MULTNOMAH COUNTY

Multnomah County NPDES MS4 Phase I Permit
Stormwater Management Program

Annual Report 2011
Permit year 16

Submitted to:
Oregon Department of Environmental Quality
November 2011

Submitted in Accordance with the Requirements
of the National Pollutant Discharge Elimination System
(NPDES) Permit Number 103004, File Number 120542

Submitted by:
Water Quality Program
Department of Community Services
Multnomah County

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1. Introduction

Multnomah County implements a comprehensive stormwater management program with the goal of reducing pollutants into the municipal stormwater system to the maximum extent practicable. This program is maintained and prioritized in response to the federal Clean Water Act and the County's responsibility to protect the health and welfare of its citizens and natural environment. The Stormwater Management Plan is the main component of the stormwater management program. This plan is submitted to and approved by the Oregon Department of Environmental Quality (DEQ) under the National Pollutant Discharge and Elimination System Municipal Separate Storm Sewer Phase I (NPDES MS4 Phase I) permit. The County's roles and responsibilities for complying with the permit term falls under seven categories of Best Management Practices (BMPs) with a focus on operating and maintaining the County bridges and roads.

This Annual Report summarizes the implementation activities of Multnomah County's Stormwater Management Plan in the County's permit area for the Permit Year 16 (Fiscal year 2011 - July 1, 2010 – June 30, 2011).

During the permit renewal process (2007-2010), the Stormwater Management Plan (SWMP) was updated through an evaluation of BMPs and integrated new permit conditions. The evaluation led to a few changes to individual BMPs and new measurable goals. Generally, the changes were not substantive but were made to consolidate information where it was repetitive, eliminate information that was not relevant, remove information that was outdated, and improve the readability of the document.

The permit was renewed on December 30, 2010, in the middle of the reporting year, and thus, this Annual Report therefore covers two different SWMP editions. Because the changes were generally not substantive, the activities are reported in a single table with references to BMP numbers from the previous edition of the SWMP given along the revised BMP.

2. Program Overview

History

From 1995 to 2010, the Oregon Department of Environmental Quality (DEQ) regulated stormwater from Multnomah County through two separate NPDES MS4 Phase I Discharge permits: Permit #101314 for the areas within the City of Portland permit boundary and Permit #108013 for the areas within the Gresham permit boundary. Multnomah County was a co-permittee on both Portland and Gresham's MS4 Permit.

The County had a limited amount of regulatory area under each permit under the two separate MS4 permits. To reduce the administrative burdens for program management and reporting, Multnomah County requested to DEQ that the permit areas be combined under a single individual permit for the 2010 permit renewal. DEQ granted this request and issued the new individual Phase I permit on December 30, 2010.

Permit area description

Multnomah County is a unique jurisdiction with NPDES permit areas composed of several discrete urban pockets, and approximately twenty-eight miles of road and bridge right-of-ways. The terms "Portland Area" and "Gresham Area" are used in this report to provide clarity in the area descriptions, and to provide continuity from the previous reporting areas.

Within the Portland Area, Multnomah County is responsible for five Willamette River bridges and a few small unincorporated pocket areas within the Portland Urban Services boundary (see Figure 2-1).

Within the Gresham Area, Multnomah County is responsible for approximately twenty-eight miles of arterial roadways in the Cities of Fairview, Troutdale, and Wood Village, and the unincorporated residential area known as "Interlachen" that is located between Fairview Lake and Blue Lake (see Figure 2-2). In 2007, Troutdale and Wood Village came under NPDES Phase II coverage, and the County roads in those communities also came into permit coverage. Some road segments shown in the following maps are served by Underground Injection Controls or lack curb/gutter systems and do not discharge to surface waters.

More specific details regarding the County's jurisdiction are provided in the Stormwater Management Plan (updated April 2011).

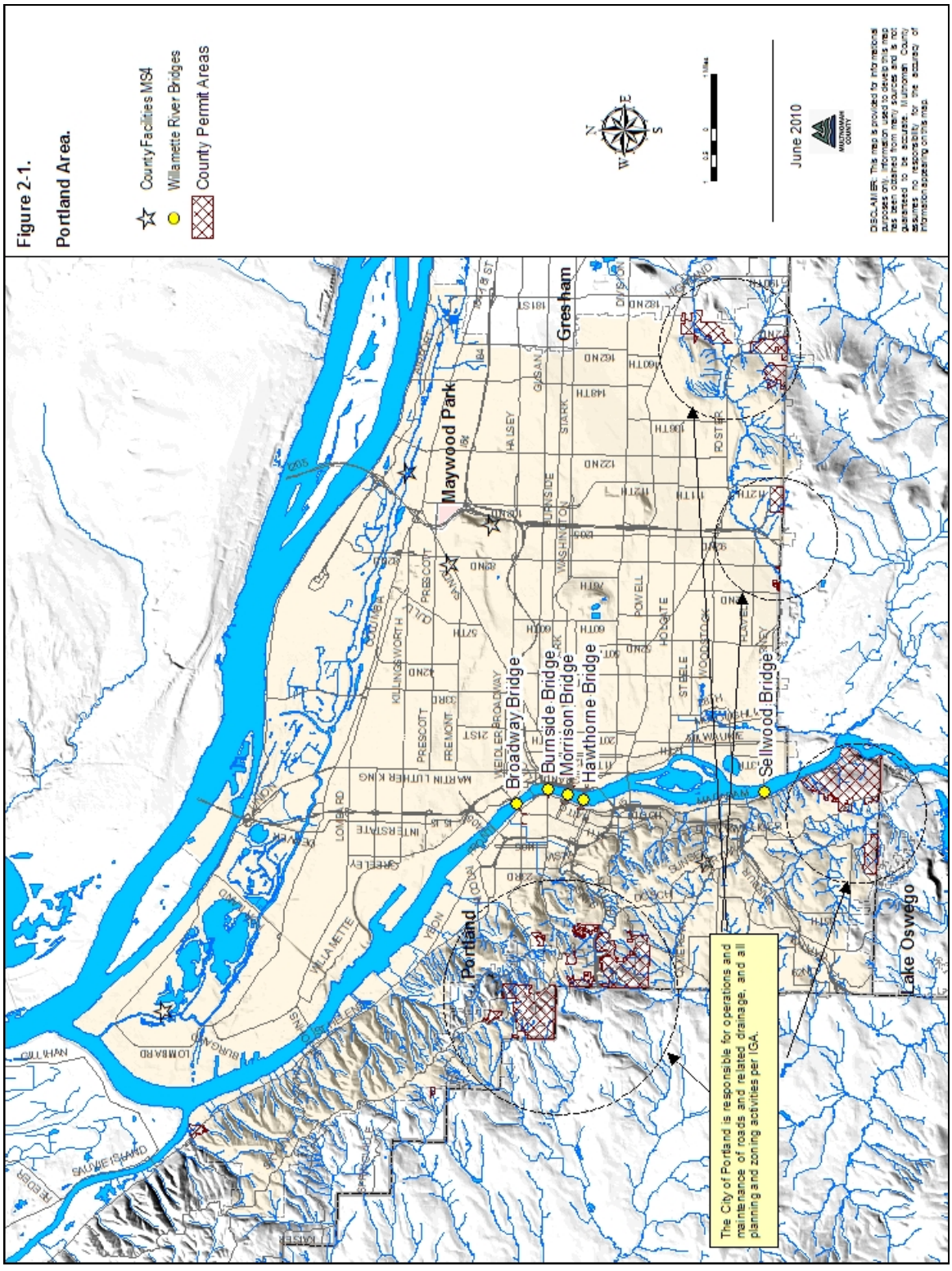
Figure 2-1.
Portland Area.
County Facilities MS4
Willamette River Bridges
County Permit Areas
June 2010
DISCLAIMER: This map is provided for informational purposes only. Information used to create this map has been obtained from many sources and is believed to be accurate. Multnomah County assumes no responsibility for the accuracy of information appearing on this map.
Portland
Gresham
Maywood Park
Lake Oswego
Broadway Bridge
Burnside Bridge
Morrison Bridge
Hawthorne Bridge
Sellwood Bridge
The City of Portland is responsible for operations and maintenance of roads and related drainage, and all planning and zoning activities per IGA.

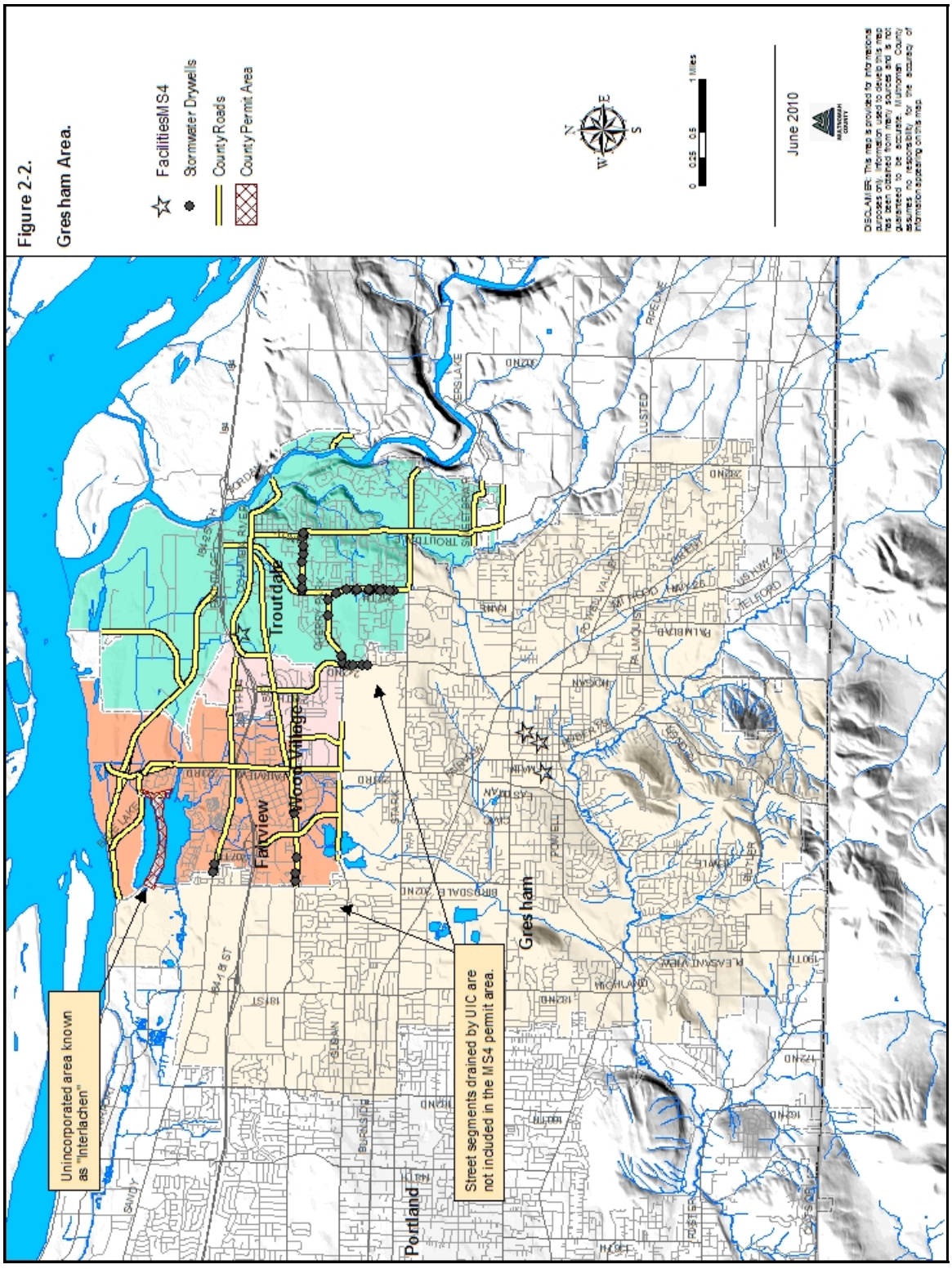
Figure 2-2.
Gresham Area.
FacilitiesMS4
Stormwater Drywells
CountyRoads
CountyPermit Area
June 2010
Unincorporated area known as "Interlachen"
Street segments drained by UIC are not included in the MS4 permit area.
Troutdale
Fairview
Wood Village
Gresham
Portland

Reporting requirements

The following table summarizes the requirements for the annual report as described in Schedule B.5 of the permit:

Permit reporting requirement	*Annual report section*
a. Status of each SWMP program element and progress in meeting measurable goals	BMP summary
b. Status or results of any public education program effectiveness evaluation conducted during the reporting year and summary of how the results were or will be used for adaptive management	BMP summary PI-1
c. Summary of the adaptive management process implementation during reporting year, including proposed changes or additions to BMPs	Adaptive management process
d. Proposed changes to SWMP elements designed to reduce TMDL pollutants	BMP summary
e. Summary of total stormwater program expenditures and funding sources over the reporting year and those anticipated in the next reporting year	Stormwater program budget
f. Summary of monitoring program results, including monitoring data and analyses	Environmental monitoring; also see Gresham and Portland permit annual reports
g. Proposed modifications to the monitoring plan	Environmental monitoring
h. Summary of the enforcement actions, inspections, public education programs, and illicit discharge screening and investigations	BMP summary
i. Overview of land use changes, concept planning and new development activities in the reporting year, including number of new post-construction permits issued and an estimate of the total new or replaced impervious surface area related to new development and redevelopment projects	Permit area description; BMP summary (ND, STR)
j. Results of ongoing field screening and follow up related to illicit discharges.	BMP summary (ILL-5)

Environmental monitoring

The City of Gresham and City of Portland have historically collected, managed, and analyzed stormwater and instream data on behalf of the County as the lead Permittee for the respective NPDES permits when the County was a co-permittee on both permits. Because the County's jurisdiction is part of the fabric of both permit areas, the data for each permit represented the overall quality of stormwater and instream health. This environmental monitoring was a component of the Intergovernmental Agreements (IGA) with both the City of Portland and City of Gresham.

Beginning December 2010, the County managed its stormwater program under an individual permit; however, the new monitoring requirements in this new permit did not go into effect until July 1, 2011. Hence, the monitoring requirement from the previous permit term applies to this Annual Report. The monitoring requirements are met through a new IGA with the City of Gresham, and the monitoring plan is available online through the City of Gresham website.

The environmental data and analysis presented in the Annual Reports for the City of Portland and City of Gresham independent of this report fulfill the monitoring requirement for the County's Annual Report, per the respective IGA.

Adaptive management process

Introduction

Consistent with Schedule A.2 of its NPDES MS4 Phase I permit, the County must reduce the discharge of pollutants from the stormwater sewer system to the maximum extent practicable (MEP). The MEP requirement is met through compliance with the MS4 permit, specifically through implementation of a stormwater management program and associated Stormwater Management Plan (SWMP). Assessment and modification of the SWMP must follow an adaptive management approach, which is defined in Schedule D as:

> *A structured, iterative process designed to refine and improve stormwater programs over time by evaluating results and adjusting actions on the basis of what has been learned.*

The stormwater management program that is described in the County's current SWMP is the result of adaptively managing (e.g., implementing, evaluating, and adjusting) program activities since first being issued a MS4 permit in 1995. The history of this adaptive management approach may be found in Section 6.2 of the County's 2008 NPDES MS4 Permit Renewal document, which describes how the current DEQ-approved SWMP meets the MEP requirement.

The purpose of this document is to fulfill requirements of Schedule D.4 of the current NPDES permit by describing the adaptive management approach that the County will follow through expiration of its current permit on December 30, 2015 to routinely assess the stormwater program's effectiveness in addressing water quality and protection of beneficial uses. Ongoing adaptive management of the SWMP as discussed in the MS4 annual reports demonstrates that the County is meeting the MEP requirement.

The adaptive management approach is divided into two distinct processes, as described below:

1) An annual adaptive management process to assist with best management practice (BMP) assessment and/or evaluation, in order to determine whether adjustments to BMPs are warranted and/or practicable to achieve reductions in stormwater pollutants to the MEP.

2) A permit cycle (5-year) adaptive management process to evaluate water quality monitoring results, assess the stormwater management program and overall effectiveness of the SWMP, in order to update the SWMP and associated measurable goals to achieve reductions in stormwater pollutants to the MEP.

Annual Adaptive Management Process

Following guidance in DEQ's Permit Evaluation Report and Fact Sheet for the County NPDES MS4 permit, the annual adaptive management process involves an operational cycle for assessing BMPs, including the steps of: 1) BMP implementation, 2) data collection, 3) assessment, 4) identifying needs, and 5) BMP modification.

Throughout the duration of the current NPDES MS4 permit cycle, the County will implement BMPs identified in the DEQ-approved SWMP as part of its stormwater management program. Tracking measures are identified for each of the BMPs to assess progress toward achieving measurable goals outlined in the SWMP. Data collected during implementation of BMPs will be consistent with documented tracking measures (e.g., miles of streets swept, number of catch basins cleaned, etc.) and will allow for the assessment of BMP measurable goal attainment. Data collected as part of the environmental monitoring plan will also be reviewed and utilized, as applicable, during the assessment phase of the adaptive management process (e.g., identification of data anomalies or water quality standards exceedances).

The assessment of BMPs will occur annually during preparation of the County NDPES annual report, to be submitted to DEQ by November 1 of each permit year. Among other reporting requirements, the MS4 annual report must contain (Schedule B.5) the following:

> *The status of implementing the stormwater management program and each SWMP program element, including progress in meeting the measurable goals identified in the SWMP.*

By providing a summary in the NPDES annual report of progress toward attaining BMP measurable goals (through data collection and tracking measures), the County both: 1) meets the aforementioned reporting requirement, and 2) facilitates a critical step in adaptively managing its stormwater program by assessing each BMP.

While preparing the MS4 annual report, the County will collect data and feedback from staff responsible for implementing/reporting on each BMP to facilitate the BMP assessment process. Examples of data collection procedures, tools, and factors considered during the assessment phase are provided in Appendix A. Key factors considered in the annual evaluation include but are not limited to:

- *Was the BMP measurable goal attained? If not, describe circumstances why, and how progress will be made toward future attainment.*
- *For multi-year BMPs, were milestones or timelines met?*
- *Can we feasibly refine or improve the BMP to gain efficiency or effectiveness in removing stormwater pollutants?*
- *Are staffing/financial resources available to support such a BMP improvement or refinement?*

In addition to assessing the implementation of each BMP, staff will weigh resource availability and needs related to the overall stormwater program, including consideration of budget/funding, training needs, new technology, or available equipment.

The aforementioned assessment phase will inform any alterations to the stormwater program or modifications to the SWMP. A summary of the adaptive management process including any proposed revisions to the SWMP will follow the requirements of Schedule B.5.c. and Schedule D.5 of the NPDES permit.

Subsequent to implementing modifications, the annual adaptive management process will continue to include an assessment of whether the modifications are resulting in the predicted outcomes/efficiencies through an iterative feedback loop. Annual adaptive management will, therefore, ultimately contribute to the County's SWMP updates required by Schedule B.6. of the NPDES permit for the permit renewal application package, including the modification, addition, and removal of BMPs, and associated measureable goals.

Permit Cycle (5-year) Adaptive Management Process

In preparation of the NPDES MS4 permit renewal application (as required by Schedule B.6 of the permit), the County will assess each BMP described in their SWMP, the environmental monitoring program, environmental monitoring data, and results from the additional assessments or studies conducted in support of their MS4 permit compliance to evaluate the overall permit objective to reduce pollutants to the MEP.

Annual BMP implementation data collected and evaluated over the course of the permit cycle, as well as historical data if applicable, will be reviewed during preparation of the NPDES MS4 permit renewal package. This review will help overall BMP suite - determine BMP refinements and improvements - that should be proposed as part of the program modifications at the end of the permit cycle. This process supports the examination of factors including but not limited to:

- *Do we have information about new technology or other information to improve or refine existing BMPs, identify alternative BMPs, or include additional BMPs?*

- *Have we set the appropriate measurable goals for existing BMPs?*

- *Are resources (funding, staff, equipment, etc.) available to change the BMP measurable goal or to create new capacity?*

Where applicable, the effectiveness of individual BMPs may also be evaluated by use of environmental data as described in Schedule B.1.a. For example, pesticide monitoring data may be of use in identifying targeted outreach activities related to pesticide use, and possible refinement of appropriate outreach/education BMPs. Data collected through the environmental monitoring program will also contribute to the assessment of the overall stormwater management program.

In addition to BMP implementation data and environmental monitoring data analyses, specific deliverables in the MS4 permit will also facilitate the adaptive management process. Other required permit elements that will aid the SWMP evaluation include:

- Hydromodifiication assessment (Schedule A.5),
- stormwater retrofit strategy (Schedule A.6),
- 303(d) list evaluation (Schedule D.2),
- Total Maximum Daily Load (TMDL) Wasteload Allocation Attainment Assessment
- TMDL Pollutant Load Reduction Evaluation and establishment of benchmarks.
- public education program effectiveness evaluation (Schedule A. 4. d.), and
- public involvement and participation (Schedule A. 4. e.)

Cumulatively, these deliverables will require the County to identify strategies to reduce the impact of stormwater discharges on receiving water bodies. Some of these deliverables will also require identification of priorities for stormwater control facility

implementation (i.e., the hydromodification assessment and the stormwater retrofit strategy). Others will help identify opportunities for further refinement and improvement of its stormwater management program, particularly as related to 303(d) parameters and TMDL benchmarks. Objectives and strategies identified in these deliverables will be considered in context of existing BMPs, and be used to revise appropriate BMPs (and associated measurable goals) during the NPDES MS4 permit renewal process. Finally, the County will utilize all of the above described analysis to evaluate the adequacy of the SWMP in reducing pollutants from the MS4 to the MEP according to the permit requirements in Schedule B.6.b.

Conclusion

The adaptive management approach described in this document identifies both annual and end of the NPDES MS4 permit cycle processes that will facilitate continuous improvement of the County stormwater management program. Each of the five steps identified in DEQ's Permit Evaluation Report and Fact Sheet for an adaptive management approach were addressed, including: 1) BMP implementation, 2) data collection, 3) assessment, 4) identifying needs, and 5) BMP modification. Implementation of these processes and the adaptive management approach, will assure the County continues to improve its stormwater management programs and reduce the discharge of pollutants to the maximum extent practicable.

3. BMP Summary

The Multnomah County Stormwater Management Plan is a set of Best Management Practices (BMPs) designed to reduce stormwater pollutants to the maximum extent practicable. The County's stormwater management plan is made up of thirty-two BMPs grouped into seven categories as shown below. The following table summarizes the task, measurable goals, status, and changes for each BMP.

- Public Involvement and Education (PI);
- Operations and Maintenance (OM);
- Illicit Discharges Control (ILL);
- New Development Standards (ND);
- Structural Controls (STR);
- Natural Systems (NS); and
- Program Management (PM).

Managers and staff in the Multnomah County Department of Community Services, Land Use and Transportation Program are organized into "functional groups" to implement the Stormwater Management Program. The functional groups are:

- Public Affairs
- Bridge Engineering
- Bridge Maintenance
- Land Use and Transportation Planning
- Code Compliance
- Facilities
- Emergency Response
- Right-of Way Permits
- Road Maintenance
- Road Engineering
- Asset Management
- Nuisance Code
- Program Management

PI – Public Involvement and Education

Overall goal: *To inform and educate the public about the causes of stormwater pollution, the effects on local streams and rivers, and the need for stormwater management, and to encourage active participation in pollution reduction efforts.*

	Tasks	*Measurable Goal*	*Status*	*Adaptive Management*
PI-1 Participate in Regional Public Education Efforts	Provide County representative to attend the *Regional Coalition for Clean Rivers and Streams* (RCCRS) meetings. Plan and Implement public education campaign promoting behaviors that improve water quality.	Help develop and implement RCCRS annual strategy to promote behavior change through the RCCRS website, television, radio and social media. Evaluate education campaign effectiveness by November 1, 2014.	RCCRS contracted an ad agency to develop and implement stormwater education videos and messaging for online media, including website ads on local TV websites and social media, using the "Don't be a Water Hazard" theme. Additional media buys for cable TV ads were also made. RCCRS hired Davis, Hibbits & Midghall in December 2010 to conduct an online survey and a focus group to evaluate public awareness of stormwater issues. The summary of the two studies were published in May 2011are submitted with this report. Additionally, the County's watershed model was used at the Children's Clean Water Festival, Fairview Truck Day, and a De-Pave project at a local Portland school.	New strategy to disseminate information through the KOIN television "Clean Water Tips" is being considered for FY2012 to increase exposure during prime time. Results of the public survey will be used to develop new messaging in FY2012 along with a new coordinator position.
PI-2 Participate in Public Meetings	Attend public meetings related to water quality.	Track participation in watershed council and ad hoc committee meetings.	Water Quality (WQ) staff shared monitoring and project updates at regular monthly meetings of the Johnson Creek Watershed Council and Sandy River Watershed Council. WQ Staff facilitates the Interjurisdictional Committee for Johnson Creek, a technical workgroup that coordinates stream monitoring and analysis for Johnson Creek watershed.	No change
PI-3 Distribute Public Education Information Regarding Stormwater	Make brochures and other educational materials from Soil & Water Conservation Districts and Watershed Councils available at the planning office. Ensure that public education materials are current and cover relevant topics.	Track the number of materials distributed at meetings, front counters and online.	Although the landowners who visit the planning office are largely rural property owners not included in the NPDES permit area, this public education outlet is valuable for the TMDL pollutant reduction. Approximately 80 brochures were taken on various topics from septic maintenance, riparian management and livestock care, during the last permit year.	No change

PI-4 Conduct Training and Education for County Personnel	Send a representative(s) to water quality conferences when feasible. Share information learned in training with other staff. Train volunteers, maintenance and operations crews, as well as inspectors on impacts of activities on water quality and MS4 in addition to new approaches to water quality protection and proper reporting procedures.	Conduct a minimum of one staff training session a year.	Road crew trainings include: Road Maintenance & Operations Manual (RMOM) BMP review, Beaver Creek fish survey presentation, vendor training on Vactor and sweeper equipment, confined space training for WQ filter vault inspection. Bridge crew training include: lead abatement, general inspector certification, Hazardous materials. WQ staff attended the regional Urban Ecology symposium and ACWA Stormwater Summit. Vegetation staff continued to participate in regular meetings of the Cooperative Weed Management Areas group.	No change
PI-5 Implement the Adopt-a-Road Program	Develop a strategy to promote the adopt-a-road program. Track road segments where volunteer roadside litter removal and clean-up is performed through participation in County Adopt-A-Road programs.	Continue to advertise and support the adopt-a-road program as interest exists.	Adopt-a-road program is promoted though a County webpage, complete with instructions. Four groups are active in the NPDES area, with one new group signed on in June, 2011. Clean ups range from once a month to once a year depending on the group. Adopt a Road is a trash pick up, but additional eyes on the road for illegal dumping is a benefit to the Roads program, as well as increasing the stewardship ethic in the community.	No change
PI-6 Maintain Signage to Protect Water Quality	Determine whether any areas need to be marked or re-marked and provide staff and materials to carry this out. Maintain signs in right-of-way promoting watershed awareness, as requested by watershed councils.	Inspect drain markers and signage once per permit term at all catch basins and stream crossings in the permit area.	Catch basins were inspected during a GIS mapping inventory in 2010. Data for the catch basin layer is currently being processed and validated (see PM-3; STR-3). Work orders will be developed and prioritized based on this data.	No change
PI-7 Provide Opportunities for Public Involvement During the CIP Process	Involve the public in the process of updating the Capital Improvement Plan and Program (every two years) and in evaluating the stormwater quality impacts and issues associated with the program.	Ensure opportunities for public participation in the CIP update process through public meetings. Ensure that public comment period is established for permit renewal.	The CIP process occurs every two years, and did not occur during FY11. The County did however continue its public involvement process through the design and construction of the Sellwood Bridge Replacement Project, including a redesign of the stormwater management system. The public involvement program for the Sellwood project includes an interactive website, a citizens advisory committee, meetings with neighborhood associations and public open houses.	No change
PI-8 Facilitate Public Reporting of Illicit Discharges	Determine where signs need to be posted regarding illegal dumping and place them.	Install and maintain signage in all known areas that are problematic in terms of dumping.	No activity in permit year.	No change

OM – Operations and Maintenance

Overall goal: *To implement operations and maintenance practices for public streets, bridges, storm sewers, and other facilities to reduce pollutants in discharges from the municipal separate storm sewer system.*

BMP	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
OM-1 Review the RMOM for Potential Updates to Address Water Quality	Review the Road Maintenance Operations Manual annually. When manual revisions are made, conduct refresher staff training as provided for under BMP PI-4.	Annually review of the RMOM to ensure current practices are incorporated respect to water quality.	The RMOM was updated in November 2010 and again in June 2011 with small changes in bridge maintenance BMPs.	No change
OM-2 Inspect and Maintain the Storm Drainage System	Inspect the entire stormwater conveyance system on an annual basis. Utilize the record keeping system and database to record findings and follow-up work completed by field crews.	Establish criteria used to determine catch basin (CB) cleaning frequency to maintain effective pollutant removal by July 1, 2011. Clean all roadway catch basins (CB) a minimum of 2 times per year, unless catch basin cleaning records indicates less frequent or more frequent cleaning is appropriate.	Criteria for roadway CB and sweeping frequency were submitted to DEQ on June 22, 2011, and are included as Appendix B in this report. A full round of roadway catch basin cleaning was completed in summer of 2010, and catch basin depths and measurements were taken at that time to support the cleaning frequency evaluation. A second round of catch basin cleaning occurred in spring 2011, and fullness data was collected. Hardware and software issues are being finalized to track and record data in FY12. (See PM-3 for additional information. Total number of CB cleaned: 1078. Parking lot CBs maintained by County Facilities were inspected and cleaned on annual basis.	Program implementation continues into next year to evaluate electronic hardware and catch basin fullness
OM-3 Conduct Street Sweeping	Track street sweeping efforts to record the sweeping frequency.	Use catch basin cleaning records or inspections to inform the necessary sweeping frequency. Establish criteria used to determine street sweeping frequencies to maintain effective pollutant removal, and identify high priority street sweeping areas by July 1, 2011	(See OM-2 and PM-3)) Automatic Vehicle Location tracking hardware testing was finalized, which will allow for the GIS tracking of street sweeping frequency. Products selection was finalized. Equipment will be installed in FY2012. Lane miles swept: 327	Program implementation continues into next year to evaluate electronic hardware and develop new mapping tools

OM-4 Properly Dispose of Road Waste Material	Identify alternatives for a new decant facility to be used for the dewatering of road wastes, or upgrades to the existing facility.	Annually review disposal options that protect water quality.	Vactor waste and sweepings are disposed at a private transfer facility. Vactor liquid is field decanted into public sewer trunk with approval from Fairview. WQ staff researched alternative ditch waste disposal options for the urban area, and lab samples will be collected in FY2012.	Additional studies will take place to evaluate ditch waste pollutant concentrations, and determine options for disposal
OM-5 Minimize Impacts from Anti-icing Operations	Continue to follow the County RMOM procedures for the application, collection, and washing of sanding materials applied to roadways. Continue to research alternative anti-icing methods.	Conduct street sweeping to recover sanding materials within two weeks after the Road Maintenance Manager determines that the roads are free from the threat of an ice or snow event.	Sanding materials were used three times during freezing conditions in FY11 and were removed within two weeks after the threat of ice was gone. Anti-icing chemical review was conducted and a new chemical was selected for use (Magnesium Chloride). The analysis is included in this report as Appendix C.	Effectiveness of new product will be evaluated during next permit year
OM-6 Minimize Impacts from County Truck Hauling Practices	Follow the RMOM procedures for conducting equipment checks when hauling materials.	See OM-1	No activity in permit area	See OM-1
OM-7 Minimize Impacts From Right-of-Way and Road Shoulder Maintenance	Conduct maintenance according to RMOM	See OM-1	Activity was minimal and followed RMOM BMPs	See OM-1
OM-8 Minimize Impacts from Ditch Maintenance	Conduct maintenance according to RMOM	See OM-1	Activity was minimal and followed RMOM BMPs	See OM-1
OM-9 Maintain County-owned stormwater facilities	Inventory facilities by January 1, 2013	Annual inspection of treatment facility	Road Crews received confined space training to take care of inspection and replacement of Contech Stormwater filters in the two filter vaults. One vault inspected in FY11, another in FY12. Stormfilters on County bridges were inspected and replaced in FY11. The County Roads owns two vegetated infiltration swales which are inspected annually by Vegetation staff. County Facilties maintains several Vortex units and one swale in facility parking lots. Inspection and cleaning occurred annually.	No change

ILL – Illicit Discharge

Overall goal: *To prevent, identify, investigate, and if appropriate, control/eliminate any non-stormwater discharges into the municipal separate storm sewer system.*

BMP	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
ILL-1 Implement the Spill Response Program	Continue to follow and implement the Multnomah County Spill Response Plan. Track and record spills and information regarding spills as they occur.	Conduct spill response procedures when spills are reported.	One minor spill by a private concrete truck in Fairview. Rapid clean up by crews using vactor and sweeper trucks resulted in no material entering stormwater system.	No change
ILL-2 Address Spills from Private Truck Haulers	Report to the appropriate agency of the private truck hauling practices impacting the County right-of-way and the stormwater conveyance system.	Contact all private haulers when spills are observed to ensure proper clean up	No activity in permit area	No change
ILL-3 Require Erosion and Pollution Controls for Public Projects (formerly ILL-4 and ILL-5)	Execute formal contracting practices including pre-construction meetings, bonding, construction permit review, and erosion control inspections.	Inspect 100% of County project sites	No activity in permit area	No change
ILL-4 Investigate Illegal Dumping	Continue to implement the existing field inspection program during routine maintenance activities. Record and report any noticeable illegal discharge and dumping in the right-of-way.	Clean up all reported discharge or debris dumped in the right-of-way	No activity in permit area	No change
ILL-5 Detect and Eliminate Illicit Discharges to the Storm Sewer	Continue to inspect and maintain the bridge restroom facility holding tanks on a quarterly basis. Document enforcement response plan for illicit discharges by November 1, 2011	Conduct quarterly maintenance of bridge facilities. Conduct tasks by date above, and annual inspection of dry weather flows at major outfalls.	Bridge facilities maintained quarterly without incident. No dry weather flow at the major outfall in Fairview. Enforcement response procedure for illicit discharges are included in Appendix D.	Tasks continue to next permit year to develop IDDE program

ND – New Development

Overall goal: *New Development Standards (ND) BMPs are designed to mitigate pollutant discharges and other water quality impacts associated with new development and redevelopment during and after construction.*

BMP Description	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
ND-1 Require Erosion Control for Private Development	Review and provide comments on applications for grading permits and hillside development permits. Perform Erosion and Sediment Control Inspections for all approved construction projects.	Inspect 100% of sites once during the permit review, and a second time during active construction.	No activity in permit area	No change
ND-2 Regulate Stormwater Discharge	Continue to review new development permit applications to ensure proper connection to the storm sewer system and application of design standards. Inspect stormwater facilities during and after construction to ensure that the site is compliant with design standards.	Conduct plan reviews and inspections for 100% of permitted projects.	No activity in permit area	No change

STR – Structural Controls

Overall goal: *To implement structural modifications (constructed facilities) to existing systems/development to reduce pollutants in discharges from the municipal separate storm sewer system.*

BMP	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
STR-1 Address Water Quality with New Capital or Roadway Improvement Projects	Develop criteria and strategy for when stormwater treatment will be incorporated into public projects. Conduct plan checks of stormwater quality treatment facilities that are included in capital improvement or roadway improvement projects to assure they follow standard design criteria that include stormwater quality considerations, and that the appropriate facility is selected for the intended purpose.	Identify strategy or criteria used to determine when stormwater quality treatment will be incorporated into Capital Improvement Projects by November 1, 2013.	No activity in permit year	No change
STR-2 Retrofit Existing Facilities for Water Quality Benefit	Include consideration of stormwater treatment for water quality purposes in capital projects to reduce pollutants to the maximum extent practicable. Conduct a hydromodification assessement and develop a strategy to identify and prioritize potential retrofit projects by November 1, 2014.	Identify one retrofit project by November 1, 2013. Develop hydromodification and retrofit strategy by November 1, 2014.	Morrison Bridge replacement of steel deck with concrete deck includes new stormfilter catch basins and improved traction for reduced accidents/spills. Sellwood Bridge righ-of-way purchased for bioswales to contain new bridge runoff.	No change
STR-3 Inventory and Map the County Storm Sewer System	Continue to update the County GIS storm sewer system map.	Complete GIS drainage system maps of the NPDES permit area by 2014, including catch basins, culverts, manholes, ditches and pipes systems.	Catch basin and culvert location and inventory were conducted in permit year using GPS and GIS technology. The both layers will be finalized in FY2012.	Challenges with having truly complete information were anticipated and the project will be an iterative process. Mapping continues with pipes and manholes.

NS – Natural Systems

Overall goal: *to help preserve and restore the natural environment/functions to reduce pollutants in discharges from the municipal separate storm sewer system.*

BMP	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
NS-1 Conduct Vegetation Management Activities	Follow RMOM and IVM procedures. Maintain current Oregon Department of Agriculture (ODA) certifications for chemical applicators. Review and update integrated vegetation management practices (IVM) annually.	Review RMOM vegetation activities and the Integrated Vegetation Management Program (IVM) annually.	No changes were needed.	No change
NS-2 Specify Native Vegetation in ROW and Permitted Projects	Review the current contract specifications for landscaping in the right-of-way, and update as needed. Promote the use of native vegetation and develop contract specifications for landscaping. Condition plan approvals with invasive plants removal, if needed. Ensure contract specifications are followed which require certain landscaping materials and placement.	Inspect 100% of project sites for landscaping specifications.	No activity in permit year.	No change

PM – Program Management

Overall goal: *Program Management BMPs ensure effective program management, coordination, and reporting.*

BMP	*Tasks*	*Measurable Goal*	*Status*	*Adaptive Management*
PM-1 Stormwater Program Management	Continue to participate in the NPDES MS4 coordination meetings and any DEQ meetings. Continue to work with other NPDES MS4 permittees and DEQ to implement the stormwater management program. Review each BMP file annually. Prepare an annual report to demonstrate the County's compliance with requirements. Submit to DEQ.	Annually review BMP implementation data and submit annual report by November 1 each year.	Annual report submitted to DEQ	No change
PM-2 Assess and Evaluate the Stormwater BMP Program	Evaluate progress of BMPs for annual report using adaptive management approach.	Develop an adaptive management approach by November 1, 2011.	The adaptive management approach was discussed with other ACWA phase I jurisdiction staff to develop a consistent and meaningful strategy for program evaluation. The approach is included in the report.	No change
PM-3 Maintain Environmental Management Database	Pilot new GPS and onboard computer technology by July 2011. Develop GIS or other mapping technology to sync with GPS system by July 2012. Develop SAP work orders and tracking to integrate with GIS by July 2013.	Ensure tasks are completed by dates shown.	Product testing of Automatic Vehicle Location devices (AVL - GPS with radio-based or cell-based transmitters) occurred in Winter 2011 with good results. Final product selection was made. Product installation is will occur FY2012. The final verification for catch basin GIS data is needed to link GIS mapping to AVL.	No change

4. Stormwater Management Program Budget

Program activity within the County's NPDES permit area is divided between area that were previously in the Portland area and Gresham area permits. The Water Quality program, consisting of one staff manages the County stormwater program, and portions of two Asset Management staff provide mapping and database services across the entire permit area. Services specific to the two areas are described below.

Gresham area stormwater related services:

- Road Maintenance expenditures and anticipated budget allocations within the Fairview and Interlachen incorporate items including drainage maintenance, right-of-way, surface management, vegetation management, general administration, emergency road hazard response and training.

- Road Engineering expenditures and anticipated budget allocations within Fairview and Interlachen incorporate drainage studies and reviews, environmental compliance review, as-built plan drafting and inventory, GIS database entry, and training.

- Land Use and Transportation Planning expenditures and anticipated budget for design review of capital improvements and right-of-way impacts to the County roads in Fairview, Troutdale, and Wood Village, and for design review and permits for development within the Interlachen Area.

Portland area stormwater related services:

- Bridge Maintenance expenditures and anticipated budget allocations within the Portland Permit area incorporate items including, drainage maintenance, right-of-way, surface management, vegetation management, general administration, emergency road hazard response and training.

- Bridge Engineering expenditures and anticipated budget allocations within the Portland Permit area incorporate drainage studies and reviews, environmental compliance review, as-built plan drafting and inventory, GIS database entry, and training.

- Multnomah County Road Maintenance, contracts the City of Portland and Clean Water Services to maintain and operate County owned roads to their respective standards in the urban unincorporated pocket areas through Intergovernmental Agreements.

- Road Engineering continues to retain authority to review access and impacts to the right-of-way including stormwater discharge when such discharges cannot be retained on site.

- Transportation Planning within the Portland Permit area includes development review in the unincorporated pockets where such development has the potential to access or impact the county right-of-way.

Funding sources for stormwater program expenditures are derived from two sources. The Land Use and Transportation Planning program receives funding from County's General Fund. The Transportation Division (Road and Bridge Services) receives funding from the State Highway Trust Fund, which consists of revenue from this source include the State gasoline tax, weight/mile tax on trucks, and vehicle registration fees, which are constitutionally dedicated to road related issues. The County has no revenue from dedicated stormwater fees. This is a result of the County roads and unincorporated pockets being nested within other city jurisdiction's service areas.

The table below outlines program expenditures for Fiscal Year 2011 and provides the anticipated budget for Fiscal Year 2012.

Program Area	*FY 2011 actual*	*FY 2012 budget*
Water Quality Program[1]	$133,829	$233,427
Asset Management[2]	$14,733	$15,300
Gresham area		
• Road Maintenance[3]	$226,269	$357,740
• Road Engineering[3]	$150,782	$157,279
• Land Use & Transportation Planning	$ 138	$ 280
Portland Area		
• Bridge Maintenance/Operations	$18,337	$40,775
• Bridge Engineering[4]	$15,062,120	$84,683,005
• Road Maintenance IGA	$44,378	$100,000
• Road Engineering[5]	$10,061	$10,700
• Transportation Planning	$1,229	$1,000

[1]*Figure includes entire Water Quality program includes one staff, monitoring budget for UIC, TMDL and NPDES programs, and additional program costs. Increase from previous year is the result of some additional allocation of other program areas that previously funded water quality activities.*
[2]*Estimate is based on a portion of time from two Asset Management staff.*
[3]*Estimate is based on actual spending from the previous year for time spent on water quality work plus a budget for training.*
[4] *The amount shown represents the entire Bridge Engineering program. The entire program is included because Bridge Services do not budget or collect charges for water quality tasks. Water quality best practices are integral in all aspects of design and construction and hence we are not able to be segregated from the other work. Increase in budget reflects Sellwood Bridge funding.*
[5]*Estimate of the amount of time spent on spends on water quality issues in Portland area right-of-way.*

Appendix A – RMOM Activity Review Form

MULTNOMAH COUNTY

Road Maintenance and Operations Manual Activity Review Form

District	Past Quarter in Review	
1 2 4 5 Env.	Winter Spring Summer Fall	Completed by: _____ Date: _____

Site Specific Issues	Broad / Chronic Issues
Spill and accident reports (location, description, waterbody, RAZ)	Clean up Snow / Ice RAZ protection Other
Storm and slides reports (location, description, waterbody, RAZ) New Recurring	Clean up Engineering Restoration Other
Erosion repair issues (location, description, waterbody, RAZ) Drainage Culvert Shoulder	Erosion control techniques Restoration Agriculture Other
BMP Application	**BMP Review**
General Vegetation Traffic Ops Surface ROW Drainage Emergency Bridge In-Water Erosion control	**CONCERNS:** Safety Equipment Weather/timing Resources Fish/wildlife Water quality Restoration Coordination

Appendix B – Catch Basin and Sweeping Frequency Criteria

Multnomah County Road Services

MULTNOMAH COUNTY

Catch Basin and Street Sweeping Frequency Criteria

Issue: *Incorporate sediment accumulation and removal rates from street sweeping and catch basin cleaning into an adaptive approach to improve BMP effectiveness.*

Goal: *Develop a strategy to determine the appropriate street sweeping and catch basin cleaning frequency to balance the performance of the catch basins with efficiencies in the maintenance tasks.*

Background

Catch basins are not designed to efficiently trap roadway sediment, however, they do provide significant reductions of sediment and associated pollutants if properly maintained. Studies have shown that sediment trapping efficiency of a catch basin can approach 75% when they are cleaned out on a semi-annual or annual basis. The removal rates decrease by about 50% when the catch basin reaches 50% capacity. A catch basin loses its effectiveness in capturing sediment when it reaches 60% of its capacity. Catch basin cleaning frequency must therefore consider how full a catch basin is to maintain the performance of the device.

Street sweeping provides a water quality benefit by removing a range of particle sizes from the roadway. Vacuum sweepers are capable of capturing fine particles (silt and fine sand) that often are associated with metals, PAHs and other pollutants, as well as the medium and coarse (sand) fractions of road sediment. Although vacuum sweeping is conducted largely for road safety and aesthetic reasons, it serves to capture a sediment fraction which catch basins are not designed to trap, and can potentially reduce catch basin cleaning frequency by removing sediment that would otherwise be directed into a catch basin.

Studies show that very frequent street sweeping (weekly) and catch basin cleaning (monthly) can remove more total sediment than less frequent cleaning, despite that the sediment removed during each maintenance event decreases with increased frequency. The costs associated with such an intense level of maintenance, however, are not practicable with the current budgeting for Multnomah County Road Services. Reducing pollutants to the *maximum extent practicable* means that Road Services must achieve a balance of all road maintenance tasks and contracts to achieve the best results with the avaiable staff and equipment resources. A strategy to maximize the pollutant reduction within the means of the current structural system and resources is needed to improve the program in an adaptive approach.

The current County catch basin maintenance program calls for cleaning catch basins twice a year. This level of maintenance is conducted uniformly across the County catch basins in the NPDES permit area without considering differences in sediment input, traffic, land use, or other metrics at a detailed level. However, in certain locations where known chronic problems occur, catch basin cleaning is done more often – up to six times a year. Measures of the total amount of debris collected have been recorded in the past, but this figure has not been useful to better understand the catch basin network and improve the program. A fine tuning of both catch basin cleaning paired with street sweeping can be achieved using new technologies, including GPS tracking, on-board computing, and GIS mapping software.

Goal and hypothesis

The goal for the program is to identify a catch basin frequency that ensures that cleaning is done before the catch basin reaches 60% capacity, and if possible, to clean before a sump reaches 50% capacity.

The hypothesis is that current program of sweeping (approximately 20-times per year) and catch basin cleaning (twice per year) achieves this goal.

Maintenance tasks

1. *Determine the capacity of each catch basin*

The depth of the catch basin, measured from the bottom of the catch basin to the outlet pipe (*a*), is used as a surrogate to the volume (capacity) of sump (Fig.1). This depth was measured after the catch basin was cleaned during the summer of 2010. To facilitate estimation of catch basin fullness when sediment obscures the bottom of the sump, a measurement from the catch basin grate to the bottom of the sump was also recorded (*b*). These data are stored in a GIS map of catch basins.

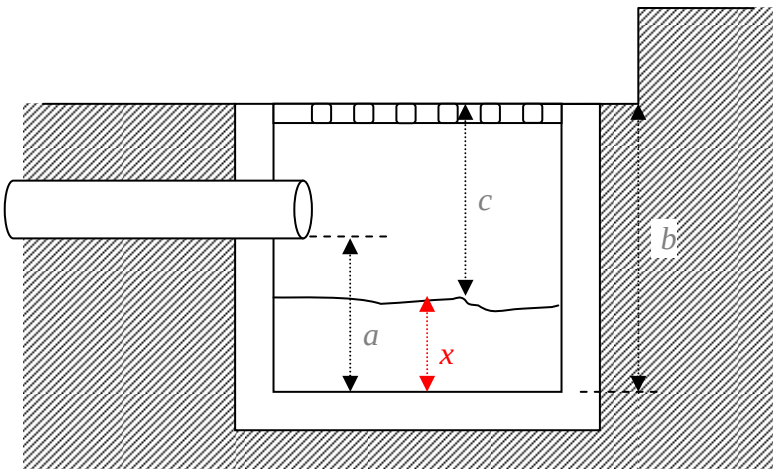

Figure 1. Measurements in the catch basin used to determine the rate of sediment accumulation and estimates of fullness.

2. *Determine the amount of sediment accumulation during the dry and wet months*

   Catch basins are typically cleaned during April/May and September/October. Prior to each cleaning a measurement from the catch basin grate to the top of accumulated sediment (*c*) is recorded (Fig. 1). The depth of accumulated sediment (*x*) is calculated by subtracting the measurement to the top of accumulated sediment (*c*) from the total depth from the grate to the bottom of the sump (*b*). This depth of accumulated sediment is a surrogate for sediment accumulation.

3. *Maintain a set sweeping schedule*

   Sweeping is conducted approximately 20 times per year. There is a regular frequency (approximately twice a month), and additional sweeping occurs after sanding material is applied during storm events. The number of sweeping passes will be recorded for each road segment.

Data evaluation

1. *Determine the rate of sediment accumulation*

   The rate of sediment accumulated in the catch basin is calculated from the sediment depth divided by the number of months between cleaning. The mean sediment accumulations rate per month will be estimated per road segment. Road segments will be identified on a GIS map.

2. *Estimate how full the catch basin becomes between cleanings*

   The fullness of the catch basin is calculated as the ratio of sediment depth and the height of the outlet pipe, calculated as a percentage. The mean catch basin fullness and range will be estimated per road segment.

3. *Test hypothesis*

   Compare the mean and range of fullness to the 30% and 60% fullness criteria for each road segment. Compare the rate of sediment accumulation and forecast fullness at the time of the next cleaning.

4. *Determine follow up actions based on results*

   Using the following table as a guide, determine the appropriate changes to catch basin and street sweeping frequency.

		Sept/Oct catch basin cleaning		
		< 30% full	*30-60% full*	*> 60% full*
Apr/May catch basin cleaning	*< 30% full*	Reduce catch basin cleaning frequency to once in Sept/Oct	Reduce catch basin cleaning frequency to once in Apr/May. Increase sweeping frequency in dry months	Maintain semi-annual catch basin cleaning. Increase sweeping frequency in dry months
	30-60% full	Reduce catch basin cleaning to once in Sept/Oct. Increase sweeping frequency in wet months	No change	Maintain semi-annual catch basin cleaning. Increase sweeping frequency in dry months
	> 60% full	Maintain semi-annual catch basin cleaning. Increase sweeping frequency during wet months.	Maintain semi-annual catch basin cleaning. Increase sweeping frequency during wet months.	Increase catch basin cleaning to 3 times per year. Increase sweeping frequency during wet months.

Discussion

The relationship between sweeping and catch basin accumulation varies because of many variables including depth of catch basin, sediment trapping efficiency rates, sediment composition, rain volume, timing of cleaning, and sediment sources. It is therefore not possible to quantify or estimate the effect of sweeping on catch basin cleaning frequency by looking at the total street sweeping debris. Previous data of total catch basin sediment and sweepings has a wide range. Some of this variability can also be attributed to the difficulty in cleaning or sweeping all or every portion of a road segment for practical reasons, particularly parked cars.

The height of the catch basin outlet pipe is key determinant of catch basin capacity. About 1/3 of the County's catch basins have the outlet pipe set at the bottom of the catch basin, hence these have no apparent capacity. However, outlet pipes set at the bottom are more prone to clogging with debris and trash, and ironically, clogged pipes create a sort of filter that causes these catch basins to rapidly fill up with sediment. These catch basins (and potentially other very shallow catch basins) will be reviewed as a separate category from other more typical catch basins which average 16" of sump depth (to the outlet pipe). Follow up inspections and increased cleaning or potential retrofits may occur depending on the condition of the catch basin.

Catch basin sediment accumulation will naturally vary, and we will consider the range as well as the mean in the evaluation. New grouping and sub-grouping of catch basins may result from the evaluation. Some flexibility will be used in applying the guidelines in the table to accommodate efficiencies in conducting the maintenance. Catch basins with chronic or unusual problems will be handled in a separate category, like those with outlet pipes at the

bottom, very large/deep catch basins, or catch basins located at the bottom of slopes, and inspection and cleaning strategies will be adjusted as needed.

The impact of lateral clogging is another variable that is difficult to assess. Lateral cleaning will occur once a year concurrently with catch basin cleaning. Broken laterals of other maintenance needs will be reported and repaired as they arise. Determining whether to include or exclude catch basins with maintenance needs will be done on a case by case basis.

A GIS mapping system will allow us to track catch basin cleaning and sweeping in a new way. The GIS mapping will help with developing work orders that target specific catch basins, as well as sets of catch basins on a road segments. A fine tuning of the maintenance schedule is possible with this data, so that follow up work can be assigned in an strategic manner. In the forthcoming adaptive management approach, we intend to use watersheds and subwatersheds to assign a priority scheme for maintenance using the health of the aquatic resources and the risks associated with stormwater on those resources as criteria. Work orders may be tailored to consider all of these factors to most effectively conduct this work.

Conclusion

Developing a strategy to create more efficient work plans and pollutant removal through street sweeping and catch basin cleaning will require program development, mobile computer resources, and good observations from staff. Given the variability in the stormwater system, there will be challenges to summarize and evaluate the sediment accumulation data. This paper outlines the strategy to collect data and established the criteria that will be used to evaluate the program. As more information is collected, additional questions are certain to arise and further adaptive management will be needed to develop the program.

Appendix C – Deicer Decision Analysis Memo

OFFICE MEMORANDUM...DEPARTMENT OF COMMUNITY SERVICES
Road Services Division

To: Bill Whitson, Road Maintenance Manager

From: Roy Iwai, Water Resources Specialist

Date: January 18, 2011

Re: Selection of snow and ice control products

In response to the County Road Maintenance Section's need to select alternative snow and ice control products for improved performance, I submit the following memo and attachment for your consideration.

Calcium magnesium acetate (CMA) has been the preferred anti-icing product at the County because the product is environmentally safe. All the local jurisdictions including Oregon Department of Transportation (ODOT) used CMA for many years, however there has been a movement away from this product for cost and performance related concerns.

During the past several years it has become clear that the performance of CMA is inconsistent, limited by the application timing, weather patterns, and temperature. Because the optimum conditions for application are rarely met, the performance is often compromised. Ice control is often met with the use of abrasives and chemical products.

Continued use of abrasives (sand) is necessary, regardless of the chemical anti-icing product selected, to maintain safe travel on County roadways. However, if the anti-icing product does not allow for a reduction of abrasives, this raises concerns of the costs associated with its application and clean up and the potential impacts to water quality. At the request of the Road Maintenance leadership, I researched alternatives to CMA to determine if viable alternatives exist to achieve objectives for performance, cost and water quality protection.

Literature review

Literature on chemical snow and ice control products was conducted on the internet for three alternatives: CMA, magnesium chloride ($MgCl_2$), and conventional road salt (NaCl). These alternatives were selected for comparison based on their regional use and availability. Information on each product was readily available online from a number of government, academic, and industry sources including:

Transportation Research Board
(http://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_577.pdf)
Pacific Northwest Snowfighters (www.wsdot.wa.gov/partners/pns/)
Stormwater (www.stormh2o.com/july-august-2001/salt-road-environmental-impacts.aspx)
Washington State DOT (www.wsdot.wa.gov/research/reports/fullreports/741.1.pdf)

Several other websites describing chemical properties were also reviewed. Interviews with policy and operations staff at the City of Portland, City of Gresham, and the Oregon Department of Transportation also contributed to the information in the analysis. Local knowledge of weather and road conditions was very important to analysis to understand the application and risk of the alternatives.

Material Selection Decision Tool

The *Material Selection Decision Tool*, developed by the Transportation Research Board of the National Academy of Science, was the basis of my analysis. This tool was developed with the publication of the *Guidelines for the Selection of Snow and Ice Materials to Mitigate Environmental Impacts* (January 2007). This tool is a scoring mechanism that considers cost, performance, environmental impacts and corrosion, weighted with the program objectives. The tool was downloaded at
(http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=883).

In the final analysis, I modified the tool in a spreadsheet to overcome some cost aspects that were too detailed for the level of our application, and to edit product scores to include consideration of product specific benefits (e.g. anti-corrosion additives) and local conditions. The input of the Road Maintenance District supervisors at two meetings (December 16, 2010 and January 13, 2011) on Road Maintenance objectives and product scoring were included in the scoring and were central to this process.

The final scoring was the sum of weighted ranking of chemical characteristics based on the importance of each of the criteria mentioned above. This mathematical approach serves as a guide for your decision on de-icing alternatives. The spreadsheet results of the analysis are attached to this memo.

Conclusions

CMA, magnesium chloride and conventional road salt had different total scores based on the cost, performance, environmental and corrosion criteria. Magnesium chloride had the highest score, followed by conventional road salt, and CMA, respectively. Based on this analysis, magnesium chloride is the preferred alternative.

Product	*Score*
Magnesium Chloride ($MgCl_2$)	83
Conventional Road Salt (NaCl)	70
Calcium Magnesium Acetate (CMA)	51

The literature shows that magnesium chloride has minimal impact on the environment similar to CMA, particularly at the application rates used locally. Magnesium chloride has some risk to vegetation according to the literature. However, interviews with ODOT staff, who have used magnesium chloride for four years, concluded that vegetation in stormwater facilities or native vegetation in the right-of-way have had no adverse impacts from magnesium chloride use. Based on the analysis described above, magnesium chloride is a viable alternative to CMA use at the County.

CC: Kim Peoples, Road Services Manager

Snow and Ice Material Selection Decision Tool - Multnomah County - January 2011

CATEGORY WEIGHTING

Category	*Category Weighting (%)*	*Subcategory*	*Objective/Level of Concern (major - minor)*	*Subcategory Weighting (%)*
Cost	5		Minor concern: County currently uses CMA, which is the most expensive alternative	
Performance	50		Major concern: public safety is the first priority for Road Services.	
Environment	30	Aquatic	Major concern: ESA listed fish in area streams; amphibians, macroinvertebrates, mussels	50
		Air	Minor concern: air transport is marginal when traffic not at highway speeds for alternatives selected.	5
		Vegetation	Major concern: vegetation in ditches and bioretention areas provide stormwater pollutant removal.	30
		Soil	Minor concern: the selected alternatives don't have signifcant impact on soils at the application rate typical for County.	10
		Animals	Minor concern: application rate not significant to pose a risk of salt ingestion in mammals or birds	5
Corrosion	15	Vehicles	Major concern: vehicle chassis and electrical systems may be vulnerable to corrosion	40
		Metal infrastructure	Moderate concern: Sauvie Island bridge and other bridges, excluding Willamette Bridges	30
		Concrete reinforcing	Minor concern: alternatives contain corrosion inhibitors	20
		Concrete matrix	Minor concern: alternatives impact on concrete not conclusive	10

PRODUCT RANKING

Category	*Subcategory*	*Description*	*Product Ranking (1=poor; 5=excellent)*		
			MgCl	*CMA*	*NaCl*
Cost		Per gal equivalent: CMA = $3.16; MgCl = $1.00; NaCl = $0.70	4	1	5
Performance		Practical application temp: CMA = 15F, does not deice; MgCl = -13 to 5F; NaCl=15F	5	1	4
Environment	Aquatic	CMA: BOD issues in small waterbodies; Excessive chloride loading possible with limited dilution potential or high imperviousness	3	4	3
	Air	Low potential for air transport at low speed	1	1	1
	Vegetation	NaCl: osmotic stress, nutrient imbalance, leaf scorch; MgCl: similar to NaCl, but Mg is an important to plant physiology; CMA: little or no effect.	3	5	1
	Soil	NaCl: Na bind to soil and breakdown soil structure; Cl: may bind with heavy metals and increase mobility, and under heavy conditions, impact groundwater; CMA: Ca and Mg may release metals through cation exchange, but Ca and Mg improves soil structure.	3	4	1
	Animals	NaCl: salt toxicosis in birds and mammals, but magnitude of issue potentially minor; MgCl2: little or no adverse effects; CMA: little or no adverse effects	5	5	3
Corrosion	Vehicles	NaCl: accelerates corrosion; MgCl2: similar to NaCl, both products available with corrosion inhibitor; CMA: less corrosion than Cl based deicers	4	5	4
	Metal infrastructure		4	5	4
	Concrete reinforcing		4	5	4
	Concrete matrix	MgCl2 and NaCl: scaling; MgCl2 can affect concrete strength, but studies inconclusive	2	5	4

DECISION SCORE

Magnesium Chloride ($MgCl_2$)

Product Ranking (1-5)	*Decision Subcategory Level*			*Decision Category Level*		
	Subcategory	*Weight (%)*	*Score (1-5)*	*Category*	*Weight (%)*	*Score (max=100)*
			4.0	Purchase cost	5	
			5.0	Performance	50	
3	Aquatic	50				
1	Air	5				
3	Vegetation	30		Natural environment		
3	Soil	10				
5	Animals	5	3.0		30	
4	Vehicles	40				
4	Metal infrastructure	30		Corrosion		
4	Concrete reinforcing	20				
2	Concrete matrix	10	3.8		15	83

Calcium Magnesium Acetate (CMA)

Product Ranking (1-5)	*Decision Subcategory Level*			*Decision Category Level*		
	Subcategory	*Weight (%)*	*Score (1-5)*	*Category*	*Weight (%)*	*Score (max=100)*
			1.0	Purchase cost	5	
			1.0	Performance	50	
4	Aquatic	50				
1	Air	5				
5	Vegetation	30		Natural environment		
4	Soil	10				
5	Animals	5	4.2		30	
5	Vehicles	40				
5	Metal infrastructure	30		Corrosion		
5	Concrete reinforcing	20				
5	Concrete matrix	10	5.0		15	51

Sodium Chloride (NaCl)

Product Ranking (1-5)	*Decision Subcategory Level*			*Decision Category Level*		
	Subcategory	*Weight (%)*	*Score (1-5)*	*Category*	*Weight (%)*	*Score (max=100)*
			5.0	Purchase cost	5	
			4.0	Performance	50	
3	Aquatic	50				
1	Air	5				
1	Vegetation	30		Natural environment		
1	Soil	10				
3	Animals	5	2.1		30	
4	Vehicles	40				
4	Metal infrastructure	30		Corrosion		
4	Concrete reinforcing	20				
4	Concrete matrix	10	4.0		15	70

Appendix D – Illicit Discharge Enforcement Response Procedure

Illicit Discharge Elimination Response Plan
Multnomah County Department of Community Services

1. *Notice of violation*. Upon determination by the County Engineer of the source an illicit discharge to the County stormwater system (Multnomah County Code, subchapter 27.781), the County Engineer shall issue a written notice of violation to the discharger within 5 working days, which outlines the violation and the potential penalty. The notice shall be personally delivered to the discharger's premises or be sent certified or registered mail, return receipt requested.

2. *Discharge elimination timeframe.* The notice shall further request correction of the illicit discharge within a specified time or require written confirmation of the correction or efforts being made to correct the violation by a specified date. If the elimination of discharge will take longer than 15 working days, the discharger must submit a plan with timeframes to eliminate of the illicit discharge in an expeditious manner within 20 working days to the County Engineer.

3. *Penalties.* A civil penalty may be assessed in the amount up to $500 per day violation. (Multnomah County Code, subchapter 27.999)

4. *Coordination with municipal authorities.* Concurrent with the notice of violation to the discharger, the County Engineer will notify the appropriate land use authority and sewer utility of the illicit discharge, and make an initial evaluation of the feasibility to eliminate the discharge. The County will coordinate with the local jurisdictions on inspections and follow up actions.

5. *Reporting to DEQ.* The County will notify DEQ water quality program of potential impacts to water quality from the illicit discharge, including source and type of the discharge, watershed, outfall location, and timeframes for elimination.