summarizes conditions in Mason Creek subwatershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

##### Ongoing Projects and Involvement

Mason Creek is well known as part of ongoing work to protect and restore fish habitat within the East Fork Lewis River watershed.

The Washington Department of Ecology is developing TMDLs for bacteria and temperature in the East Fork Lewis River watershed.

## 2007 Stormwater Needs Assessment Program

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Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	<ul style="list-style-type: none"> <li>• Fair</li> <li>• TMDL required</li> <li>• TMDL required and often does not meet salmon habitat criteria</li> <li>• No data</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish	<ul style="list-style-type: none"> <li>• Moderate biological integrity</li> <li>• Coho and winter steelhead use. High regional recovery priority</li> </ul>
<b>Habitat</b> NOAA Fisheries criteria Riparian Wetland	<ul style="list-style-type: none"> <li>• Forest cover and road density fall into the Non-Functioning category.</li> <li>• Stream crossing density and estimated effective impervious area fall into the Properly Functioning category</li> <li>• Forest cover is about 40 percent and is found in stream valleys and some upland areas.</li> <li>• Large woody debris has low recruitment potential in the upper basin and good in the lower stream reaches.</li> <li>• Primarily limited to riparian areas</li> </ul>
<b>Hydrology and Geomorphology</b> Overall hydrology Future condition	<ul style="list-style-type: none"> <li>• No hydrologic data is available but likely typical for a partly forested rural watershed</li> <li>• Projected impervious area should remain at levels that do not alter hydrology if forest cover is retained or expanded.</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description Inventory status System adequacy System condition	<ul style="list-style-type: none"> <li>• Primarily field drains and road-side ditches.</li> <li>• No public stormwater facilities exist</li> <li>• Largely complete</li> <li>• Adequate treatment is probably provided by vegetation in ditches.</li> <li>• No flow control other than infiltration in ditches.</li> <li>• No outfall screening was performed.</li> <li>• Largely undocumented but presumed functional</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Few projects were identified by the assessment due to the absence of public land to site them. The main project needs appeared to be for riparian and wetland habitat restoration, undersized culvert replacement, and fish passage barrier removal.

Examples of opportunities for stormwater-related watershed improvement include:

- Focused stormwater outreach and education to streamside landowners in the headwaters areas.
- Focused monitoring to determine if fecal coliform sources are present.
- Potential retrofits to roadside ditches for enhanced stormwater control or treatment.
- Repair of any erosion problems in county road ditches.
- Promotion of riparian enhancement projects, particularly in the upper watershed.

Non-project stormwater management recommendations address areas where CWP programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to Mason Creek subwatershed include:

- The Lower Columbia Fish Recovery Board is planning a project to identify restoration projects in the East Fork Lewis River floodplain. While there is little of Mason Creek within the East Fork Lewis River floodplain, there may be opportunity to coordinate actions.
- TMDL development coordination for bacteria and temperature will include Clark County.
- For new construction, emphasize stormwater management practices that focus on reduction of runoff and diffuse infiltration.
- Erosion control BMPs are an important measure to protect streams from land disturbing activities. Ensure that all regulated land disturbing activities have adequate erosion control.
- Examine the use of small projects to improve stormwater retention and treatment in roadside ditches.
- While no specific wetland or habitat restoration projects are proposed by the SNAP due to the absence of public land to place projects, restoring headwater wetlands should be a priority to improve hydrologic functions.
- Restoring riparian functions to improve fish habitat is a priority in Mason Creek.
- Consider fish barrier removal projects in the upper watershed as existing roads and culverts are upgraded or replaced.
- Develop a system to provide education about appropriate ditch maintenance practices to rural landowners.

## 2007 Stormwater Needs Assessment Program

**Table 5: Known Water Quality Concerns, Sources, and Solutions for Mason Creek**

<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b>
		sanitary sewer leaks	groundwater seeps storm sewers	<b>Education programs</b> <b>Storm water facility designs/retrofits to optimize bacteria reduction (see Schueler, 1999)</b>
		livestock, pets, wildlife	overland runoff storm sewers direct access	Agricultural Best Management Practices Septic and sanitary sewer system inspection and maintenance
Water temperature	Core summer salmonid habitat	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b> <b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b>
		ponds	direct solar radiation stagnation	<b>Education programs</b>
		low summer flows	decreased resistance to thermal inputs	Pond removal or limitation

# 2007 Stormwater Needs Assessment Program

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## Mill Creek – East Fork Executive Summary

### Study Area

This Stormwater Needs Assessment report includes the Mill Creek tributary to the East Fork Lewis River, or Mill Creek East Fork. Assessment effort focused on the unincorporated areas.

### Intent

Stormwater Needs Assessment reports compile and provide summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. Assessments are conducted at a subwatershed scale, providing a greater level of detail than regional WRIA or ESA plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

### Findings

#### Watershed Conditions

The following table summarizes conditions in Mill Creek East Fork subwatershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

#### Ongoing Projects and Involvement

Mill Creek East Fork is not well known outside the individuals and organizations that work to protect and restore fish habitat within the East Fork Lewis River watershed.

The Washington Department of Ecology is developing TMDLs for bacteria and temperature in the East Fork Lewis River watershed. Also, the Washington Department of Transportation is planning a major road widening project for SR 502 that should result in wetland and habitat restoration projects in the next several years.

## 2007 Stormwater Needs Assessment Program

Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria Temperature Sediment	<ul style="list-style-type: none"> <li>• Estimated as Fair to Poor</li> <li>• TMDL required</li> <li>• Generally meets salmon habitat criteria</li> <li>• No data</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish	<ul style="list-style-type: none"> <li>• Moderate biological integrity</li> <li>• Coho and winter steelhead use. High regional recovery priority</li> </ul>
<b>Habitat</b> NOAA Fisheries criteria   Riparian   Wetland	<ul style="list-style-type: none"> <li>• Forest cover, road density, and estimated total impervious area percentage fall into the Non-Functioning category.</li> <li>• Stream crossing density and estimated effective impervious area fall into the Properly Functioning category.</li> <li>• Forest cover largely limited to stream valleys.</li> <li>• Large woody debris moderate to high recruitment potential downstream of 239<sup>th</sup> Street and none above 239<sup>th</sup> Street.</li> <li>• Primarily limited to near-stream depressions</li> </ul>
<b>Hydrology/Geomorphology</b> Overall hydrology   Future condition	<ul style="list-style-type: none"> <li>• No hydrologic data available; likely impacted, typical for an unforested rural watershed.</li> <li>• Stream reaches upstream of 239<sup>th</sup> Street are mainly excavated drainage ditches.</li> <li>• Projected impervious areas may increase rate of channel incision, bank failures, and accelerated channel migration in various areas unless adequate runoff controls are in place.</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description  Inventory status System adequacy  Condition	<ul style="list-style-type: none"> <li>• Primarily field drains and road-side ditches, with limited piped infrastructure.</li> <li>• Two mapped public stormwater facilities</li> <li>• Largely complete.</li> <li>• Adequate treatment is probably provided by vegetation in ditches.</li> <li>• No flow control other than ditch infiltration</li> <li>• Eighty-seven public outfalls exist and were inspected for illicit discharges; no suspected illicit discharges were detected.</li> <li>• Forty-eight public outfalls discharging to critical areas; none causing significant erosion.</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Few projects were identified by the assessment due to the absence of public land to site them. The main project needs appeared to be for riparian and wetland habitat restoration and fish passage barrier removal. Stormwater management for westward expansion of Battle Ground is an important consideration for the future.

Examples of opportunities for stormwater-related watershed improvement, including the following:

- Focused stormwater outreach and education to streamside landowners in the headwaters areas.
- Coordination of potential habitat projects with WSDOT mitigation of SR 502 widening.
- Focused monitoring to determine if fecal coliform sources are present.
- Potential retrofits to roadside ditches for enhanced stormwater control or treatment.
- Removal of fish passage barriers in the lower reaches.
- Promotion of riparian enhancement projects, particularly in the upper watershed.

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to Mill Creek East Fork subwatershed include:

- Mill Creek East Fork is shared by Clark County and the City of Battle Ground. Basic stormwater management activities such as illicit discharge screening and infrastructure mapping may be coordinated in the future.
- The Lower Columbia Fish Recovery Board is planning a project to identify restoration projects in the East Fork Lewis River flood plain. While there is little of Mill Creek East Fork on the East Fork Lewis River flood plain, there may be opportunity to coordinate actions.
- TMDL development for bacteria and temperature coordination will include Clark County.
- In developing areas, emphasize stormwater management that focuses on reduction of runoff and diffuse infiltration close to the source rather than in centralized facilities. LID practices should be encouraged.
- Examine the use of small projects to improve stormwater retention and treatment in roadside ditches.
- While no specific wetland or habitat restoration projects are proposed by the SNAP due to the absence public land to place projects, restoring headwater wetlands should be a priority to improve hydrologic functions.
- Restoring access to fish habitat is a priority in Mill Creek East Fork. Consider fish barrier removal projects in the upper watershed as existing roads and culverts are upgraded or replaced.
- Develop a process to provide education about appropriate ditch maintenance practices to rural landowners.
- Problems caused by stormwater are common and most severe on small tributary streams. Future assessment may be most effective by focusing on smaller tributary streams.

## 2007 Stormwater Needs Assessment Program

**Table 5: Likely Water Quality Concerns, Sources, and Solutions for Mill Creek East Fork**

<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b>
		livestock, wildlife, pets	overland runoff storm sewers/ditches direct access	Agricultural Best Management Practices Septic system inspection and maintenance
Water temperature	Core summer salmonid habitat (anadromous)	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b> <b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b> <b>Education programs</b>
	Salmonid spawning and rearing (resident)	low summer flows	decreased resistance to thermal inputs	
Turbidity	Salmonid spawning rearing, and migration  Aesthetic enjoyment	erosion ( <i>development projects; land clearing; cropland; impervious surfaces; channel erosion</i> )	overland runoff storm sewers/ditches channel dynamics	Erosion control regulations <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices Stream bank stabilization/rehabilitation <b>Storm water outfall/facility retrofits to reduce flow-induced channel erosion</b>
Total phosphorus	Aesthetic enjoyment	natural groundwater	groundwater seeps	Erosion control regulations
		erosion	(see turbidity)	Septic system inspections and maintenance
		livestock, wildlife	(see bacteria)	<b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b>
		failing septic systems	(see bacteria)	Agricultural Best Management Practices

# 2007 Stormwater Needs Assessment Program

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## Mill Creek

### Executive Summary

#### Study Area

This Stormwater Needs Assessment report includes the Mill Creek subwatershed, tributary to Salmon Creek in west central Clark County.

#### Intent

Stormwater Needs Assessment reports compile summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. The assessments are conducted at a subwatershed scale, providing a greater level of detail than regional WRIA or ESA plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

#### Findings

##### Watershed Conditions

The table on the following page summarizes conditions in the Mill Creek subwatershed, including water quality, biological health, habitat, hydrology, and the stormwater system.

##### Ongoing projects and involvement

The Salmon Creek Watershed Council, Clark Public Utilities, and Ecology are actively involved in improving and protecting Mill Creek through local grass roots organizing, widespread riparian enhancement work, and ongoing TMDL adaptive management, respectively. The lowermost reaches of Mill Creek flow through the WSU Vancouver campus and provide a popular outdoor classroom. Clark County Clean Water Program (CWP) participates in the TMDL process through implementation of the NPDES permit, provides water quality monitoring, and supports various local organizations working within the Mill Creek area. The watershed continues to benefit from the efforts of these groups.

A major WSDOT highway construction project is planned for SR502 between I-5 and Battle Ground, potentially beginning construction in 2012.

There are several potentially significant TIP projects on the County's 20-year CIP list, including NE 179<sup>th</sup> Street, NE 72<sup>nd</sup> Avenue, NE 50<sup>th</sup> Avenue, NE 29<sup>th</sup> Avenue, and Salmon Creek Avenue.

There are no Clark County CWP stormwater projects in Mill Creek under the 2007-2012 Stormwater Capital Improvement Program.

## 2007 Stormwater Needs Assessment Program

Category	Status
<b>Water Quality</b> Overall Fecal coliform bacteria  Temperature  Sediment	<ul style="list-style-type: none"> <li>• Poor to Very Poor</li> <li>• Included in Salmon Creek fecal coliform TMDL</li> <li>• Does not meet state criteria</li> <li>• Does not meet state criteria, but among the cooler streams monitored by Clark County</li> <li>• Meets state criteria for turbidity, but shows an increasing trend</li> </ul>
<b>Biological</b> Benthic macroinvertebrates Anadromous fish  Resident fish	<ul style="list-style-type: none"> <li>• Low to moderate biological integrity</li> <li>• Presumed use by fall Chinook, Coho, and winter steelhead</li> <li>• Low to moderate regional recovery priority (LCFRB Tier 4, Group D)</li> <li>• Unknown</li> </ul>
<b>Habitat</b> Reference condition  NOAA Fisheries criteria  Riparian  Wetland	<ul style="list-style-type: none"> <li>• Overall habitat similar to a Category C (degraded) Willamette Valley reference stream</li> <li>• Forest cover, road density, and impervious area percentage fall into the Non-Functioning category</li> <li>• Large Woody Debris recruitment potential low to moderate</li> <li>• Overall shade below state targets</li> <li>• Many recent and ongoing riparian planting projects</li> <li>• Concentrated in mid-upper subwatershed and riparian zones</li> <li>• Suitable for wetland restoration</li> </ul>
<b>Hydrology and Geomorphology</b> Overall hydrology  Channel stability Future condition	<ul style="list-style-type: none"> <li>• Impacted; typical of a flashy urban or unforested rural watershed</li> <li>• May be in transition from stable to unstable stream channels</li> <li>• Projected impervious area will cause increased rate of channel incision, bank failures, and accelerated channel migration in various areas unless adequate runoff controls are in place</li> </ul>
<b>Stormwater (Unincorporated areas)</b> System description  Inventory status System adequacy  Condition	<ul style="list-style-type: none"> <li>• Mix of piped infrastructure, road-side ditches, and field drains</li> <li>• 62 public and private stormwater facilities currently mapped</li> <li>• Incomplete (estimated 80 percent)</li> <li>• Marginally adequate control and inadequate treatment</li> <li>• Projected impervious area indicates need for updated control standards with considerable investment in new and retrofit infrastructure</li> <li>• 95 percent of public stormwater facility components in compliance with state standards at time of inspection</li> <li>• 105 public outfalls discharging to critical areas; one causing significant erosion</li> <li>• 231 outfalls inspected for illicit discharges; one intermittent bacteria source discovered</li> </ul>

# 2007 Stormwater Needs Assessment Program

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## Opportunities

Projects listed in the SNAP report represent only a small part of those required to protect and restore Mill Creek. Immediate priorities based on current conditions and local program capabilities are listed.

Numerous opportunities exist for stormwater-related watershed improvement, including the following:

- Focused outreach to streamside landowners between NE 29<sup>th</sup> Avenue and NE 50<sup>th</sup> Avenue south of 179<sup>th</sup> Street for riparian enhancement
- Potential retrofit of one existing public stormwater facility for enhanced control and treatment
- Repair and maintenance of existing stormwater infrastructure
- Evaluation of potential wetland enhancement or advanced mitigation projects within tax-exempt parcels.
- Inspection of one potentially at-risk earthen dam
- Cleanup of three illegal dump sites
- Investigation of one potential sanitary sewer leak
- Potential capital improvement projects including ditch retrofits, large-scale riparian enhancements, and regional facilities
- Potential purchase or protection of ~100 acres intact forest and wetland within a Priority Habitat Buffer
- Updates to stormwater infrastructure database
- Evaluation of potential fish barriers in the middle watershed
- Technical assistance visits to landowners with potential source control and water quality ordinance issues.

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Management recommendations relevant to the Mill Creek subwatershed include:

- Complete the stormwater infrastructure inventory.
- Coordinate and leverage opportunities with groups and agencies active in Mill Creek improvement.
- Encourage the use of Low Impact Development techniques for new development, and runoff reduction techniques for existing development.
- Confirm that county ditch maintenance practices minimize vegetation removal; provide education for private landowners on appropriate ditch maintenance.
- Replace missing or deteriorated stream name signs at road crossings.
- Encourage removal of invasive plants and riparian restoration through education, technical assistance and/or financial assistance.
- Encourage removal of fences across the stream channel.
- Promote protection of first-order tributary streams. Consider the use of habitat buffers, establishment of conservation easements, and increased control of existing stormwater and agricultural runoff.

## 2007 Stormwater Needs Assessment Program

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- Collaborate on stormwater activities between Clark County, City of Battle Ground, and Vancouver-Clark Parks and Recreation in the upper watershed.

## 2007 Stormwater Needs Assessment Program

**Table 6. Known Water Quality Concerns, Sources, and Solutions for Mill Creek**

<b>Characteristic</b>	<b>Beneficial Use Affected</b>	<b>Potential Sources</b>	<b>Mechanism</b>	<b>Solutions (bold indicates direct Clean Water Program involvement)</b>
Fecal coliform bacteria	Primary contact recreation	failing septic systems	groundwater seeps storm sewers	<b>Storm sewer screening for source identification and removal</b> <b>Education programs</b> <b>Storm water facility designs/retrofits to optimize bacteria reduction (see Schueler, 1999)</b> Agricultural Best Management Practices Septic and sanitary sewer system inspection and maintenance
		sanitary sewer leaks	groundwater seeps storm sewers	
		livestock, pets, wildlife	overland runoff storm sewers direct access	
Water temperature	Core summer salmonid habitat	vegetation removal	direct solar radiation	<b>Stormwater infiltration to increase baseflow</b> <b>Streamside planting/vegetation enhancement/riparian preservation through acquisition</b> <b>Education programs</b> Pond removal or limitation
		ponds	direct solar radiation stagnation	
		low summer flows	decreased resistance to thermal inputs	
Total solids	Core summer salmonid habitat	erosion ( <i>development projects; land clearing; cropland; impervious surfaces; channel erosion</i> )	overland runoff storm sewers channel dynamics	Erosion control regulations <b>Storm sewer system cleaning and maintenance</b> Agricultural Best Management Practices Stream bank stabilization/rehabilitation <b>Storm water outfall/facility retrofits to reduce flow-induced channel erosion</b>
Total phosphorus	Aesthetic enjoyment	natural groundwater	groundwater seeps	Erosion control regulations Septic system inspections and maintenance Sanitary sewer leak identification and removal <b>Storm sewer system cleaning and maintenance</b> <b>Storm water facility designs/retrofits to optimize settling and removal of suspended silt/clay</b> Agricultural Best Management Practices <b>Education programs (reduced fertilizer use)</b>
		fertilizers	overland runoff storm sewers	
		erosion	(see turbidity)	
		livestock, pets, wildlife	(see bacteria)	
		failing septic systems	(see bacteria)	
		sanitary sewer leaks	(see bacteria)	



