

# Whatcom County Future Stormwater Monitoring Plan and Effectiveness Monitoring Plan

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Prepared for  
Whatcom County, WA  
December, 2010

## Section 1

### Monitoring Overview

This section provides a brief overview of the monitoring requirements that are set forth in the Washington State Phase II Municipal Stormwater Permit for Western Washington (Phase II Permit).

#### 1.1 Current Phase II Permit Monitoring Requirements

The Phase II Permit regulates stormwater discharges for small municipal separate storm sewer systems (MS4s) as established in Title 40 CFR, part 122.26. The Phase II Permit, issued in 2007 and modified in 2009, includes requirements for permittees to prepare to conduct a monitoring program in future permits.

The Phase II Monitoring Program described in Section S8.C includes two types of monitoring:

1. Stormwater Monitoring (S8.C.1.a)
2. Stormwater Management Program (SWMP) Effectiveness Monitoring/Targeted SWMP Effectiveness Monitoring (S8.C.1.b)

Stormwater Monitoring (S8.C.1.a) requires permittees to identify sites suitable for monitoring stormwater discharges based on jurisdictional size and land use types, and on known water quality problems and/or targeted areas of interest for future monitoring.

SWMP Effectiveness Monitoring (S8.C.1.b) requires permittees to identify questions that monitoring may answer to determine the effectiveness of specific components of their SWMP. The permittee must identify sites for monitoring and create monitoring plans to answer at least two effectiveness questions.

#### 1.2 Future Phase II Permit Monitoring Requirements

This monitoring plan was prepared to meet the requirements of the current (2007) Phase II Permit. However, the next Phase II Permit, which is scheduled to be issued in 2012, may contain monitoring requirements substantially different from those envisioned in the current Permit.

In 2008, Ecology convened the Puget Sound Stormwater Workgroup (SWG) to develop a comprehensive, sustainable, stormwater monitoring strategy for Puget Sound, as well as monitoring requirements for the next Phase I and Phase II permits. The SWG members represent caucuses of local, state, and federal agencies, environmental and business organizations, tribes and agriculture. The SWG submitted the comprehensive strategy in July 2010 to Ecology. Based on this strategy, the SWG submitted monitoring recommendations for the next NPDES Phase I and II permits on October 29, 2010, in a document titled *Recommendations for Municipal Stormwater Permit Monitoring*.

The SWG recommends that Ecology designate an independent entity to administer the stormwater-related monitoring and assessment activities in the next Phase I and Phase II permits. This recommendation is called the “pay-in” option. The SWG recommended receiving water monitoring rather than the outfall monitoring described in the current Phase II Permit. Moreover, the SWG recommended that the regional entity (rather than each permittee) administer the program effectiveness monitoring and focus on questions of regional significance.

More information on the SWG is available at

<http://www.ecy.wa.gov/programs/wq/psmonitoring/swworkgroup.html>.

If the next Phase II Permit incorporates the SWG recommendations, the monitoring requirements will be substantially different from those envisioned in the current Permit. Thus, the monitoring plans described in this document should be regarded as tentative and subject to change based on the next Phase II Permit.

## Section 2

### Monitoring Site Selection Process

#### 2.1 Land Use Requirements

Whatcom has a population of 84,683 according to the 2009 State population estimate. Based on the thresholds set in Permit section S8.C.1.a, the County must select two outfalls where stormwater characterization monitoring could be conducted. One site should represent commercial land uses and the other should represent low-density residential land uses.

#### 2.2 Sampling Site Selection

The Phase II Permit states that the selected outfalls should be located in areas of known water quality problems and/or targeted areas of interest for future monitoring (in addition to meeting the land use criteria described above).

The Phase II Permit requires permittees to document:

1. Why sites were selected;
2. Possible site constraints for installation of and access to monitoring equipment;
3. A brief description of the contributing drainage basin including size in acreage, dominant land use, and other contributing land uses;
4. Any water quality concerns (or interests) in the receiving water of each selected outfall or conveyance.

Ecology's May 2010 Monitoring and Reporting Guidance for Phase II Municipal Stormwater Permits (Publication 10-10-030) provides additional information regarding monitoring site selection.

The County reviewed land use data collected by National Ocean Atmospheric Administration (NOAA) and tax parcel data to identify outfalls draining areas with appreciable commercial and low-density residential land uses. The County then reviewed existing monitoring data to identify water quality concerns for those locations as well as potential opportunities to complement ongoing monitoring efforts. This process identified the two potential monitoring sites described below.

#### Site 1 (Commercial): Sudden Valley

**Brief Description-** The monitoring site is located at the catchbasin on the east side of Lake Whatcom Blvd before it discharges to Austin Creek (see Figure 1).

**Reason for Selection-** This site was selected because it drains one of the few commercial areas in the County's NPDES area and discharges to Austin Creek, which Ecology has listed as "polluted" due to elevated fecal coliform levels.

**Constraints-** There are no known constraints to automated sampling at this site. However, if fecal coliform is the key parameter of concern, manual sampling may be more appropriate.

**Brief Description of Contributing Drainage Basin (size, dominant land use, other contributing land uses)-** The drainage basin is 25 acres. Commercial and multi-family residential land uses cover 17% percentage of the catchment area. Most of the basin (80%) is open space, parks, and golf course and a

small percentage (3%) is residential. Less than 1% is streets and right-of-way.

**Water Quality Concerns or Interests-** Austin Creek is listed as “polluted” due to elevated fecal coliform levels. Austin Creek flows into Lake Whatcom, which has been listed as “polluted” due to low dissolved oxygen (DO) concentrations. Ecology has determined that the DO problems in the lake are caused by elevated phosphorus loads from human activities in the watershed.

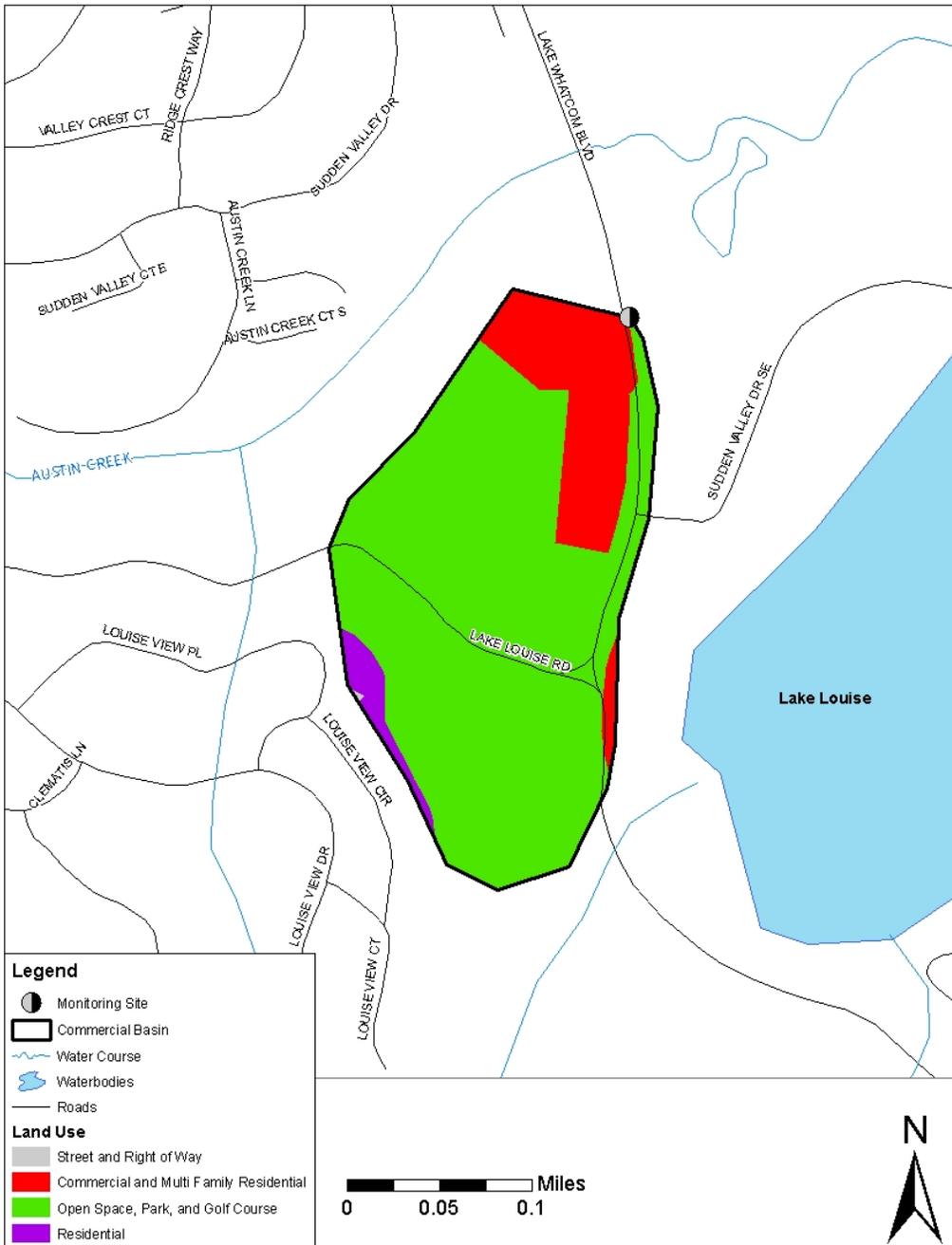


Figure 1. Commercial Land Use Basin

## Site 2 (Low Density Residential): Britton Road Outfall

**Brief Description-** The outfall drains a mostly residential area (Figure 2). The water is collected in a swale/creek near the intersection of Britton Road and Lahti Drive where it flows about 800 feet before discharging into Silver Beach Creek.

**Reason for Selection-** This site was selected because of local interest in the recently constructed Britton Road Lahti Drive swale. The site discharges to Silver Beach Creek, which is listed as “polluted” due to elevated fecal coliform levels and has been identified as a source of phosphorus to Lake Whatcom.

**Constraints-** There are no known constraints to automated sampling at this site.

**Brief Description of Contributing Drainage Basin (size, dominant land use, other contributing land uses)-** The drainage basin is 117 acres. Most of the basin (87%) is dominated by single family residential houses. The density is not defined in the County’s land use data but using GIS analysis it was determined that the average density was five units per acre, which is considered low-density according to the Ecology Guidance document. A small portion (3% is multi-family residential, which includes condominiums, triplexes, and fourplexes. About 3% of the basin is open space, and the rest is unknown, streets, and right-of-way.

**Water Quality Concerns or Interests-** Silver Beach Creek is listed as “polluted” by fecal coliform bacteria. Silver Beach Creek discharges into Lake Whatcom, which has been listed as “polluted” due to low DO concentrations. Ecology has determined that the DO problems are caused by elevated phosphorus loads from human activities in the watershed.

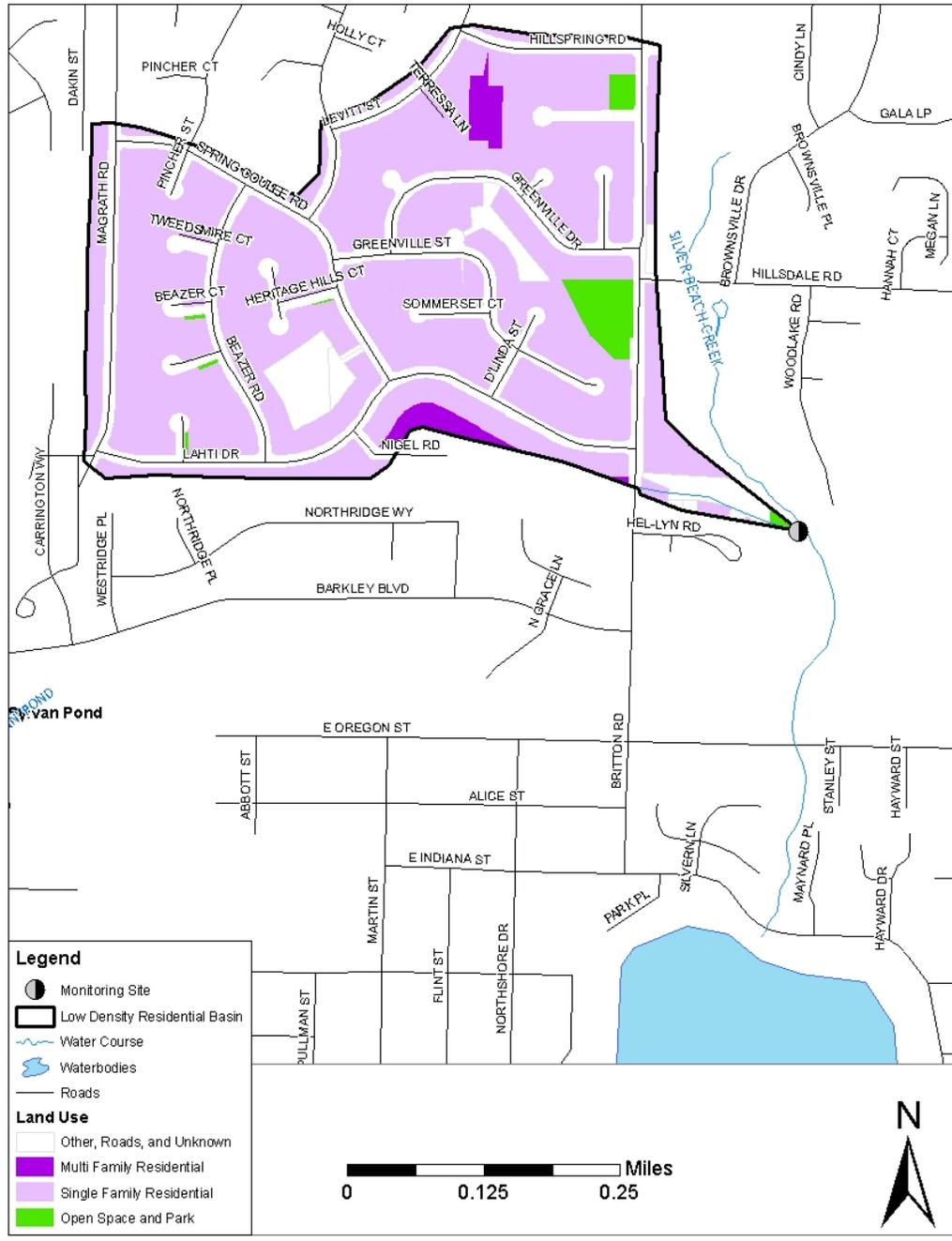


Figure 2. Residential Land Use Basin

## Section 3

### Targeted Stormwater Program Effectiveness Questions

Phase II Permit condition S8.C.1 requires that each permittee prepare a monitoring plan to address two questions related to the effectiveness of the permittee's stormwater management program. The monitoring plan must contain the following elements:

- A statement of the question, an explanation of how and why the issue is significant to the permittee and a discussion of whether and how the results of the monitoring may be significant to other MS4s.
- A specific hypothesis about the issue or management actions that will be tested.
- Specific parameters or attributes to be measures.
- Expected modifications to management actions depending on the outcome of hypothesis testing.

The County's proposed effectiveness questions and monitoring approach are described below. As noted above, the County understands that the next version of the Phase II Permit may contain monitoring requirements substantially different from those envisioned in the current Phase II Permit. The County may revise these effectiveness questions and/or monitoring strategies after the next Phase II Permit has been issued

#### Question 1- Will a comprehensive stream restoration program substantially reduce stormwater runoff?

##### Problem Statement/Description:

Lake Whatcom is the sole drinking water source for approximately 95,000 people. All of the urbanized portions of its watershed are affected by the NPDES Phase II Stormwater requirements. In 2008, Washington State Department of Ecology (DOE) issued a TMDL study (Lake Whatcom Water Quality Improvement Project) that recommended substantial reductions in phosphorus and fecal coliform bacteria loads. Achieving these load reductions will likely require substantial reductions in surface runoff.

The Lake Whatcom Management Program, a partnering agreement between Whatcom County, the City of Bellingham and Lake Whatcom Water and Sewer District, has embarked on an ambitious project to initiate a comprehensive program to restore a key Lake Whatcom tributary, Silver Beach Creek, to a more naturally functioning ecosystem. The program is known as the Silver Beach Creek Pilot Program (SBCPP).

In *Urban Stormwater Management in the United States*, the National Research Council recommended using runoff volume as a proxy for stormwater quality management (NRC 2008). With that in mind, the County proposes to monitor flows in Silver Beach Creek in order to evaluate the cumulative effects of the SBCPP implementation.

Other MS4's throughout the state and nation are experiencing similar problems to Whatcom County and the Lake Whatcom Management Program. This program could provide insight to other municipalities for continuing their efforts.

**Hypothesis:** Silver Beach Creek flow volumes will decline over time as the Silver Beach Creek Pilot Program is implemented.

**Specific parameters or attributes:** The County, in partnership with the Lake Whatcom Management Program, will use automated equipment to monitor flows in Silver Beach Creek.

**Expected modifications:** If monitoring determines that the hypothesis is correct and the County is successful in reducing flow volumes, the County will pursue the same suite of actions in other drainage basins with similar attributes.

## **Question 2- Does retrofitting with a bio-infiltration swale reduce phosphorus loads?**

### **Problem Statement/Description:**

Lake Whatcom is the sole drinking water source for approximately 95,000 people. All of the urbanized portions of its watershed are affected by the NPDES Phase II Stormwater requirements. In 2008, Washington State Department of Ecology (DOE) issued a TMDL study (Lake Whatcom Water Quality Improvement Project) identifying Lake Whatcom for phosphorus reduction.

In 2008 the Whatcom County Council approved the Lake Whatcom Comprehensive Stormwater Plan. The plan identified a suite of programmatic and capital improvement project solutions. The Britton Road Lahti Drive bio-infiltration swale, one of the capital improvement projects, was constructed in 2010. It is a stormwater treatment retrofit project designed in part to remove phosphorus from a 31-acre section of a subdivision constructed in the 1970s.

Whatcom County engineers designed this facility and will be able to provide useful information regarding the facility to other MS4's throughout the state and nation who are experiencing similar problems.

**Hypothesis:** By reducing the flow volume and retaining phosphorus in the soil, the Britton Road Lahti Drive bio-infiltration swale will reduce the total phosphorus (TP) load from the 31-acre residential contributing area.

### **Specific parameters or attributes:**

- 1) The County will install automated sensors to measure flows entering and exiting the swale.
- 2) The County will collect subsamples from surficial soils (e.g., 0 to 12 inches) at a number of locations within the swale, mix the subsamples to form two composite samples, and analyze the samples for TP. The County will repeat the sampling at annual intervals and compare the results to determine if soil TP concentrations are increasing over time (because the swale is causing particulate phosphorus to settle and dissolved phosphorus to adsorb/precipitate onto soil particles).

**Expected modifications:** If monitoring determines that this swale design is successful in reducing flow volumes and phosphorus loads, the County will utilize it in other drainage basins with similar problems and characteristics.