

---

Snohomish County National Pollution Discharge Elimination System  
Municipal Stormwater Program  
Total Maximum Daily Load  
Bacteria Pollution Control Plan  
for the Snohomish River Tributaries, North and Swamp Creeks



August 2011

Prepared by:

Snohomish County Public Works  
Surface Water Management Division  
3000 Rockefeller Ave.  
Everett, WA. 98201



Left intentionally blank for duplex printing

---

## Table of Contents

Introduction .....	5
Background.....	5
Watersheds and Actions .....	6
Required Programs.....	6
Illicit Discharge Detection and Elimination .....	7
Water Quality Complaint Investigations.....	7
Dry weather field screening.....	9
Inspection of Commercial Animal Handling Facilities.....	13
Mobile Business Grant.....	14
Monitoring and Implementation.....	14
Considered Approaches to Controlling Bacteria .....	15
Ambient Water Quality and Stormwater Monitoring .....	15
Program Effectiveness Stormwater Monitoring .....	16
Residential Behaviors and Practices .....	17
Water Lessons for Educators/Students .....	18
General Public Understanding and Awareness .....	18
Septic System Grant .....	19
North Creek Integrated Stormwater Grant.....	20
Shellfish Protection Program.....	21
Evaluation of Critical Areas Ordinance to Address TMDLs .....	22
Methods that Prevent Additional Stormwater Bacterial Pollution through Stormwater Treatment, and Volume Reduction using Low Impact Development .....	23
References.....	23



Left intentionally blank for duplex printing

---

## Introduction

Snohomish County is required by Appendix 2 of the 2007 – 2012 National Pollution Discharge Elimination System (NPDES) Phase 1 Municipal Stormwater Permit, hereafter referred to as the permit to develop a Bacteria Pollution Control Plan (BPCP). The BPCP describes and updates the status of required actions and programmatic recommendations Snohomish County has implemented or considered, to address clean up of fresh waters determined by Ecology as polluted beyond state standards for fecal coliform bacteria. This draft must be available for public review by November 16, 2010 and submitted in final form to the Washington State Department of Ecology (Ecology) by August 16, 2011.

Abbreviated updates to TMDL actions are also found as an attachment to permit reports submitted to Ecology annually and posted to the Snohomish County NPDES website [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Services/NPDES/](http://www1.co.snohomish.wa.us/Departments/Public_Works/Services/NPDES/)

Snohomish County is committed to improving water quality within its municipal stormwater systems and consequently waters of the state to reduce public health risk, enhance recreational uses, and generally improve the quality of life for residents of Snohomish County. The following plan outlines the current status of required and recommended activities Snohomish County implemented from 2007 – 2012 to address the concern.

## Background

Section 303(d), of the Clean Water Act (CWA) mandates the establishment of Total Maximum Daily Loads (TMDL) of pollutants for surface waters that do not meet standards after application of technology-based pollution controls. A TMDL is a written, quantitative assessment of water quality problems and of the pollutant sources presumed to cause the problem within a watershed. The goal of a TMDL is to set baselines and boundaries for the discharge of pollution into discrete waterbodies in order to attain water quality standards. In Washington State, Ecology is responsible for developing and administering TMDLs.

Ecology has determined through technical studies that waterbodies within the Snohomish River Tributaries, and the Lake Washington tributaries of North and Swamp Creeks do not meet fresh water fecal coliform bacteria standards. As a result, fecal coliform bacteria TMDL clean up plans were developed. Appendix 2 of the permit mandates and recommends that Snohomish County implement clean up actions, otherwise known as best management practices (BMPs) to reduce fecal coliform bacteria levels in fresh surface waters.

Fecal coliform bacteria are indicators of the presence of fecal wastes from warm-blooded animals. Sources include but are not limited to direct discharge or deposit to streams of domesticated and wild animal feces, runoff from manure stockpiles or manure-fertilized land, unauthorized discharges or leaks from sanitary sewers, discharges from on-site sewage treatment systems and re-suspension of contaminated sediments.

Water quality standards for fecal coliform bacteria in fresh surface waters are established in Washington State Administrative Code (WAC 173-201A). Water quality standards are based upon designated uses consistent with public health and public enjoyment of the waters and the

---

propagation and protection of fish, shellfish, and wildlife. Fecal coliform standards are based upon designated uses for recreational contact. Depending upon the waterbody, fecal coliform TMDL listed segments within the Snohomish River Tributaries; North and Swamp Creek subbasins are assigned designated uses of either extraordinary or primary contact for recreation.

The designation of extraordinary primary contact sets the numeric standard for fecal coliform as follows: *“fecal coliform organism levels shall both not exceed a geometric mean value of 50 colonies/100 ml, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 ml.”*

The designation of primary contact establishes the numeric standard for fecal coliform as:

*“fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, and not more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 200 colonies /100 mL.”*

Samples are filtered and filters then placed on an agar (food) allowing bacteria to grow under controlled temperature and light conditions. In basic terms, fecal coliform colonies are enumerated by a certified technician by counting the colonies which grow on the filter. Results are expressed as colonies per 100ml of sample.

## **Watersheds and Actions**

Detailed descriptions and maps of the Snohomish River Tributaries, North and Swamp Creek, plus additional basins in which water quality monitoring is carried out, can be found in pages 9 - 13 of Snohomish County’s Quality Assurance Project Plan for Total Maximum Daily Load Water Quality Monitoring.

[http://www.co.snohomish.wa.us/documents/Departments/Public\\_Works/surfacewatermanagement/water\\_quality/snoco\\_tmdl\\_qapp\\_web\\_version.pdf](http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/water_quality/snoco_tmdl_qapp_web_version.pdf)

## **Required Programs**

Appendix 2 of the permit requires the implementation and focus of three programs within the Snohomish River Tributaries, North and Swamp Creek to address fecal coliform bacteria in surface waters, including;

- screening of outfalls to identify and remove illicit connections or discharges,
- inspection of commercial animal handling facilities,
- water quality monitoring and implementation activities.

A description of and update to these programs follows.

---

## Illicit Discharge Detection and Elimination

As required by section S5.C.8 of the permit, discharges of pollutants including sources of bacteria to the storm drainage system and waters of the state are addressed in the County through use of two existing programs: water quality complaint investigations and dry weather field screening, commonly referred to as illicit discharge detection and elimination (IDDE).

Training for staff who implement the illicit discharge programs, and all municipal field staff who may come across a potential illicit discharge or connection has been developed and are provided to staff to maintain permit compliance. Ecology recognized Snohomish County's Illicit Discharge training program for all municipal field staff by incorporating it into a set of regional program examples. A digital copy of the training may be found on Ecology's website at [http://www.co.snohomish.wa.us/documents/Departments/Public\\_Works/surfacewatermanagement/1st/WQ/idde\\_fieldpers\\_training\\_1of2-rev.pdf](http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/1st/WQ/idde_fieldpers_training_1of2-rev.pdf)

### Water Quality Complaint Investigations

The County has an existing water quality complaint investigation program whereby the public or other local, state or federal agencies may submit a concern online [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/Water\\_Quality/Investigations/default.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Water_Quality/Investigations/default.htm) or through a telephone hotline, publicized on the County website and phone directory. The water quality complaint investigation hotline phone number is (425)-388-6481.

This program is effective at both identifying and removing sources of fecal coliform bacteria from County drainage systems and waters of the state.

Complaints are prioritized by pollutant type and severity of the perceived discharge, source control violation and/or spill and subsequently investigated by trained staff.

Response to high priority cases, such as potential discharges of sewage are attempted within three working days as allowed by weather conditions, lab service availability, and/or other external constraints. Response may include notification to other agencies, phone calls, emails and site visits to determine the nature and extent of the problem or discharge.

Spills of severe threat are approached through the County Comprehensive Emergency Management Plan and notifications to the Ecology Northwest Regional Office, the National Spill Response Center and the Washington Emergency Management Division. If a spill might cause bacterial contamination of shellfish beds, the County also notifies the State Department of Health. The Comprehensive Emergency Management Plan is available through the Snohomish County Department of Emergency Management (DEM) website at [http://www1.co.snohomish.wa.us/Departments/Emergency\\_Management/Information/Plans\\_Reports/default.htm](http://www1.co.snohomish.wa.us/Departments/Emergency_Management/Information/Plans_Reports/default.htm)

Implementation of investigative procedures may involve coordination with other divisions of County government such as Planning and Development Services (PDS) or external agencies, such as the Department of Ecology, Department of Fish and Wildlife, the Snohomish Health District, and law enforcement where necessary.

Ecology and other agencies, if necessary, are notified upon removal of severe illicit connections, severe source control violations and/or severe spills. Snohomish County tracks all complaint investigations electronically to document compliance with Snohomish County Code (SCC 7.53)

[http://www.co.snohomish.wa.us/Documents/Departments/Council/county\\_code/CountyCodeTitle7.pdf](http://www.co.snohomish.wa.us/Documents/Departments/Council/county_code/CountyCodeTitle7.pdf) and provide annual reports to Ecology.

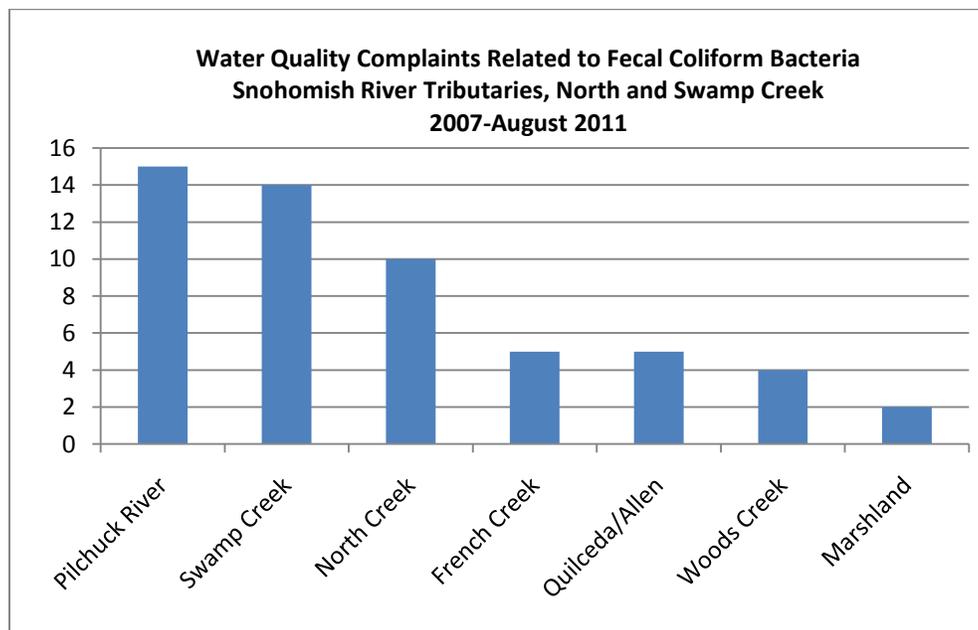
Upon documenting a potential or apparent violation of SCC 7.53, SWM provides technical assistance to inform responsible parties of required operational and/or structural BMPs to employ, per the Snohomish County Drainage Manual [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/drainagemanual.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/drainagemanual.htm) or equivalent documents. Chapters 2 and 3 of Volume 4 of the drainage manual contains the operational and structural BMPs that are required or recommended for implementation upon confirming or identifying the potential for discharge of contaminants to the MS4 or receiving waters.

Follow up inspections, phone calls, emails, and/or referrals are conducted to document voluntary compliance or continued non-compliance. Although required to implement source control BMPs in Chapters 2 and 3 of Volume 4 in the Drainage Manual, responsible parties will be allowed the option of implementing structural or treatment BMPs prior to operational in accordance with the Drainage Manual or other equivalent documents.

Should a responsible party fail to correct an apparent violation in a timely manner, SWM determines whether to notify PDS Code Enforcement that voluntary compliance was not gained. If SWM determines the case should be referred to Code Enforcement, an investigative packet is developed for enforcement. The packet includes, but is not limited to sampling data, maps, photographs, an affidavit and a monetary civil penalty schedule which scores the violation for assessment of penalty. The monetary civil penalty schedule and process for determining the penalty score is modeled after Ecology's as identified in Wrye (1999).

Figure 1. summarizes water quality complaints received from February 2007 – August 2011, related to potential discharge of fecal coliform bacteria, which fell within each of the required action areas. Table 1 summarizes the nature and outcome for the same complaints.

Figure 1. Water Quality Complaints Received within TMDL Areas Related to Potential Discharges of Bacterial Contamination



A total of 55 complaints were received from February 2007 – August 2011 relating to potential discharges of bacterial contamination within the TMDL areas. Table 1 summarizes the nature and outcome of those complaints.

Table 1. Water Quality Complaint Case Nature and Outcome February 2007 – August 2011

Total Number Cases	Number Sewage Cases	Number Manure Cases	Number Detectable and Valid Cases	Number Detectable and Valid Cases Closed upon providing Technical Assistance	Number Detectable and Valid Cases Closed with Voluntary Compliance	Number Sewage Cases Referred to Health District	Number Severe Sewage Cases and Health District/ Ecology Notified	Number Severe Sewage Cases Resolved within 6 months
55	34	21	33	16	9	10	5	5

### Dry weather field screening

Dry weather screening for identification and removal of illicit discharges is conducted per the requirements and timelines found in section S5.C.8 of the permit. The dry weather outfall program evaluates the water quality of outfalls and conveyance systems during the dry weather period (June-September) to identify and eliminate illicit discharges and illicit connections to the County municipal separate storm sewer system (MS4) and/or surface waters. Methods are summarized in Snohomish County’s Source Control Program Document and detailed in the Snohomish County Dry Weather Outfall Screening Manual. A copy of the manual may be found on the Snohomish County website at

[http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/Water\\_Quality/Investigations/IllicitDischargeDetectionandEliminationProgram.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Water_Quality/Investigations/IllicitDischargeDetectionandEliminationProgram.htm)

An illicit connection is defined in the permit as “any man-made conveyance that is connected to a municipal separate storm sewer without a permit, excluding roof drains and other similar type connections. Examples include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the municipal separate storm sewer system. An illicit discharge is defined in the permit as “any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.”

Outfalls as defined through the Phase 1 Municipal Stormwater permit did not facilitate ease of program implementation. As a result, Snohomish County proposed to Ecology that a County drainage facility outfall be defined as:

“a point of discharge of any size from a County owned and operated public drainage facility other than a natural drainage system which conveys stormwater to receiving waters or another party’s or jurisdiction’s property where the County drainage facility does not re-connect to itself.”

The definitions for stormwater, receiving waters, public drainage facility, and natural drainage system are found in SCC 7.53.

Snohomish County is directed by the permit to prioritize and screen 50% of the outfalls and conveyances in “urban/higher density rural subbasins.” In addition field screening must be

---

completed for all outfalls and conveyances in one rural subbasin within four years from the effective date of the permit.

Ecology defines “urban/higher density rural subbasins” as all areas within or proposed to be within the urban growth area (UGA), or any subbasin outside the UGA with 50% or more area comprised of lots less than five acres. While a rural subbasin is not defined in the permit, Snohomish County proposed to Ecology that it be defined as a subbasin outside the UGA having more than 50% of the area comprised of lots more than 5 acres.

Appendix 2 of the permit, under the Swamp Creek TMDL, recommended that the County give strong consideration to prioritizing dry weather outfall screening in areas where bacteria TMDLs are in place. This was considered, but rejected by Snohomish County because prioritizing by TMDL areas conflicts with requirements to screen 50% of outfalls in “urban higher density rural subbasins”. Although not intentional, some subbasins identified as urban higher density rural subbasins, in which IDDE efforts are focused, are also currently subject to permit requirements through bacteria TMDLs. These include North and Swamp Creek.

Outfalls for screening are located by querying the existing Snohomish County geographical information system (GIS) data layers, including but not limited to drainage and hydrography, using the most recent and accessible version of GIS software. Outfalls located within the urban/higher density rural subbasins are identified as an outfall and added to the outfall monitoring database for screening. The same query was applied to one rural subbasin, Church Creek. This GIS exercise to identify outfalls was revisited on an annual basis to account for newly mapped drainage and changes to ownership and/or hydrography.

Outfalls are field screened using methods as described in the Snohomish County IDDE Dry Weather Outfall Screening Manual as adapted from Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, Center for Watershed Protection, October 2004.

Field teams screen the list of outfalls during the dry weather season which ranges from June through September. Screening during dry weather periods reduces interference with storm events and increases the likelihood of identifying a true illicit discharge. At each location, the team takes photographs, records a GPS location if the location is not already mapped, collects physical attributes, and determines whether there is discharge from the outfall.

At each flowing outfall or conveyance location, the field team notes visual and olfactory observations, takes in situ chemical and physical measurements and collects water samples for laboratory analysis. The suite of parameters used allows for determination of anthropogenic discharges including those related to sewage. If field observations or laboratory results are suspect, then the field team further investigates the conveyance system associated with the outfall to determine the potential source of pollution. The field team uses a laptop with GIS software to query the county drainage maps to determine the best locations within the conveyance system to screen. Samples may be taken at each location and analyzed using a colorimeter to more quickly track potential sources. Once the location of a potential source is found, samples may be collected for laboratory analysis.

---

Table 2 indicates the total number of known outfalls Snohomish County identified county-wide, the required number to screen within each focus area, and the completed status of screening as of August 2011. Those areas highlighted in yellow are found within the Snohomish River Tributaries, North and Swamp Creek basins. The TMDL areas combined contain 825 known outfalls of which the County was required to screen 412. From 2007 – August 2011, over 50% or 463 outfalls were screened within these areas. Based upon visual cues, one suspected failing septic system was identified in the Marshlands drainage system in 2010 and referred to the SHD for follow up. The SHD determined the septic system in question was not in failure mode and required no further action. One discharge from an agricultural tile drain to the storm drainage system was identified in the Church Creek subbasin. The discharge was referred internally to the water quality complaint investigation program. The discharge was determined to be irrigation water which commingled with stormwater. This is an allowable discharge under the NPDES permit. A third discharge to the stormwater drainage system was identified within the Stanwood Urban Growth Area. This discharge was confirmed to originate from a residential drinking water filtration system, which purged intermittently. The discharge was potable, did not contribute fecal coliform bacteria to the stormwater drainage system and was considered allowable.

No confirmed illicit connections or discharges of sewage, manure or other pollutants that would impact County drainage systems and/or receiving waters were identified through dry weather outfall screening in or outside the TMDL areas.

During Ecology's initial public comment period for the 2007-2012 permit, and again in July of 2010 Snohomish County requested Ecology consider providing jurisdictions with flexibility to identify dry weather outfall screening priority areas using existing long term water quality data in receiving waters, geographical information systems analysis and local knowledge. Jurisdictions who have developed strong GIS capabilities, knowledge of the business community, experience with water quality complaint investigation and source tracking would benefit from flexibility. Given the complexity of the County MS4 and breadth of the 2007-2012 requirement to identify target areas, the County was unable to take full advantage of this information to design a program that may have been more effective in identifying problems.

Snohomish County's recently revised long term water quality monitoring program uses such an approach to address bacteria TMDL requirements, while also triggering IDDE and source control techniques to diagnose and prescribe treatment for our impaired waters. Such an approach could serve as a platform to also address Source Control and TMDL requirements in the 2012 – 2017 permit.

Table 2. Dry Weather Outfall Screening Status

Permit Required Area	Number of Outfalls Identified	Required Number of Identified Outfalls to Screen	Screened 2007	Screened 2008	Screened 2009	Screened 2010	Screened 2011	Total Screened 2007-2011	Illicit Connections or Discharges Confirmed	Source of Illicit Connection or Discharge	Total % Screened
<b><i>Rural Subbasin (Required to Screen 100% of Identified Outfalls)</i></b>											
Church Creek	52	52	0	0	52	0	0	52	1	Manure/Fertilizer	100%
<b><i>Higher Density Rural Subbasins (Required to Screen 50% of Identified Outfalls)</i></b>											
Little Bear	166	83	0	8	123	0	0	131	0		79%
McAleer	5	3	0	0	0	5	0	5	0		100%
North Creek	303	152	4	49	4	100	0	157	0		52%
Puget Sound Drainages	170	85	0	19	4	42	23	88	0		52%
Port Susan Drainages	34	17	3	19	12	0	0	34	1	Garden Fertilizer	100%
Swamp Creek	371	186	2	129	0	0	55	186	0		50%
<b><i>Urban Growth Areas (Required to Screen 50% of Identified Outfalls)</i></b>											
Arlington UGA	4	2	2	0	0	0	0	2	0		50%
Darrington UGA	0	0	----	----	----	----	----	----	----	----	----
Gold Bar UGA	0	0	----	----	----	----	----	----	----	----	----
Granite Falls UGA	3	3	0	0	0	3	0	3	0		100%
Index UGA	0	0	----	----	----	----	----	----	----	----	----
Maltby UGA	0	0	----	----	----	----	----	----	----	----	----
Marysville UGA	1	1	11*	19*	0	0	0	30*	0		100%
Monroe UGA	15	8	0	0	0	9	0	9	0		60%
Lake Stevens UGA	26	13	0	0	0	14	0	14	0		54%
Snohomish UGA	8	4	0	0	0	5	0	5	0		63%
Southwest UGA**	101	51	3	0	0	49	0	52	1	Failing Septic/ referral to SHD	51%
Stanwood UGA	10	5	3	0	7	0	0	10	1		100%
Sultan UGA	2	1	0	0	0	2	0	2	0		100%
Totals	1271	666	28	243	202	229	78	780	4	----	----

---

## Inspection of Commercial Animal Handling Facilities

In February 2009, SWM began a pollution control inspection program designed to help business owners and managers control surface water pollution and comply with Snohomish County Water Pollution Control Code (SCC 7.53)

[http://www.co.snohomish.wa.us/Documents/Departments/Council/county\\_code/CountyCodeTitle7.pdf](http://www.co.snohomish.wa.us/Documents/Departments/Council/county_code/CountyCodeTitle7.pdf)

Recent revisions in SCC 7.53 reflect enhanced water quality and pollution control measures outlined in the permit issued to Snohomish County by the Department of Ecology in 2007. The permit requires businesses located in unincorporated Snohomish County to implement BMPs. The specific BMP requirements are identified in Snohomish County Drainage Manual Volume IV. These measures help prevent discharge of pollutants to municipal storm systems, streams, rivers, lakes, and Puget Sound.

Since the programs' inception, a brochure promoting the program and template for spill response have been developed and are provided to the public and business community through the SWM website

[http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/Water\\_Quality/PollutionSourceControlBusinessInspectionProgram.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Water_Quality/PollutionSourceControlBusinessInspectionProgram.htm)

The provisions of the permit required SWM staff to compile a list of commercial animal handling and composting facilities within each of the TMDL areas and inspect those facilities by December 16, 2010. The facilities included veterinary, pet care/boarding, animal slaughtering and support activities for animal production.

SWM personnel are working with the business community to assess pollution management strategies, offer program literature, and recommend effective solutions to achieve compliance. Depending on business type, there are a variety of ways to become compliant: from work place education and awareness to structural BMP implementation. Staff provide recommendations upon conclusion of the initial visit.

All facilities that were required to be inspected through the TMDL were inspected. Besides these required sites, owners of approximately 40 additional sites were contacted. As of August 2011, 12 non-compliant cases remain open. These sites were inspected and found to be in violation. SWM is working with the SCD to help gain compliance.

---

## Mobile Business Grant

In 2010, SWM was awarded a Municipal Stormwater Grant of Regional and Statewide significance. The grant agreement funded a program to develop a state-wide education and outreach effort to reduce surface water pollution from mobile businesses, including carpet cleaners, pressure washing companies and painting contractors. Discharges of carpet cleaning and pressure washing waste water have the potential to contain fecal coliform bacteria. The program was required to be adopted and implemented by a minimum of 20 jurisdictions statewide (Snohomish County had 14 jurisdictions participating).

To partially fulfill grant requirements, Snohomish County and its partners in Kitsap County and the cities of Moses Lake, Wenatchee and Seattle, developed an education and outreach campaign (Dump Smart – It's Not Just Water) for 3 mobile business sectors: carpet cleaners, painters and power/pressure washers. Focus group sessions were held in four geographic areas of Washington during the fall and winter of 2010 to assess the challenges the mobile business sector faces to reduce discharges of pollutants. The resulting report <http://www.ecy.wa.gov/programs/wq/stormwater/municipal/MUNIdocs/dumpsmartprojectreport6-2011.pdf> was used to develop a strategic campaign in English and Spanish and was presented to over 3,000 businesses statewide.

## Monitoring and Implementation

Ecology gave Snohomish County the option of choosing two approaches for monitoring and implementation of TMDL activities. Snohomish County chose to use Strategy B, the Early Action Approach. The Early Action Approach required the development of this plan following timelines set forth in the North Creek and Snohomish River Tributaries TMDL requirements. Much like the Early Action Best Management Practice Plan, the plan is required to evaluate and document the applicability of the following approaches to controlling bacteria:

- Ambient water quality and stormwater quality sampling to specifically identify bacterial pollution sources;
- educational program directed at reducing bacterial pollution;
- evaluation of the critical areas ordinance in relation to TMDL goals;
- evaluation of water pollution control enforcement capabilities;
- investigation and implementation of methods that prevent additional stormwater bacterial pollution through stormwater treatment, reducing stormwater volumes, and preventing additional sources of stormwater in association with new development;
- implementation of activities in the Quilceda/Allen or French Creek Watershed Management Plans (as applicable);
- livestock and compost ordinances;
- pet waste ordinance.

---

The evaluation and applicability for development of livestock, compost and pet waste ordinances, water pollution control enforcement, plus implementation of activities in the Quilceda/Allen and French Creek Watershed Plans were addressed in the Best Management Practice Early Action Plan and 2010 Stormwater Management Plan update, available for download at [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Services/NPDES/](http://www1.co.snohomish.wa.us/Departments/Public_Works/Services/NPDES/)

These approaches are not re-evaluated here. The remaining approaches are considered applicable and updates to those programs are discussed here.

## Considered Approaches to Controlling Bacteria

### Ambient Water Quality and Stormwater Monitoring

Snohomish County Surface Water Management has collected long term monthly ambient water quality data in creeks throughout the County since 1992. The goal of this monitoring program was to detect trends in fecal coliform bacteria, dissolved oxygen, temperature, nutrients, sediment, and metals. Historic data through 2009 are available for download from the County website at [http://198.238.192.103/spw\\_swhydro/index.asp](http://198.238.192.103/spw_swhydro/index.asp).

To address bacteria TMDLs, Appendix 2 of the permit and the Early Action Approach required the preparation and submittal of a Quality Assurance Project Plan (QAPP) for the sampling of streams and/or discharges from conveyance systems in the Snohomish River Tributaries, North and Swamp Creek in order to:

- assess whether or not affected water bodies and/or stormwater discharges are meeting state water quality standards,
- reasonably characterize the receiving waters or waste stream,
- estimate changes in bacterial levels in Swamp Creek as a result of stormwater inputs through receiving water monitoring coupled with flow duration or comparable analysis,
- identify sources of bacterial pollution.

Snohomish County submitted the required TMDL Monitoring QAPP on July 16, 2009 for Ecology review and comment. The updated QAPP resulted in an expanded ambient water quality monitoring effort to address TMDL requirements listed above, plus monitoring within the Stillaguamish basin and Little Bear Creek as a result of EPA approval for these TMDLs. A copy of this sampling plan may be downloaded from [http://www.co.snohomish.wa.us/documents/Departments/Public\\_Works/surfacewatermanagement/water\\_quality/snoco\\_tmdl\\_qapp\\_web\\_version.pdf](http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/water_quality/snoco_tmdl_qapp_web_version.pdf)

The revised TMDL monitoring approach employs the use of a microbial water quality assessment (MWQA) decision support model, whereby monitoring locations with sufficient data are ranked by the percentage of times sample results exceed a fecal coliform bacteria threshold of 200 colonies/100ml. The sites which exhibit the worst conditions are prioritized for phased contaminant source surveys. The contaminant source survey phases range from continued monthly sampling to use of GIS to support spatial analysis and field source tracking which may include sampling of discharges.

---

The County began implementation of the revised TMDL monitoring, including monthly sampling of fresh water for bacteria, total suspended solids and in situ measurements at 40 long term stations in January 2010.

A complete analysis of fecal coliform data gathered by Snohomish County at ninety-one independent locations from 1994-2010 was completed in 2011. Data was analyzed using 12, 30 and 60 sample datasets where data was less than 10 years old. Analysis was consistent with WAC 173-201A. Results of the analysis are used to prioritize streams and rivers for contaminant source surveys, to identify and correct potential discharges of fecal coliform bacteria, and to inform managers of stream segments that either continue to exceed or meet fresh water fecal coliform bacteria standards.

In 2011, SWM staff in coordination with partner organizations used the MWQA approach and data analysis results to carry out stakeholder workshops to further prioritize contaminant source survey areas within the Stillaguamish basin. A similar, but less intensive effort is also being carried out in the Little Bear Creek subbasin. A description of the MWQA approach as carried out in the Stillaguamish basin is found at [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/Water\\_Quality/CWD/cwdmicrobial.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Water_Quality/CWD/cwdmicrobial.htm)

## Program Effectiveness Stormwater Monitoring

The 2007-2012 permit required each permittee to conduct monitoring designed to determine the effectiveness of the permittees' stormwater management program (SWMP) at controlling a stormwater related problem directly addressable by targeted actions in the SWMP. The SWMP effectiveness monitoring component was designed to answer one of each type of the following questions:

- The effectiveness of a targeted action (or narrow suite of actions), and
- The effectiveness of achieving a targeted environmental outcome.

The County chose to monitor the effectiveness of a pet waste outreach campaign. This program is focused on public education and outreach efforts to motivate pet owners to properly pick up and dispose of pet waste. The goal is to reduce fecal coliform bacteria from domestic pet waste in streams. The program consists of monitoring the outreach component directly through survey techniques and monitoring bacteria in drainage areas where outreach has been conducted.

The outreach monitoring program utilizes three different survey techniques including readership, physical, and phone surveys. The multiple survey techniques are expected to triangulate the responses and actions of the intended audience and provide reliable feedback. The anticipated feedback SWM hopes to attain is an understanding of behavior change, message penetration, message retention, and message diffusion as a result of the outreach program. This program was conducted during 2011 and results will be included in the final permit report in 2012, available on the internet at [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Services/NPDES/npdesreports\\_03-Dec-2010\\_07-28-09.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Services/NPDES/npdesreports_03-Dec-2010_07-28-09.htm)

---

To quantify the pet waste program effectiveness, SWM is sampling stormwater for fecal coliform in discrete drainage areas targeted by the pet waste program. The goal of the sampling program is to collect 10-15 storm events per site both before and after pet waste education is implemented. The results before the implementation of the pet waste program and after the program implementation will be compared to identify whether a change in fecal coliforms can be detected.

The pre-education sampling effort was conducted from October 2008 to September 2010. Sixteen successful storm events were sampled with a total of 173 fecal coliform samples collected at all sites. Approximately 90 percent of the samples were collected during the wet season. Pre-education results are low, with 45 percent of the sample values less than or equal to 10 MPN/100mL. A complete report for the pre education sampling efforts can be found in section 4 of the 2010 annual stormwater monitoring report submitted to Ecology at [http://www1.co.snohomish.wa.us/Departments/Public Works/Services/NPDES/2010 NPDES S tormwater Monitoring Report.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Services/NPDES/2010_NPDES_S tormwater_Monitoring_Report.htm)

Pre-outreach surveys began November 2010 and continued through March 2011. Pet waste education and workshops were scheduled to take place between April and July 2011. Post-education stormwater sampling began immediately after the education has ended and will conclude February 2012.

## **Educational Program Directed at Reducing Bacterial Pollution**

Snohomish County is required by section S5.C.10 of the permit to implement an education and outreach program aimed at residents, business, industries, elected officials, policy makers and various County employees. The program must use a variety of methods to target audiences and be designed to achieve measurable improvement of target audience understanding. Further, Appendix 2 of the permit requires that consideration be given to directing education at reducing bacterial pollution. The following are descriptions of educational programs and projects Snohomish County has implemented to address bacterial contamination.

### **Residential Behaviors and Practices**

In coordination with the City of Everett, City of Marysville, Sound Salmon Solutions and Scrub-a-Mutt, SWM staff provided “Scoop the Poop” pet waste disposal education at various 2010 and 2011 events. At the 2011 Poochalloza (in Marysville) and Bark in the Park (in Everett) events, SWM staffed a booth with information regarding proper pet waste disposal. Attendees were encouraged to learn about proper pet waste disposal practices through a “pet poop” bean bag toss game. Participants were then encouraged to sign a pledge to pick up after their pets and received a pet waste promotional item. One hundred and fifty Poochalloza participants played the “pet poop” toss game and signed the pledge. For the Mutt Strut event SWM staff provided materials and the toss game for the City of Everett and Sound Salmon Solutions. For the Scrub-a-Mutt event SWM provided promotional materials that tied into the education program.



2010 Mutt Strut – Dog Waste Disposal Practice Participant

In August of 2010 and 2011, SWM staffed an education booth at the Stillaguamish Festival of the River that engaged approximately hundreds of festival-goers over the two day festival. Although the festival was outside the permit required TMDL areas, citizens from around Snohomish County are presumed to have attended. The booth presented information on pet waste disposal, natural yard care practices, the Stillaguamish Clean Water District (CWD), the Marine Resources Committee, the Big Trees Project, E-cycle and the medicine return program. A CWD member suggested that the SWM booth was among the best at engaging people at the festival. One highlight included the same “pet poop” toss game, used at Mutt Strut, which was a big success in generating buzz throughout the festival. Kids and parents showed up at the booth eager to play the game and win a prize (a pet waste promotional item).

Pet waste management education and outreach strategies have gained the attention of the media and Snohomish County Council. In doing so, both target audiences have gained wider understanding of threats associated with mismanaged pet waste.

### **Water Lessons for Educators/Students**

Surface Water Management implements a Water Lessons program for educators and students [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Services/WaterLessons.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Services/WaterLessons.htm)

Lessons focus on such topics as water quality and conservation, the water cycle, native plants, salmon, and macroinvertebrates. Lessons are available to all teachers (public and private) in Snohomish County. For the 2010 – 2011 school year, the “Scoop the Poop” campaign was incorporated into the suite of lessons.

### **General Public Understanding and Awareness**

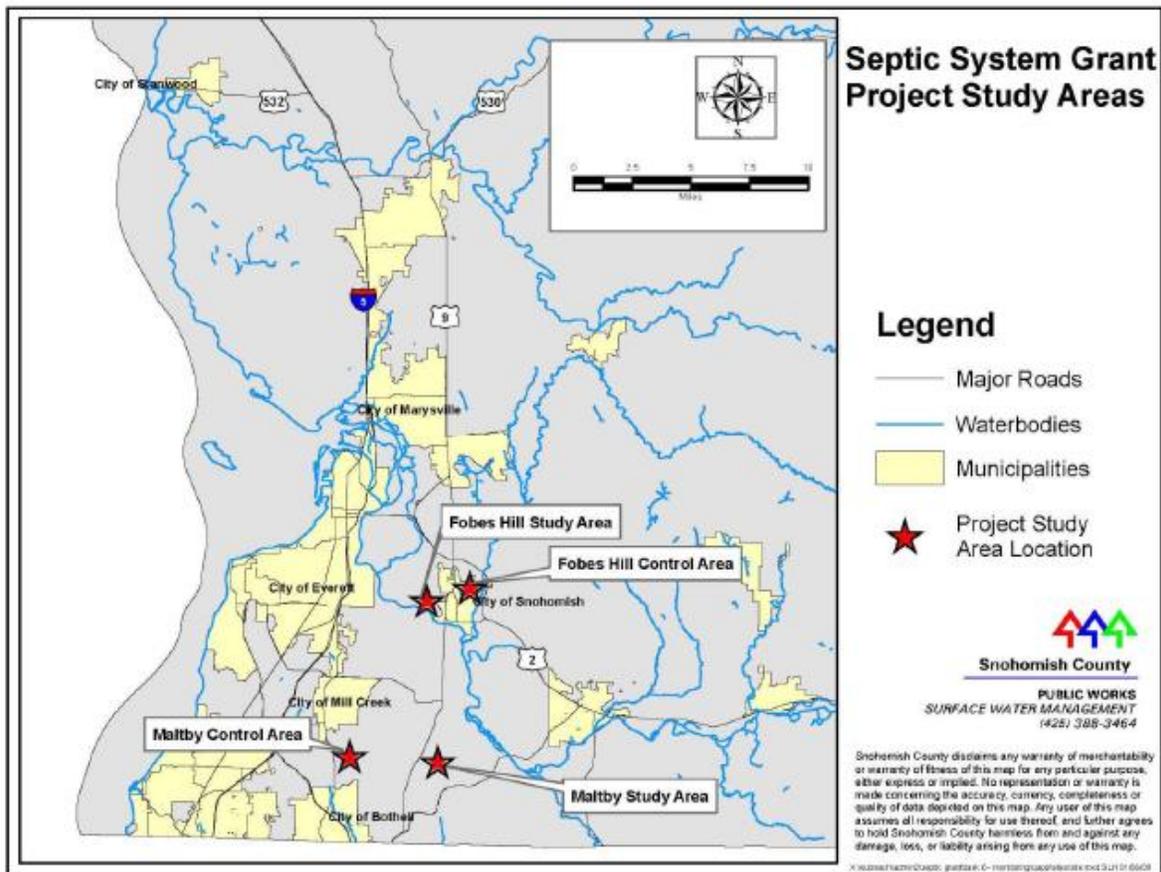
The County works in partnership with numerous local agencies and non-profit organizations to promote public understanding and awareness of storm and surface water contamination, practical solutions including proper pet waste disposal, and local events through participation in the Puget Sound Starts Here campaign <http://pugetsoundstartshere.org/>

Since the campaign’s launch in September 2009 the 30-second “Puget Sound Starts Here” commercial has aired more than 6,000 times on network and cable TV stations such as: KIRO-7, KING-5, KCPQ-13, A&E, Discovery, Animal Planet, USA, the Travel Channel, the Food Network, and HGTV. For the ads and the entire campaign, “Scoop the Poop” has been one of the three priority messages.

### Septic System Grant

Snohomish County Surface Water Management (SWM) received a Centennial Clean Water Grant in 2005 from the Department of Ecology (Ecology) to implement a pilot program focusing on septic systems in Snohomish County. As part of this Grant, Snohomish County Surface Water Management (SWM), in conjunction with the Snohomish Health District (SHD) and the University of Washington Sound Citizen Program (<http://soundcitizen.org>), installed, and sampled a total of 15 shallow groundwater monitoring wells within four small drainage basins in Snohomish County (four monitoring wells in each study and one control with the second control having 3 wells). As shown in Figure 2, the monitoring stations were located within the Fobes Hill sub-basin of the Snohomish TMDL area and the Maltby area where the study site is within the Little Bear sub-basin and the control within the North Creek TMDL area.

Figure 2. Septic Grant Study Area



---

The goal of the monitoring program was:

*To collect groundwater samples in an effort to identify the presence or absence of fecal coliform bacteria, nutrients and/or household products that may have been discharged by up-gradient septic systems in two of the four aforementioned basins*

Two of the four basins treated sewage using on-site septic systems; facilities in the other two basins are connected to a municipal sanitary collection system. The two basins utilizing a sanitary collection system are controls for the project. The monitoring wells were installed immediately up-gradient from the Snohomish County Municipal Separate Storm Sewer System ([MS4] drainage ditches) within County Right-of-Ways (ROWs). The sample sites were designed to capture shallow subsurface seasonal high groundwater potentially linked to septic system subsurface treatment zones, which may eventually discharge into the County MS4. The program attempts to identify the presence or absence of consumer products, fragrances, flavoring, pharmaceuticals, nutrients and bacteria.

Four parameters, nitrate + nitrite, salicylic acid, ortho-phosphate, and dicyclohexyl phthalate were found to have a greater concentration in the study area serviced by septic systems. The presence of these four parameters is confirmed, but the source is not clear. Nitrate-nitrite, ortho-phosphate, and salicylic acid each have natural sources and it is difficult to ascertain the origin of these parameters. Dicyclohexyl phthalates are not natural and potentially could be an indicator of septic system effluent. However, the results are not conclusive given limitations of the data.

Many of the parameters, including fecal coliform and the majority of the household products, are not present in seasonal high shallow groundwater immediately up-gradient of the County's stormwater conveyance. The parameters that are present cannot, with confidence, be associated with septic systems. The results from this study do not support the hypothesis that septic system effluent is discharging into the County's stormwater conveyance system via seasonal high groundwater at the study locations.

#### **North Creek Integrated Stormwater Grant**

In 2005, Snohomish County received a Centennial Clean Water grant from Ecology to implement an Integrated Stormwater Management Program in North Creek aimed at assisting and motivating property owners to implement natural drainage techniques on private property. Natural drainage BMPs are also referred to as low impact development (LID) techniques. Their purpose is to manage stormwater onsite by slowing it down, soaking it in (infiltration), and cleaning it up (filtration). Although received prior to the current permit effective date of February, 16, 2007, the final grant report was delivered to Ecology during the current permit cycle in April of 2010. Water quality monitoring data was uploaded to Ecology's Environmental Information Management System. An electronic copy of the final report may be obtained by contacting Snohomish County Surface Water Management.

The grant agreement included monitoring stormwater for fecal coliform bacteria and other parameters at the inlet and outlet of three discrete LID drainage improvement projects. Implementation of stormwater monitoring to determine effectiveness at removal of fecal coliform bacteria from all locations proved challenging due to high rates of infiltration. Further, the compost amended soils used in the projects may contribute unknown levels of fecal coliform bacteria.

---

Current Solid Waste Handling Regulations (WAC 173-350) do not require compost facilities using type 1 feedstocks (yard and garden wastes, wood wastes, agricultural crop residues, wax-coated cardboard, pre-consumer vegetative food wastes, and other similar source-separated material), to test the product for levels of fecal coliform present. These type 1 compost materials can unknowingly be used during implementation of LID drainage improvement projects. It was recommended to Ecology's Waste 2 Resources program, during a recent comment period for WAC 173-350, that the regulation be amended to require testing for fecal coliform bacteria E.Coli, and other contaminants in finished product where type 1 feedstocks have been used. This would provide municipalities using type 1 feedstock compost for LID projects assurance that materials used were not contributing unknown fecal coliform contamination to surface waters.

### Shellfish Protection Program

Surface Water Management developed the *Stillaguamish Shellfish Protection Program* (Shellfish Program) through a collaborative process with stakeholders that began in 2008. The Shellfish Program is documented in a written report that lays out the purpose of the program; the history and status of the South Skagit Bay and Port Susan commercial shellfish growing areas; the water quality problems affecting classification of these two shellfish areas; and the shellfish protection goals, objectives, and actions of Snohomish County and its partners. The Shellfish Program report, completed March 2011, is posted on the Internet at <http://cwd.surfacewater.info>.

To support the Shellfish Protection Program and address the Stillaguamish multi-parameter TMDL, which includes fecal coliform bacteria, SWM continues to implement the long term water quality monitoring program and microbial water quality assessment process. This involves continued monthly sampling at 11 established stations in the Stillaguamish basin.

Additionally, the 2011 work plan included synthesis of bacteria data from multiple watershed partners in preparation for a June stakeholder workshop where participants identified the Portage Creek subbasin as the first priority area for phased contaminant source surveys. Contaminant source surveys are scheduled for dry and wet seasons in 2011 to determine likely sources and identify the potential risk to human health for follow up source control actions. A description of efforts in Portage Creek and the Stillaguamish basin can be found at [http://www1.co.snohomish.wa.us/Departments/Public\\_Works/Divisions/SWM/Work\\_Areas/Water\\_Quality/CWD/cwdmicrobial.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Water_Quality/CWD/cwdmicrobial.htm)

Efforts will help support the goals of the Shellfish Protection Program through attempted reduction of fecal coliform concentrations affecting shellfish areas, and raising public awareness of status and trends of water quality.

---

## Evaluation of Critical Areas Ordinance to Address TMDLs

Snohomish County's updated Critical Area Regulations (CAR) went into effect on October 1, 2007

[http://www1.co.snohomish.wa.us/Departments/PDS/Divisions/PlanningandTechnology/Code\\_Development/CAR/](http://www1.co.snohomish.wa.us/Departments/PDS/Divisions/PlanningandTechnology/Code_Development/CAR/)

Critical area protections were revised and expanded to meet the 7-year compliance review requirement of the Growth Management Act, incorporate Best Available Science, and give special consideration to conservation measures for anadromous fish. Critical areas protected under the CAR include Wetlands, Fish and Wildlife Habitat Conservation Areas, Geologic Hazard Areas, Critical Aquifer Recharge Areas, and Frequently Flooded Areas. The code applies to all new development activities and projects proposed by public agencies.

Critical Area protections have been substantially strengthened under the new CAR. Most notably, critical area definitions have been greatly expanded. Riparian buffers have increased to 150 ft on all fish-bearing streams and widened for all wetland types. Geologic Hazard Areas now include channel migration zones. Critical Aquifer Recharge Areas now also include sole source aquifers and other areas with groundwater sensitivity. Stricter effective impervious surface limitations have been put in place within a 300 foot buffer from all surface waters. Furthermore, wetland and riparian mitigation ratios have been greatly increased, providing both a deterrent to impacts and greater certainty that impacts will be mitigated if they occur.

Section 30.62A.620, General Agricultural Standards, states that agricultural activities are in compliance with CAR when activities are performed in accordance with one of the following options: BMPs contained in the latest edition of the NRCS Field Office Technical Guide (FOTG), other recognized BMPs for such activities which protect functions and values of critical areas where the FOTG does not provide specific guidance, or a farm plan that includes provisions addressing critical areas protection specific to the farm site approved by the NRCS or the SCD and signed by the landowner.

The Critical Area Regulations are consistent with bacteria TMDL goals. By preventing development activities in sensitive areas, requiring implementation of BMPs, and potentially cooling water temperatures by providing larger buffers to filter pollutants before they reach surface waters, the CAR will provide greater protections of water quality in Snohomish County watersheds.

---

## Methods that Prevent Additional Stormwater Bacterial Pollution through Stormwater Treatment, and Volume Reduction using Low Impact Development

In 2009 – 2010, Ecology’s Water Quality Program conducted a process to develop definitions and standards for LID stormwater requirements in the Phase I Municipal Stormwater General Permit.

The Pollution Control Hearings Board ruled in August 2008 that Ecology must add requirements to the Phase I permit that apply to local governments covered under the permits. Ecology convened this stakeholder advisory process to provide input on those requirements.

EPA Region 10 funded Ecology to conduct an 8 to 10 month process to take input from two advisory committees: a technical advisory committee and an implementation advisory committee.

Over the next two-year process of reissuing the permit, Ecology will make a decision on LID requirements. The process for issuing permits includes a number of opportunities for public input. Ecology issues a draft permit for public review and comment as part of modifying any permit. It issues the final permit with a Response to Comments and information on appeal procedures. Ecology expects to incorporate the standards in the Stormwater Management Manual for Western Washington.

Despite the process underway, none of the LID techniques being proposed have been evaluated for their ability to reduce bacterial pollution, rather a benefit is presumed. Until LID techniques are tested locally, it is not feasible to evaluate effectiveness of any LID technique.

### References

Wrye, Dan. 1999, Water Quality Enforcement Review. Report of the Enforcement Subcommittee of the Water Quality Partnership. Publication 99-18. Washington State Department of Ecology Water Quality Program, P.O. Box 47600, Olympia, WA, 98504-76