# WA DEPARTMENT OF ECOLOGY
# WATER QUALITY PROGRAM
# PROGRESS REPORT FORM

**Funding Source:** ☐ 319 ☐ Centennial ☐ DIF ☐ Revolving Fund
☐ Reclaimed Water ☒ Stormwater

**Grant/Contract/Loan Number:** G0800631

**Project Title:** Mason County Stormwater Management Program Funding and Improvement/ Urban Water Quality LID Retrofit Project

**Project Period:** January 31, 2008 to June 30, 2012
(Start and end date from grant agreement)

**Recipient Organization:** Mason County

**Recipient Project Manager:** Loretta Swanson / Charlie Butros
100 W Public Works Drive
Shelton WA 98584
Phone: (360) 427-9670, Ext. 450
Email: lorettas@co.mason.wa.us

**Reporting Period:** April 1, 2011 to June 30, 2011

**Date This Form Was Prepared:** June 27, 2011

**Ecology Contacts:**
Regional Project Manager: Deborah Cornett, (360) 407-7269 Regional Office
Financial Manager: Melanie Tyler, (360) 407-7039 Lacey Office

**Funding:** Total Eligible Cost: $ 1,000,000
Total Ecology Award: $ 750,000
Total Expenditures to Date: $ 866,850

**Task and Milestone Achievements** (for current reporting period only)

| | |
|---|---|
| Task 1 | Amendment No. 1 executed April 17, 2011 to change the grant expiration date to June 30, 2012. |
| Task 2B | Technical Memorandum completed April 2011 that identifies potential annual revenue needs and funding mechanisms. Consultant presentation to Board and the Stormwater Task Force. |
| Task 2B | Second round of public meetings held in June 2011. |
| Task 3 | Phase II of the Belfair stormwater LID retro-fit project substantially completed June 2011 (planting scheduled for this fall). |

## Task 1: Project Administration / Management

| | |
|---|---|
| Total Eligible Cost | $30,000 |
| Total Expenditures to Date: | $11,087 |

**Administration**

Grant Amendment No. 1 was executed April 17, 2011 changing the grant expiration date from June 30, 2011 to June 30, 2012.

**Coordination**

The Stormwater Work Group continued regular meetings during this quarter (typically held on the first and third Thursdays).

Consultant coordination occurred on a regular basis, with emphasis on the completion of Technical Memorandum #1A and preparing for the second set of public meetings.

Occasional grant status reports were provided to the Ecology grant officer via email.

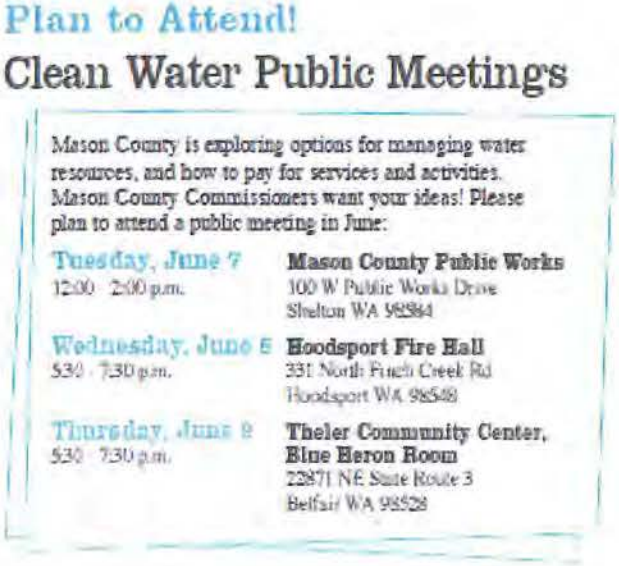
## Task 2: Program Implementation

| | |
|---|---|
| Total Eligible Cost | $390,000 |
| Total Expenditures to Date: | $416,186 |

A. **Public Education and Outreach:**

**Clean Water Meetings: June 7th, 8th, and 9th, 2011**

The June Clean Water Public outreach meetings presented possible elements of a Clean Water program, potential costs, and ways to fund (see Task 2.B below) a program. This was the second major public outreach effort. The first was held in December 2010 and aimed at sharing known water quality, flooding and erosion issues and gathering additional community input.



Plan to Attend!

Clean Water Public Meetings

Mason County is exploring options for managing water resources, and how to pay for services and activities. Mason County Commissioners want your ideas! Please plan to attend a public meeting in June:

| | |
|---|---|
| Tuesday, June 7<br>12:00 - 2:00 p.m. | **Mason County Public Works**<br>100 W Public Works Drive<br>Shelton WA 98584 |
| Wednesday, June 8<br>5:30 - 7:30 p.m. | **Hoodsport Fire Hall**<br>331 North Finch Creek Rd<br>Hoodsport WA 98548 |
| Thursday, June 9<br>5:30 - 7:30 p.m. | **Theler Community Center, Blue Heron Room**<br>22871 NE State Route 3<br>Belfair WA 98528 |

Postcards designed by Melinda Posner and Lee Doyle were mailed to all Mason County businesses and residences, a KMAS radio spot advertised the meetings, and there was also good newspaper coverage both prior to, and after the meetings. (Copy of article attached).

Several Stormwater Task Force members were in attendance at each of the three meetings. Mason Conservation District, WSU Extension, County Health and Public Works representatives were on hand to help facilitate the discussion period and field questions.

Mason County
CleanWater

**Public Meetings About Program Components & Funding Options**

Last December, Mason County held a series of Clean Water Open Houses and asked you to identify water quality, erosion and flooding issues. Please plan to attend a public meeting to hear more about managing water in Mason County. See other side for meeting dates and locations.

At the meetings we will:

- Share what we heard in December
- Describe a County Clean Water Program
- Present ways to fund a Clean Water Program
- Hear your priorities about programs and funding options
- Share next steps and schedule

For more information, visit
*www.co.mason.wa.us/stormwater/*
or call Loretta Swanson at
(360) 427-9670 x769

A total of 82 people signed in during the three meetings (more were in attendance). The meeting format was: 1.) A presentation (PowerPoint presentation is attached) by the Stormwater Program Coordinator, and 2.) a facilitated discussion and question/ answer period.

Following is a brief summary of common themes from the three meetings:

- People are generally supportive of efforts and understand the need for a Clean Water program
- The County needs to clearly state the specific reasons for a program. What is the County's assessment of problems and priorities?
- There is not a good understanding of current efforts within the County, whether those efforts are adequate, and how they are funded.
- There is concern about potential duplication of efforts and inefficiencies.
- People expressed a need for inspection and enforcement.
- People expressed concern for establishing new revenue source(s) at this time.

### Other Education and Outreach Activities

WSU Extension staff worked extensively with the local KMAS radio station and community partners to set up a new radio show called "Environmentally Sound" which features local speakers discussing important environmental issues and community events. It is likely that this summer members from the SWTF will provide clean water minutes and perspectives on the SW Utility process.

WSU Extension staff also conducted environmental education programs with area 5th and 3rd grade classes on the importance of clean water and habitat at Panhandle Camp and Twanoh State Park on 5/17, 5/18 and June 2nd.

Mason CD, WSU Extension, and County staff manned booths with educational materials and

"hands-on" activities during the April "Earth Day at Oakland Bay" event.

**Stormwater Task Force** (Meetings April 25th and June 16th)

Stormwater Task Force activities for this quarter included the following:

- April presentation by Otak consulting team with a summary of updated and refined Gap Analysis, examples of potential funding mechanisms and entities that could receive funding, and identification of the most suitable mechanisms. Task Force members completed a survey of initial reactions to potential funding sources.
- June PowerPoint presentation on Forestry BMP's by Rick Schmeling, Green Diamond.
- Toured the WSU Puyallup Stormwater research facility May 25, 2011.

Mason Conservation District staff participated at all Mason County Stormwater Advisory Task Force meetings and WSU Extension staff continues to provide note-taking and draft minutes for Task Force meetings. In lieu of the SWTF meeting in May, WSU Extension staff organized a tour of the new Low Impact Development Center for SWTF members and other staff at WSU Puyallup Research and Extension Center.

**Coordinated Education and Outreach Campaign – new PSSH Grant**

MCD Staff submitted a grant to the Puget Sound Partnership focused on rural Mason County residents' awareness of clean water

**Stormwater Website**

The Stormwater website is continuing to develop. We have recently added Public Meeting information, current stormwater grant progress reports and information relating to the Stormwater Task Force.

The stormwater website can be found here: http://www.co.mason.wa.us/stormwater/

**Shoreline Property Owners**

WSU Shore Stewards in Mason County (529 individuals) received three e-newsletters during the reporting period on 1) Japanese Eelgrass 2) Dungeness Crab and Oil Spill Prevention and 3) Shoreline Planting for Pollinators. Publicity for the community open houses was also distributed to shoreline landowners via these newsletters.

MCD provided technical assistance to 1 landowner this quarter.

**LID Retrofit**

A lunch-time presentation was given by Peter Evans, Northwest Regional Manager for Filterra. Peter provided a summary of Filterra uses and benefits and fielded questions from approximately 30 attendees.

**B. SWMP Funding Plan**

The consulting team of Henderson, Young and Associates and Otak completed *Funding Strategies for Mason County's Stormwater Management and Water Resources Program-*

*Technical Memorandum #1A* in mid-April. The consulting team provided a briefing to the Mason County Board of Commissioners, followed by a presentation to the Stormwater Task Force. The information contained in the tech memo was used to develop presentation materials for the June Clean Water public meetings.

The purpose of the technical memo is to present a high-level assessment of funding options for a Clean Water program. The Gap Analysis completed last quarter was used to assess potential revenue source viability. The memo was used as a resource for presentations and discussions with elected officials, staff, Stormwater Task Force, stakeholders, and the public.

In all, nine potential funding sources were evaluated for their ability to generate revenue, monthly cost per single family household, legal authority, advantages/disadvantages, and specific assumptions used in the analysis.

The next step will be the selection of 2-3 funding mechanisms to advance for further analysis. Stormwater Task Force members completed a survey of "initial reactions" to this end and will re-visit funding sources after a closer evaluation of program component options.

**C. Develop and Implement Legal Authorities and Train Staff**
Meetings continued with Department of Community Development staff to identify areas in need of code clarification, improvements to hand-out materials, and other resources. MCD staff worked with MCPW Stormwater Coordinator to scope LID guidance documents to be used by Community Development.

**D. GIS based Water Quality Mapping**
MCD staff members continued to work with MCPW GIS staff on preparation of a Countywide Low Impact Development Facility map.

## Task 3: Stormwater Retrofit, LID Projects, and Planning

| | |
|---|---|
| Total Eligible Cost | $580,000 |
| Total Expenditures to Date: | $439,577 |

**BELFAIR**

Phase II (Roy Boad Road) of the Belfair stormwater retro-fit project was substantially completed during this quarter. Bids were opened April 13th and there were four responsive bidders. Bids ranged from the low bid of $115,673 (Pivetta Brothers) to $134,084. The Engineer's Estimate was $126,951.

A pre-construction meeting was held with Pivetta Brothers on April 27, and work began May 2. Three change orders were issued during the project, amounting to a net contract change of $9660.26, or 8.3% increase. The project was completed on May 20, 2011.

**Roy Boad Road ditch section, prior to work.** **Same view, near project completion.**

MCD continued to collaborate with MCPW to plan community outreach and involvement activities for Belfair small businesses.

## ALLYN/HOODSPORT

Mason County Engineering and maintenance staff completed plan review and made minor comments and changes to work prepared by Preferred Engineering.

### Stormwater Monitoring

Mason County Public Health completed water testing for potential stormwater remediation sites and has prepared a draft report on the results. The report was written as a stand-alone document in scientific study format. The draft report is attached to this quarterly report.

### Hood Canal Coordinating Council Regional Stormwater Retro-Fit

The Stormwater Program Coordinator regularly participates in the Hood Canal Coordinating Council Stormwater and Land Use technical advisory committee. One of the recent work products has been to develop a framework to pursue a regional stormwater retro-fit program for the Hood Canal Action Area.

**Tasks/Milestones not achieved and why:**

**Potential Future Challenges to Performance** (time delays, staff changes, etc.)

**General Comments**

**List the cumulative totals for all numerically measurable accomplishments for this calendar year**

(Example: amount of riparian area planted, length of fencing installed, technical assistance, conservation plans, etc)

# Mason County Clean Water

**Program and Funding Presentation**

June 2011

1

# Mason County Clean Water Program

| | |
|---|---|
| Overview | 5 minutes |
| Clean Water Program<br>- What is a Clean Water Program?<br>- What might it cost? | 20 minutes |
| Funding<br>- Current funding<br>- Potential future funding | 10 minutes |
| Next Steps | 5 minutes |

2

# Overview

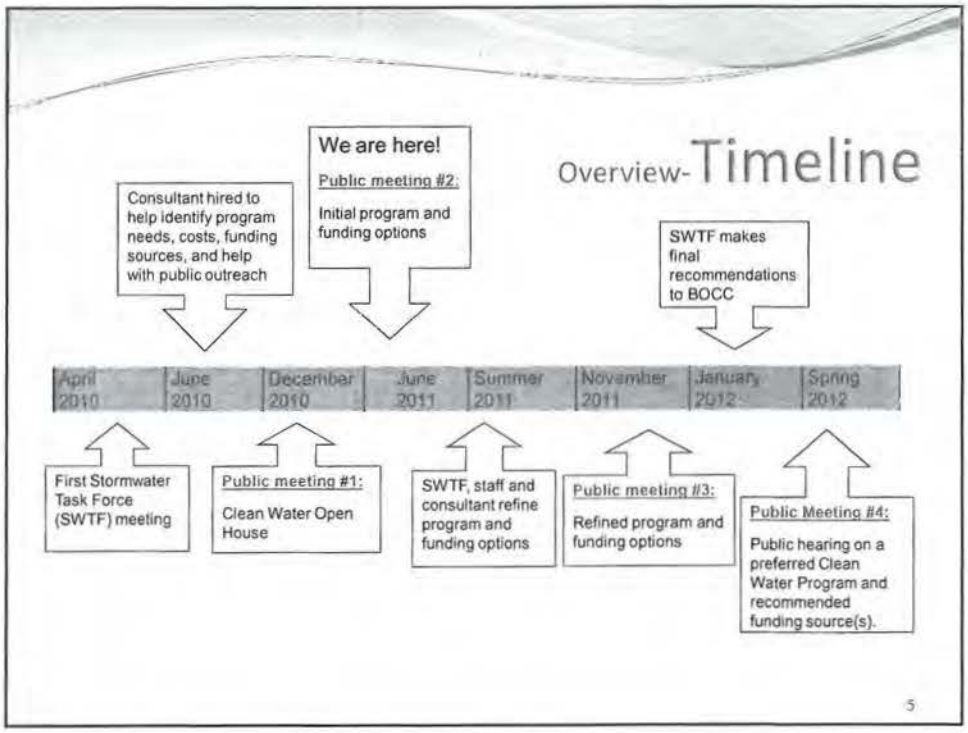
- Program options, and
- How to pay for program services and activities

3

# Overview

- Lots of good work happening in Mason County
- Implementing local priorities, working towards meeting future NPDES permit requirements, Action Agenda
- Majority of the work is grant funded
- Be proactive and begin discussions to identify what work is important to continue, and how we might pay for that work.

4




## Overview – Postcard Response

- 95% concerned about the health of our water
- 81% say it is important to pay to prevent pollution
- 84% feel it is a joint effort to prevent water pollution

6

## Overview - Open House

- Flooding/Erosion
- Water Quality/Habitat
- Process Concerns/Questions
- Other Comments

7

## What is a Clean Water Program?

- Programs and activities to manage our water resources
- Often called "Water Resource Programs", "Clean Water Programs", "Stormwater Programs".
- Aimed at preserving, protecting, and enhancing:
  - Fresh waters (lakes, wetlands, streams, rivers)
  - Marine waters
  - Aquifers

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## How was the program developed?

- Collaborative approach:
  Mason County, WSU Extension, Mason Conservation District, Stormwater Task Force, consultant and others
- Reviewed existing plans (stormwater, watershed, Puget Sound)
- Examined what other jurisdictions are doing
- Looked to future stormwater permit requirements (NPDES)
- Considered citizen comments from previous public forums

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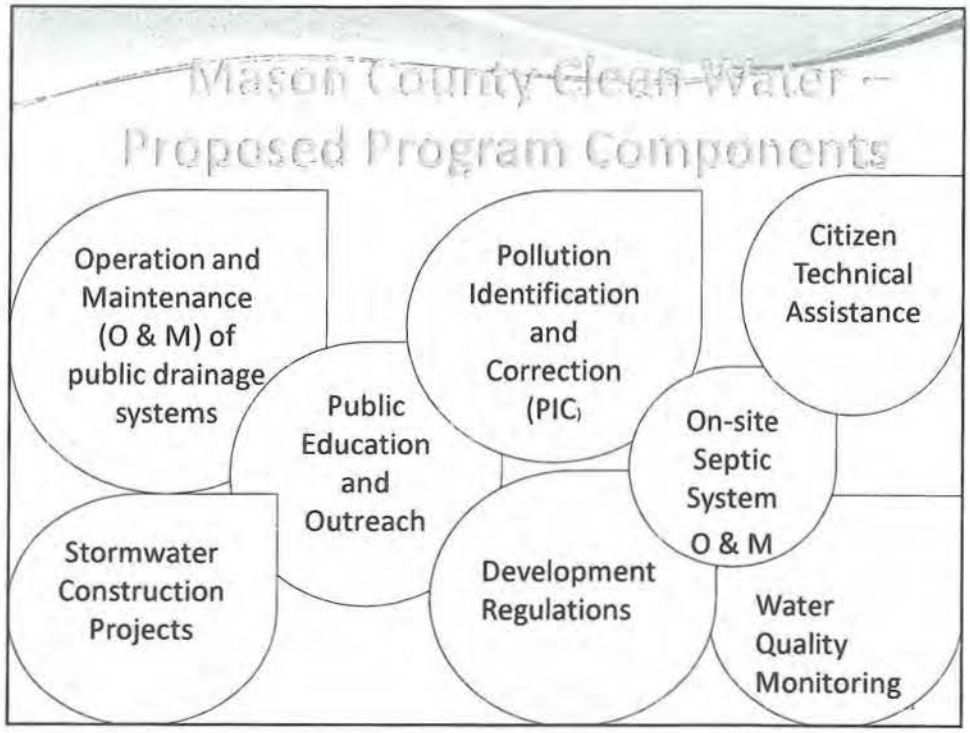
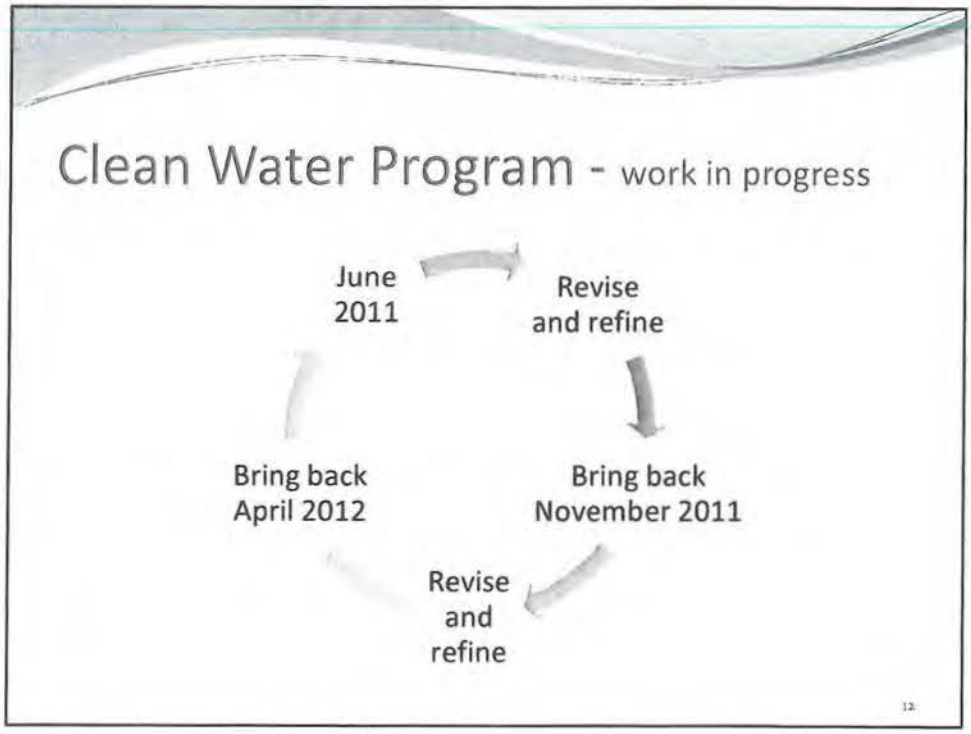
## NPDES?

- A stormwater permit issued to municipalities
- A federal (EPA) permit; administered in Washington by the department of Ecology
- Permit revisions now underway and new permit issued July 2012
- Mason County? Shelton UGA sometime in the future

10


Mason County Clean Water –
Proposed Program Components
Operation and Maintenance (O & M) of public drainage systems
Pollution Identification and Correction (PIC)
Citizen Technical Assistance
Public Education and Outreach
On-site Septic System O & M
Stormwater Construction Projects
Development Regulations
Water Quality Monitoring


Clean Water Program - work in progress
June 2011
Revise and refine
Bring back November 2011
Revise and refine
Bring back April 2012
12

## Public Education and Outreach

- Designed to build awareness and stewardship
- Workshops, brochures, youth activities, training, meetings
- An NPDES permit requirement
- Estimated maximum annual funding gap $160,000

13

## Development Regulations

- Anticipates an increased level of plan review, inspection, enforcement and reporting
- Anticipates need to update regulations in the future
- An NPDES permit requirement
- Estimated maximum annual funding gap $310,000

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# Technical Assistance

- Property owner help with stormwater problems and applying low impact development practices
- Includes: site planning and engineering support; agricultural/stormwater solutions; $ 150,000 for financial assistance
- Is not an NPDES permit requirement
- Estimated maximum annual funding gap $400,000

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# Water Quality Monitoring

- Establish routine monitoring of water bodies on a rotating watershed basis
- Conduct follow-up work in priority action areas
- Is not an NPDES permit requirement
- Estimated maximum annual funding gap $380,000

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# On-Site Septic System Operation and Maintenance

- Program to inventory, track, and ensure routine maintenance of on-site septic systems
- Includes: training, education and incentives
- Is not an NPDES permit requirement
- Estimated maximum annual funding gap $200,000

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# Public Works Drainage Operation and Maintenance

- Inspect and maintain drainage systems within County road ROW
- Is an NPDES permit requirement
- Estimated maximum annual funding gap $285,000 for anticipated new activities required under an NPDES permit

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# Construction

- Project planning, design, and construction to improve water quality, reduce flooding and erosion, and improve habitat
- Not an NPDES permit requirement
- Estimated maximum annual funding gap $1,358,000

# Program Management and External Coordination

- Provide overall program management including: budget, personnel, reporting, accountability
- Attend, lead, or coordinate external water management activities
- An NPDES permit requirement
- Estimated maximum annual cost $560,000

20

# Potential Maximum Annual Program Cost

| | |
|---|---|
| **Education and Outreach** | **$160,000** |
| **Development Regulations* (if funded by fees, cost = $0)** | **310,000** |
| **Technical Assistance** | **400,000** |
| **Water Quality Monitoring** | **380,000** |
| **On-site Septic System O&M** | **200,000** |
| **Public Works Drainage O&M** | **285,000** |
| **Construction** | **1,385,000** |
| **Program Management; External Coordination** | **560,000** |
| **Program Overhead** | **500,000** |
| **Total all elements** | **4,153,000** |

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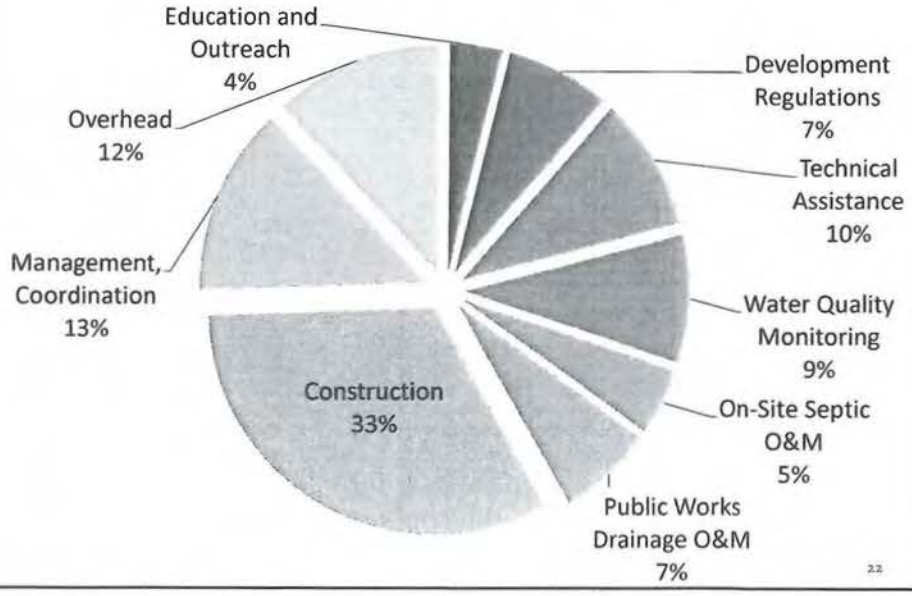
## Clean Water Components as % of the Total Program

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# Current Funding Sources

- Grants
- Developer Fees
- Road Fund
- Real Estate Excise Tax (REET)
- Rural Counties Sales and Use Tax (0.09)

23

# Potential New Funding Sources

Nine new sources initially considered

Advance 1-3 for further analysis

24

# Potential New Funding Sources

| | | |
|---|---|---|
| Impervious Surface Charge | Property Tax | Business License Fee |
| Vehicle License Fee | Sales Tax | Real Estate Excise Tax (REET) |
| Charge per Parcel | Charge per Acre | Debt |

25

# Potential New Funding Sources

Some sources unlikely for a variety of reasons:

- Generate very little revenue
  (Charge per acre)
- Require approval from another entity
  (Charge per acre/per parcel - Mason Conservation District)
- Reduce funds available for basic county services
  (Sales Tax)

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# Potential New Funding Sources

Several sources have limitations. Some examples:

- Impervious surface charge must be collected and kept in a separate fund
- A vehicle license fee can not exceed $20 per vehicle unless approved by voters
- Real Estate Excise Tax (REET) must be used for the planning, design and construction of capital facilities

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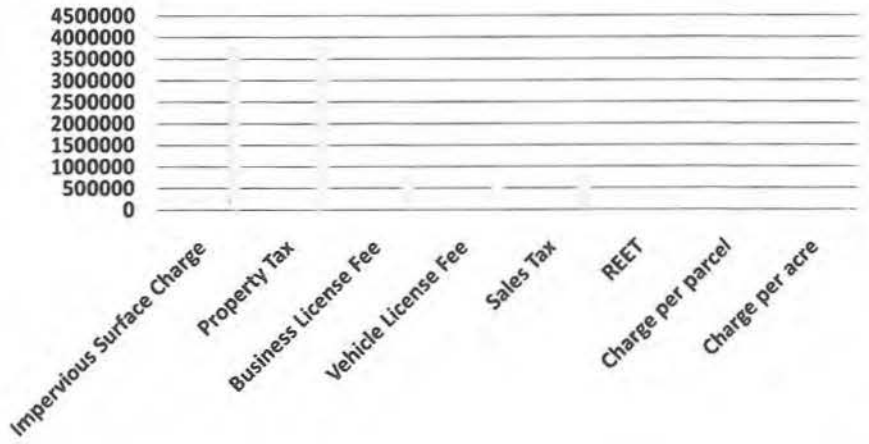
# Source Comparison – potential revenue generated

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# Why consider this now?

- Many County services will greatly diminish (or completely go away) once funding ends
- Establishing a dedicated revenue source will increase ability to leverage grant funding
- Experience of other jurisdictions show cost to restore "after the fact" is 8 x the cost to prevent impacts
- We can select *our priorities* and implement at *our own pace*

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# Next Steps

| | |
|---|---|
| Summer 2011 | Staff/consultant/SWTF refine program and funding options |
| November 2011 | Public meetings to present refined program and funding strategy, and gather your input |
| January 2012 | SWTF makes program and funding recommendations |
| April 2012 | Public hearing on recommended program and funding option |

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# Questions? Comments?

Thank you for attending!

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# The cost of clean water

By NATALIE JOHNSON

Since last year, Mason County has made great strides in creating it's own clean water program, and this week held it's second set of public meetings to discuss the program.

While most at the meeting could agree that having county-wide programs to address stormwater management and water quality would be a benefit, many were concerned by the $5.3 million price tag, with $4.1 million currently unfunded.

"It's more costly to fix things after the fact," said Loretta Swanson, the county's stormwater program manager. "The longer we wait the more expensive this will get."

At some point in the future, Mason County may hit a population that will require the county to qualify for the National Pollutant Discharge Elimination System (NPDES) permit. Without many of the programs within the clean water program, the county will not qualify for that permit.

While the county doesn't need to get the permit now, it's better to plan ahead, Swanson said.

"We're not in that pot this time but we're working towards that," she said.

During the meeting Swanson outlined individual components of the current draft of the clean water program and how much each would cost annually.

Journal photo by Natalie Johnson

**Loretta Swanson, Mason County's stormwater program manager, led the Clean Water Program meeting at the Mason County Public Works Building on Tuesday.**

They include: Public education and outreach, with a funding gap of $160,000, development regulations with a gap of $310,000, technical assistance with a gap of $400,000, water quality monitoring with a gap of $380,000, on-site septic system operation and maintenance with a gap of $200,000, public works operation and maintenance with a gap of $285,000, stormwater construction with a gap of $1,358,000, program management and coordination with a gap of $560,000 and program overhead with a gap of $500,000.

This program is based off of stormwater and cleanwater programs in other jurisdictions, Swanson said.

"Rather than recreate the wheel ... we used what have we already got on the books," she said.

Swanson said the county is currently evaluating funding options for these programs. All of the options they are considering are fees or taxes, she said.

"We are mindful of the times we're in – we're not putting this out lightly," she said.

The county's Stormwater Task Force (SWTF) plans to make a recommendation to the county commission on the clean water program by January 2012.

The third meeting will be today at 5:30 at the Theler Community Center in Belfair.


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make repairing the road economically beneficial. Yet the county seems intent on repairing the road. Why?

Government agencies dangle carrots in the form of grants to local county governments. In this case, FEMA (Federal Emergency Management Agency) provides grants to repair storm-damaged roads. The money (which originates from unseen and unrecognized taxpayers) doesn't cover the entire cost, forcing the county to spend money to get free money. We're told if we don't take the free money then we will lose the money. Trouble is, this free money comes with strings attached.

Pursuing government grants may be a necessary evil, but I can't help but visualize grant seekers as grant whores – those who pursue free grant money, then bend and twist their project to fit a grant's requirements in order to get paid. There are unintended consequences, usually in the form of sinewy strings

WORD ON THE STREET

## What do you think about the possibility of Mason County creating a $5 million Clean Water Program?

### Theresa Kenney-Martinez

"It depends on what their budget is like – if they'll go more in the hole. Environmentally it sounds like a good plan."

### Christina Bartholet

"I would be for that. There's nothing more important than clean water."

### Vicki Anderson

"For all that I think $5 million is a deal. Anything that is good for the environment is good."

### Barney Stewart

"They spend money on stuff we don't need – they might as well spend money on something we do."


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Kelly Riordan, production manager
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# Report on Mason County Stormwater Management Water Quality Monitoring Program

**Department of Ecology Grant Number G0800631**

**Submitted July 28th, 2011**

**Prepared by:**

**Stephanie Kenny**
**Mason County Public Health**
**under contract for**
**Mason County Public Works**

**Prepared for:**
**Washington State Department of Ecology**

# Introduction and Background

Stormwater conveyances are a major contributor to surface water contamination. Stormwater contaminants can include oils, grease, pesticides, heavy metals, suspended solids, nutrients and fecal coliform bacteria. Contaminated stormwater can flow into stormwater conveyances and be transported directly into sensitive receiving waters. In some cases stormwater flow can overwhelm natural and man-made pollution control systems which cause water quality problems. It is believed that stormwater runoff in Mason County is not adequately detained or treated thereby increasing the need for effective stormwater management, particularly within the more urban and developing areas of Mason County

This grant funded a study to establish a baseline of stormwater quality conditions at specific sites in the watershed and identify water quality impacts. Mason County Public Health (MCPH) collected stormwater data to guide environmental decision-making and prioritize stormwater facility retrofits projects.

# Project Area/ Description

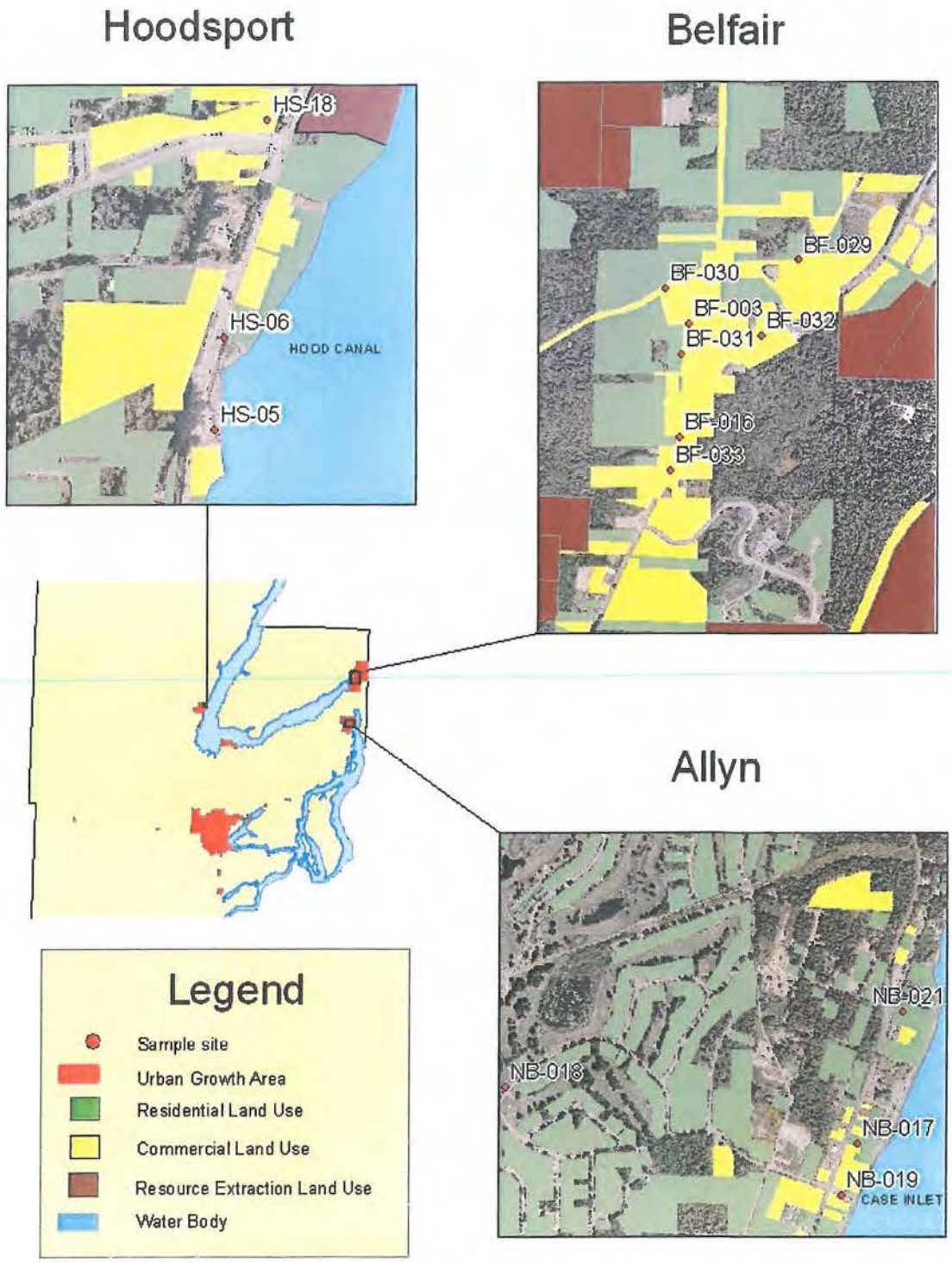
Mason County is a predominantly rural county; the 2008 countywide population estimate was 56,300 with 47,320 occupying the unincorporated areas (OFM, 2009). The county lies in the southeastern portion of the Olympic Peninsula, is approximately 1,052 square miles in area, and includes nearly 94 square miles of water (Radcliff, 2009). Shelton receives an average of 64 inches of precipitation annually, with average monthly rainfalls ranging from a low in July of 0.8 inches, to a high in January of 10.4 inches (OTAK, 2009). Average annual precipitation decreases from northwest to southeast, ranging from 200 inches in the high mountains of the northwest corner of the county to about 100 inches in the Olympic foothills to 50 inches along the Sound at the county's eastern edge (MCD, 2006). Seven watersheds exist within Mason County. They include Case Inlet, Chehalis River, Lower Hood Canal, Oakland Bay, Skokomish River, Totten-Little Skookum Inlet, and Hood Canal.

Mason County has extensive water resources and water dependant industries such as shellfish aquaculture. Degraded water quality diminishes economic, cultural and recreational activities and can have major impacts on the local population. Stormwater has been identified as a major source of impairment to local water bodies (OTAK, 2007).

Mason County has one incorporated area, the City of Shelton. Potential sites within the Shelton Urban Growth Area were excluded from the study because they are not within county jurisdiction. The areas adjacent to the Allyn Urban Growth Area in North Bay and within the Hoodsport Rural Activities Area and Belfair Urban Growth Area in the south end of Hood Canal were selected as the focus of the study. These areas were chosen because, though rural, they are heavily developed, zoned for additional growth and adjacent to marine ecosystems. They have a larger percentage of impervious surface and more stormwater infrastructure, more commercial sources of pollutants and more heavily trafficked roads than is typically found in rural areas.

Figure 1 shows the relationship between zoning, land use and the sample sites. Figures 3 and 4 shows relationship between Belfair and Hoodsport areas sample sites and stormwater conveyance infrastructure in the area. The stormwater conveyance infrastructure in Allyn was not mapped.

**Figure 1- Zoning and Land Use at All Stormwater Sample Sites**



In selecting specific sites, sampling stations were located to assess impacts of significant runoff pollutants and major storm drain systems. Some land use practices considered to be possible contributors to significant runoff:

- Pavement/Impermeable Surfaces
- Onsite Septics
- Moderate Risk Waste Businesses
  - Dental offices
  - Dry cleaners
  - Welding
  - Auto industries
- Car Washing Facilities
- Marinas, Boat Moorings and Boat Maintenance
- Roads, Maintenance and ROW
- Farm/Pastures
- Construction Activities
- Landfills/Hazardous Waste Areas
- Earth fills/channelization
- Underground Storage Tanks
- Surface run-off from gas stations
- Illegal Dumping/Sewer leaks
- Natural Vegetation (leaves, fallen trees)
- Seasonal Land use Activities i.e., fertilizer application in spring, road de-icing activities

In addition, the physical characteristics of potential sites where also considered. Only sites where stormwater remediation could be installed were selected for sampling. An acceptable sampling site needed channelized flow, with either year round, perennial or intermittent flow with no more than 6 months/year of dry conditions. The site could not be a stream. DOE does not allow stormwater treatment devices to be installed in streams.

# Project Design/Methods

MCPH proposed a two year monitoring plan. The first year was a baseline monitoring event plus two initial wet weather monitoring events to prioritize pollution risk at the 15 initial locations. Baseline conditions were established during dry weather. Wet weather storm events were the focus of all other sampling under this monitoring plan. For Year Two we prioritize based on sample results and select five sites for continued monitoring. MCPH monitored the five sites, three additional times through the wet weather for all constituents. The goal of this monitoring was to identify at least one site for stormwater retrofits.

MCPH identified the 15 sites of concern within the project areas of Hoodsport, Belfair and Allyn. The identification of these sites was based on potential water quality contamination from land use such as; roads, residences and commercial activities. Grab samples were collected under and approved Ecology QAPP.

Samples were analyzed for fecal coliform, cadmium, copper, lead, nickel, zinc, hardness, nitrate-nitrite-N, ortho-phosphorus-P, total suspended solids and a suite of PAHs. MCPH monitored temperature, conductivity, salinity, dissolved oxygen and pH in the field. MCPH also collected flow measurements at each site during each monitoring event.

Representative storms were targeted to ensure the quality of the water quality data, based on the following criteria:

- Target storm depth: A **minimum of 0.25 inches** of precipitation over a 24-hour period.
- Antecedent conditions: A period of **at least 6 hours** preceding the event **with less than 0.1 inches** of precipitation.

To the extent possible, the timing of sample collection for each storm event was targeted to capture the rising limb of the storm hydrograph and increase the likelihood of collecting concentrations of contaminates above the laboratory reporting limit.

The QAPP established "results of concern", a designation used for analytes that were above Western Washington Stormwater Means, Washington State Standards, Mason County's 90$^{th}$ percentile or US EPA National Recommended WQ Criteria. Any sampling result above the most restrictive of the four levels was included in the ranking of sites for retrofits. Table 1 shows "results of concern".

## Table 1- Results of Concern

| Constituent | Western Washington Stormwater Means [a] | Level of Concern [b] | Washington State Standard [c] | US EPA National Recommended WQ Criteria [d] |
|---|---|---|---|---|
| TSS | 81 mg/L | | | |
| nitrite+nitrate-nitrogen | 1.53 mg/L | 0.88 mg/L | | |
| orthophosphate | 0.13 mg/L | 0.65 mg/L | | |
| fecal coliform | 1763 CFU/100mL | | 50 MPN FC/100mL | |
| Zinc, total | 162 µg/L | | g | 120 µg/L |
| Copper, total | 24 µg/L | | g | 13 µg/L |
| Lead, total | 120 µg/L | | g | 65 µg/L |
| Nickel, total | 10.75 µg/L | | g | 470 µg/L |
| Cadmium, total | 1.63 µg/L | | g | 2.0 µg/L |
| hardness (CaCO3) | 25 | | | |
| polycyclic aromatic hydro-carbons (PAH) | 0.10 – 0.36 µg/L | | | |
| Temperature | | | | |
| Conductivity | 71.6 µg/L | | | |
| Dissolved Oxygen | | | | |
| pH | 6.4 µg/L | | | |
| Antimony, total | 4.9 µg/L | | g | 5.6 µg/L [e] |
| Arsenic, total | 2.4 µg/L | | 360 µg/L | 340 µg/L |
| Chromium, total | 12.7 µg/L | | 15 µg/L | 16 µg/L |
| Selenium, total | | | 20 µg/L | 5 µg/L [f] |
| Silver, total | | | | 3.2 µg/L |
| Thallium, total | | | | 0.24 µg/L [e] |

**a.** Herrera, 2007, Untreated Highway Runoff in Western Washington

**b.** MCPH 2008, Hood Canal Pollution Identification and Correction Project Final Report – "Levels of Concern" are based on the 90th percentile of over 500 monitoring results from water flowing into Hood Canal

**c.** As per WAC 173-201A

**d.** US EPA National Recommended Water Quality Criteria for Priority Pollutants, all values are based on the Freshwater "Criteria Maximum Concentration," unless otherwise noted.

**e.** Human Health for Consumption of Water + Organism was used, as Criteria Maximum Concentrations did not exist

**f.** Criteria Continuous Concentration, as a Criteria Maximum Concentration did not exist

**g.** Although Washington Standards exist for these constituents, they are for dissolved metals, as we will be monitoring for total metals, the State Standard amounts were not included.

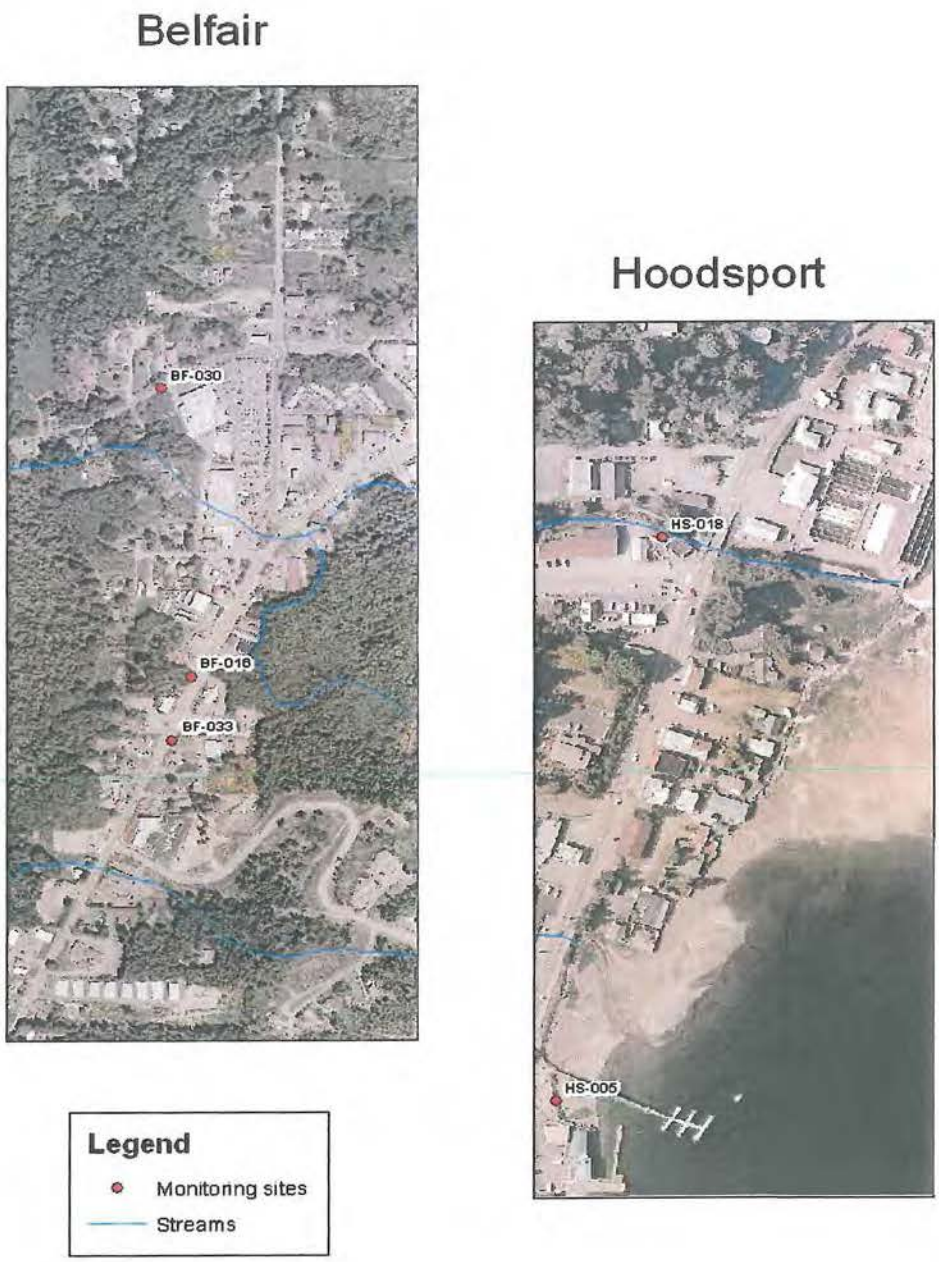
MCPH began Year One monitoring with 15 sites, seven in Belfair, five in Allyn and four in Hoodsport. After Year One, MCPH prioritizing the sites according the number and level of contaminants found, physical site considerations and retrofit type, one site in Belfair and one site in Allyn were selected for stormwater retrofit installations. The five sites with the highest number of contaminants that were not slated for a retrofit project were selected for Year 2 monitoring. The Year 2 monitoring sites include two sites in Hoodsport and three sites in Belfair. Table 2 and Figure 2 show Year 2 site information.

**Table 2- Year 2 Site Details**

| | |
|---|---|
| BF-016 | Exiting road culvert at 23601 SR 3 (Celebrate Life Thrift Shop). Drains Hwy 3 and commercial area. Exceeded levels of concern for TSS, Nitrate-Nitrite, Hardness, Fecal Coliform, Copper and Zinc. |
| BF-030 | Storm grate at NW corner of 201 NE SR 3 (QFC). Presumable drains part of QFC parking lot and North Shore Road. Exceeded levels of concern for Copper, Fecal Coliform, Hardness, Ortho-phosphorous, Zinc, Dissolved Oxygen and Temperature. |
| BF-033 | Hwy 3 drainage ditch entering road culvert at 23530 NE SR 3 (Delco). It drains the highway, commercial and residential development from North and South including an automotive repair shop. Exceeded levels of concern for Hardness, Ortho-Phosphorous, TSS and Zinc. |
| HS-005 | 18 " culvert at the south end of Hoodsport Public Beach. Next to Hoodsport Marina and Café. Presumable drains residential and along Hwy 101. Exceeded levels of concern for Copper, Fecal Coliform, Hardness, Nitrate-Nitrite, Ortho-Phosphorous and Zinc |
| HS-018 | Exiting culvert to Finch Creek under restaurant. At SW corner of SR 101 bridge. Drains downtown Hoodsport. Exceeded levels of concern for Copper, Fecal Coliform, Hardness, Nitrate, Nitrite, Ortho-Phosphorous, Total Suspended Solids and Zinc. |

According to the original QAPP, we were to prioritize the sites based on sample results and identify the top ten sites first, then narrow it down to five. Midway through monitoring, Mason County Public Works (MCPW) wished to do some early implementation and construct stormwater retrofit installations at two of the sites that had been sampled in Year 1. Mason County proposed eliminating the middle step in order to accommodate early retrofit projects. The QAPP changes were approved by Ecology.

**Figure 2- Year 2 Stormwater Monitoring Sites**



# Project Results/Discussion

Appendix A shows the test parameter exceedances at all sites. The most common "level of concern" exceedance was hardness, followed by fecal coliform, zinc, ortho-phosphorous and copper.

**Table 3- Exceedance Summary**

| Parameter | # exceedances | Sites |
|---|---|---|
| Hardness | 41 | 81 % |
| Fecal Coliform | 35 | 86 % |
| Zinc | 13 | 62 % |
| Ortho-Phosphorous | 12 | 14 % |
| Copper | 11 | 28 % |
| Total Suspended Solids | 9 | 28 % |
| Nitrite- Nitrate | 4 | 19 % |
| Dissolved Oxygen | 4 | 14 % |
| Temperature | 2 | 5 % |
| Lead | 1 | 5 % |
| Nickel | 1 | 5 % |

The exceedances in Table 3 have different meaning depending on the parameter. Four different means, standards or criteria were incorporated into the "levels of concern" (see Table 1) used for this study. One standard, the Washington State Standard, sets limits for a constituent, which it should not exceed. The US EPA National Recommended Criteria also sets limit. The Mason County level of concern is a 90$^{th}$ percentile, not a limit. The Western Washington Stormwater Mean is an average. The bottom of Table 1 has more information on the standards, criteria, percentiles and means used.

Most of the sites were above the "level of concern" for hardness. Since the "level of concern" is a mean for hardness, half or so of the sample above would be the expected result. Fecal coliform levels are often high during storm events, when fecal pollution tends to be flushed from the surface of the ground into nearby water courses. Our sampling targeted such events. The number of zinc exceedances seems high. It is above the US EPA Recommended WQ criteria. The copper exceedances are above the US EPA National Recommended WQ Criteria. The total suspended solid results are a little low, since they are based on a mean. Four nitrate-nitrite exceedances were detected, which is 6 % of the total. The "level of concern" for nitrate was established using the 90$^{th}$ percentile of Mason County Public Health's own sampling results, so there are slightly fewer exceedances then would be expected.

## Table 4- Ranked Year 2 Results

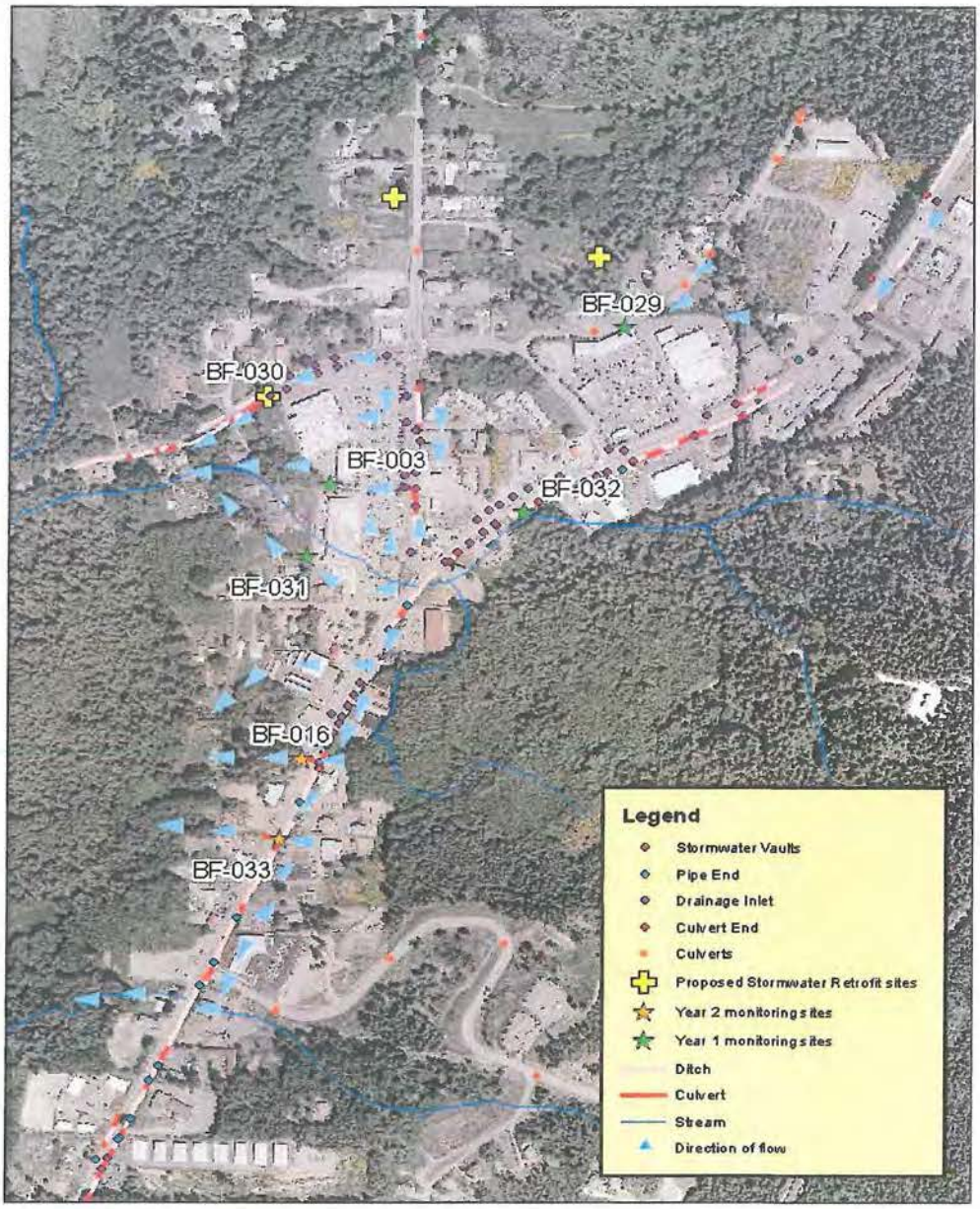
| Site ID | FECAL COLIFORM | Cadmium | Copper | Lead | Nickel | Zinc | Nitrate-Nitrite as N | Ortho-Phosphorous as P | Hardness as CaCO3 | Total Suspended Solids | Temp | Cond. | Sal | DO* | pH Min* | pH Max | Total Parameter Exceedances |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HS-018 | Y | | Y | | | Y | Y | Y | Y | Y | | | | | | | 7 |
| BF-030 | Y | | Y | | | Y | | Y | Y | | Y | | | Y | | | 7 |
| BF-016 | Y | | Y | | | Y | Y | Y | | Y | | | | | | | 6 |
| HS-005 | Y | | Y | | | Y | Y | Y | Y | | | | | | | | 6 |
| BF-033 | | | | | | Y | | Y | Y | Y | | | | | | | 4 |

Table 4 shows the final ranking, based on monitoring results, for stormwater retrofits. The data ranked by number of parameters above the "level of concern"

A number of the ortho-phosphorous results showing in Table 4 are estimated values. Ortho-phosphorous was the only analyte in Table 4 that was significantly affected by estimated values. Ortho-phosphorous has a "level of concern" that is near the level of detection. That means that all of the lower end data that is flagged as estimate if there are QC issues are also within the "level of concern" range. Other parameters had the "levels of concern" set high enough above the level of detection that flagging of low end data didn't affect data in the "level of concern" range.

The monitoring data collected as part of this study is a useful beginning to understanding and correcting stormwater pollution. The drainage area for each stormwater conveyance is also important, in order to understand where the possible sources of contamination are. The figures on the next page show our field diagrams of the direction of flow in stormwater conveyances combine with a Public Works generated map layer of the locations and types of stormwater infrastructure (ditches, culverts, grate and vault, etc.)in the Belfair and Hoodsport area. The maps were made by observing the piping layout and, when possible, the direction of flow in stormwater vaults. Allyn was not mapped because the stormwater infrastructure needed dye tracing in order to understand the drainages.

**Figure 3- Belfair Stormwater Flows**




There are some gaps in our understanding of sources and some of the flows shown are guesses of the most likely source. These sites include BF-003, BF-029 and BF-030 in Belfair. That area is the most densely developed section of Belfair. It includes two large strip mall/parking lot complexes, a perennial stream, a state high water, county roads and a gas station

**Figure 4- Hoodsport Stormwater Flows**

In Hoodsport HS-018 appears to drain the majority of the downtown core. However, it is unclear, if that is the case, where some of the other culverts lead. HS-006 also has a complex drainage. The grocery store parking lot drains through an oil/water separator, while a creek is tight lined through the parking lot, according to the owner of the property, before they meet up at HS-006.

# Data quality discussion

Overall, the field QC/QA was satisfactory. See Table 4. The field replicates for chemistry was slightly short of the goal. Some field blanks had detectable levels of analytes measured. Any departures in field results from the ideal set in the QAPP reflect sampling conditions, not errors in sampling technique.

**Table 5- Field Sampling Quality Control Goals**

| Parameter | Goal | Actual |
|---|---|---|
| Field Blanks Bacteriological | 1/ sample event | 1/sample event |
| Field replicate Bacteriological | 10% | >10 % |
| Field Blanks Chemical | 1/sample event | 1/sample event |
| Field Replicates Chemical | 10% | 8% |

**Lab bias assessed with method blanks, matrix spikes, and laboratory control samples**

Some method blanks had detectable levels of analytes measured or other QA/QC problems. Data effected was flagged J (for estimate). Ortho-phosphorous was the only analyte that was significantly affected by data flagged as J, however, as mentioned in the data discussion this is partially due to a "level of concern" being low.

**Additional lab issues-** there were a few analysis times exceedances. There were a few issues with the lab testing using testing methods and levels that were not the ones requested. We were not notified about any of these issues. The effect on the data was minimal; however, the amount of time needed to carefully go through and check the labs work was not budgeted into the grant. Use of a different lab for stormwater testing needs should be considered in the future.

A more detailed discussion of data quality may be found in Appendix B.

# Conclusions-

The data from this study was useful in establishing baseline stormwater quality conditions at specific sites and identifying water quality impacts from potential contamination sources. The results were helpful in prioritizing stormwater facility retrofits.

The most common "level of concern" exceedance was hardness, followed by fecal coliform, zinc, ortho-phosphorous and copper.

The grant did not allow for overtime pay rates so MCPH had to timing all stormwater sampling within the work week. That was difficult. In order to catch the right phase of the storm, only storm that started in the early AM hours on Monday, Tuesday or Wednesday could be sampled. Lab hours were also a barrier to sampling some of the storm events.

The amount of data generated by this rather small stormwater study was tremendous. The EIM worksheet for this study has about 62,000 cells in it. The PAH results take up a good portion of that space and was the most expensive parameter to test. It is interesting to note that no PAH contaminants were found. PAH is likely to be present in the environment, so testing should continue however perhaps a more limited amount of PAH testing might be considered in areas where contamination is unlikely.

To better our understanding of stormwater infrastructure we should dye trace some of the more complicated storm water conveyance systems, especially in areas that show evidence of stormwater contamination. Belfair and Allyn would both benefit from dye tracing. Correct identification of the conveyance paths will be useful for retrofit and remediation projects in the future, and correct identification of sources useful for source control.

It is not within the scope of this grant to monitor any of the sites after retrofits are installed. Performing monitoring at some of the retrofit locations would demonstrate the effectiveness of the installed retrofit. If the installation is ineffective, monitoring would give Mason County Public Works information about installations that need additional corrective work.

## References

Ecology. 1997. Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201a WAC, Washington State Department of Ecology, 1997.

Georgeson, A and Mathews, W. 2008. Mason County Public Health Hood Canal Pollution Identification and Correction Project Final Report, Mason County Public Health, December, 2008.

Herrera Environmental Consultants, Inc. 2007. White Paper – Untreated Highway Runoff in Western Washington, WA Department of Transportation, May 2007.

MCD. 2006. Mason Conservation District Long Range Plan, Mason Conservation District, Shelton, Washington. December 2006. http://www.scc.wa.gov/index.php/Download-document/109-Five-Year-Plan-Mason-CD.html

OFM. 2009. Mason County 2008 population estimate. (Obtained from Washington State Office of Fiscal Management website). April 13, 2009) http://www.ofm.wa.gov/forecasting/key2pop.asp

OTAK, 2009. Mason County – Countywide Stormwater Management Strategy, OTAK Inc., Kirkland, Washington, March 30, 2009.http://www.co.mason.wa.us/forms/public_works/swm_countywide.pdf

OTAK, 2007. Allyn Urban Growth Area Stormwater Management Plan: Addendum, OTAK Inc., Kirkland, Washington, August 21, 2007www.co.mason.wa.us/forms/public_works/AllynSWMP.pdf

OTAK, 2007. Belfair Urban Growth Area Stormwater Management Plan: Addendum, OTAK Inc., Kirkland, Washington, August 21, 2007 http://www.co.mason.wa.us/forms/public_works/belfair_uga_swmp.pdf

Radcliff, Jennifer. 2009. Personal Communication (discussion with Seth Book, Mason Conservation District, regarding GIS Data). Mason County GIS Department, Shelton, Washington. April 29, 2009.

U.S E.P.A. National Recommended Water Quality Criteria for Priority Toxic Pollutants, U.S. Environmental Protection Agency. http://www.epa.gov/waterscience/criteria/wqctable/index.html#L