

**Stormwater Management Program for
Snohomish County, Washington**

March, 2008

**Prepared in partial fulfillment of requirements of the
National Pollutant Discharge Elimination System
(NPDES) Municipal Stormwater Permit**

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Introduction

This Stormwater Management Program, or SWMP, describes the actions that Snohomish County will take to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) Phase 1 municipal stormwater permit, issued on January 17, 2007. The Phase 1 permit was issued by the Washington State Department of Ecology to six municipalities: Snohomish County, King County, Pierce County, Clark County, the City of Seattle, and the City of Tacoma. The permit was also issued to the Washington State Department of Transportation. Ecology issued the first Phase 1 permits in 1995 and reissued them in February, 2007. At that time, Ecology also issued Phase 2 municipal stormwater permits, which have a reduced scope of requirements relative to the Phase 1 permits, to over 100 cities and counties in Washington.

This SWMP is considerably different than the SWMP developed for the last municipal stormwater permit. Under the previous permit, each municipal permittee was required to submit to Ecology a SWMP that contained specific details about what the permittee would do to comply with the permit. Ecology officially approved the SWMP, which in essence became a set of permit conditions. In contrast, the current permit contains all the details Ecology considers adequate to define required actions and levels of compliance, and so while each permittee is still required to develop a SWMP document, the main purpose of the SWMP document is to inform various audiences about the permit and what the County will do to comply with it. These audiences include the Department of Ecology, County elected officials, and the public.

The current permit also requires annual updating of the SWMP document and an ongoing public involvement process. For any given year, the SWMP document will tend to emphasize proposed changes to programs, and programs for which there is significant opportunity for meaningful public involvement.

The SWMP is not intended to serve as a single operational manual for all actions under the permit. Numerous other documents, such as Quality Assurance Plans for monitoring, maintenance standards for drainage systems, and specific field procedures for storm sewer inspections have been or will be developed. Some of these are noted in the SWMP, and many of these documents are or will be available on the Snohomish County NPDES web site: <http://www.permit.surfacewater.info>.

The current NPDES permit contains numerous implementation schedules with deadlines that will occur months or years after February 2007. Section S5B of the permit states that until these deadlines occurs, Snohomish County shall continue implementation of the corresponding programs under the terms of the SWMP developed under the 1995 permit.

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The SWMP document is organized according to the sequence of requirements in condition S5C of the permit:

1. Legal Authority
2. Municipal Separate Storm Sewer System Mapping and Documentation
3. Coordination
4. Public Involvement and Participation
5. New Development / Redevelopment / Construction Site Runoff Control
6. Structural Stormwater Controls
7. Stormwater Pollution Source Controls
8. Detection and Elimination of Prohibited Storm Sewer Connections and Discharges
9. Operation and Maintenance of Stormwater Facilities, Roads, and Properties
10. Education and Outreach

For each requirement, the SWMP contains a summary of the permit requirements followed by the related actions Snohomish County will take. The reader should note that the summaries may not contain all details of the permit requirements, as the summaries are intended to facilitate general understanding by the targeted audiences, with a focus on the intended outcomes of the programs, or on programs with which the public is likely to come into contact or may wish to provide input. For example, several permit requirements involve administrative or recordkeeping processes, or state that all County staff who perform a task shall receive appropriate training. Typically, such requirements have not been included in the summaries. Interested readers can refer to the complete permit and appendices, which are posted on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phase_I_permit/ph_i-permit.html.

1. Legal Authority

Permit requirements

By February 16, 2007, Snohomish County must have been able to demonstrate that it can operate pursuant to legal authority that authorizes or enables the County to control discharges to and from municipal separate storm sewers owned or operated by the County.

This legal authority, which may be a combination of statute, ordinance, permit, contracts, orders, interagency agreements, or similar means, shall authorize or enable the County, at a minimum, to:

- Control through ordinance, order, or similar means, the contribution of pollutants to municipal separate storm sewers owned or operated by the County from stormwater discharges associated with industrial activity, and control the quality of stormwater discharged from sites of industrial activity;
- Prohibit through ordinance, order, or similar means, illicit discharges to the municipal separate storm sewer owned or operated by the County;
- Control through ordinance, order, or similar means, the discharge of spills and the dumping or disposal of materials other than stormwater into the municipal separate storm sewers owned or operated by the County;
- Control through interagency agreements among co-applicants, the contribution of pollutants from one portion of the municipal separate storm sewer system to another portion of the municipal separate storm sewer system;
- Require compliance with conditions in ordinances, permits, contracts, or orders; and,
- Within the limitations of state law, carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and non-compliance with permit conditions, including the prohibition on illicit discharges to the municipal separate storm sewer and compliance with local ordinances.

Stormwater management program

The County will rely on a mixture of codes, contracts, and interlocal or interagency agreements to meet the requirements in S5C1. Many of the requirements are met through existing legal instruments. Specific requirements for additional legal authority have been set forth in the permit; such as those for new development runoff control in permit section S5C5. The County has until August 15, 2008 to adopt the additional legal authority needed.

2. Municipal Separate Storm Sewer System Mapping and Documentation

Permit requirements

By February 16, 2009, the County must map all known County storm sewer outfalls, receiving waters, and stormwater treatment and flow control facilities owned, operated, or maintained by the County. By that date, the County must also initiate a program to map connection points between storm sewers owned or operated by the County and other municipalities or other public entities. The County must continue to map additional outfalls and structural BMPs as they are found or constructed.

By February 16, 2011, the County must map certain storm sewer attributes within 'urban/higher density rural sub-basins' associated with storm sewer outfalls with a 24" inches nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems (note that this essentially includes all road ditch systems). Attributes mapped must include land use, tributary conveyances (including type, material, and size if known), and associated drainage areas. The term 'urban/higher density rural sub-basins' is defined in the permit as 'all areas within or proposed to be within the urban growth area (UGA), or any sub-basin outside the UGA with 50% or more area comprised of lots less than 5 acres'.

The County must initiate a program to develop and maintain a map of all connections to the storm sewer authorized or allowed by the County after February 16, 2007.

By February 16, 2011, the County must map existing, known connections over 8" to the County storm sewer that are tributary to storm sewer outfalls with a 24" inches nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. The extent of this information must be 50% of the area within urban/higher density rural sub-basins, but the permit does not specify how the County will select the specific areas mapped.

By February 16, 2011, the County must map areas served by the County storm sewer that do not discharge stormwater to surface water.

Stormwater management program

During the term of the last permit, Snohomish County developed a GIS-based map and database system containing information about the drainage system within the unincorporated urban growth areas. This system includes information about storm sewer structures and facilities, including their location, elevation, material, type, size, and condition. Schematic maps of the County drainage system are available on the internet at: http://www.co.snohomish.wa.us/PWApp/SWM/drainage_maps/index.html. In accordance with the last permit, the County also developed paper maps showing the location of outfalls outside the urban growth areas. While, this program and map system

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will need some enhancement to meet the requirements of this permit, it is one of the best systems in the region.

In the course of developing this program and the code revisions required elsewhere in the permit, County staff realized that definitions for some key terms were ambiguous, contradictory, or simply not present. Since clear definitions are needed to implement the permit, Snohomish County proposed the following definitions in the revisions to Snohomish County Code (SCC) Chapter 7.53, Water Pollution Control:

- “drainage facility” means any part of a man-made physical system that collects, conveys, stores, or controls the flow of stormwater or receiving waters;
- “natural drainage system” means the physical beds and boundaries of receiving waters, including those natural drainage systems that have been altered by human actions;
- “public drainage facility” means any drainage facility owned or operated by Snohomish County, including...natural drainage systems located therein;
- “receiving waters” means lakes, rivers, ponds, streams, wetlands, groundwater, brackish or salt waters...and all other naturally occurring surface waters and watercourses, including those for which the physical beds and boundaries have been altered by human actions; and
- “stormwater” means surface water runoff resulting from rainfall, snowmelt, or other precipitation, prior to discharge to a receiving water.

Further, in the context of the municipal storm sewer mapping program and other programs under the NPDES permit, Snohomish County proposes to define an “outfall” of the County storm sewer as follows:

- “County drainage facility outfall” means a point of discharge of any size from a public (County) drainage facility, other than a natural drainage system, which conveys stormwater to receiving waters or to another party’s or jurisdiction’s property that does not reconnect to a County drainage facility.

Three important consequences of these definition are:

- they allow unambiguous determination of the location of an outfall in the field;
- they establish an outfall as the “most downstream known point” in the County’s system (an outfall does not discharge water to another outfall); and
- they establish a principle that once stormwater is discharged from an outfall to a receiving water in a natural drainage system, the receiving water does not become stormwater downstream, nor does the natural drainage system become a storm sewer downstream.

This set of definitions will allow County staff to establish data gathering and data management protocols that result in simple and consistent determination of locations of outfalls and receiving waters.

3. Coordination

Permit requirements

Snohomish County must implement coordination mechanisms among County departments to eliminate barriers to compliance with the terms of this permit.

The County must also coordinate stormwater-related policies, programs and projects with other NPDES municipal permittees with which the County shares one or more watersheds.

Stormwater management program

On February 4, 2008, the Snohomish County Executive issued Executive Order 2008-49 that requires department directors or their designees to attend twice-annual meetings at which NPDES issues will be discussed. For each meeting, a report containing discussion items and any recommendations will be prepared and distributed to department directors and the Executive's Office. The first meeting has been scheduled for April 14, 2008.

Snohomish County participates in a variety of coordination efforts with other NPDES municipal permittees. For years, permit coordinators from Phase 1 permittees have met frequently to discuss permit implementation issues. Since the reissuance of the Phase 1 permit in 2007, a number of separate coordination groups have been initiated. Some are focused on specific issues such as public education, and include Phase 1 and Phase 2 permittees without regard to geographic location. Other coordination groups are focused on specific geographic areas, for example, the group composed of Snohomish County and Phase 2 permittees within the county. As programs are developed and implemented under these permits, additional coordination efforts will be developed in response as needed.

4. Public Involvement and Participation

Permit requirements

By August 16, 2007, Snohomish County was required to develop and begin implementing a process to create opportunities for the public to participate in processes involving the development, implementation and update of the SWMP, including a process for consideration of public comments on the SWMP. The County must make the SWMP and all other submittals required by this permit, including annual reports, available to the public starting with the first annual report, which is due to Ecology on March 31, 2008. The County shall post these documents on the County website, or submit them in electronic format to Ecology for posting on Ecology's website.

Stormwater management program

This SWMP will be submitted to Ecology by March 31, 2008, and posted on the County's NPDES website: www.permit.surfacewater.info.

Section S5B of the current permit requires the County to continue implementation of elements of the last permit's SWMP until the current permit's programs are phased in according to the schedules contained therein. For 2007 through early 2008, Snohomish County decided to focus initial public involvement efforts on:

- general public education about the NPDES permit and the SWMP;
- changes to County codes and Snohomish County Drainage Manual, which need to be adopted by August 16, 2008; and
- the structural stormwater control program, which must be developed by February 16, 2008 and implemented by August 16, 2008.

The County has discussed the NPDES permit, the SWMP, and the changes to the codes and Drainage Manual at the following meetings:

April 5, 2007	Snohomish County Fire Commissioners Meeting
May 3, 2007	Unified Development Code public workshops (2)
July 10, 2007	Snohomish County Agricultural Advisory Board
October 4, 2007	Unified Development Code public workshops (2)
October 18, 2007	Engineering Focus Group
October 22, 2007	Snohomish County Council briefing (open to public)
October 23, 2007	Snohomish County Planning Commission (open to public)
November 13, 2007	Public Utilities stakeholder meeting
November 13, 2007	Snohomish County Agricultural Advisory Board
November 19, 2007	Water / Sewer Utilities stakeholder group
December 6, 2007	Unified Development Code public workshops (2)
December 12, 2007	Snohomish County Farm Bureau
March 6, 2008	Unified Development Code public workshops (2)

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Public involvement efforts related to revising the codes and County Drainage Manual will continue through their adoption in August, 2008.

A draft Structural Control Program was posted on the Snohomish County NPDES website in February, 2008. Public comments on this draft will be accepted until March 17, 2008.

In 2008 and beyond, the NPDES public involvement program will increase in scope as more programs are developed and implemented.

5. New Development / Redevelopment / Construction Site Runoff Control

Permit requirements

By August 16, 2007, Snohomish County must adopt extensive revisions to codes, engineering standards, and the County Drainage Manual, and must modify its construction administration and inspection processes to meet specific requirements in the permit.

The codes and related enforceable documents must:

- contain the equivalent to the Minimum Requirements, thresholds, and definitions in Appendix 1 of the NPDES permit;
- allow non-structural preventive actions and source reduction approaches such as Low Impact Development (LID) techniques; and
- establish legal authority to inspect private stormwater facilities and enforce maintenance standards for all new development and redevelopment approved under the revised codes.

The County's program to regulate private construction must be designed and implemented to meet the following requirements at 95% of the sites regulated by the requirements in Appendix 1:

- review all stormwater site plans submitted to the Permittee for proposed development involving land disturbing activity that meet the thresholds Appendix 1;
- prior to clearing and construction, inspect all permitted development sites that meet these thresholds and that have a high potential for sediment transport;
- during construction, inspect all permitted development sites involving land disturbing activity that meet the thresholds in Appendix 1 to verify proper installation and maintenance of required erosion and sediment controls, and enforce the related permit conditions; and
- upon completion of construction and prior to final approval/occupancy, inspect all development sites that meet the thresholds in Appendix 1 to verify proper installation of permanent erosion controls and stormwater facilities/BMPs, and enforce related permit conditions.

The County must have a program to enforce against violations of County code, and must keep records of inspections and enforcement actions by staff, including inspection reports, warning letters, notices of violations and other enforcement records, maintenance inspections, and maintenance activities.

The County must make available copies of the "*Notice of Intent for Construction Activity*" and the "*Notice of Intent for Industrial Activity*" to representatives of proposed new development and redevelopment.

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Stormwater management program

Snohomish County regulates private construction and builds a wide variety of public projects. The County's program for each of the permit requirements related to these activities is described below.

A) Revisions to County codes, engineering standards, and Snohomish County Drainage Manual

The County developed draft revisions to chapters of Snohomish County Code (SCC) Title 30 (Unified Development Code), the Engineering Design and Development Standards (EDDS), and the Snohomish County Drainage Manual, and submitted these revisions to the Department of Ecology on February 13, 2008. These documents and others included in that submittal are available on the internet at:
http://www1.co.snohomish.wa.us/Departments/PDS/Divisions/Code_Development/UDC/DOESubmittals02-08.htm.

Upon receipt of comments from Ecology, the County will take actions to adopt the revised codes, EDDS, and Drainage Manual in accordance with permit deadlines.

B) Regulation of private construction

The Department of Planning and Development Services (PDS) is responsible for all phases of regulating private construction, including review and approval of plans, issuance of permits, inspection of construction projects, and enforcement of County codes.

PDS is developing the programs needed to implement the revised codes by the permit deadlines.

C) County construction projects

All County projects are designed and constructed to conform to County codes. Design, construction, and construction inspection may be performed by County staff or private consultants or contractors. Some County agencies, such as Parks and the Airport, use PDS to inspect the work of construction contractors, whereas most Public Works projects are inspected by Public Works staff who manage the contractors. This is important in the context of counting enforcement actions as required by the permit, since the term "enforcement actions" implies code enforcement. The County controls its own contractors through contract management, not code enforcement, so a given corrective measure might be required at a private project and also at a County project, but an enforcement action would only occur at the private project.

6. Structural Stormwater Controls

Permit requirements

By February 16, 2008, Snohomish County must have developed a Structural Stormwater Control Program designed to control impacts from discharges from the County's storm sewer system that are not adequately controlled by other required actions of the SWMP. Implementation of the program shall begin no later than August 16, 2008. The program shall address disturbances to watershed hydrology and stormwater pollutant discharges, and shall consider impacts caused by stormwater discharges from areas of existing development, including runoff from highways, streets and roads owned or operated by the County, and areas of new development where impacts are anticipated as development proceeds.

The County must consider projects such as:

- regional flow control facilities;
- water quality treatment facilities;
- facilities to trap and collect contaminated particulates;
- retrofitting of existing stormwater facilities; and
- use of existing rights-of-way and County property and acquisition of other property to provide additional water quality and flow control benefits.

The program should also consider other means to address impacts such as:

- reduction or prevention of hydrologic changes through the use of on-site (infiltration and dispersion) stormwater management BMPs and site design techniques;
- riparian habitat acquisition; and
- restoration of forest cover and riparian buffers

In-stream culvert replacement or channel restoration projects are not eligible to count towards compliance with this permit requirement.

The County must provide a list of planned individual projects that are scheduled for implementation during the term of the permit. The initial list must be provided in the 2009 annual report, and any updates and revisions to the list will be provided in subsequent annual reports. The Structural Stormwater Control Program may also include a program designed to implement small-scale projects that are not planned in advance.

The County must include a description of the Structural Stormwater Control Program in the written documentation of their SWMP, including a description of the goals that the Structural Stormwater Control Program are intended to achieve and the planning process used to develop the Structural Stormwater Control Program. The description of the planning process shall include:

- geographic scale of the planning process;
- issues and regulations addressed;

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- steps in the planning process;
- types of characterization information considered;
- implementation budget; and
- public involvement process.

For planned individual projects, and programs of small projects, the County must provide the following information:

- the estimated pollutant load reduction that will result from each project designed to provide stormwater treatment;
- the expected outcome of each project designed to provide flow control;
- any other expected environmental benefits; and
- if planned, monitoring or evaluation of the project.

Stormwater management program

A draft Structural Stormwater Control Program document was posted for public comment on the County's website at: www.permit.surfacewater.info. The full document has numerous appendices and maps. It is presented in summary below.

Program goals

The Structural Stormwater Control Program will address stormwater impacts caused or exacerbated by discharges from the County's storm sewer that are not adequately controlled by other required actions of the SWMP. The program includes a list of projects that will be periodically updated and a process to identify additional potential future projects. The goals of the program are:

1. provision of stormwater treatment or other best management practices (BMPs) in the watersheds of the 303(d) listed water bodies in Snohomish County that are not addressed by other BMPs in the SWMP;
2. ensuring adequate stormwater treatment by retrofitting existing stormwater facilities to improve water quality treatment and/or flow control;
3. improved stream riparian buffers that would otherwise be vulnerable to the effects of runoff from development or modified land, whether directly through the riparian area, or from collected stormwater runoff in the stream, such as lack of tree or vegetative cover which would moderate or mitigate thermal pollution due to lack of cover, reduced wetland areas that could provide biofiltration treatment of instream runoff, riparian erosion from high flows of stormwater runoff, damage from livestock activity due to access, or other causes;
4. installation of low impact development and infiltration BMPs to promote groundwater recharge and stream flow; and
5. improved stormwater treatment in urbanized and urbanizing areas of the County.

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Program priorities

Snohomish County has established the following priorities to be used in the evaluation of specific projects:

- location in areas of existing development or new development, including land modified for agriculture or other use;
- concentration of potential pollutant sources that could indicate higher potential return for investment in water quality improvements;
- possibility of combining stormwater control projects in other existing capital projects; and
- logistical feasibility, including secured funding, land development/access rights, and permits.

Program description

The Structural Stormwater Control Program will combine activities and projects from several Surface Water Management (SWM) work areas, including new capital stormwater improvements, structural retrofits to existing stormwater systems, riparian buffer work, and riparian buffer acquisition. Because of the varied nature of these activities and projects, each will have specific attributes and profiles for the nature of work being done, the environmental and water quality benefits being achieved, and the method of public involvement being used.

The County is committed to spend approximately \$250,000 annually for the structural stormwater control program. Depending on availability, grants and other funding sources will be used as allowable to leverage County funding.

In any given year, the Structural Stormwater Control Program will consist of a combination of specific project types. The project type(s) will vary from year to year, as the County continues to evaluate water quality problems, coordinate priorities with the public, and identify capital projects to address those problems. The table presented below provides an initial list of projects to be constructed in 2008 and included in the Structural Stormwater Control Program, and a list of project options/types for the Program in 2009-2012. More detailed information on each of these projects or project options/types is provided in Appendix B of the complete Structural Stormwater Control Program document. The list will be evaluated and updated each year as projects are completed and new projects are added.

Projects in Snohomish County Structural Stormwater Control Program

A. Projects Underway (Design or Construction in 2008)

Lake Stevens/Crestline Estates Detention Retrofit

Location: Lake Stevens area, in the Snohomish River watershed.

Brief Description: Stormwater pond retrofit. Estimated cost: \$258,000 (including matching grant).

Water quality benefits: Improved solids settling and maintenance, elimination of hydraulic short-circuiting through the pond, improved biological uptake with wetland plant installation.

B. Potential Projects (Design or Construction in 2009 to 2012). Approximately \$250,000 per year, funds may be augmented with grants when available.

Drainage facility retrofits

Location: Urban growth areas in Snohomish, Cedar/Sammamish, or Stillaguamish watersheds.

Brief Description: Individual improvement projects which may include retrofits to various drainage system components for water quality improvement, such as pipe slope drains, water quality inlets/catch basins, detention pond improvements, swale improvements, etc.

Water quality benefits: Water quality facility improvements (e.g., water quality inlets, detention pond retrofit, etc.) will allow performance improvements for removal of certain pollutants (nutrients, total suspended solids). Benefits from drainage improvements such as slope drains improvements will prevent erosion of hillsides and removal of earth, and the water quality benefit may be typically estimated in terms of linear feet protected or other descriptive measure.

Water Quality Facilities

Location: County-wide

Brief Description: Capital improvement plan for water quality facilities, to eventually lead to specific water quality facilities projects.

Water quality benefits: Water quality facility improvements (e.g., water quality inlets, detention pond retrofit, etc.) will allow performance improvements for removal of certain pollutants (nutrients, total suspended solids).

Riparian planting/restoration

Location: County-wide.

Brief description: Riparian restoration work using native plants.

Water quality benefits: Water quality benefits come from erosion protection from runoff and stream flow, improved biological treatment of runoff, and improved evapotranspiration of rainfall (reducing runoff volume). Native plants also provide an aesthetic and ecological benefit from restoring indigenous species to an area. Improvements are typically noted in terms of numbers of plants, linear feet of riparian zone, or acres of riparian buffer.

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Public involvement process

The Structural Stormwater Control Program document was posted on the County's NPDES website for public review and comment on February 15, 2008. The public comment period will conclude on March 17, 2008. These comments will be used to update the program later in 2008.

The individual projects and project types/options that comprise the Structural Stormwater Control Program may also have project or program-specific public involvement, which may include the following:

- neighborhood notification of a potential project;
- neighborhood meetings to gain feedback on priority areas or project types; and
- coordination with neighborhood or other groups on specific project construction.

In addition, Snohomish County goes through an extensive public input process for its yearly Annual Construction Program (ACP) and 6-year Capital Improvement Program (CIP) development and approval. This process includes updating and having formal public meetings for the County Planning Commission and, afterwards, the County Council, who has the responsibility of approving the yearly budget. Projects in this Program will be part of the public process because they will be included in the County's ACP and 6-year CIP.

Projects Underway (Design or Construction in 2008)

Lake Stevens/Crestline Estates Detention Retrofit

Status: The project has been awarded a Stormwater Management Implementation Grant. A contract will be developed with Department of Ecology in 2008. Construction must be completed by 2011. Design is underway and construction is expected in 2008.

Location: North of Lake Stevens, in the vicinity of the intersection of 111th Avenue SE and 27th Street SE, Snohomish River watershed, WRIA 7.

Project synopsis: This project involves retrofitting an existing 17-year old residential detention facility to improve water quality, maintenance, and safety. A sediment forebay will be created, wetland plants will be installed, and baffles will be added to increase the flow path through the pond. Much of the sediment deposition will be confined to the sediment forebay, allowing for improved maintenance. The overflow elevation will be adjusted so that overflows are directed through the overflow control structure prior to overtopping the low point of the concrete wall around the perimeter of the pond. This detention facility was originally constructed in 1990 to detain runoff from roughly 62 acres of residential development.

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Cost: The estimated project cost is \$258,000.

Anticipated water quality/environmental benefit:

- addition of a sediment forebay with a concrete bottom to improve settling and maintenance;
- addition of a center baffle wall to eliminate short circuiting and promote additional settling;
- installation of wetland plants to provide additional water quality treatment;
- installation of an overflow weir and concrete bottom upstream of the outlet to improve maintenance; and
- lowering the overflow elevation of the riser in the control structure to provide freeboard and more safely control overflows.

Public involvement: Extensive public involvement occurred in 2000 and 2001 with the development of the Lake Stevens Master Drainage Plan (MDP) Study and the Lake Stevens Urban Growth Area (UGA) Plan (Snohomish County, 2000). These plans identified the need to retrofit existing detention facilities located within the unincorporated portion of the Lake Stevens UGA, which later resulted in the selection and design of improvements to retrofit the Inglewood Estates detention pond. During the development of these plans, Snohomish County staff coordinated with staff from both the City of Lake Stevens and Drainage District #8 (DID#8), which at that time provided surface water services to an area around Lake Stevens that fell within the UGA boundaries. DID#8 and City of Lake Stevens staff were invited to attend weekly meetings with County staff. Coordination with the public was primarily conducted through the land use and infrastructure planning study within the Lake Steven UGA, which is documented in the *Lake Stevens UGA Plan*, which included a number of public meetings, hearings, Planning Commission review, and County Council review.

The project team plans to meet with residents of this neighborhood to solicit input for the project and to discuss ways of minimizing construction impacts. This outreach will be an opportunity to educate the community whose properties drain to the facility. There will be dialogue about what the new facility will do to improve water quality, as well as about things the residents can do on their property and within their homes to improve water quality.

Monitoring: Although the final monitoring plan has not been finalized, the proposed short term and long term plans outlined in the grant application are described below.

Short-Term: Prior to the construction of the project, County staff will visit the existing facility to conduct pre-project monitoring. During at least 5 site visits, measurements will be made of the turbidity and pH of the stormwater within the existing detention facility, as well as other visual observations. Following the construction of the proposed improvements, County staff will conduct post-project monitoring, which will likewise consist of turbidity and pH measurements and visual observations. Comparisons will be made between the pre-project and post-project conditions to help measure the level of

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water quality improvement. These observations and measurements will be documented in brief reports that will be sent to Ecology twice per year.

Long-Term: To ensure continuing long-term performance, the facility will be placed on a regular maintenance schedule. The tentative schedule is to clean the sedimentation forebay annually. During the field visits mentioned in the previous paragraph, it will become apparent whether a more frequent or less frequent cleaning schedule is warranted.

Potential Projects (Design or Construction in 2009 to 2012)

Drainage facility retrofits

Program synopsis: SWM has an annual construction program (ACP) and a 5-year capital improvement program (CIP) for drainage improvements. Projects in the 5-year CIP will be evaluated periodically for water quality retrofit opportunities as stand alone projects, or that can be added to drainage improvement projects. Projects tend to be located in urban growth areas, and derive information from the Drainage Needs Report (DNR), Drainage Rehabilitation and Implementation (DRI) program, and other sources.

Water quality related projects in recent years have included swale improvements, pipe slope drains, and detention pond retrofits. Future projects may include similar or other improvements, such as water quality catch basins, vaults, and low impact development BMPs.

Water quality facility improvements (e.g., water quality inlets, detention pond retrofit, etc.) will allow performance improvements for removal of certain pollutants (nutrients, total suspended solids). Benefits from drainage improvements such as slope drains will prevent erosion of hillsides, and the water quality benefit may be typically estimated in terms of linear feet protected or other descriptive measure.

This program may eventually merge with the Water Quality Facilities Management Plan (described below) for more comprehensive and integrated capital program development for water quality facilities.

Public involvement with individual projects may include mass mailings, discussions with property owners or tenants, homeowner association meetings, public meetings, and public hearings.

Water Quality Facilities Program

Project synopsis: In order to protect and improve water resources, SWM is planning to develop a Water Quality Facilities Program for different areas of the County. The program is intended to evaluate existing water quality conditions at the neighborhood scale and recommend specific capital projects and maintenance actions for implementation to help address these problems and improve water quality. The program will evaluate both traditional and innovative programs to manage existing surface water facilities. The program will also be proactive in planning the development and construction of facilities that emphasize LID designs, taking advantage of natural processes wherever possible to minimize disruptions to the natural hydrologic system. Water quality facility improvements (e.g., water quality inlets, detention pond retrofit, etc.) will allow performance improvements for removal of certain pollutants (nutrients, total suspended solids).

The short-term goal of the pilot program will be to measurably improve water quality in the watershed by recommending a combination of capital projects and maintenance actions. Potential projects that will likely be considered include retrofitting existing facilities and outfalls, enhancing ditches, and implementing source control BMPs in their contributing areas. Potential maintenance activities may include use of high efficiency vacuum sweepers for roads. The long-term goal of the pilot program is to serve as a template that can be applied to watersheds throughout the County.

The intended highlights include:

- develop timelines, budgets, staffing requirements and identify funding sources;
- develop a pilot watershed selection process;
- develop a public process to engage all stakeholders in the development of the plan;
- inventory and map all facilities, including their contributory areas;
- develop an assessment protocol and prioritize facilities;
- create a project list based on priorities;
- identify, assess, and prioritize all sources of pollution entering facilities for source reduction strategies;
- develop public involvement and outreach plans;
- develop a project list and implementation schedule; and
- develop an early action component based on citizen input and existing data on current facility failures or problems.

Riparian planting/restoration

Program synopsis: SWM is active in riparian area restoration. One component of its riparian restoration activities is the Native Plant Program. Utilizing community volunteers and with the support of a Washington Conservation Corps crew, the Native Plant Program installs approximately 40,000 plants per year in riparian (streamside)

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zones throughout Snohomish County. Native plants improve air quality, prevent flooding and erosion, improve water quality, create fish habitat, and play a crucial role in stream ecology. Measurements are typically noted in terms of numbers of plants, linear feet of riparian zone, or acres of riparian buffer. Restoration work has ranged from several hundred square feet of planting area to several acres at a time, with plant types including wetland plants, grasses, shrubs and bushes, conifers, and deciduous trees. The program has a strong community outreach component, training volunteers in riparian restoration, and providing community participation opportunities. The Native Plant Program has an ongoing program for monitoring all installation projects.

Along with the ongoing Native Plant Program, SWM from time to time conducts specific riparian area restoration projects. Typical work has included such projects as:

- Sister of Friar project in the Snohomish River watershed, completed in 2007 and improving a ¼ mile reach of Sister of Friar Creek;
- West Fork Wood Creek in the Snohomish River watershed (under project development), to improve 625 linear feet of West Fork Wood Creek and 365 linear feet of a tributary, total of 1.3 acres;
- Mosher Creek in the Snohomish River watershed, improving in-stream, streamside, and wetland habitat along 600 feet of the creek; and
- South Fork Big Trees project in the Stillaguamish River watershed, which started in 2007, and is located along the south fork of the Stillaguamish River between Arlington and Granite Falls (4.6 stream miles).

Public involvement on some of the larger projects, such as the South Fork Big Trees project, may include review and coordination with the local boards, committees and agencies. The South Fork Big Trees project included review and coordination with the Stillaguamish River Clean Water District Advisory Board (consisting of community, commercial, public agency, and tribal representatives), the Stillaguamish Implementation Review Committee (consisting of public agency and tribal representatives), and other groups.

Monitoring may vary depending on project size and needs. For example, in the South Fork Big Trees project, riparian vegetation and stream conditions will be monitored for a four year period.

7. Stormwater Pollution Source Controls

Permit requirements

By August 16, 2008, Snohomish County must require the use of source control best management practices (BMPs) at existing sites and for new construction. The BMPs must be equivalent to those in Volume 4 of the 2005 Ecology Stormwater Manual. A draft code and proposed equivalent manual sections must be submitted to Ecology by February 16, 2008.

The County must implement this code by means of an inspection program and a complaint investigation program. By August 16, 2008, the County must establish methods to identify sites for inspection, and in doing so must consider the categories of land uses and businesses in Appendix 8 of the permit, plus other pollution-generating sites identified through pollution complaint response. The County must periodically update the list.

By February 16, 2009, the County must implement an audit/inspection program for sites identified in the list or inventory. The County must notify all sites with a business address about the source control code requirements applicable to their activities. This information may be provided all at one time or spread out over the last three years of the permit term to allow for some tailoring and distribution of the information during site inspections. Each year, the County must inspect 20% of the sites to assure BMP effectiveness and compliance with source control requirements. The County may select which sites to inspect each year, and is not required to inspect 100% of sites over a 5-year period. Sites may be prioritized for inspection based on their land use category, potential for pollution generation, proximity to receiving waters, or to address an identified pollution problem within a specific geographic area or sub-basin. In addition to the proactive inspection program, the County must inspect 100% of sites identified through legitimate complaints.

Stormwater management program

Snohomish County is in the process of revising Snohomish County Code (SCC) Chapter 7.53, Water Pollution Control to contain the source control requirements described above, and is also developing an equivalent to Volume 4 of the 2005 Ecology Stormwater Manual. Both of these were submitted to Ecology on February 13, 2008, and are available on the internet at:

http://www1.co.snohomish.wa.us/Departments/PDS/Divisions/Code_Development/UDC/DOESubmittals02-08.htm.

The County has prepared a Source Control Program document that contains a detailed description of the proposed inspection program. This document is available on the Snohomish County NPDES web site at: www.permit.surfacewater.info. In summary,

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Snohomish County will prepare a list of sites to inspect by drawing upon a number of different information sources that will probably include County records of sites previously investigated for alleged water quality problems, site with certificates of occupancy issued by the County Fire Marshal's Office, Ecology NPDES industrial stormwater permit records, records from the Snohomish Health District, and other sources. Sites on the list will be prioritized for inspection based upon factors that may include general potential for pollution generation at the land use or activity, proximity to receiving waters, especially those with a 303(d) listing or an approved TMDL Water Cleanup Plan, and other factors to be determined. The County will begin inspecting sites on the list for source control BMP implementation by February 16, 2009.

8. Detection and Elimination of Prohibited Storm Sewer Connections and Discharges

Permit requirement

The County must continue implementation of a program to prevent, identify and respond to discharges and connections to the County storm sewer that are prohibited by County code. As stated above, the deadline for code adoption by the County is August 16, 2008.

The County must continue to operate a water quality complaint phone line.

The County must continue to conduct a “field screening” program to detect prohibited connections and discharges to the storm sewer. Field screening is the term used in the permit to mean a systematic dry-weather inspection of a location in the storm sewer, including both visual inspection of the storm sewer and chemical analysis of water if it is present.

By February 16, 2011, the County must prioritize outfalls and conveyances in urban subbasins and higher density rural sub-basins for screening and must complete field screening for at least half of the conveyance systems in these areas, and must complete field screening in at least one rural sub-basin.

The County must investigate a report of a prohibited connection within 21 days of the report, and must use enforcement authority in a documented effort to eliminate the prohibited connection within 6 months. All prohibited connections to the MS4 must be eliminated. In addition, the County must contact Ecology immediately upon discovering a prohibited connection that presents a severe threat to human health or the environment.

By August 16, 2007, the County must have either begun participation in a regional emergency response program, or have developed and implemented procedures to investigate and respond to spills and improper disposal into the County’s storm sewer.

The County must have a program to prioritize and investigate complaints, reports, or monitoring data that indicate potential prohibited discharges, spills, or illegal dumping. The County must immediately respond to problems or violations judged by the County to be urgent, severe, or emergent. Spills of oil or hazardous materials must be reported to appropriate authorities.

Stormwater management program

Much of the program under the 2007 NPDES municipal permit is a continuation of the program implemented under the 1995 permit.

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The County is in the process of revising its water pollution control code (SCC Chapter 7.53), and this code will contain the current permit requirements regarding specific prohibitions or conditions for discharges and connections to the County storm sewer. These code revisions will be adopted by August 16, 2008.

The County's dedicated water quality complaint phone number: 425-388-6481.

The field screening program is described in detail in the Source Control Program document posted on the internet at: www.permit.surfacewater.info. Outfalls are screened using methods adapted from Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments (Center for Watershed Protection, October 2004.)

The County has an existing water quality complaint investigation program. Complaints are prioritized by pollutant type and potential environmental severity of the reported discharge. Response to high priority cases is 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. Potentially severe spills are addressed by implementation of methods in the Snohomish County Comprehensive Emergency Management Plan, including notification to the Ecology Northwest Regional Office, the National Spill Response Center, and the Washington State 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.

Implementation of investigation 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.

The County may take immediate enforcement actions if a spill, discharge, or connection constitutes an imminent threat to the County storm sewer.

9. Operation and Maintenance of Stormwater Facilities, Roads, and Properties

Permit requirements

The operation and maintenance program may be the single most complex and far-reaching program of the permit. Snohomish County must adopt standards for operation and maintenance of stormwater facilities. The standards must apply to facilities the County owns and privately owned facilities that discharge to the County's storm sewer. The County must inspect its own facilities annually and perform any needed maintenance, and must ensure inspection and maintenance privately-owned facilities to the extent allowed by state and federal law. The County must also adopt and implement standards for operating and maintaining operating and maintaining roads and County properties such as equipment maintenance or storage yards. Each of these requirements is described in more detail below.

A) Adoption of maintenance standards

By August 16, 2008, Snohomish County must establish maintenance standards equivalent to those specified in Chapter 4 of Volume V of the 2005 Stormwater Management Manual for Western Washington. For existing facilities which do not have maintenance standards, the County shall develop a maintenance standard.

B) Maintenance of privately-owned stormwater facilities that drain to the County's storm sewer

By August 16, 2008, Snohomish County must have adopted codes or other enforceable documents requiring maintenance, according to the adopted standards, of privately-owned stormwater flow control facilities, treatment facilities, and catch basins that discharge to the County's storm sewer. By this date the County must also develop an initial inspection schedule for these facilities (excluding the catch basins), such that each facility will be inspected at least once during the term of this permit. The County must either perform the inspections and needed maintenance, or ensure that such work was done by means of credible documentation, provided that these responsibilities are limited to facilities to which the County can legally gain access.

Unless there are circumstances beyond the County's control, when an inspection identifies an exceedance of the maintenance standard, the County must maintain or ensure maintenance of the facility according to the following schedule:

- within 1 year for wet pool facilities and retention/detention ponds;
- within 6 months for typical maintenance;
- within 9 months for maintenance requiring re-vegetation; and
- within 2 years for maintenance that requires capital construction of less than \$25,000.

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Circumstances beyond the County's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the County shall document the circumstances and how they were beyond the County's control.

By February 16, 2011, the County must develop an annual inspection schedule for the facilities described above. The annual inspection requirement may be reduced based on maintenance records with a period double the length of time of the proposed inspection frequency. For example, if four years of annual records for a facility showed that maintenance was needed every other year, the County could change the scheduled maintenance frequency for that facility to two years. In the absence of maintenance records, the County may substitute written statements to document a specific less frequent inspection schedule. The written statements must be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.

By February 16, 2009, the County must implement a program to inspect all new permanent stormwater treatment and flow control facilities, including catch basins, in new residential developments every 6 months during the period of heaviest construction, and enforce compliance with maintenance standards as needed.

Compliance with the inspection requirements for regulated facilities above will be determined by the presence of an established inspection program designed to inspect all sites, and actual inspection of 95% of all sites.

C) Maintenance of stormwater facilities owned or operated by Snohomish County

By February 16, 2009, the County must implement a program to annually inspect all of its permanent stormwater treatment and flow control facilities (other than catch basins), and maintain them in accordance with adopted standards. The annual inspection requirement may be reduced based on inspection records as described above.

By February 16, 2009, the County must implement a program to conduct spot checks of potentially damaged permanent treatment and flow control facilities (other than catch basins) after major storm events (defined as those with a 24-hour duration and a 10-year recurrence interval). If spot checks indicate widespread damage/maintenance needs, the County must inspect all stormwater treatment and flow control facilities that may be affected, and conduct repairs or take appropriate maintenance actions.

Compliance with the inspection requirements described above shall be determined by the presence of an established inspection program designed to inspect all sites, and achieving inspection of 95% of all sites.

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D) Maintenance of catch basins owned or operated by Snohomish County

By February 16, 2009, Snohomish County must implement a program to annually inspect catch basins and inlets owned or operated by the County. Inspections may be conducted on a “circuit basis” whereby a sampling of catch basins and inlets within each circuit is inspected to identify maintenance needs. If such inspections indicate maintenance is needed, the County must clean all catch basins within the circuit. Alternatively, the County may inspect all catch basins, and clean only catch basins where cleaning is needed to comply with maintenance standards.

As with maintenance of other types of stormwater facilities, the frequency of catch basin inspections may be changed in accordance with records as described above.

The County must dispose of “vactor decant water” (water collected from stormwater facilities by eductor or “vactor” trucks) in accordance with the requirements of Appendix 6 of the permit.

E) Operation and maintenance of County roads

By February 16, 2008, Snohomish County must establish practices to reduce stormwater impacts associated with runoff from its parking lots and roads, and must implement these practices by August 16, 2008. The established practices must address:

- pipe cleaning;
- cleaning of culverts that convey stormwater in ditch systems;
- ditch maintenance;
- street cleaning;
- road repair and resurfacing, including pavement grinding;
- snow and ice control;
- utility installation;
- maintenance of roadside areas, including vegetation management;
- dust control; and
- pavement striping maintenance.

F) Operation and maintenance of County properties

By August 16, 2008, Snohomish County must establish and implement policies and procedures to reduce pollutants in discharges from properties owned or maintained by the County that are subject to this permit. Such properties include parks, open space, road right-of-ways, maintenance yards, and stormwater treatment and flow control facilities.

The policies and procedures must address:

- application of fertilizer, pesticides, and herbicides, including the development of nutrient management and Integrated Pest Management Plans;
- sediment and erosion control;

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- landscape maintenance and vegetation disposal;
- trash management; and
- building exterior cleaning and maintenance.

By February 16, 2009, the County must develop and implement a Stormwater Pollution Prevention Plan (SWPPP) for all County heavy equipment maintenance or storage yards and County material storage facilities located in areas subject to this permit, that are not covered under by another Ecology issued stormwater discharge permit. Implementation of non-structural BMPs shall begin immediately after the pollution prevention plan is developed. A schedule for implementation of structural BMPs shall be included in the SWPPP. Generic SWPPPs that can be applied at multiple sites may be used to comply with this requirement. The SWPPP shall include periodic visual observation of discharges from the facility to evaluate the effectiveness of BMPs.

Stormwater Management Program

A) Adoption of maintenance standards

Snohomish County's proposed maintenance standards were contained in the as part of the equivalent Drainage Manual submitted to Ecology in February, 2008. These standards will be adopted by August 16, 2008.

B) Maintenance of privately-owned stormwater facilities that drain to the County's storm sewer

In 2008, the County will develop a program to ensure inspection and maintenance of privately-owned stormwater facilities that drain to the County storm sewer. This program may include processes such as a self-certification program by which owners of facilities can perform the required inspections and maintenance and submit documentation to the County. An initial inspection schedule for these facilities (excluding the catch basins) will be developed by August 16, 2008.

In 2008 through 2010, the County intends to assess the inspection and maintenance records (or similar information) for private facilities to determine appropriate inspection intervals. By February 16, 2011, the County will develop an inspection schedule for these facilities that stipulates annual inspections unless records or other information indicate that a reduced inspection frequency is warranted.

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By February 16, 2009, the County will implement a program to inspect all new permanent stormwater treatment and flow control facilities, including catch basins, in new residential developments every 6 months during the period of heaviest construction, and enforce compliance with maintenance standards as needed.

C) Maintenance of stormwater facilities owned or operated by Snohomish County

By February 16, 2009, the County will develop and implement an inspection schedule for stormwater facilities owned or operated by the County. The schedule will stipulate annual inspections unless records or other information indicate that a reduced inspection frequency is warranted. Public Works Surface Water Management Division will likely develop the schedule for roadway-related facilities, and other County agencies that own or operate properties with such facilities will develop their own schedules.

By February 16, 2009, the County will implement a program to inspect and maintain permanent treatment and flow control facilities (other than catch basins) after major storm events, as described above. Responsibilities for implementing this work will probably be assigned as described in the previous paragraph.

D) Maintenance of catch basins owned or operated by Snohomish County

By February 16, 2009, Snohomish County Road Maintenance Division will implement a program to annually inspect catch basins and inlets owned or operated by the County, in accordance with the requirements described above.

Road Maintenance currently disposes of vector water and solids at a special facility designed for this purpose located at the regional landfill site at Cathcart. The solids are separated from the liquid, which is treated by the landfill leachate treatment plant before discharge to a sanitary sewer.

E) Operation and maintenance of County roads and parking lots

In February, 2008, Public Works Road Maintenance Division established operation and maintenance practices for County roads, and for parking lots at properties managed by Public Works. At County properties operated by other departments, parking lot maintenance is either performed by Public Works according to its practices, or performed by those department according to their practices. Practices in conformance with the permit will be implemented no later than August 16, 2008.

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F) Operation and maintenance of County properties

By August 16, 2008, all County departments that own properties or facilities for which inspections and maintenance are needed will develop programs to do so, including the development of Stormwater Pollution Prevention Plans (SWPPPs) if they are required and not already developed under an NPDES industrial stormwater permit. The SWPPPs will be implemented by February 16, 2009.

10. Education and Outreach

Permit requirements

Snohomish County must implement an education program aimed at residents, businesses, industries, elected officials, policy makers, and various County employees. The goal of the education program is to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts.

By February 16, 2008, the County must implement or participate in an education and outreach program that uses a variety of methods to target the audiences and topics listed below. The program shall be designed to achieve measurable improvements in each target audience's understanding of stormwater problems and what they can do to solve them.

- A) General Public
 - General impacts of stormwater flows into surface waters.
 - Impacts from impervious surfaces.
 - Source control BMPs and environmental stewardship, actions and opportunities in the areas of pet waste, vehicle maintenance, landscaping and buffers.
- B) General public and businesses, including home based and mobile businesses
 - BMPs for use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials.
 - Impacts of illicit discharges and how to report them.
- C) Homeowners, landscapers and property managers
 - Yard care techniques protective of water quality.
 - BMPs for use and storage of pesticides and fertilizers.
 - BMPs for carpet cleaning and auto repair and maintenance.
 - Low Impact Development techniques, including site design, pervious paving, retention of forests and mature trees.
 - Stormwater treatment and flow control BMPs.
- D) Engineers, contractors, developers, review staff and land use planners
 - Technical standards for stormwater site and erosion control plans.
 - Low Impact Development techniques, including site design, pervious paving, retention of forests and mature trees.
 - Stormwater treatment and flow control BMPs.

The County shall implement or participate in an effort to measure understanding and adoption of the targeted behaviors by the targeted audiences. The resulting measurements shall be used to direct education and outreach resources most effectively as well as to evaluate changes in adoption of the targeted behaviors.

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Stormwater management program

A) Overview

Snohomish County is developing its core NPDES stormwater education program around six emphasis areas:

1. Pet Waste Management
2. Natural Yard Care
3. Soaps and Toxins
4. Urban BMP Toolbox
5. Septic System Program
6. Streamside Landowner Program

These emphasis areas were developed through analysis of audiences and practices described in section S.5.C.10 of the 2007 Phase I Municipal Stormwater Permit, analysis of leading contaminants and the primary practices and audiences that produce those contaminants, and evaluation of various program implementation and management strategies.

This core program applies a social marketing approach to promote Best Management Practices (BMPs) among defined audiences. Since the 1970s, this approach has been used in many contexts including disease prevention, social services, and public safety.

Beginning in 2000, Snohomish County increasingly focused its efforts to apply a social marketing approach to non-point source pollution BMPs. Those early efforts, which were developed and implemented largely with funding from the Department of Ecology Centennial Clean Water Fund, produced substantive increases in adoption of specific BMPs among residents.

The 2007 stormwater permit specifically mandates measurable changes in understanding and behavior among a broad suite of target audiences. The success of those previous social marketing efforts, and the quantitative results they produced, suggest that this strategy is the most efficient and the most likely to succeed in meeting the permit's mandates.

In eight years of research, the County has not identified any other strategy that demonstrates equivalent likelihood of meeting the permit's requirement to produce measurable progress to "reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts."

In addition to the six emphasis areas, some work components developed under the previous stormwater permit will be continued at current levels, including youth education. Others will be enhanced to accommodate the new emphasis programs, including technical support to landowners, program administration and program support.

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B) Emphasis areas and targets

1) Pet Waste Management

Target pollutants and limiting factors:

- Bacteria
- Non-bacterial pathogens
- Nitrogen and phosphorus

Target audiences:

- Dog owners in Urban Growth Areas

Target practices:

- Pet waste cleanup and disposal

2) Natural Yard Care

Target pollutants and limiting factors:

- Bacteria
- Non-bacterial pathogens
- Pesticides – herbicides, insecticides, rodenticides
- Nitrogen and phosphorus – fertilizers, animal waste
- Temperature
- Dissolved oxygen
- Flow/volume

Target audiences:

- Homeowners - single family residential
- Homeowners - multi-family residential
- Renters - single family residential
- Renters - multi-family residential
- Landscaping businesses, gardeners
- Nurseries and related businesses

Target practices:

- Riparian vegetation management
- Landscaping, gardening, yard care
- Erosion control
- Stormwater infiltration/detention

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3) Soaps And Toxins

Target pollutants and limiting factors:

- Soaps and surfactants
- Household hazardous chemicals
- Metals
- Pesticides – herbicides, insecticides, rodenticides
- Nitrogen and phosphorus – fertilizers

Target audiences:

- Homeowners - single family residential
- Homeowners - multi-family residential
- Renters - single family residential
- Renters - multi-family residential
- Property managers
- Residential pest control contractors
- Cleaning businesses – carpet cleaning, pressure washing, etc.

Target practices:

- Vehicle washing
- Vehicle maintenance
- Household hazardous material storage
- Household hazardous waste disposal
- Gray water disposal – carpet cleaning, wash water, etc.
- Building maintenance – pressure washing, moss control, painting, etc.

4) Urban BMP Toolbox

Target pollutants and limiting factors:

- Bacteria
- Non-bacterial pathogens
- Soaps and surfactants
- Household hazardous chemicals
- Metals
- Pesticides – herbicides, insecticides, rodenticides
- Nitrogen and phosphorus – fertilizers, animal waste
- Temperature
- Dissolved oxygen
- Flow/volume

Target audiences:

- Homeowner association leaders and members - single family residential
- Homeowner association leaders and members - multi-family residential
- Neighborhood leaders/organizers

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Target practices:

- Riparian vegetation management
- Landscaping, gardening, yard care
- Pet waste cleanup and disposal
- Soaps and toxins
- Community property, Native Growth Protection Area, Critical Area Protection Area management
- Neighborhood stormwater facility operation and maintenance
- Stream, wetland, floodway management
- Stormwater infiltration/detention
- Impervious surfaces

5) Septic System Program

Target pollutants:

- Bacteria
- Non-bacterial pathogens
- Nitrogen and phosphorus

Target audiences:

- On-site sewage disposal system owners outside Urban Growth Areas

Target practices:

- On-site sewage disposal system operation and maintenance

6) Streamside Landowner Program

Target pollutants and limiting factors:

- Bacteria
- Non-bacterial pathogens
- Pesticides – herbicides, insecticides, rodenticides
- Nitrogen and phosphorus – fertilizers, animal waste
- Temperature
- Dissolved oxygen
- Sediment
- Flow/volume

Target audiences:

- Owner/residents of streamside properties in the Lake Washington and Snohomish River Watersheds

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Target practices:

- Stream shoreline management
- Riparian vegetation management
- Development activity
- Landscaping, gardening, yard care
- Livestock management
- Impervious surfaces
- Erosion control
- Stormwater infiltration/detention

C) Phasing

The emphasis programs are intended to follow a common programmatic path:

1. Formative Research
2. Program Development
3. Pilot Program Fielding and Evaluation
4. Program Refinement for Landscape Level Implementation
5. Landscape Level Program Fielding and Adaptive Management

At this point in time, each emphasis program is at a different stage on that path. The Streamside Landowner Program, for example, began in 2001, progressed through all five phases of work, and is being implemented in its third iteration in 2007. The Pet Waste Program, on the other hand, is being refined for landscape level implementation, while the Soaps and Toxins Program will begin formative research in 2009 (Figure 1). The long term goal is to implement each emphasis program at the landscape level. At that point ongoing education and adaptive management will guide program refinement over time.

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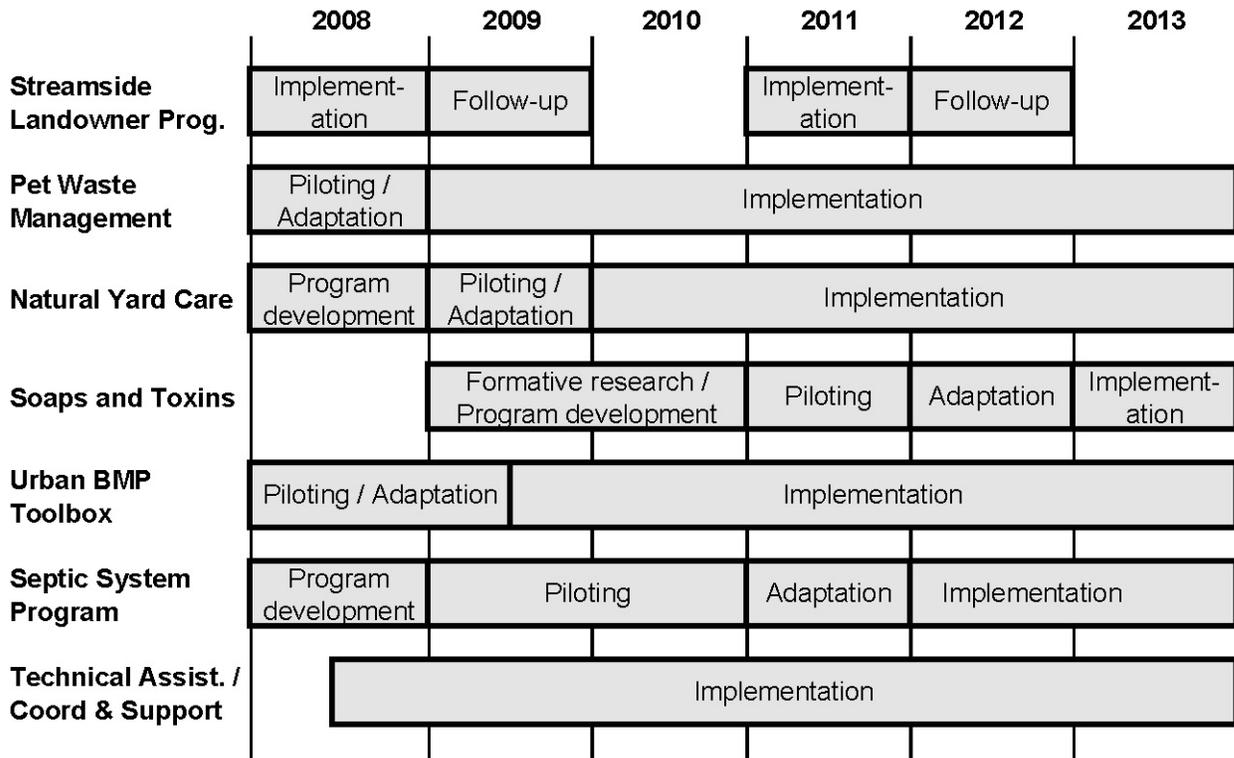


Figure 1. Implementation schedule.

D) Education To Achieve Behavior Change

Section S.5.C.10 of the stormwater permit mandates a program that goes well beyond conventional education to one that motivates and measures behavior changes in targeted audiences. Awareness programs play a key role in any comprehensive education program. The permit’s goal of behavior change, however, requires a heightened approach since the prevailing body of evidence indicates that awareness alone rarely produces desired changes in behaviors and practices.

The emphasis programs are, therefore, designed not as conventional education programs with the goal of conveying information and awareness, but rather as behavior change programs with the goal of motivating BMP implementation by target audiences.

In cases where full audience understanding of an issue is not necessary to produce BMP implementation, the County will focus on other motivators, beyond awareness and understanding, to produce the desired behavior change.

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In other cases, awareness and understanding of an issue is an essential step on the path to behavior change. In those instances, the County will rely on conventional education as just one of several steps. It occurs within a progression from 1) *information/awareness* to 2) *education/understanding* to 3) *technical assistance/facilitated action* to 4) sustained independent *BMP implementation*.

Programs developed and implemented under this plan are intended to methodically address entire target audiences rather than self-selected subsets. Examples of this strategy include Snohomish County's Streamside Landowner Program, which has produced repeated contact with every residential streamside property owner in Snohomish County, and the County's pilot pet waste management program, which contacted every veterinarian and every homeowner within the pilot area.

This is in contrast to most conventional education programs, which serve self-selected audiences instead of the broader populations mandated by the permit.

The County's large and geographically diverse population requires a landscape-scale approach. In this approach, the County anticipates conducting direct contact with strategic portions of certain audiences in phases, while relying on standard marketing practices to disseminate messages across broader populations.

E) Program Evaluation

Implementation monitoring utilizes activity measures designed to evaluate whether activities were implemented as planned (Figures 2, 3). These measures are typical of conventional education programs and are generally easy to apply. Typical measures include counts of site visits, workshops, participants, materials distributed, and the like. While activity measures do not provide a basis to measure progress toward the program goals, they are nonetheless valuable when evaluating program methods, efficiency, and finances. They are essential when evaluating task and program effectiveness, since variance in implementation may directly impact effectiveness.

Effectiveness monitoring is more challenging to accomplish, but is key to fulfilling the stated permit objectives for measurable behavior change. This type of monitoring is based on outcome measures, and will constitute the core of our program evaluation strategy.

Outcome measures are generally designed to evaluate whether program tasks produced the desired result. These measures, for example, would enable the County to determine if landowners are motivated to implement best management practices as a result of a workshop. This level of monitoring presumes that the expected outcome of program tasks will eventually lead toward achievement of the program's goals. In the case of stormwater BMPs the County will presume, based on a substantive body of peer-

reviewed scientific research, that certain BMPs applied across a landscape will eventually lead to specific desired results (i.e., reduced bacterial contamination or lower turbidity).

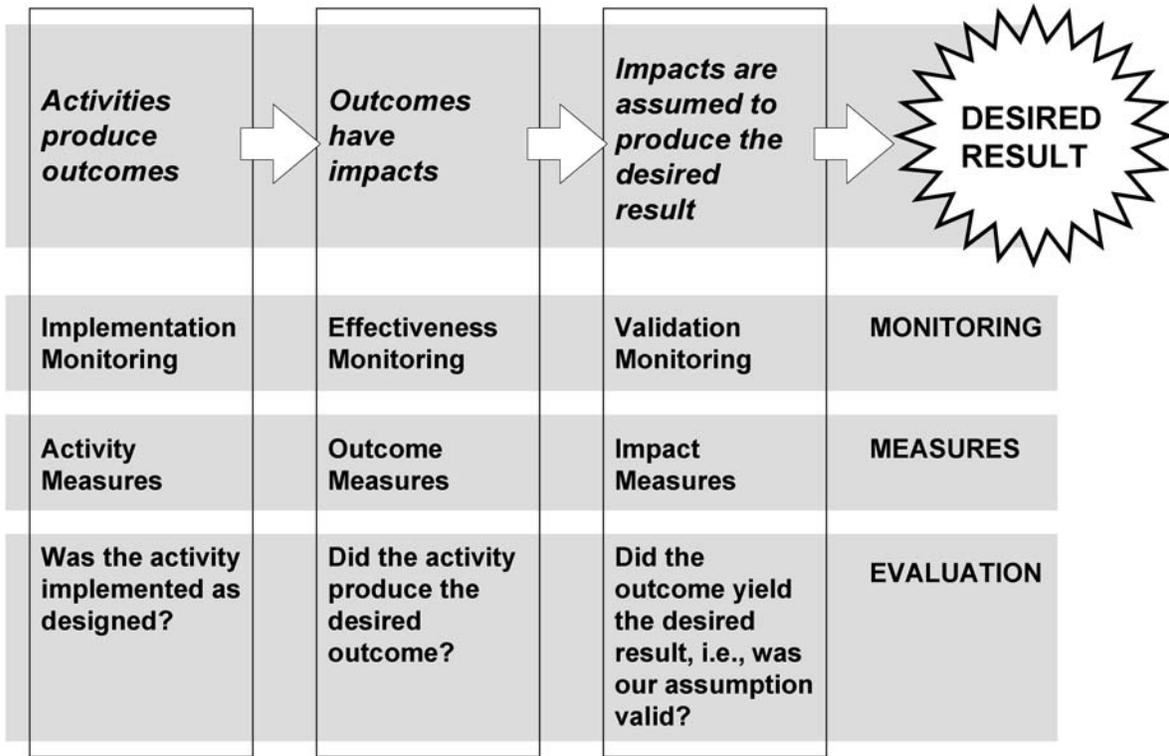


Figure 2. Monitoring measures and their relationships to a desired result.

These measures are generally more challenging to develop than activity measures because they often measure behavior patterns (in contrast to objects or tasks) and activities that are not verifiable through direct observation, and because the number of variables affecting the outcome often makes detection of direct correlations impossible.

Where possible, we will apply the following strategies to overcome these challenges:

- Use multiple measures to collectively evaluate progress.
- Avoid reliance on one measure for any given outcome.
- Use both qualitative and quantitative measures.
- Apply both task-level and program-level measures.
- Build measures directly into tasks where possible.
- Apply proxy measures where direct measures are not possible or practical.

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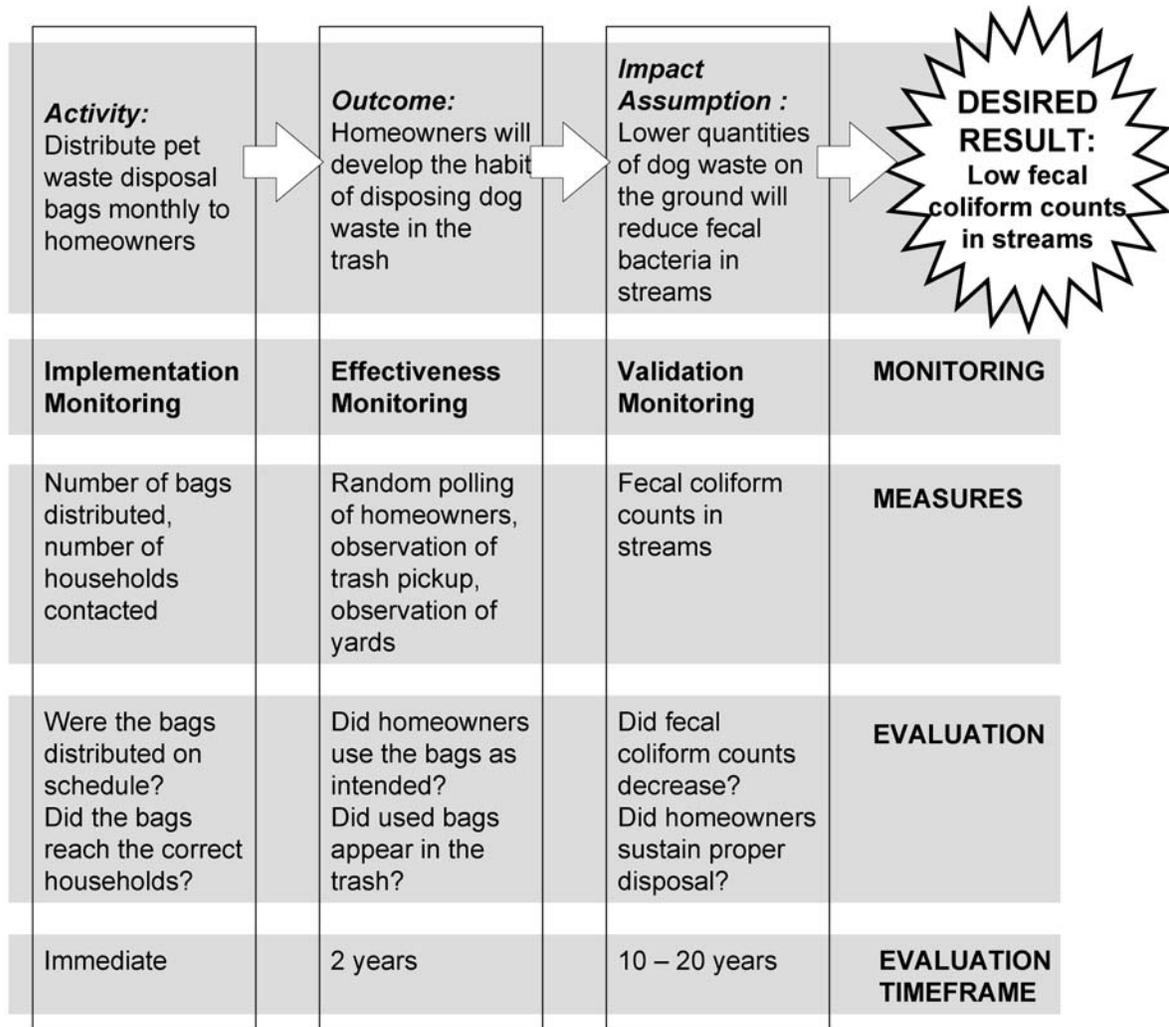


Figure 3. Example monitoring measures.

Validation Monitoring focuses on impact measures designed to evaluate if the assumptions upon which the program tasks are based have validity. For example, such monitoring can be used to check the assumption that a specific BMP applied across a landscape will produce a desired water quality result. Where possible, the County will build impact measures into the emphasis programs. However, the greater part of the County’s validation monitoring efforts are included in the program effectiveness monitoring required in permit section S8.