Year 2011 Stormwater Annual Report

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Status Report for Permit Year 2011
(July 1, 2010 – June 30, 2011)

Submitted to:

Oregon Department of Environmental Quality

Submitted by:

City of Eugene

Submitted in Accordance with the
Requirements of National Pollutant
Discharge Elimination System (NPDES) Permit
Number 101244, File Number 107989

December 1, 2011

CITY OF EUGENE, OREGON
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
MUNICIPAL STORMWATER SYSTEM ANNUAL REPORT

The City hereby submits this National Pollutant Discharge Elimination System (NPDES) Year 2011 Stormwater Annual Report in accordance with NPDES Permit Number 101244, File Number 107989 issued December 30, 2010. We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Mark Schoening, P.E., City Engineer
Public Works Department
99 E. Broadway Ave.
Eugene, Oregon 97401
(541) 682-5342

Therese Walch, P.E., Water Resources Manager
Public Works Department
99 E. Broadway Ave.
Eugene, OR 97401
(541) 682-5549

December 1, 2011

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1 INTRODUCTION

Discharges from municipal stormwater system into waters of the United States are regulated by the federal Clean Water Act and National Pollution Discharge Elimination System (NPDES) permit program. The City of Eugene has operated its stormwater program under a NPDES permit since 1994. Annual reporting is a requirement of the NPDES permits. This document, called the "**Year 2011 Stormwater Annual Report**" is Eugene's sixteenth annual report under its NPDES permit. This report fulfills Schedule B, Item 5, of NPDES Permit Number 101244, File Number 107989, issued December 30, 2010.

Section 1 of this report includes background information and a history of Eugene's stormwater NPDES permit (Section 1.1), a summary of relevant conditions from the City's current NPDES permit (Section 1.2) and an overview of the contents of this report (Section 1.3).

1.1 Background and Eugene's NPDES Permit History

Discharge of industrial wastewater, municipal wastewater, and stormwater into waters of the United States are all regulated through the NPDES permit program which is authorized by Section 402 of the federal Clean Water Act. In the state of Oregon, the NPDES permit program is administered by the Oregon Department of Environmental Quality (DEQ) on behalf of the U.S. Environmental Protection Agency (EPA). With regards to stormwater specifically, NPDES permits are issued for discharges from municipal separate storm sewer systems (MS4s) which are publicly owned or operated facilities including streets, curbs, gutters, catch basins, ditches, manmade channels and storm drains that are used for collecting or conveying stormwater.

Sources that need to obtain a MS4 permit are classified as either "Phase I" or "Phase II." Phase I MS4s are those with populations greater than 100,000, while regulated Phase II (or "small") MS4s serve populations less than 100,000 located within Census Bureau-defined Urbanized Areas. Federal regulations also provide EPA and the states the discretion to require other MS4s outside of Urbanized Areas to apply for a permit. In 1990, the EPA published its "Phase I" regulations governing stormwater discharges municipalities with populations greater than 100,000. These municipalities, including Eugene, were required to apply for a Phase I NPDES permit for their stormwater discharges.

Part 1 of Eugene's original permit application was submitted to the DEQ in May 1992 and provided information about the City's municipal stormwater system. Part 2 of Eugene's original application was submitted in May 1993 and included a proposed Stormwater Management Plan (SWMP) describing the City's plan for reducing the discharge of pollutants from its municipal stormwater system to the "maximum extent practicable." The SWMP was comprised of a set of best management practices and a Monitoring Plan. Eugene's proposed SWMP was approved by the DEQ and incorporated into its first NPDES permit which was issued in November 1994.

Eugene's first NPDES permit was scheduled to expire in November 1999. The City submitted a permit renewal application in March 1999, followed by a proposed SWMP in March 2000. The first permit was administratively extended by DEQ pending action on the permit renewal

application packet. DEQ issued Eugene its second NPDES permit in March 2004, which incorporated by reference the 2000 SWMP. The SWMP was updated again in 2006, as a result of a program evaluation required by the 2004 permit and documented in the City's December 1, 2005 annual report.

Eugene's second NPDES permit was scheduled to expire in February 2009. The City submitted a permit renewal application in September 2008 including a revised SWMP. The second permit was administratively extended by DEQ pending action on the permit renewal application packet. The City submitted an updated proposed SWMP in August 2010, reflecting program adaptive management and program improvements since the September 2008 submittal. DEQ issued Eugene its third NPDES permit in December 2010, which incorporated by reference the August 2010 SWMP. The SWMP was again updated in April 2011, in response to a permit condition to incorporate specific changes to measurable goals for five BMPs.

The City currently operates its stormwater program under the December 2010 NPDES permit (provided in Appendix D) and the April 2011 SWMP, incorporated into the permit by reference.

This Year 2011 Stormwater Annual Report covers the period of time from July 1, 2010 through June 30, 2011 which coincides with the City's Fiscal Year 2011. This report and previous annual reports are posted on the City's stormwater web site at: www.eugene-or.gov/stormwater (see "Permits & Regulations" and select "National Pollutant Discharge Elimination System").

1.2 2010 NPDES Permit

Eugene's 2010 NPDES permit consists of Schedule A, B, D, and a set of General Conditions, summarized as follows:

Schedule A lists controls and limitations for stormwater discharges. Specifically the City of Eugene must:

- Prohibit non-stormwater discharges into the MS4.
- Reduce the discharge of the pollutants from the municipal stormwater system to the maximum extent practicable.
- Implement and assess the effectiveness of the DEQ-approved SWMP which must include following program elements:
    - Illicit discharge detection and elimination
    - Industrial and commercial facilities
    - Construction site runoff control
    - Education and outreach
    - Public involvement and participation
    - Post-construction site runoff
    - Pollution prevention for municipal operations
    - Structural stormwater controls operations and maintenance activities
- Conduct a hydromodification assessment.
- Develop a stormwater quality retrofit strategy for developed and underserved areas.

Schedule B outlines monitoring and reporting requirements:

- Implement a monitoring program to support adaptive management and the evaluation of SWMP effectiveness in reducing pollutants.
- Develop and implement an approved Monitoring Plan, incorporating specific monitoring types, locations, frequencies, and pollutant parameters to be analyzed.
- Submit an annual report by December 1st of each year.
- Submit a permit renewal application package 180 days prior to the scheduled expiration of the current permit.

Schedule D outlines Special Conditions:

- Maintain adequate legal authority to implement and enforce the permit conditions.
- Conduct an evaluation of 303(d) listed pollutants applicable to Eugene's MS4 discharges.
- Complete an assessment of applicable Total Maximum Daily Load (TMDL) wasteload allocation attainment.
- Evaluate progress towards reducing applicable TMDL pollutant loads.
- Establish TMDL pollutant load reduction benchmarks for the next (fourth) permit term.
- Follow and document an adaptive management process.
- Revise SWMP to incorporate specific changes to five BMPs.
- Definitions related to the NPDES permit.

Schedule F outlines the General Conditions of the permit including penalties for violations of the permit, operations and maintenance of pollution controls, procedures for conducting monitoring and managing data and records, general reporting requirements, and definitions of generally used terms.

1.3 Annual Report Contents and Relevant Permit Conditions

This Year 2011 Stormwater Annual Report provides information on the progress of the permit activities from July 1, 2010 through June 30, 2011 herein referred to as the 2011 Report. It includes: this Introduction (Section 1); Overall Program Management, including program structure, the relationship of the NPDES permit to local policy and other local jurisdictions, financial summary, legal authority, summary of concept planning, land use changes and annexations, and adaptive management (Section 2); Status of SWMP Implementation (Section 3); and Monitoring Program Results (Section 3). Table 1-1 includes each annual report requirement outlined in Schedule B.5 of the NPDES permit, and where the information is located within this report.

Table 1-1. Annual Reporting Requirements and Location within this Report

Schedule B.5 Requirement	Report Section
a. The status of implementing the stormwater management program and each SWMP program element, including progress in meeting the measurable goals identified in the SWMP.	Section 3
b. Status or results, or both, of any public education program effectiveness evaluation conducted during the reporting year and a summary of how the results were or will be used for adaptive management.	Section 3.1
c. A summary of the adaptive management process implementation during the reporting year, including any proposed changes to the stormwater management program (e.g., new BMPs) identified through implementation of the adaptive management process.	Section 2.8 and Appendices E, F
d. Any proposed changes to SWMP program elements that are designed to reduce TMDL pollutants.	No TMDL-related changes proposed
e. A summary of total stormwater program expenditures and funding sources over the reporting fiscal year, and those anticipated in the next fiscal year.	Section 2.5
f. A summary of monitoring program results, including monitoring data that are accumulated throughout the reporting year and/or assessments or evaluations.	Section 4
g. Any proposed modifications to the monitoring plan that are necessary to ensure that adequate data and information are collected to conduct stormwater program assessments.	No related changes to Monitoring Plan proposed.
h. A summary describing the number and nature of enforcement actions, inspections, and public education programs, including results of ongoing field screening and follow-up activities related to illicit discharges.	Section 3.3.1, 3.3.2, 3.5.1, 3.5.3, 3.5.4
i. An overview, as related to MS4 discharges, of concept planning, land use changes and new development activities that occurred within the Urban Growth Boundary (UGB) expansion areas during the reporting year, and those forecast for the following year, including the number of new post-construction permits issued, and the estimate of the total new or replaced impervious surface area related to new development and redevelopment projects commenced during the reporting year.	Section 2.7
j. Results of ongoing field screening and follow-up activities related to illicit discharges.	Section 3.3.3
k. In addition to the elements listed under Schedule B.5.a. through B.5.j., the annual report submitted by December 1, 2014 must include: i. The TMDL Pollutant Load Reduction Evaluation as described in Schedule D.3.c. ii. The Wasteload Allocation Attainment Assessment as described in Schedule D.3.b. iii. The 303(d) evaluation as described in Schedule D.2.	Requirements not applicable for reporting year

2 OVERALL PROGRAM MANAGEMENT

This section of the report provides information about how Eugene's stormwater program is managed (Section 2.1), an explanation of SWMP BMP coding and general BMP categories (Section 2.2), the relationship to local stormwater program policy (Section 2.3), the relationship to other local jurisdictions (Section 2.4), a financial summary (Section 2.5), a summary of the City's legal authority to implement the program (Section 2.6), a summary of concept planning, land use changes, and annexations within the urban growth boundary (Section 2.7), and a summary of the City's adaptive management process and results (Section 2.8).

2.1 Program Structure

The Eugene Public Works Department has overall responsibility to implement the NPDES permit and SWMP. The SWMP elements are managed by five divisions in the department: Administration, Engineering, Maintenance, Parks & Open Space, and Wastewater, with two elements managed by the Planning & Development Department. Table 2-1 provides a summary of the general areas of responsibilities within the stormwater program.

Table 2-1. General Areas of Responsibility within the Stormwater Program

Department/Division	Areas of Responsibility
Public Works Administration Division	Stormwater outreach and education, graphics Financial management
Public Works Engineering Division	Standards for new development Erosion control and construction site management Capital improvement projects Storm system mapping & data management Stormwater planning NPDES permit management
Public Works Maintenance Division	Illicit connections/Illegal discharges Spill response Street sweeping Leaf pick-up Constructed system maintenance Regulation of private underground facilities
Public Works Parks & Open Space Division	Open channel and vegetated facility maintenance Vegetation management Litter pick up Volunteer programs Regulation of private vegetated facilities Bacteria pilot study coordination
Public Works Wastewater Division	Water quality sampling and data analysis Industrial stormwater program
Planning and Development Department	Recycling and waste prevention education Yard debris recovery program

Coordination of the various activities occurs through routine staff communication, and via several staff teams as shown in Table 2-2.

Table 2-2. Stormwater Program Policy, Management and Coordination Teams

Stormwater Program Team	Team Purpose
Stormwater Policy Team	Provides policy direction for the Stormwater Program.
Stormwater Management Team	Provides overall management for Stormwater Program. Oversees development of new policy for approval by Policy Team. Implements Policy Team direction.
Stormwater Operations Team	Shares information for on-going program coordination. Resource pool of key staff for specific tasks.
Stormwater Enforcement Coordination Team	Coordinates on code compliance incidents. Shares information on enforcement actions.
Stormwater Penalty Review Team	Reviews administrative civil penalties and makes determination. Provides inter-divisional coordination.

2.2 Stormwater Management Plan BMP Categories

Eugene's SWMP includes 24 best management practices (BMPs) designed to reduce the discharge of stormwater pollutants to the maximum extent practicable. Each BMP is given a code (for example, A1) for tracking and reporting purposes; the coding is based on the division within the Public Works Department or Planning & Development Department that has lead responsibility, as follows:

A = Administration Division of Public Works
B = Building Division of Planning and Development
E = Engineering Division of Public Works
M = Maintenance Division of Public Works
P = Parks and Open Space Division of Public Works
W = Wastewater Division of Public Works

The 24 BMPs fall into seven general categories: Public Education; Planning, Capital Improvements, and Data Management; Construction Site Management and Design Standards for New Development; Operations and Maintenance; Illicit Discharge Controls; Waste Management; and Industrial Controls. The grouping of BMPs and a general description of each category are described below. Table 2-3 includes the full list of BMPs by BMP number, title and category.

2.2.1 Public Education

The purpose of public education BMPs is to inform the public, the commercial/industrial sector, and in-house personnel about the sources and causes of stormwater pollution, its effect on the local receiving waters, and to encourage active involvement (e.g. behavioral changes, volunteerism, etc.) in the effort to reduce pollution. The following BMPs represent the public education elements of the SWMP:

A1 Stormwater Education
P1 Educational Volunteer Program

2.2.2 Operations and Maintenance

The purpose of operations and maintenance BMPs is to maintain the publicly managed stormwater system (e.g. pipes, culverts, open waterways, water quality facilities), balancing flood control, drainage services, water quality, and natural resource protection needs, and to adaptively manage for continuous improvement of current operations and maintenance practices. Operations and maintenance BMPs are also focused on planning and performing other City services, such as landscape maintenance or road repair projects for example, in a manner that minimizes the potential for stormwater pollution from these activities. The following BMPs represent the operations and maintenance element of the SWMP:

M3 Street Sweeping Program and Leaf Pick-up
M4 Prevent Leaks and Spills from Municipal Vehicles and Equipment
M5 Public Stormwater System Cleaning Program – Piped System
M8 Winter Road Sanding and De-Icing Program
P3 Tree Planting and Information Programs
P4 Public Stormwater System Maintenance – Developed Parks and Right-of-Ways
P5 Public Stormwater System Maintenance – Open Waterways

2.2.3 Illicit Discharge Controls

The purpose of illicit discharge control BMPs is to become aware of, investigate, detect, mitigate, and enforce the elimination of illicit (non-stormwater) discharges and illegal dumping to the stormwater system. The following BMPs represent the illicit discharge control element of the SWMP:

M1 Management of Illicit Discharges to the Municipal Stormwater System
M2 Spill Response
M7 Systematic Stormwater Field Screening and Investigation
P7 Litter and Illegal Dumping Control

2.2.4 Waste Management

The purpose of the waste management BMPs is to educate the public, regulate waste management services, and to ensure that proper facilities are available in order to minimize the potential of negative stormwater impacts from solid waste collection, improper disposal of toxic materials, and illegal dumping of garbage and debris. The following BMPs represent the waste management element of the SWMP:

B1 Household Hazardous Waste Disposal
B2 Solid Waste Management

2.2.5 Construction and New Development

The purpose of the construction and new development BMPs is to ensure that appropriate control measures are considered, implemented, and maintained during and after the planning, design, and construction phases for new public and private development and significant re-development projects. The following BMPs represent the new construction and new development related elements of the SWMP:

E2 Erosion Prevention and Construction Site Management Program
E4 Stormwater Development Standards
P6 Compliance Program for Maintenance of Privately Owned Vegetated Stormwater Facilities
M6 Regulation of Inspection, Maintenance and Reporting of Private Underground Stormwater Structures

2.2.6 Planning, Capital Improvements and Data Management

The purpose of planning, capital improvements and data management is to develop and implement comprehensive stormwater basin plans, evaluate potential sources of specific pollutants and related BMPs to address them, and maintain up to date data on the stormwater system. The following BMPs represent the planning, capital improvements and data management elements of the SWMP:

E1 Stormwater Capital Improvement Projects
E3 Stormwater System Mapping and Data Management
P2 Bacteria Pilot Study

2.2.7 Industrial Facilities

The purpose of industrial controls is to provide oversight of stormwater discharges from industrial facilities, including screening, inspections, technical assistance, and response to spills at permitted facilities. The following BMP represents the industrial element of the SWMP:

W1 Industrial Stormwater Management Program

2.2.8 Permit Management

The purpose of permit management is to ensure effective permit management, coordination, and reporting. The following BMP represents the administrative element of the SWMP:

E5 Permit Management and Reporting

Table 2-3. April 2011 SWMP Best Management Practices

BMP ID	BMP Title	BMP Category
A1	Stormwater Education	Public Education
E1	Stormwater Capital Improvement Projects	Planning, Capital Improvements, Data Mgt.
E2	Erosion Prevention & Construction Site Management Program	Construction and New Development
E3	Stormwater System Mapping and Data Management	Planning, Capital Improvements, Data Mgt.
E4	Stormwater Development Standards	Construction and New Development
E5	Permit Management & Reporting	Permit Management
M1	Management of Illicit Discharges to the Municipal Stormwater System	Illicit Discharge Controls
M2	Spill Response	Illicit Discharge Controls
M3	Street Sweeping Program and Leaf Pick-up	Operations & Maintenance
M4	Prevent Leaks and Spills from Municipal Vehicles and Equipment	Operations & Maintenance
M5	Public Stormwater System Cleaning Program – Piped System	Operations & Maintenance
M6	Regulation of Inspection, Maintenance and Reporting of Private Underground Stormwater Structures	Construction and New Development
M7	Systematic Stormwater Field Screening and Investigation	Illicit Discharge Controls
M8	Winter Road Sanding and De-Icing Program	Operations & Maintenance
P1	Educational Volunteer Program	Public Education
P2	Bacteria Pilot Study	Planning, Capital Improvements, Data Mgt.
P3	Tree Planting and Information Programs	Operations & Maintenance
P4	Public Stormwater System Maintenance – Developed Parks and Rights-of-Way	Operations & Maintenance

BMP ID	BMP Title	BMP Category
P5	Public Stormwater System Maintenance – Open Waterways	Operations & Maintenance
P6	Compliance Program for Maintenance of Privately Owned Vegetated Stormwater Facilities	Construction and New Development
P7	Litter and Illegal Dumping Control	Illicit Discharge Controls
B1	Household Hazardous Waste Disposal	Waste Management
B2	Solid Waste Management	Waste Management
W1	Industrial Stormwater Management Program	Industrial Facilities

2.3 Relationship to Comprehensive Stormwater Management Plan (CSWMP)

In 1993, the Eugene City Council adopted as a refinement to the Eugene-Springfield Metro Plan, the Comprehensive Stormwater Management Plan (CSWMP) which provides the policy framework for the City's stormwater program. The impetus for adopting CSWMP was in part the anticipated federal requirements of the NPDES permit, but it was also necessitated by concerns over open waterway management and the discovery, in the early 1990's, of an extensive concentration of wetlands in west Eugene. A major goal of adopting CSWMP was to address a variety of stormwater issues within a comprehensive management framework -- to manage each of the program areas so that they are coordinated and consistent, meet the requirements of federal law, meet the needs of the community, and meet multiple objectives. CSWMP policies cover 4 general areas:

- **Flood control** efforts are to be modified to maintain current levels of service while improving water quality and protecting natural resources.
- **Water quality** efforts are to be employed to reduce the discharge of pollutants to the maximum extent practicable.
- **Natural resources** that are related to the stormwater drainage and flood control system, such as conveyance corridors and adjoining wetland and riparian zones, are to be managed to benefit water quality and wildlife habitat.
- **Operations and maintenance** practices are to be modified to meet the objectives of flood control, water quality improvement, and related natural resources protection.

CSWMP incorporates the City's original (1994) NPDES permit SWMP BMPs, as well as other implementation measures to achieve CSWMP goals and objectives. Many of the NPDES-related BMPs overlap with other CSWMP objectives such as the use of native plants along water corridors for bio-filtration purposes and for wildlife habitat, and the restoration of local waterways for increased capacity, water quality improvement, and habitat enhancement.

As part of a stormwater program review in 2002, the Public Works Stormwater Policy Team reviewed CSWMP and concluded that it still represents the appropriate policy basis for Eugene's stormwater program. CSWMP is available on the internet at: www.eugene-or.gov/stormwater (see "Stormwater Planning" and select "CSWMP").

2.4 Relationship to Other Local Jurisdictions

EPA adopted rules to implement Phase II of the NPDES permit program in December 1999. Phase II expanded the MS4 permit program to include smaller communities located in United States census-defined Urbanized Areas, including Eugene's metro area partners the City of Springfield and Lane County. Phase II rules require communities to develop, implement and enforce stormwater management programs that address six minimum measures:

- Public education and outreach
- Public participation/involvement
- Unlawful discharge detention and elimination
- Construction site runoff control
- Post-construction site runoff control
- Pollution prevention/good housekeeping

NPDES Phase II stormwater permits, including for the City of Springfield and Lane County were issued in January 2007. In anticipation of Lane County's NPDES permit, and for the mutual benefit of both agencies and the customers they serve, Lane County and the City of Eugene entered into an intergovernmental agreement ("Stormwater IGA") in April 2004 to collaborate on certain stormwater program elements within the jurisdictional area outside of the Eugene city limits and within the Eugene urban growth boundary. Program elements covered under the Stormwater IGA included stormwater planning in an area of shared jurisdiction, stormwater education, erosion prevention and construction site management, and illicit discharge detection and elimination. The Stormwater IGA has been amended several times between 2004 and present, to update the description of services provided, to increase the County's reimbursement limit, and to extend the timeframe to enable the completion of the stormwater planning work (see BMP E1 for more information). Discussions are underway between the two agencies related to an updated Stormwater IGA, scheduled for consideration prior to the scheduled expiration date of November 30, 2011. NPDES Phase II permits are scheduled to expire on December 31, 2011. Lane County has submitted its updated SWMP in July 2011 and is currently in discussions with DEQ related to their new (second) NPDES permit.

On an on-going basis, formally through the Stormwater IGA with Lane County and informally through participation in multi-agency efforts such as the Pollution Prevention Coalition, the cities of Eugene and Springfield and Lane County often collaborate on stormwater education activities such as defining topics for the City of Eugene's Stormwater Connections newsletter, and topic-specific outreach and education efforts such as pressure washing brochures (see BMP

A1 for more information). The City actively participates in collaborative stormwater-related efforts with agencies across the state, including under the auspices of the Oregon Association of Clean Water Agencies (ACWA).

2.5 Financial Summary - Actual (FY2011) and Projected (FY2012) Expenditures

Stormwater program activities are funded by a combination of public and private financing: stormwater user fees, stormwater systems development charges; assessments; state and federal funds; volunteer services; and partnerships (Youth Corps/Bureau of Land Management/The Nature Conservancy).

The two primary on-going funding sources for stormwater program activities are:

- Stormwater User Fees. User fees are paid by all existing and new residents and businesses. User fees are impervious surface area-based and are reduced if the site is not connected to the public system or if the site contains retention or pollution reduction facilities. Stormwater user fees fund on-going operations and maintenance (including street sweeping, catch basin cleaning, litter pick-up, spill response, stormwater education and volunteer activities) and new capital (including major system rehabilitation projects, retrofits of the existing system to address water quality, wetland and waterway restoration projects, and new stormwater facilities such as pipes, culverts, constructed wetlands, ponds, and filters).

- Stormwater Systems Development Charges (SDCs). SDCs are paid by new and expanding development. The fees are based on impervious surface area, number of dwelling units, or footprint. SDC's typically fund construction or expansion of large pipes, drainage ways, catch basins and culverts.

The stormwater program-wide actual expenditures over the year reporting period for Fiscal Year 2011 and projected expenditures (budget for Fiscal Year 2012) are shown in Table 2-4. The NPDES permit reporting year aligns with the City's fiscal year. Expenditures reported include funding for NPDES permit related activities and for stormwater program activities which are outside of the NPDES permit, such as: system maintenance for conveyance and flood control and wetland program management.

Table 2-4
City of Eugene
Public Works Department - Stormwater Funds (335, 531, 535)
Actual Expenditures FY2011, Projected Expenditures FY2012
(Fiscal year is July 1 - June 30)

Fund		Division	FY11 Actuals	FY12 Budget	
335	**Stormwater SDC**	93 - Engineering	$275,534	$392,041	a.
		99 - Non Departmental	$1,800		
335 Total			***$277,334***	***$392,041***	
531	**Stormwater Utility - Capital**	93 - Engineering	$2,099,976	$7,778,335	b.
531 Total			***$2,099,976***	***$7,778,335***	
535	**Stormwater Utility - Operation**	87 - WWTP	$378,415	$492,591	
		89 - Administration	$1,433,403	$1,697,519	
		93 - Engineering	$1,535,424	$1,955,741	
		94 - Maintenance	$3,955,087	$4,214,775	
		96 - POS	$3,459,491	$4,204,959	
		99 - Non Departmental	$857,000	$855,000	
535 Total			***$11,618,820***	***$13,420,585***	
Grand Total			**$13,996,130**	**$21,590,961**	

a. FY12 budget includes $92k carryover from FY11.
b. FY12 budget includes $5.5 million carryover from FY11.

2.6 Continued Legal Authority

Schedule D.1 of the NPDES permit requires that the City of Eugene maintain adequate legal authority, through ordinance(s), interagency agreement(s) or other means to implement and enforce the provisions of the permit.

In Section 2.0 of the City's original Phase I permit application *(Part I of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems, May 1992*), the City provided a detailed summary of relevant local ordinances which were in effect at the time, and thereby demonstrated that the City of Eugene had the required legal authority.

Although specific code sections referenced in 1992 may have changed, the authority required by 40 CFR 122.26 (d)(2)(i) still exists and the City has actually increased its level of authority and enforcement capabilities over time. Appendix C contains the current version of the Table of Contents for Chapter 6, "Environment," Chapter 7, "Public Improvements," and Chapter 9, "Land Use," of the Eugene Municipal Code. Chapter 6 contains most, but not all, of the code

provisions Eugene relies on to apply and enforce stormwater related regulations including those required per Schedule D(1).

2.7 Planning, Land Use Changes, and Annexations within the UGB

A process called Envision Eugene, led by the City's Planning and Development Department, continued to make progress in determining the best way to accommodate projected population growth through the year 2031. During 2010 the Envision Eugene process collected community input through workshops, surveys, and other means, and produced a draft proposal for the Eugene City Council's consideration in March 2011. The draft proposal includes accommodating projected commercial and multi-family needs inside the existing Eugene urban growth boundary (UGB) and potentially expanding the UGB for large lot industrial uses. UGB expansion for single family housing is still under consideration.

For the reporting year there were no annexations of land to the City within the Eugene UGB.

2.8 Adaptive Management Process

Schedule D.4 of the NPDES permit requires that the City of Eugene follow an adaptive management approach to assess and modify its SWMP to achieve reductions in stormwater pollution to the maximum extent practicable. This section describes the City of Eugene's adaptive management process and summarizes the results from the 2011 reporting period adaptive management assessment.

2.8.1 Introduction

Consistent with Schedule A.2 of its National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit, the City of Eugene 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 City'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 1994. The history of this adaptive management approach may be found in Section 3.3 of the City's NPDES MS4 Permit Renewal document (September 2008), which describes how the current Oregon Department of Environmental Quality (DEQ) approved SWMP meets the MEP requirement.

The purpose of this section is to fulfill requirements of Schedule D.4 of the current MS4 permit by describing the adaptive management approach that the City will follow through expiration of its current permit on December 29, 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 City 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) An MS4 *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.

2.8.2 Annual Adaptive Management Process

Following guidance in DEQ's Permit Evaluation Report and Fact Sheet for the City's 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 City 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 City's MS4 annual report, to be submitted to DEQ by December 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 MS4 annual report of progress toward attaining BMP measurable goals (through data collection and tracking measures), the City 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 City will collect data and feedback from staff responsible for implementing/reporting on each BMP to facilitate the BMP assessment process.

Factors considered during the assessment phase are reflected in the Adaptive Management BMP Evaluation Tool template provided in Appendix E. 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 and Schedule D.5 of the NPDES MS4 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 City's SWMP updates required by Schedule B. 6. of the NPDES MS4 permit for the permit renewal application package, including the modification, addition, and removal of BMPs, and associated measureable goals.

2.8.3 Permit Cycle Adaptive Management Process

In preparation of the NPDES MS4 permit renewal application as required by Schedule B. 6 of the permit, the City will assess each BMP described in its SWMP, its 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 effectiveness of its stormwater management program in reducing pollutants to the MEP.

As described in Section 2, 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 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 or should they be changed?
- Are resources (funding, staff, equipment, etc.) available to change the BMP measurable goal, and does it make sense to change the goal?

Where applicable, the effectiveness of individual BMPs may also be evaluated by use of data collected through the City's environmental monitoring program. 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:

- Hydromodification 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 City 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 City 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.

2.8.4 Summary of Adaptive Management Process

The adaptive management approach described in this section identifies both annual and end of the NPDES MS4 permit cycle processes that will facilitate continuous improvement of the City's 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 that the City continues to improve its stormwater management programs and reduce the discharge of pollutants to the maximum extent practicable.

2.8.5 Summary of Adaptive Management for 2011

The annual adaptive management process described in Section 2.8.2 resulted in the need to propose the following modifications to the April 2011 SWMP BMPs:

- BMP P1 (Educational Volunteer Program) – Modify P1 to reflect the consolidation of the POS volunteer programs made optimize efficiencies within the Parks and Open Space (POS) volunteer programs. Three volunteer programs (previously called Stream Team, Neighborwoods, and Volunteers in Parks) have been consolidated into one multiple objective volunteer program, coordinated by regional volunteer coordinators. This change improves efficiencies by minimizing traveling time for coordinators and broadening the benefits of volunteer projects beyond single-objective projects. The work previously conducted under the three programs will continue to occur, however the individual names, including Stream Team (currently referenced in P1) and Neighborwoods (currently referenced in P3) will no longer be used. Changes to P1 include removing reference to the Stream Team and incorporating the program formerly called Neighborwoods into P1 from where it is currently referenced in the SWMP (P3- Tree Planting and Information Programs).
- BMP P3 (Tree Planting and Information Programs) - Modify P3 to reflect the consolidation of the volunteer programs described in the previous bullet for P1, including changing the description of P3 to reflect only the governmental tree planting programs, removing references to the community tree planting program (formerly called Neighborwoods) which will be reflected in P1, and modifying related measurable goals and tasks for P3 accordingly.
- BMP E4 (Stormwater Development Standards) - Modify E4 to clarify the applicability of adopted Stormwater Development Standards as referenced from one of the measurable goals.

The proposed changes are described in more detail in the individual BMP reports for P1, P3 and E4. Revised BMP fact sheets for P1, P3 and E4 reflecting these adaptive management modifications are provided in Appendix F.

3 STATUS OF SWMP IMPLEMENTATION

This section summarizes the status of implementation of the SWMP in the form of measurable goals, tracking measures and accomplishments for each BMP during the reporting year. A historical account of the program accomplishments may be found in prior annual reports, beginning with the Year 1 Annual Report (November 1995) through the Year 16 Report (December 2010). Also included with each BMP report is proposed revisions to the BMP as a result of the adaptive management process, and planned activities or activities under consideration for reporting year 2012.

3.1 Status of Education BMPs

3.1.1 A1 – Stormwater Education

Responsible Department/Division:
Public Works / Administration

BMP Contact:
Administration Division Director

BMP Description
Plan, develop, implement and revise as necessary a program to provide stormwater information and education to homeowners, school children, City and other agency staff and the general public about the impacts to stormwater quality and natural resource values from both point and non-point sources of pollution.

In addition, educate professional, commercial, and industrial businesses about best management practices that can help prevent and reduce stormwater quality impacts to the public stormwater system and local receiving waters.

Tasks
1. Update and improve upon educational materials through assorted print material, videos, web, audio and visual media.
2. Prepare and staff booths at special events to reach community members.
3. Develop on-going campaigns as appropriate to support projects, programs, special opportunities and targeted pollutants.

Measurable Goals	Status of Measurable Goals – FY11
• Conduct surveys every two years with Eugene residents to determine attitudes and opinions of residents about the stormwater management program.	• Conducted Stormwater Management survey May 2011.
• Provide SPLASH educational curriculum to teachers and administrators in local school districts.	• Continued to provide education curriculum to teachers in 4J and Bethel School Districts. • Reached a total of 1, 957 students.

• Develop and implement internal stormwater education to city staff through new employee orientation, "green team" presentations, work group presentations and audio/visual presentation.	• Draft outline of stormwater education training developed.
• Increase catch basin markers with "dump no waste" messages and storm drain covers installed on public improvement projects.	• "Drains to Stream" catch basin markers given to volunteers for application to existing storm drain catch basins and curb inlets. • "Dump No Waste, Drains to Stream" manhole lids installed on all new manholes constructed as part of a public improvement project.
• Work collaboratively on education campaigns with other local agencies.	Joint outreach projects have included pressure wash booklets for mobile washers, pressure wash hang tags for rental stores, pressure wash handouts for residents, paint brochures in English and Spanish, joint radio campaign for car wash kits for fundraisers, good earth home show and spring home show booth at Lane County event center. Partnered with Eugene Water and Electric Board, City's waste prevention and green building program and parks and open space department , Nearby Nature and two local landscape architects to create a waterwise residential garden in Alton Baker Park. The purpose is to provide an example of smart water use through an irrigation system, a rainwater harvesting system, drought tolerant plants, a bioswale and rain garden. Future plans include hosting how-to workshops and tours.

Tracking Measures	**Tracking Data – FY11**
• Number of information materials (all media) prepared and distributed to the public.	Material prepared and distributed includes: • 156,400 copies of Stormwater Connections to Lane County residents through direct mail for fall 2010 and spring 2011. • 27 Pressure washing hang tags for rental stores • 72 Pressure washing handouts in brochure holders at rental stores. • Hired two videographers to produce a pressure

	washing video and a Canines for Clean Water video. Also advertised on TV and posted on City's web site. • Created in-house video for fish friendly car wash kit program. Posted on City's web site. • 96 Paint brochures in English and Spanish put in display racks at public locations and given out at the spring home show. • Gave out 312 note pads with City of Eugene website and other sites for healthy landscaping information. • Purchased and provided 80 copies of *Grow Smart, Grow Safe* books to instructors in OSU extension service program that teaches Sustainable Landscape Program for community members. • Gave out approximately 212 *Grow Smart, Grow Safe* books at spring home and garden show. • Provided 50 handouts of each of the following for the Sustainable Landscape Program: Make Clean Water Part of your Life, Landscape Business-Make Clean Water Part of your Life, Stormwater Friendly Lawn and Garden Care.
• Number of students and teachers who use SPLASH curriculum annually.	• 4J and Bethel School Districts reported reaching 1,957 students with the SPLASH curriculum. • 71 teachers using curriculum
• Number of attendees at public outreach events.	• 30,000 attendees at Good Earth Home Show • 36,00 attendees at Lane County Home and Garden Show • [XX] attendees at Earth Day celebration
• Number of employees attending stormwater education sessions.	• [XX] employees attended stormwater education sessions
• Track quantity of installed catch basin markers and storm drain covers.	• 47 glue-on Drains to Stream" markers given to a local volunteer youth group for application to existing storm drain catch basins and curb inlets. • [XX] "Dump No Waste, Drains to Stream" manhole lids installed on all new manholes in association with all public improvement projects
• Identify collaborative campaigns, target audience and summary of campaign.	• Fish-friendly car wash campaign has been ongoing. Primary target audience is fundraising

		groups. A team from Eugene, Lane Co. and Springfield work together to make kits available for use. Several dog wash events have used kits as well. We use print media and radio to promote the program. • Eugene is a member of the Pollution Prevention Coalition – a group of agencies that work together to share our collective knowledge and resources to educate community members about environmental issues, such as stormwater, and to provide technical assistance in program specific areas. Over the last three years, we have teamed up to have a large education booth at the Lane County Home and Garden Show to give out information and talk with residents about areas of concern to them. Our target audience is area residents.
• Documentation of stormwater survey responses.		• 400 survey participants • Bi-annual Stormwater Management survey results summarized in consultant report May 2011 and posted on City's web site at: www.eugene-or.gov/stormwater (see "Stormwater Education" and select "Stormwater Survey, May 2011").

FY11 Activities and Accomplishments beyond Measurable Goals and Tracking Measures

- Developed three new educational videos which were disseminated via local television stations and then posted on the City's internet web site.
- Fall 2010 issue of Stormwater Connections highlighted erosion prevention, leaf collection, private catch basin maintenance, flood risk, prevention and tips and the impacts of dirt on salmon habitat.
- Spring 2011 issue of Stormwater Connections highlighted garden pests and least-toxic solutions, stormwater permit reissuance, chickens in the urban environment, mulch basics, drinking water protection through drywell projects, clean water for canines, fish-friendly kits, vegetation enhancement along waterways, the benefits of pollinators and improvements to the water wise garden project.
- Lane County Spring Home Show booth contained a centerpiece display contrasting chemical vs. alternative solutions to yard care along with an overall healthy yard care theme. Handouts covered a range of topics addressing land, air, water and waste.

Proposed Adaptive Management Revisions to BMP
None.

Planned or Considered FY12 Activities

- Look further into social media communication means and tools to explore other ways to reached targeted audiences.
- Research educational videos to either inform creating additional videos of our own or providing access via hotlinks to existing videos.

3.1.2 P1 – Educational Volunteer Program

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description
Manage and support the City's Stream Team volunteer program and other community volunteer programs that promote stormwater education. Provide opportunities to involve citizens of all ages and socio-economic backgrounds in meaningful, hands-on and educationally oriented stormwater related projects. Such projects are aimed at providing both physical benefits and participant awareness related to protecting stormwater quality, fostering citizen stewardship of the City's water resources, promoting the use of native-vegetation, and enhancing fish and wildlife habitat within the local urban watershed.

Tasks

1. Recruit, support, and coordinate activities for groups or organizations to adopt portions of the City's stormwater system, such as creeks, ponds, and drainage channels.
2. Investigate inclusion of publicly owned vegetated stormwater facilities within developed parks and right of way into the volunteer program.
3. Advertise, coordinate and conduct periodic work parties for regular and drop-in volunteers aimed at waterway clean-up, invasive species removal, native vegetation salvage and native vegetation planting in riparian areas.
4. Partner with local agencies, organizations, businesses and/or corporate sponsors to plan, promote, coordinate and implement annual large scale waterway clean-up volunteer events.
5. Inform the public about the purpose of the volunteer program through public presentations, distribution of program information materials, event related press releases and news media articles and news stories. Include in the communication the challenges and benefits of managing stormwater properly.

Measurable Goals	Status of Measurable Goals – FY11
• As attrition occurs continue to recruit replacement adoption groups to maintain current levels of participation.	• Continued to work with the same number of adoption groups during the reporting year.
• Conduct one volunteer work party annually that will address maintenance needs at publicly owned vegetated stormwater facilities with developed parks or the right of way.	• Two volunteer events were held at a site that had publicly owned vegetated stormwater facilities.
• On average, conduct 12 volunteer work parties per year.	• Completed
• Conduct at least one partnership based large-scale water resource clean-up or enhancement volunteer project per year.	• Completed
• Correspond with the city's stormwater education program coordinator on a regular basis to determine if there are opportunities to better inform the public regarding the challenges and benefits of stormwater management.	• Corresponded periodically with the Stormwater Education Coordinator throughout the reporting period.

Tracking Measures	Tracking Data – FY11
• Number of adoption groups that are retained and continue to participate in the volunteer program. Track number of new adoption groups brought into the program.	• 10 Adoption Groups were retained and continued to participate in the volunteer program. There were 2 new adoption groups added to the program during the reporting year. Friends of Trees adopted a section of Wilamut and Marche Chase Park.
• Number of volunteer work parties conducted that involve maintenance of publicly owned vegetated stormwater facilities and number of volunteer participants.	• 2 work parties were organized during the reporting period to work on West University Park. West University Park has several stormwater management facilities (pervious pavement and infiltration strips). 43 volunteers turned out to conduct maintenance at the park. The volunteers voted to adopt the park is as their community service project for the next two years.

• Number of work parties conducted and number of volunteer participants.	• 148 projects were completed during the reporting year. The number of volunteers that participated was approximately 1300.
• Document annual large-scale project(s), participating partners and number of volunteer participants.	• Volunteer Program staff partnered with Willamette Riverkeepers and REI to coordinate the annual Willamette Cleanup event on October 2, 2010. A total of 80 volunteers participated. • June 11, 2010 approximately 100 volunteers from the Church of Jesus Christ of Latter Day Saints worked at the Alton Baker Park duck pond and planted native plantings along the new fence surrounding the duck ponds and weeded entire area. • Friends of Ridgeline – 1st Annual celebration. Included guided hikes, educational opportunities, music and trail maintenance. • Wilamut Plantings – Annually there are over 100 volunteers that work in the Wilamut Natural Area.
• Document annually efforts to educate the public about the city's volunteer programs and the protection of water quality as it relates to stormwater.	• Utilized the Volunteer Program E-Newletter to education the public about upcoming event that are related to stormwater.

FY11 Activities and Accomplishments

- To optimize efficiencies within the Parks and Open Space (POS) volunteer programs, three volunteer programs (previously called Stream Team, Neighborwoods, and Volunteers in Parks) have been consolidated into one multiple objective volunteer program, coordinated by regional volunteer coordinators. This change improves efficiencies by minimizing traveling time for coordinators and broadening the benefits of volunteer projects beyond single-objective projects. The work previously conducted under the three programs will continue to occur, however the individual names, including Stream Team (currently referenced in P1) and Neighborwoods (currently referenced in P3) will no longer be used.
- Volunteer Program staff and the Urban Forester coordinated with University of Oregon (UO) in staging the City's Arbor Day Celebration event at West University Park, where Mayor Piercy accepted the City's 32nd consecutive Tree City USA award from the Arbor Day Foundation. UO accounting fraternity Beta Alpha Psi, which has adopted West University Park, worked to weed and mulch the all-native plant park, and they joined Day of Service volunteers in planting two Oregon white oak street trees on Hilyard Street. Eugene Tree Foundation and neighborhood volunteers planted 20 street trees in the surrounding blocks.
- Annual Skinners Butte Spring Clean-up.

Planned or Considered FY12 Activities

- Work on a new Marketing Plan and branding for consolidated Volunteer Program.
- Will host several large regional events in parks and natural areas.
- Continue to work with local high schools along open channels with more emphasis on stormwater education.
- Will work with the Stormwater Education Coordinator to produce an article in the quarterly "Stormwater Connections" newsletter.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

Proposed changes to P1 reflect the consolidation of the POS volunteer programs, specifically removing reference to the Stream Team and incorporating the program formerly called Neighborwoods into P1 from where it is currently referenced in the SWMP (P3- Tree Planting and Information Programs). See P3 status report for a corresponding change to that BMP. The proposed revisions to P1 are as follows:

- Remove reference to the Stream Team from the BMP description and incorporate into the description the goal of raising awareness of the benefits of trees for water quality.
- Add the following text to the end of Task 3: "…and tree planting within the right-of-way."
- Add the following tracking measure: Report on the number of trees planted annually by the Volunteer Program within the right-of-way.

A revised fact sheet for BMP P1 is included in Appendix F.

3.2 Status of Operations and Maintenance BMPs

3.2.1 M3 – Street Sweeping and Leaf Pick-up

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
Undertake both mechanical brush and vacuum sweeping of publicly maintained roads, bike paths, and parking lots in accordance with the Stormwater Operations and Maintenance Manual. Monitor and evaluate new technology and methods related to street sweeping, and make appropriate adjustments to the current sweeping program when feasible to maximize water quality benefits.

Tasks
1. Follow sweeping frequencies as outlined in the Stormwater Operation and Maintenance Manual.
2. Collect sweeping data such as amount of debris swept, curb miles swept, streets and/or areas swept.
3. Conduct annual curbside pickup of leaves on City streets.

Measurable Goals		Status of Measurable Goals – FY11
Follow sweeping frequencies as outlined in the Stormwater Operation and Maintenance Manual, more specifically described as follows:		
• Sweep downtown core twice per week.		• Goal was met for FY11.
• Sweep university and industrial areas once per week.		• Goal was met for FY11.
• Sweep arterial streets every 2 weeks.		• Goal was exceeded for FY11.
• Sweep residential streets every 6-8 weeks.		• Goal was exceeded for FY11.
• Sweep bike paths and improved alleys twice per year.		• Goal was exceeded for FY11.
• Coordinate and manage two seasonal opportunities for the citizen's leaves to be picked up and managed by the SW operations crew.		• Partnered with Surface Maintenance to successfully manage the 2010-2011 leaf collection season.

Tracking Measures	Tracking Data – FY11
• Lane miles swept.	• Swept 39,737 lane miles.
• Amount of debris collected.	• Collected over 13,700 cubic yards of debris.
• Amount of leaves picked up.	• Collected 15,734 cubic yards of leaves during the 2010-2011 leaf collection season.

FY11 Activities and Accomplishments

- Removed over 85% of sanding rock and other debris after sanding materials were applied to streets along snow and ice routes.
- Replaced 2 sweepers with new, more efficient sweepers.
- Swept off-street bike paths totaling more than 70 lane miles.
- Maintained the ability to respond 24/7 to emergency requests such as vehicle accidents and spills.
- Continued to review and update sweeping routes. The purpose of the review is to gauge the effectiveness and efficiency of the sweeping program in meeting the community's need and producing equivalent workloads.
- Successfully completed another season of City's curbside "Leaf Pick Program". This effort prevented over 15,700 cubic yards of leaf material from potentially entering the public stormwater collection system. This material is reused in the community's popular compost program.

Planned or Considered FY12 Activities

- Analyze street sweeping operations on a continual basis and make modifications as necessary to ensure maximum water quality benefits.
- Perform sweeping operations during eighteen of a possible twenty-one work shifts per week.
- Sweep behind City leaf pick-up crews to remove remaining debris.
- Evaluate street sweeping technologies and equipment.
- Determine methods and schedule for high pollutant load areas.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.2.2 M4 – Prevent Leaks and Spills from Municipal Vehicles and Equipment

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description

Undertake preventive maintenance program for all municipal vehicles and equipment in order to prevent or correct sources of vehicle fluid leaks. Implement employee education practices and field operations procedures to detect and report leaks and to prevent incidences of fluid and

material spills from municipal vehicles. Equip municipal trucks and large mechanized equipment with renewable spill response kits.

Tasks

1. Maintain training competencies for Fleet Services employees.
2. Maintain a preventative maintenance schedule for all vehicles and equipment.
3. Maintain a supply of spill kit materials for designated vehicles and equipment.

Measurable Goals	Status of Measurable Goals – FY11
• Include a spill procedure card in all City vehicles and equipment by December 1, 2011.	• Goal was met
• Perform preventative maintenance service on all City vehicles and equipment annually, at a minimum.	• Goal was met
• During the repair/clean-up process, analyze the type and cause of the spills associated with the repairs conducted by Fleet staff, and evaluate whether operator training maybe helpful with spill minimization.	• Goal was met

Tracking Measures	Tracking Data – FY11
• Track the number of spill procedure cards issued annually.	• Spill procedure card was created in 2011 and issued for all City of Eugene vehicles and equipment.
• Track the number of vehicle related leaks repaired annually.	• Fleet Services completed 1302 scheduled preventive maintenance inspections for this reporting period as part of the City's leak prevention program. Fleet Services performed a total of 1022 17-point safety and operational inspections on scheduled and non-scheduled work for the reporting period as part of the leak prevention program.
• Track the percentage of vehicles which receive preventative maintenance service annually.	• Performed annual preventative maintenance service on 98% of City of Eugene vehicles in reporting year. 1302 preventive maintenance services took

		place on the City of Eugene's 680 pieces of equipment that have preventive maintenance schedules.

FY11 Activities and Accomplishments

- Fleet services responded to 2 municipal vehicle-related spills, a vactor with a broken hydraulic hose, and a tractor used in our leaf collection program with a broken hydraulic hose. Both incidents were cleaned up with minimal impact to the municipal stormwater system and the environment.
- The mechanical Stormwater water quality structure at our maintenance facility was cleaned once during the reporting period with no structure failures, and no other maintenance required.

Planned or Considered FY12 Activities

- All municipal cars, service vehicles, fire apparatus, and large mechanized equipment are inspected and serviced on a routine and frequent basis.
- Vehicles found with fluid leaks or with worn/frayed hydraulic lines are either repaired immediately or taken out of service until necessary repairs can be made.
- Staff will issue spill kits to new Public Works vehicles and equipment as appropriate.
- Staff will replenish materials as spill kits are used.
- The spill kit program will continue to be monitored for effectiveness.
- The performance of the structural BMP will continue to be monitored.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.2.3 M5 – Public Stormwater System Cleaning Program – Piped System

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description

Undertake frequent, systematic cleaning of the components of the public stormwater system such as catch basins, pipes, culverts, inlets, and stormwater quality devices in accordance with the adopted Stormwater Operations and Maintenance (O&M) Manual. Document quantities of material removed from each structure. Using the maintenance management system, refine the regular cleaning schedule for pipes, catch basins and stormwater quality devices. Research and monitor developments in maintenance technology and operations and maintenance methods for the closed systems which will further increase the effectiveness of our cleaning practices and water quality improvement practices.

Tasks

1. Follow cleaning procedures as outlined in the Stormwater O&M Manual.
2. Collect loading information for individual structures and facilities.

Measurable Goals	Status of Measurable Goals – FY11
• Clean 50% of the all of the public catch basins and inlet structures annually unless increased efficiencies are shown through adaptive management.	• 6,173 catchbasin/curb inlet structures were cleaned. • A good example of adaptive management resulting in increased efficiencies would be Public Works Maintenance utilizing a more comprehensive cleaning program where Pavement Preservation projects were to take place. This included the complete cleaning and cctv inspection of the piped system to assess its integrity and to determine the need for any repairs in advance of the paving projects. Another example is documenting pertinent data when cleaning catch basins/curb inlets including sump depth and sediment load prior to cleaning. The intending results will be a targeted cleaning practice that reduces pollutant loads to the MS4.
• Clean all of the public underground stormwater quality structures as outlined in the Stormwater O&M Manual.	• Goal was met

Tracking Measures	Tracking Data – FY11
• Track the number of structures cleaned.	• Cleaned 6173 catchbasin/curb inlet structures.
• Track the amount of debris recovered.	• Removed 625 tons of debris from the piped stormwater system through a systematic catchbasin and mainline cleaning program.
• Track the lineal footage of stormwater lines cleaned.	• Cleaned 35,932 linear feet of stormwater lines.

FY11 Activities and Accomplishments

- Continued to utilize operations crews across all 15 available weekday shifts. This includes two full-time stormwater jet/vac trucks and 1 stormwater field leadworker. These crews provide O & M functions to the piped system, manholes, proprietary stormwater devices, sediment traps and inlets, as well as providing timely 24/7 response to service requests.
- Continue to track sump depth of catch basins/curb inlets, and sediment levels prior to cleaning. This information is used to help determine cleaning frequencies, and need for catch basin/curb inlet replacement.
- Continued cleaning and performing Closed Circuit Television inspection and assessment of storm lines and inlets in advance of Pavement Preservation Projects. This work identifies conveyance problems in advance of surface improvements and promotes proactive maintenance practices. Several utility breaches were identified and repaired and numerous structural repairs made.
- Cleaned 33 sedimentation manholes and 17 underground water quality structures.
- Continued use of Maintenance Management System (MMS) to initiate and track stormwater cleaning request for service. Attributes of the system include increased tracking capability, expedited response time, & result documentation.
- Continue to identify catch basins that need to be changed out to curb in-lets to reduce seasonal flooding.

Planned or Considered FY12 Activities

- Maintain stormwater infrastructure database ("Cassworks").
- Generate "Cassworks" work orders for infrastructure maintenance.
- Seasonally inspect key inlets and outfalls; remove any blocking vegetation or other obstructions.
- Clean catch basins and connecting pipes of accumulated sediment, debris, and other pollutants on a systematic basis.
- Record quantities of debris removed and identify structures requiring more frequent cleaning cycles.
- Evaluate and update systematic cleaning schedules based on information gathered by field observations and analysis of individual loadings and capacity of the system.
- Track sump depth of catch basins/curb inlets, and sediment levels prior to cleaning. This information is used to help determine cleaning frequencies, and need for catch basin/curb inlet replacement.
- Evaluate system performance.
- Dispose of collected materials at a waste drainage pad at the Lane County Solid Waste Collection Facility.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.2.4 M8 – Winter Road Sanding and De-icing Program

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
Apply and clean up winter traction sand on publicly maintained roads and parking areas in conjunction with the application of a pre-wetting agent designed to reduce the need for repeat sanding. Conduct research efforts to identify and evaluate new technology and strategies for application of environmentally friendly chemical anti-icing and de-icing agents. Conduct research into new methods, practices, and efficiencies which may further limit the runoff of sanding related pollutants to the storm system. Conduct preseason staff training on the proper application methods of sand and chemical agents.

Tasks
1. Apply sand to roadways in accordance with the Public Works Snow and Ice Plan.
2. Apply chemical agents in accordance to Guidelines for Anti-icing/Deicing included in the Public Works Snow and Ice Plan.
3. Respond to priority routes as outlined in Public Works Snow and Ice Plan.
4. Collect data such as streets plowed and sanded, material used, and other data related to snow/ice events.

Measurable Goals	Status of Measurable Goals – FY11
• Minimize the use of abrasive materials for snow and ice control through adaptive management practices.	• The Goal was met for 2011. The use of abrasive materials is minimized through the use of liquid deicer, systematic sanding and weather condition monitoring including road temperature.
• Begin cleanup of abrasive materials when streets become free of ice and snow, and the forecast does not call for more ice and snow within the next 24 hours.	• Goal was met for 2011. Cleanup and removal of abrasive materials was started when the forecast no longer called for ice and snow within the next 24 hours.

Tracking Measures	Tracking Data – FY11
• Document the quantities of sanding materials applied and collected during each storm event.	• 158.75 cubic yards of sand where applied last winter
• Document the volume used for deicing/anti-icing operations.	• 13,773 gallons of liquid deicer/anti-icer

FY11 Activities and Accomplishments

- 980 hours of regular and overtime hours were recorded for sanding and clean up during snow and ice events.
- During reporting period, a total of 13,773 gallons of Magnesium Chloride (MgCl) was applied to 573 lane miles of streets. Applications of anti-icers took place on 17 separate days.
- Removed over 85% of sanding rock and debris after sanding operations during snow and ice events. Removal of the sanding rock began at the conclusion of the storm events when streets became free of ice and snow, and forecasts did not call for more snow or ice within the next 24 hours. Priority routes for removing the sanding rock were the same as for the it's application. Special attention is given arterials with striped bike lanes to ensure they are clean.
- Continue to use sanding and sweeping logs during snow and ice events. During significant snow and ice events, utilize the Public Works Emergency Command Center and the Maintenance Management Command Center software. This allows staff to track which snow and ice routes have been completed, track vehicle location, as well as pertinent data for reporting.
- Performed annual snow & ice equipment inspection and training.

Planned or Considered FY12 Activities

- Subscribe to Weather Net to obtain focused weather briefing to help minimize unnecessary applications of anti-ice materials.
- Participate in Base Camp, a regional weather sharing site to help make informed decisions regarding sanding, plowing, or de-ice activities.
- Continue to research alternative technologies which may be viable for snow and ice control.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.2.5 P3 – Tree Planting and Information Programs

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description

Manage and support both governmental and community tree planting programs. Provide information to the public about the multiple benefits that trees provide for protecting and enhancing stormwater quality.

Tasks

1. Manage and support the City's community focused Neighborwoods volunteer tree planting program.

2. Manage and support the City's internally focused tree planting programs that regulate new development so they are fully planted with street trees and that ensure City-engineered street improvement projects include street trees in appropriate plantable areas.
3. Seek opportunities to provide and/or present information to the community regarding stormwater related benefits of trees.

Measurable Goals	Status of Measurable Goals – FY11
• On average, conduct 12 Neighborwoods volunteer program tree planting projects per year.	• Goal was met. The Neighborwoods program conducted 10 tree planting projects. The Urban Forester and volunteer staff also assisted with several other volunteer tree planting projects.
• Include the planting of street trees with all new private developments and with all new public street improvement projects as opportunities arise.	• Goal was met.
• Plant 600 trees per year through the Neighborwoods program and the City's regulatory tree planting program.	• Goal was met.
• Provide information about the stormwater benefits of trees at major publicly attended events at least 4 times per year.	• Goal was met.

Tracking Measures	Tracking Data – FY11
• Track the number of Neighborwoods volunteer program planting projects and the resulting number of trees planted.	• 10 projects, 330 trees planted by Neighborwoods; over 200 trees planted at City-ETF Trainsong neighborhood project, and over 100 other trees planted by Friends of Trees in partnership with the City.
• Track the number of trees planted through new development tree planting requirements and through City-engineered street improvements.	• 118 trees planted in new development and replacements through IGA with EWEB; 8 trees planted through City engineering projects.
• Track the number and type of publicly attended events where stormwater related tree information was provided or where a presentation was made.	• 16 events and presentations, including 2 neighborhood association presentations, Arbor Day and Tree City USA Award presentation, and a presentation by the Urban Forester to the Oregon Chapter of the American Association of Landscape Architects.

FY11 Activities and Accomplishments

- In its sixth year, the Tree Stewards volunteer tree care project continued the partnership between the City's Neighborwoods program and Eugene Tree Foundation (ETF) to perform crucial structural pruning of newly-established trees. Citizen volunteers are trained individually in a study-at-home program in the basics of tree biology and identification, pruning techniques and safety. Volunteers put in 550 hours in pruning work and training. Over 1137 trees were pruned during the reporting period.
- Urban Forestry staff continued work on an ArcGIS-based tree inventory system using staff and temporary workers for collecting data using a GPS hand-held computer and PDAs. Inventory data have been collected in all new developments that were planted under the Developer Street Tree Program. The street tree inventory is now almost complete, and emphasis has been placed on incorporating the inventory into the daily work of all urban forestry operations staff to keep the inventory up-to-date and to realize the greatest benefit from the technology. Urban Forestry staff oversaw the contractual planting of 118 street trees in new developments and in replacement tree planting this year.
- Mayor Kitty Piercy helped kick off the City's Arbor Day celebration by accepting Eugene's 32nd consecutive Tree City USA award from the Oregon Department of Forestry (ODF). Speeches by the Mayor, Dave Lorenz, Western Lane District Forester, Robin Holmes, UO Vice President for Student Affairs, and the Urban Forester provided information to the public audience about the myriad environment benefits of trees, including storm water runoff reduction. Holmes welcomed University Day of Service volunteers, Adopt-a-Park volunteers (UO accounting fraternity Beta Alpha Psi), ETF and other neighborhood association leaders and citizens and planted 17 trees adjacent to the West University Park and in the surrounding neighborhood.
- Parks and Open Space planning staff sponsor public workshops for community input on park development projects. Staff help educate neighborhood groups on the storm water benefits of trees and developing designs that protect existing trees in an effective way.
- All Parks and Open Space supervisors attend various monthly neighborhood association meetings to represent the Division in answering questions about parks and trees, often presenting information in an informal way about the myriad environmental benefits of trees, including water quality enhancement. The Urban Forester gave a tree pruning workshop and demonstration at the first annual Jefferson Westside Neighborhood Tree Party. He and the Neighborwoods coordinator staffed the Ask the Expert booth at the party, providing information about the benefits of trees to citizens throughout the day.
- The Urban Forester was an invited speaker at spring symposium of the Oregon Chapter of the American Society of Landscape Architects at Portland State University. He talked about preliminary results of the City's street tree inventory, discussed the benefits of properly placed trees, and noted the performance attributes of several commonly-planted street tree species.

- The Urban Forester, as Awards Chairman of Oregon Community Trees, detailed the benefits of trees for storm water quality at the group's annual conference. Carla Staedter, of the City of Tigard, accepted an award for her work with the Clean Water Services staff in developing the Healthy Streams Plan for Tigard's part of the Tualatin River watershed. He called special attention to the effective educational outreach in the Canines for Clean Water program she developed.
- Urban Forestry staff assisted Public Works Engineering staff in designing effective tree preservation for large canopy shade trees on several street construction and reconstruction projects.
- To optimize efficiencies within the Parks and Open Space Volunteer programs, three volunteer programs (previously called Stream Team, Neighborwoods, and Volunteers in Parks) have been consolidated into one multiple objective volunteer program, coordinated by regional volunteer coordinators. This change improves efficiencies by minimizing traveling time for coordinators and broadening the benefits of volunteer projects beyond single-objective projects. The work previously conducted under the three programs will continue to occur, however the individual names, including Neighborwoods (currently referenced in P3) will no longer be used.

Planned or Considered FY12 Activities

- In the 2011 update to the Urban Forestry Service Profile, POS staff details to the Citizens Budget Committee urban forestry strategies for the next four years. Those strategies include making sure the number of replacement trees planted equals the number of street trees removed; offering at least five neighborhood association presentations each year, describing the street tree population and canopy cover in that neighborhood; working to improve the resilience of the urban forest to climate change, diseased, stress, insect attack and fire; increasing the diversity of species of street trees by decreasing the percentages of invasive, non-native and unapproved trees in the top twenty species city-wide; analyzing the tree inventory data to produce information about the canopy of street trees in Eugene, and using software to calculate the measurable benefits of that canopy level in reducing air pollution, providing storm water runoff reduction, and improving water quality, among other things.
- In 2012, POS staff plans to revise and update City webpages, including urban forestry webpages, increasing the educational outreach opportunities for citizens to learn about the benefits of trees in improving water quality and reducing pollutants in streams and allowing for easier access to volunteer opportunities to plant and care for trees.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

Proposed changes to P3 reflect the consolidation of the volunteer programs, including specifically the change to the description of P3 to reflect only the governmental tree planting programs (Developer Street Tree Program and City Engineered Street Improvement Program) and the removal of references to the community tree planting program (formerly called Neighborwoods) which will be reflected in P1.

The proposed revisions to BMP P3 are as follows:

- Modify the BMP description to read: "Manage and support governmental tree planting programs. Provide information to the public about the multiple benefits that trees provide for protecting and enhancing stormwater quality."
- Add the following measurable goals to P3:
  - Continue to maximize the number of street trees planted in the Developer Street Tree Program as new residential development occurs;
  - Ensure that the number of street tree replacement plantings is equal to the number of street trees removed due to hazardous conditions or storm damage;
  - Continue to work with PW Engineering to maximize the number of replacement and new street tree plantings associated with street construction and reconstruction projects.
- Remove the following measurable goals from P3:
  - On average, conduct 12 Neighborwoods volunteer program tree planting projects per year.
  - Plant 600 trees per year through the Neighborwoods program and the City's regulatory tree planting program.
- Add the following tracking measures to P3:
  - Report the number of trees planted under the Developer Street Tree Program each year.
  - Report the percentage of trees that were removed that are replaced with new trees.
- Remove the following tracking measure from P3:
  - Track the number of Neighborwoods volunteer program planting projects and the resulting number of trees planted.

A revised fact sheet for BMP P3 is included in Appendix F.

3.2.6 P4 – Public Stormwater System Maintenance – Developed Parks and Rights-of-Way

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description
Evaluate and, as necessary, adapt or revise turf, landscape and natural area vegetation management programs for public lands under the City's jurisdiction. Such areas include developed parkland and public right-of-way.

The focus of this BMP is to minimize and further limit the discharge of pollutant laden runoff from these areas.

Tasks

1. Update and refine the Integrated Pest Management (IPM) policy document and operations manual as new techniques are researched and the results of implementation of these techniques are uncovered.
2. Research, evaluate and implement park and landscaped area design practices and new vegetation management techniques to minimize impervious surfaces; reduce pesticide and fertilizer use; and maximize the use of native vegetation, where appropriate.
3. Complete stormwater inspections utilizing inspection checklist for all publicly-maintained vegetated stormwater facilities within the right-of-way and developed parks. Update the new stormwater facility tracking system database with information gathered in field.
4. Evaluate the Pesticide Free Parks Program. Revise, adapt, and expand program as appropriate.
5. Utilize the IPM policy document to continue adding Pesticide Free Zones within Eugene's seven stormwater basins.

Measurable Goals	Status of Measurable Goals – FY11
• Review IPM manual at least once during the permit term, and update and refine the IPM policy document and operations manual in accordance with integrated pest management principles.	• There was no update of the IPM manual scheduled for this reporting period.
• Conduct periodic inspection of each publicly maintained vegetated stormwater management facility within the right-of-way and developed parks. Populate the stormwater facility tracking system database with current information for each facility that is inspected.	• Completed inspections of all publicly maintained vegetated stormwater facilities. Staff did not enter data into the stormwater facility tracking system database.
• Continue to provide services to existing Pesticide Free Parks.	• All Pesticide Free Parks were served during the reporting period.
• All newly developed playgrounds, pools, sprayplay features, recreational areas and other park areas will be evaluated during design or within one year of initial public use for addition into the Pesticide Free Zone program.	• No new structures were added to Pesticide Free Zone program during the reporting year.

Tracking Measures	Tracking Data – FY11
• Document updates of IPM policy document and operations manual.	• The IPM policy document is updated every two years and the next scheduled review will occur in winter of 2012.
• Document new techniques and practices that are incorporated into park and landscape design.	• There were no new parks or landscaped areas constructed during the reporting period that utilized new techniques and practices.
• Document the number of publicly maintained vegetated stormwater facilities inspected and information entered into the stormwater facility tracking system database annually.	• 12 vegetated stormwater facilities were inspected during the reporting period. Staff has not entered data into the stormwater facility tracking system database.
• Track the condition of existing parks that are currently maintained using the Pesticide Free Parks protocol.	• Maintenance was performed at eight pesticide free parks during the reporting period. Tasks included litter and garbage collection, weekly mowing during the first part of the growing season then a reduction in frequency to every two weeks, and weed and plant management throughout the year using alternative methods of weed control such as flame-weeding, hand-weeding, and mulching.
• Calculate the total acreage that has been placed in the Pesticide Free Zone Program per year. • Utilize Chem Track program to track how much chemical (pound per acre) were used each year and determine total reduction of chemicals used annually.	• During this reporting period there were no additional areas added into the Pesticide Free Zone Program. To date a total of 200 acres of pesticide free zones exist in the park system. • A total of 23.24 pounds of chemicals were applied to areas within the park system/right-of-way during the reporting period. • This is the first time reporting on the use of chemicals, therefore it is not possible to determine the reduction of chemicals used annually. Staff will use FY11 pounds applied and compare to the pounds applied in FY12 to gauge if there was a reduction. This data will be reflected in next reporting period.

FY11 Activities and Accomplishments

- Parks and Open Space (POS) established No-Spray Zones Program previous to the reporting period; however, the development and implementation of the geographical portion of the chemical tracking database (ChemTrak) now gives us the ability to quantify and extrapolate site specific information related to type and amount of chemical used in each location. The modifications that occurred to ChemTrak during the reporting period significantly increases the accuracy and tracking ability of where POS chemical applications occur.
- Another important accomplishment that is noteworthy is that POS has been asked to work with other divisions within the organization to introduce the IPM document and the ChemTrak database. Divisions such as the Airport, Wastewater, Facilities and Recreation are now being familiarized with the purpose of the Integrated Pest Management (IPM) document and the ChemTrak database.

Planned or Considered FY12 Activities

- Review and if needed update the IPM document.
- Consider partnering more with the Volunteer Program to set up volunteer events for publicly owned vegetated stormwater facilities.
- Build into ChemTrak the ability to generate a report that shows chemical applications that occurs in either Developed Parks or the ROW during each reporting period.
- Look for opportunity to incorporate unique stormwater design into Creekside Park that will be constructed during the next reporting period.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.2.7 P5 – Public Stormwater System Maintenance – Open Waterways

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description

Maintain and manage open waterways consistent with adopted Open Waterway Maintenance Plans. These plans are intended to protect and enhance stormwater quality and natural resources values while continuing to maintain sufficient conveyance capacity in the waterways.

Tasks

1. Follow written procedures for on-going maintenance of open waterways: Open Waterway Maintenance Plans (for all open waterways) and U.S. Army Corps of Engineers Levee Owner's Manual (for portions of Amazon Creek).
2. Establish native trees and shrubs along portions of open waterways that are lacking shade.

3. Repair channel banks as erosion or slumping issues occur.
4. Revise Open Waterways Maintenance Plans to incorporate new information and techniques to further advance the goal of maximizing water quality and habitat benefits while also maintaining sufficient conveyance.
5. Implement storm event monitoring at potential choke points in the open waterway system.
6. Complete stormwater inspections utilizing inspection checklist for all publicly-maintained vegetated stormwater facilities (e.g., detention ponds, wetlands, bioswales). Update the stormwater facility tracking system database with information gathered during inspection.

Measurable Goals	Status of Measurable Goals – FY11
• Implement "green piping" (i.e., pruning woody vegetation within active channel zone) on 5 miles of open waterway annually to maintain conveyance.	• Implemented "green piping" on 4.7 miles of open waterway during the reporting period.
• Establish native trees and shrubs on 5000 lineal feet of waterway annually to help shade streams, lower water temperatures, and increase slope stability.	• Established native trees and shrubs on well over 5000 lineal feet of waterway during the reporting period
• Revise all Open Waterway Maintenance Plans by December, 2012.	• Work will begin on revising the Open Waterway Maintenance Plans during the next reporting period.
• Conduct periodic inspections for publicly-maintained vegetated stormwater facilities (e.g., detention ponds, wetlands, bioswales). Populate the stormwater facility tracking system database with current information for each facility.	• Inspected publicly maintained vegetated stormwater facilities. Have not entered data into the stormwater facility tracking system database.

Tracking Measures	Tracking Data – FY11
• Miles of open waterways that are green-piped each year.	• A total of 4.7 miles of waterway were green-piped during the reporting period.
• Track the number of riparian vegetation planting projects, including the number of lineal feet planted, and the number and general type of native species planted (i.e. trees, shrubs, grasses, etc.).	• Completed 7 separate native tree projects, over approximately 5,400 linear feet of channel bank, mostly on the Amazon. • Native willows where planted along 23,190 linear feet of the Amazon

	channel during this reporting period. • Delta Ponds & Heron Slough projects planted a total of approximately 35,000 trees, willow, shrubs & sedges. • Delta Ponds: Total linear feet planted 14,880. Planted: trees 1,545; willows 7928; shrubs 10,578; sedges/rushes 10,000. • Heron Slough: Total linear feet planted 2,524. Planted: trees 166; willows 1,860; shrubs 3,560; sedges/rushes 2,200; forbs 1,091
• Number of channel bank repair projects (e.g., to reduce erosion or slumping) completed each year.	• 3 channel bank repair projects were completed during the reporting period.
• Number of times each year that the storm event monitoring program for open waterways is activated.	• The storm event monitoring program was not activated during the reporting year.
• Number of publicly maintained vegetated stormwater facilities inspected and information entered into the stormwater facility tracking system database annually.	• Total of 10 vegetated stormwater facilities were inspected during the reporting period.

FY11 Activities and Accomplishments

There are no additional accomplishments to report.

Planned or Considered FY12 Activities

- Staff will be conducting physical monitoring work at specific sites as required under the permit monitoring plan.
- Staff will plan on evaluating all Stormwater Drainage Maintenance Agreements and conduct field visits to each facility in order to determine existing conditions.
- Review the purpose of the stormwater facility tracking system database and ensure that the information generated is useful and has appropriate application.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.3 Status of Illicit Discharge Control BMPs

3.3.1 M1 – Management of Illicit Discharges to the Municipal Stormwater System

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
Discourage and reduce improper discharges into the stormwater system through operation of a stormwater discharge compliance enforcement program. The primary goals of this program are to protect the quality of the receiving waters of the City's stormwater system and to ensure that discharges to the City's stormwater system are in compliance with local, state, and federal regulations to the maximum extent practicable. The City will conduct periodic review of enforcement program practices and procedures and make revisions as deemed necessary.

Tasks
1. Use CCTV inspection, dye testing, smoke testing and field investigation to identify illegal connections, cross connections with the wastewater system and failures in the pipe system.
2. Inspect stormwater outfalls to identify illicit discharges, as well as track outfalls added or removed from the stormwater system.
3. Implement the City's Stormwater System Administrative Rule, 58-02-01-F, with the intent to prohibit improper connections and illegal discharges to the City's stormwater system utilizing an effective enforcement program.

Measurable Goals	Status of Measurable Goals – FY11
• Work to reduce the number of improper discharges into the municipal stormwater system through public outreach and a reasonable enforcement of regulations.	Goal was met

Tracking Measures	Tracking Data – FY11
• Track the number of stormwater pollution complaints received by the City.	• A total of 189 discharge concerns were investigated after being reported to City staff and logged into the Maintenance Management System.
• Track the number of outfalls inspected annually.	• 150+ separate outfalls were inspected in the reporting period. This includes the outfalls with a greater potential to cause flooding or damage to the stormwater system being inspected multiple times.

• Track the number of requests-for-service (RFS) related to illicit discharges to the municipal stormwater system which required enforcement.	• One written notice of violation was issued.

FY11 Activities and Accomplishments

- Reviewed the City's Stormwater Enforcement Manual to evaluate the need for updates in light of program adaptive management and the City's new MS4 permit.
- Public Works Maintenance-Spill Response Program - Technical Specialist continues to work closely with staff of Public Works Engineering-Erosion Control Team and Public Works-Wastewater Industrial Source Control Technicians as an Enforcement Team with regular review meetings to discuss discharges, educational outreach, compliance/penalty cases and joint field investigation.
- The City's Maintenance Management System (MMS) is the primary mechanism for database tracking of spills and illicit discharges. The MMS system now includes a direct link to photos and other discharge information, with the next expansion set to include the creation of work orders and a link to enforcement documents.
- Sixth successful year of combined efforts, working with City of Springfield Environmental Services staff and City of Eugene Wastewater Industrial Source Control personnel to administer the "Fish Friendly" Car Wash Kits for local Non-Profit Fundraising. This was done by researching other municipal programs, putting together user friendly kits and inspecting sites for suitability. This program was funded through donations from the Sierra Club-Many Rivers Program. Planning for seventh season is underway.
- 2 sites continue to utilize permanent Car Wash kits and 12 were loaned to volunteer organizations during this reporting year.
- The Polk Street Stormwater Vault, the recent focus of an extensive reconstruction project was cleaned 4 times last year and over 18 tons of debris was removed.

Planned or Considered FY12 Activities

- Implement the Dry Weather Field Screening program.
- Continue to manage the "Fish Friendly Car Wash Kit Program"
- Partner with Local Emergency Planning Commission on Hazardous Materials training involving various scenarios including a train tanker leak.
- Expanded training with the City of Eugene Fire department Hazmat team.
- Follow the guidelines established in the Stormwater Investigation and Enforcement Manual (Updated August, 2002).

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.3.2 M2 – Spill Response

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
Maintain an on-call team trained in spill response procedures involving environmentally hazardous materials and a vehicle equipped for such spill mitigation. Coordinate efforts with other local response teams such as the City of Eugene Fire and Police Departments, Lane County, and state agencies.

Tasks
1. Maintain an on-call list of personnel trained in spill response procedures.
2. Maintain an inventory of equipment and supplies necessary to mitigate improper discharges to the municipal stormwater system.
3. Coordinate in conjunction with Fire Department / Hazmat Team on mitigation efforts including hazardous material clean-up and disposal.
4. Update the City of Eugene's Public Works Maintenance Spill Response and Illicit Discharge Operations Plan.

Measurable Goals	Status of Measurable Goals – FY11
• Maintain a list of HAZWOPER trained personnel that are available for 24-hour emergency response.	Goal was met. Expanded list of 40 hr. HAZWOPR trained staff to a total of 7 employees. Conducted annual refresher for 8hr., 24hr., and 40hr. HAZWOPR trained staff.
• Maintain and update, as necessary, the City's On-Call Emergency Roster for Environmental Spills.	Goal was met. Updated On-Call Roster twice during reporting year.

Tracking Measures	Tracking Data – FY11
• Up-to-date list of employees trained for spill response.	• Expanded list of 40 hr. HAZWOPR trained staff to a total of 7 staff.
• Track number of spills and follow-up details.	• 189 requests for service were recorded for spill response, spill information requests, and illicit discharge concerns.

FY11 Activities and Accomplishments
- Spill Response staff continue to work closely with Stormwater and Wastewater Vacuum Truck Operators, Systematic Field Inspection staff, Street Sweeper Operators, the

Stormwater Supervisor, Parks and Open Space Staff, Wastewater Industrial Source Control Technicians, StreamTeam Coordinator and volunteers, Engineering Division Construction Erosion Control Technicians to identify, investigate and abate Illicit Discharges and Spills-through combined efforts.

- Continued response to spills by City Maintenance Staff, Fire and Police Emergency Services Personnel, and the use of Hazmat contractor NorthWest Hazmat Inc. for cleanup, consultation and material disposal needs.
- Expanded the cooperative relationship, with regular meetings and networking, with City of Springfield, Environmental Services staffers on IDDE, Non-Profit Car Washing kits, Landscaping businesses and Pressure Washing Contractors, Retailers and Equipment Rental outfits.
- Partnered with the City of Springfield to create a Best Management Practices booklet for commercial pressure washing activities.
- The City's Maintenance Management System (MMS) is the primary mechanism for database tracking of spills and illicit discharges. The MMS now includes a direct link to photos and other discharge information, the creation of work orders/service requests, and a link to enforcement documents.
- Program Technician is coordinating with volunteer groups to provide non painted storm drain markers that will be applied to private stormwater structures that discharge to the City's stormwater system.
- Two Public Works employee successfully completed the 40 hour Hazwoper/General Site Worker training course and was added to the Public Works Emergency Spill Response Team. Public Works Maintenance now has 6 employees with the 40 hour Hazwoper/General Site Worker designation.

Planned or Considered FY12 Activities

- Continue to manage the "Fish Friendly Car Wash Kit Program"
- Partner with Local Emergency Planning Commission on Hazardous Materials training involving various scenarios including a train tanker leak.
- Expanded training with the City of Eugene Fire department Hazmat team.
- Continue to monitor on-street homeless camping activities with a goal of reducing levels of pollutants entering the MS4.
- Work with City of Eugene and University of Oregon to remove debris from the Mill Race channel.
- Assist City of Eugene Administrative Staff with display booth at Public Works Day.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.3.3 M7 – Systematic Stormwater Field Screening and Investigation

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
The Stormwater Field Screening and Investigation program inspects the public stormwater system for condition assessment and the private stormwater system to assess water quality impacts to the municipal stormwater system. Where illicit discharges are found, attempt to identify the source and eliminate the discharge.

Tasks
1. Work with the Sub Surface Maintenance Crew to assess, inspect and map the details of the public and private stormwater system.
2. Conduct annual dry-weather field screening inspections per the City of Eugene Field Screening manual.
3. Work with the inspection and enforcement staff to continue to educate and regulate the users on the proper use of the stormwater system.

Measurable Goals	Status of Measurable Goals – FY11
• Improve accuracy of the Stormwater System layer in our Geographic Information Systems (GIS) through map update requests.	Goal was met
• Identify and remove illicit discharges to the municipal stormwater system through the dry-weather field screening process.	Dry weather field screening process is in development stage. Locations have been selected, and testing parameters are currently being selected.
• Utilize interaction with the public as an educational opportunity to increase stormwater user awareness.	Goal was met
• Develop "map update" requests based on field inspections and forward this information to the GIS manager for inclusion into the citywide GIS system.	Goal was met

Tracking Measures	Tracking Data – FY11
• Track the number of map update requests forwarded to the GIS team.	• Forwarded 55 of map update requests to the GIS team.

• Track and create work orders for the system repairs discovered through the inspection process.	• Created 75+ of work orders for stormwater system repairs discovered through the inspection process.
• Track the number of dry-weather field screening inspections and follow-up details.	• Dry weather field screening process is in development stage. Locations have been selected, and testing parameters are currently being selected.

FY11 Activities and Accomplishments

- The Stormwater maintenance lead worker position investigates and inspects both the public and private stormwater systems for conveyance issues and system mapping irregularities.
- Continued inspections of public catch basin structures for deteriorated bottoms which need to be replaced. A work program for the replacement of bottomless catch basins is currently in place. These structures are placed on a capital improvement project list for replacement. Continuing investigating conveyance problems such as utility breaches, grout build up, off-set joints, cracks and roots that Closed Circuit Television inspections capture.
- The stormwater maintenance lead worker scheduled and oversaw the cleaning of the Polk Street Stormwater Vault, the recent focus of an extensive reconstruction project was cleaned 4 times last year and over 18 tons of debris were removed.
- Targeted stormwater line segments were inspected and investigated for defects using smoke testing, dye testing, and cctv inspection. Line segments were selected based on previous smoke testing results were defect was identified but could not determine exact cause.
- The Stormwater maintenance lead worker worked in conjunction with Pavement Preservation projects to identify conveyance problems prior to new road surfacing.

Planned or Considered FY12 Activities

- The Stormwater Maintenance technician will continue to work in conjunction with the Pavement Preservation Program to identify defects to the stormwater system and prioritize and make recommendations for repairs prior to the road resurfacing.
- Work with spill response/illicit discharge technician to GPS existing stormwater points improve the mapping accuracy of the existing stormwater system.
- Continue to inspect large diameter stormwater line segments and prioritize cleaning efforts to remove sediment from the system and maintain capacity.
- Continue to map both the public and private stormwater systems to increase information available through the GIS system.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.3.4 P7 – Litter and Illegal Dumping Control

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description
Manage and support efforts to reduce impacts to stormwater runoff and local receiving waters by controlling litter and debris in public spaces and by removing illegally dumped refuse and debris as well as garbage and trash from illegal camp sites.

There are two primary focal points of this BMP. The first is to provide opportunities for proper disposal of litter and trash at strategic publicly owned sites to prevent it from being washed into the public stormwater system. The second is to clean-up illegal dump sites and illegal camp sites prior to pollutants from the trash and debris being washed into the public storm system or the local receiving waters.

Tasks

1. Place trash receptacles in parks, public areas and at venues for public events which are likely to generate garbage, litter and other throw-away items. Provide frequent collection service to prevent over filling.
2. Require up-front clean-up deposits for large events in City parks, for rental of City park shelters, and for rental of other City owned and operated recreation or outdoor cultural facilities.
3. Conduct routine debris inspections of significant waterways under the City's jurisdiction and remove illegally dumped or discarded debris and other items as appropriate.
4. Conduct routine inspections along riverbanks and in other undeveloped lands under the City's jurisdiction to locate, dismantle, and clean-up illegal camp sites and their associated trash, garbage, debris and bio-hazardous materials.
5. Identify and monitor known historic dump sites in remote areas of the public right-of-way (such as undeveloped cul-de-sacs, dead-end streets, etc.), attempt to identify a responsible party for significant piles of dumped debris, and remove the dumped material as soon as possible to discourage additional dumping by others.

Measurable Goals	Status of Measurable Goals – FY11
• Ensure all parks, all public space areas managed by the City and all venues for outdoor public events on City lands have adequate trash receptacles. Empty trash receptacles frequently enough to prevent spillage due to being over filled.	• All parks and public space areas managed by the City continued to keep adequate trash receptacles available for use by the public. Trash receptacles were emptied regularly. • Staff continued to monitored strategic locations where litter receptacles have been placed due to high litter and debris

	activity.
• Ensure at least 75% of all rentals of parks, park shelters, and other City operated outdoor facilities will result in no loose litter and debris left behind.	• All park rentals that occurred during the reporting period were managed for litter removal.
• Inspect all major waterways and riverbanks weekly for dumped or discarded debris and illegal campsites. When found, remove dumped materials within two working days. When found, dismantle illegal campsites and clean-up as soon as is physically and legally possible.	• Priority waterways and riverbanks were checked weekly and illegal campsites were dismantled.
• Monitor all identified historic dumping sites in the public right-of-way and clean-up as necessary at least twice per month.	• Patrolled reoccurring dump sites and camp sites throughout the reporting period.

Tracking Measures	**Tracking Data – FY11**
• Track the collection frequency for trash receptacles in City parks and other public space areas managed by the City.	• Monitored 946 outdoor public events and provided trash and litter collection. • Employed parks maintenance staff to provide seven-day-a-week coverage for litter patrol and trash pick-up. • Dog waste cans at each of the four dog off-leash parks are dumped eight times per year. Total amount of dog waste collected and disposed of is 64 cubic yards
• Document the number or percentage of rentals of parks, park shelters, and other outdoor venues held on City managed land that forfeit all or part of their clean-up deposit due to excessive litter left behind.	• Out of a total of 946 events only two events lost their deposit due to not cleaning up their event site.
• Track the number of illegal campsites cleaned-up along riverbanks, waterways, or other public space areas managed by the City.	• A total of 288 illegal campsites were cleaned up along riverbanks, waterways and other public space areas during the reporting period.

• Track the frequency of collection and the amount of debris collected from waterways and from the public right-of-way.	• A two person crew patrolled the river corridor two or three times a week and cleaned up illegal campsites. • Crews collected over 331 cubic yards of litter and trash including 659 syringes from river corridor and major drainage channels. • Staff removed 1885 cubic yards of trash from general park sites.

FY11 Activities and Accomplishments

- The City sponsored and provided logistical support for the Willamette River Cleanup on October 2, 2010. This was a partnership with the Willamette Riverkeepers and REI and had 80 volunteers that collected approximately 20 cubic yards of trash and litter and 70 hypodermic needles from the river and its banks.
- Park maintenance staff and the Sheriff's work crew removed blackberry thickets in the river corridor and in areas along major drainage channels where illegal camping is popular. By eliminating the vegetation the illegal campers seek out for concealment, the hope is that by removing the cover that the amount of illegal camping will decrease as well as the amount of associated trash and pollutants.

Planned or Considered FY12 Activities

- None to report

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.4 Status of Waste Management

3.4.1 B1 – Household Hazardous Waste Disposal

Responsible Department/Division:
Planning and Development / Building and Permit Services

BMP Contact:
Building and Permit Services Division Director

BMP Description
Support existing efforts and programs within the Eugene metro area to inform citizens of local opportunities for the proper discard and disposal of their household hazardous waste materials. Support and promote facilities and programs that provide such opportunities.

The improper disposal of household hazardous waste poses a serious threat to local stormwater quality. Old paint, solvents and thinners, pesticides, bleach, drain cleaners, antifreeze, gasoline, used motor oil and other motor vehicle fluids can easily be flushed into the stormwater system if disposed of in yards, left uncovered in the rain, or poured down driveways or into the street. Supporting efforts to inform homeowners and tenants about where they can properly dispose of these products as well as supporting local household hazardous waste management facilities and efforts is an effective way to reduce the amount of these products that inadvertently make their way into the stormwater system and local receiving waters.

Tasks
1. Collaborate with Lane County Waste Management Division staff on educational outreach via the development and distribution of brochures, fact sheets, and community outreach events.
2. Require solid waste haulers to notify their customers of the Special Wastes Program offered through the Lane County Waste Management Division.
3. Develop information on a City website page that provides education on household hazardous waste and explains how to set up an appointment with Lane County Solid Waste to dispose of materials properly.
4. Collaborate with local metro area partners to publish information in local phone books regarding waste prevention, recycling, composting, and disposal of household hazardous waste.

Measurable Goals		Status of Measurable Goals – FY11
• Work with Lane County and City of Springfield to annually update "Brown Pages" in the US Dex directory to include new electronics requirements.		• Completed
• Update the City's web site periodically to direct residents to the latest information about recycling and waste		• Completed

prevention news, resources, and local events.		

Tracking Measures		Tracking Data – FY11
• Document completion of "Brown Pages" update.		• Published annually in the US Dex Director
• Document materials disbursed about household hazardous materials.		• Lane County materials

FY11 Activities and Accomplishments

- Include information about the Oregon statewide program, PaintCare, which is a take back program with area paint retailers for architectural paints, solvents and stains.

Planned or Considered FY12 Activities

- Participate in the updating of the US Dex Brown Pages with information on how to properly dispose household hazardous waste and local programs that provide disposal or educational assistance.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.4.2 B2 – Solid Waste Management

Responsible Department/Division:
Planning and Development / Building and Permit Services

BMP Contact:
Building and Permit Services Division Director

BMP Description

Evaluate and revise, as necessary, existing solid waste and recycling collection rules to address stormwater quality.

Improper and/or unregulated collection and recycling of solid waste has a serious potential for creating negative impacts to stormwater quality. High collection fees, infrequent or spotty collection service may lead to illegal dumping activity. Unregulated waste containers may be prone to leaking or spilling allowing pollutants to wash into the storm system. By continuing to monitor and evaluate local solid waste management collection efforts, the City will be better able to improve local regulations so that stormwater quality is taken into account.

Tasks

1. Regulate solid waste and recycling collection activities within the city limits to curb possible impacts to the stormwater systems from leachate of garbage, yard debris, and recycling materials.
2. Support a minimum of biweekly collection service for organic materials and provide backyard composting classes for residents with or without collection service.
3. Implement the nuisance abatement enforcement program that provides rapid response to illegal dumping of garbage, yard debris, or other solid waste materials.

Measurable Goals	Status of Measurable Goals – FY11
• Review Administrative Rule to ensure regulations are up to date and include requirements to support appropriate waste management and prevention.	• Administrative Rule were reviewed.
• Contract with Oregon DEQ for a waste composition study.	• Waste composition study was completed by Oregon DEQ.

Tracking Measures	Tracking Data – FY11
• Document total tons of yard debris collected through the curbside program.	• 14,339 tons of yard debris collected in CY2010
• Document the number of compost demonstration workshops and participants.	• 10 compost demonstrations • 90 attendees
• Document number of enforcement cases (i.e., received complaints) related to inappropriate garbage handling.	• 107 cases of nuisance complaints related to garbage.
• Compare waste composition study with the prior one.	• Completed

FY11 Activities and Accomplishments

- City of Eugene began internal waste reduction program that will provide comprehensive tracking of City Waste.

Planned or Considered FY12 Activities

- Develop and implement commercial food waste collection program.

- Develop comprehensive Construction and Demolition Debris program.
- Implement new waste reduction program internally.
- Implement "Toward Zero Waste at Events" community initiative.
- Complete Urban Agriculture manual with section on Stormwater Management concerns and BMPs.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures
None.

3.5 Status of Construction and New Development

3.5.1 E2 – Erosion Prevention and Construction Site Management Program

Responsible Department/Division:
Public Works / Engineering

BMP Contact:
City Engineer

BMP Description
Administer and monitor an Erosion Prevention and Construction Site Management Program in compliance with Eugene Code 6.625-6.645, preventing and mitigating pollutant and sediment discharges into the city's stormwater system due to construction activities and land disturbance.

Tasks
1. Screen all development permits for sensitive area status, conduct plan reviews, issue erosion permits, conduct erosion inspections, and provide compliance enforcement as appropriate.
2. Issue Erosion Permits for activities which disturb an area one acre or greater in size or disturb an area 500 square feet or greater within a sensitive area (i.e. adjacent to a water feature or its buffer, ground slopes greater than 10%, having highly erodible soils).
3. Conduct education and outreach related to new erosion techniques/practices.
4. Act as 1200-C Agent for DEQ.

Measurable Goals	Status of Measurable Goals – FY11
• Conduct one inspection prior to the commencement of work for all erosion permitted sites.	• Measurable Goal was met. An initial inspection continues to be required prior to the commencement of work for erosion permitted sites.
• Inspect non-erosion-permitted sites at least twice during the life of the building/construction permit or as necessary to assure compliance with the program.	• Measurable Goal was met. Non-erosion permitted sites receive random inspections to assure compliance with the program requirements. Additionally, they continue to be monitored for the need of an inspection based off the construction activity and the level of potential impact the activity may have on water quality.
• Inspect permitted sites monthly or as necessary to assure compliance with the program.	• Measurable Goal was met. The City continues to inspect most permitted sites monthly. Due to many factors, including: permitting, phasing of construction, and the economic down turn (permitted projects being place on hold due to funding) not all permitted sites receive an inspection monthly. All

		permitted sites are evaluated and monitored to best prevent impacts to water quality.
• Conduct one annual erosion prevention training event.		• Measurable Goal was met. Eight training sessions were conducted.

Tracking Measures		Tracking Data – FY11
• Number of compliance orders issued.		• Five Administrative Compliance Orders were issued.
• Number of erosion permits issued.		• Issued: 57 residential, 37 commercial, 3 annual permits.
• Number of inspections.		• Approximately 1067 erosion permitted inspections were conducted. This only includes documented inspections (i.e. logged into a permitting database) and does not account for the unpermitted inspections.
• Number of training/outreach events.		• Eight training sessions were conducted.

FY11 Activities and Accomplishments

- Renewed 18 erosion permits.
- Continued our role as DEQ agents for the NPDES 1200-C permitting process. This is implemented under a Memorandum of Agreement with DEQ.
- Actively involved in registering 7 DEQ NPDES 1200-C permits.
- Entered into an Intergovernmental Agreement with DEQ to allow construction sites that disturb land less than 5 acres in size within in the City's jurisdictions to be automatically covered under the NPDES 1200-CN process.
- Continued to administer the City's Erosion Program outside the City limits but within the urban growth boundary. This is implemented through an Intergovernmental Agreement with Lane County.
- Responded to approximately 39 stormwater complaints.
- Included an article related erosion and sediment control in the City's Stormwater Connections newsletter. The newsletter is distributed throughout the community.
- Mailed post-cards to permit holders reminding them about the City's wet-weather season's (October 15 – April 30) erosion requirements.

Planned or Considered FY12 Activities

- Renew the City's Intergovernmental Agreement with Lane County to administer the erosion program within the urban growth boundary.
- Review the erosion program administrative rule to update information and practices for construction site runoff.

- Update the City's website information for user friendliness and to improve educational outreach.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures
None.

3.5.2 E4 – Stormwater Development Standards

Responsible Department/Division:
Public Works / Engineering

BMP Contact:
City Engineer

BMP Description
Administer and monitor a program that implements the city's Stormwater Development Standards, Eugene Code 9.6790-9.6796, Eugene Code 7.143 (3), and associated Stormwater Management Manual. The Stormwater Development Standards regulate the location, design, construction and maintenance of private and public stormwater facilities for flood control, water quality, and natural resource protection.

Tasks
1. Screen development permits for post-construction stormwater management, conduct plan reviews, approve stormwater facilities, conduct inspections, and provide compliance enforcement as appropriate.
2. Maintain an up-to-date Stormwater Management Manual for new development.
3. Track, evaluate, and develop new technologies and practices for post-construction stormwater management.
4. Provide training and technical assistance on water quality facilities to city staff and the public.
5. Conduct a review of policies, practices and regulations to identify potential barriers to implementing low impact development techniques.

Measurable Goals	Status of Measurable Goals – FY11
• Review stormwater management proposals at the land use and/or development permit stage (i.e. earliest level of review).	• Measurable Goal was met. Reviewed all stormwater management proposals at the earliest level of review for all land use and development permit applications.
• Review and approve construction plans for stormwater management facilities for all development sites which create 1000 square feet or more impervious surface.	• Measurable Goal was met. Construction plans were reviewed for all stormwater management facilities proposed during the reporting year.

• Update Eugene's Stormwater Management Manual every two years or as needed to provide new information or practices for post-construction stormwater management.	• Measurable Goal was met. Draft updates to Eugene's Stormwater Management Manual were completed in 2010. The updated manual is currently pending adoption.

Tracking Measures	Tracking Data – FY11
• Number of private water quality facilities permitted with building permits.	• [XX] private water quality facilities permitted with building permits.
• Number of land use applications reviewed.	• 39 land use applications reviewed.
• Number and type of public water quality facilities constructed.	• Three public water quality facilities were constructed in FY11.
• Number of training/outreach events held.	• Two stormwater quality training and education sessions for the design and development community were held.

FY11 Activities and Accomplishments

- Included an article related to stormwater runoff in the City's Stormwater Connections newsletter. The newsletter is distributed throughout the community.
- Distributed handouts about sustainable stormwater management (i.e. rain gardens, swales, pervious pavements, etc.) at the Lane County Spring Home show booth.
- Approximately 189 inspections were conducted on privately constructed stormwater management facilities.
- Built on and fostered good working relationships with people who share a role in the implementation of post-construction stormwater runoff management within the community (i.e. design professionals, contractors, and local agencies).
- Approved two new proprietary stormwater treatment technologies for use on private property.

	# Approved	% Required to Implement Water Quality Treatment	% Proposing Green Infrastructure treatment	% Proposing Mechanical treatment	% Privately Maintained	% Publicly Maintained
Partitions	13	92	67	25	92	8
Subdivisions	3	100	33	67	67	33

PUDs	0	N/A	N/A	N/A	N/A	N/A
Conditional Use Permits	1	100	100	0	100	0
Site Reviews	2	100	0	100	100	0

Building Permit Review Type	Water Quality Treatment	Provide Water Quality Treatment that meets Destination Standards	Total Facilities Reviewed
Residential Building Permit Review	46 *(Treatment Type: 7 mechanical – 39 non mechanical)*	21	**50**
Commercial Building Permit Review	94 *(Treatment Type: 39 mechanical – 55 non mechanical)*	5	**94**

Planned or Considered FY12 Activities

- Review City code and make adjustments that may improve the BMP effectiveness and to meet new NPDES MS4 permit.
- Update the City's website information for user friendliness and to improve educational outreach.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

The proposed change to E4 is to modify the text of the second measurable goal to clarify that the goal applies to construction plans for developments that create 1,000 square feet or more impervious surface area and that are not otherwise exempt. This clarification to the measurable goal reflects the City's current program and related Stormwater Development Standards ordinance which exempts new single family homes on existing lots of record from certain stormwater development standards requirements. The proposed revision to BMP E4 is as follows:

- Modify the text in Measurable Goal #2 to read: "Review and approve construction plans for stormwater management facilities for all development sites which create 1,000 square feet or more impervious surface and are not otherwise exempt in accordance with the adopting ordinance."

A revised fact sheet for BMP E4 is included in Appendix F.

3.5.3 P6 – Compliance Program for Maintenance of Privately Owned Vegetated Stormwater Facilities

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description
Develop, implement and manage a program to ensure that privately owned and operated vegetated stormwater treatment facilities are maintained so that they function as designed and constructed. The program will employ a combination of rules, protocols and procedures to require: that each private vegetated facility is routinely inspected; that routine and corrective maintenance actions are performed in a timely manner; and that completion of both such activities are regularly reported to City staff. Based on Eugene Municipal Code requirements, penalties and/or other legal remedies will be employed to enforce compliance with these requirements when necessary.

Tasks
1. Continue to document pertinent information for new privately owned and operated vegetated stormwater facilities. This includes photo documentation of newly constructed facilities and populating the stormwater facility tracking system database with all new facility information.
2. Develop an administrative rule that details the policy guidelines, practices, procedures, specific authorities, permitted actions, and penalties to be used by City staff in managing the program.
3. Establish criteria for when maintenance audits, corrective actions, and/or enforcement actions are warranted.
4. Maintain mechanisms, processes and procedures to track BMP ownership, maintenance inspections, required reports, corrective maintenance activity and enforcement actions.
5. Develop templates for written correspondence to BMP owners, such as inspection notification, reporting reminder, notice of non-compliance, notice of violation, and enforcement documents.
6. Review required inspection and maintenance logs submitted by BMP owners.

Measurable Goals	Status of Measurable Goals – FY11
• Inspect all new vegetated private stormwater facilities at the time of construction and log pertinent information into the stormwater facility tracking database system. Adopt and implement an administrative rule to enforce the maintenance of private stormwater facilities by February 2011.	• All new vegetated private stormwater facilities were inspected at the time of construction. All information was recorded in the stormwater tracking database system. • Administrative Rule was not adopted during the reporting period. Rule was signed in October of 2011 with a

	planned adoption by November of 2011.
• Ensure the inspection of each vegetated private stormwater facility is conducted at least once per year by the owner/operator and an inspection and maintenance log documenting the necessary corrective actions is submitted to City staff annually.	• All inspection logs were submitted with the exception of three during the reporting period. Two were allowed to not submit this year due to extenuating circumstances; one will be going to enforcement.
• Review annual reports for privately-owned vegetated stormwater facilities.	• All inspection logs submitted were reviewed by the stormwater inspector.

Tracking Measures	**Tracking Data – FY11**
• Number of private vegetated stormwater facility inspections completed at time of construction.	• 25 privately maintained vegetated stormwater facilities were inspected at the time of construction and approved during the reporting period.
• Number of owner/operator inspection and maintenance logs received and reviewed annually.	• 53 inspection and maintenance logs were received and reviewed during the reporting period.
• Number of notices of non-compliance and subsequent enforcement.	• No notice of non-compliance were issued.

FY11 Activities and Accomplishments

- Established a priority matrix that will assist in differentiating low priority facilities that do not need regular inspection from high priority facilities that require regular inspections. Facilities given a high priority designation will be given more attention due to the facility being in poor condition or maintenance logs not submitted in a timely manner.
- Worked with Information Technology staff to update the City GIS layer to ensure all privately maintained stormwater facilities are reflected in GEODART. All approved facilities are now found in a geographic database system that can be queried and used by all city staff.
- Continued to offer feedback to plan review staff that are responsible for approving permits that involve construction of stormwater facilities. Based on field experience have shared methods for improving design and construction of vegetated stormwater facilities.

Planned or Considered FY12 Activities

- Conduct outreach to existing private property owners that are responsible for operation and maintenance of vegetated stormwater facilities. Phone calls to each property owner will

allow for one on one conversation to take place and confirmation that property owners are aware of their responsibility to maintenance the facility. Follow-up inspections will take place as needed.

- Inspection of all high priority sites identified through the priority matrix process.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures
None.

3.5.4 M6 – Regulation of Inspection, Maintenance and Reporting of Private Underground Stormwater Structures

Responsible Department/Division:
Public Works / Maintenance

BMP Contact:
Maintenance Division Director

BMP Description
Develop, implement and manage a program to ensure that privately owned and operated underground stormwater treatment structures are properly maintained.

The program will employ the guidance provided by the required individual Operations and Maintenance (O&M) plan for each structure.

Tasks

1. Develop templates for written correspondence to the private operator, such as inspection notifications, reporting reminders, notices of non-compliance, notices of violation, and enforcement documents.
2. Establish criteria for when maintenance audits, corrective actions, and/or enforcement actions are warranted.
3. Develop and maintain mechanisms, processes and procedures to track structure type, ownership, maintenance inspections, required reports, corrective maintenance activity and enforcement actions.
4. Collect and file the required annual reports as provided by the private operator.

Measurable Goals		Status of Measurable Goals – FY11
• Inspect all new private underground stormwater structures at the time of construction and log pertinent information into a database.		• Goal was met
• Establish a correspondence file for each structure/operator.		• Goal was met

• Ensure that each private underground stormwater structure is inspected, maintained and reported on as required by the O&M plan for the specific device.	• Goal was met
• Review annual reports for privately-owned underground stormwater facilities.	• Goal was met

Tracking Measures	Tracking Data – FY11
• Track the number of O&M plans obtained.	• 29 new O&M plans were received for new private mechanical stormwater treatment systems.
• Track the number of private inspection, maintenance and reporting activities conducted.	• 36 private facilities were visually inspected during the last reporting period.
• Track any enforcement activities related to the individual structures.	• No enforcement activities took place last reporting period.

FY11 Activities and Accomplishments

- Track the number of private mechanical stormwater facilities installed, facility type, location of facility, and all pertinent information for reporting, in a database shared jointly with Parks and Open Space.
- Utilize sewer inspection staff to map locations and connection points to the public system using a stormwater connection records form.
- Work with Public Works Engineering to ensure all private mechanical stormwater facilities are accurately mapped and included in stormwater layer of GIS as well as field maps.

Planned or Considered FY12 Activities

- Continue to work with private mechanical stormwater facility owners and maintenance contacts to provide information and education on maintenance and operation of facilities.
- Develop a matrix for prioritizing inspections at the number of facilities expands.
- Continue to work with proprietary stormwater facility manufacturers to stay current on emerging technologies and improvements in maintenance operations.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.6 Status of Planning, Capital Improvements, and Data Management

3.6.1 E1 – Stormwater Capital Improvement Projects

Responsible Department/Division:
Public Works / Engineering

BMP Contact:
City Engineer

BMP Description
Implement the Stormwater capital improvement program (CIP), including projects identified in the City's Stormwater Basin Master Plans (Basin Plans) for Amazon, Willow Creek, Bethel-Danebo, Willakenzie, Laurel Hill, and Willamette River and the River Road – Santa Clara basins.

The Basin Plans describe a multiple-objective strategy for managing stormwater that addresses water quality protection and improvement, conveyance and flood control, and waterway protection and restoration. The basin strategies reflect the unique characteristics, problems and opportunities in each basin. Volume I contains a prioritized city-wide capital projects list including: water quality facilities in high pollutant source areas, streambank stabilization, stream restoration, and capacity enhancement projects.

The Basin Plan capital projects are one of the main sources of capital projects that comprise the City's CIP. In addition to the Basin Plans, CIP projects also originate from a list of maintenance and rehabilitation needs, from focused planning studies such as the Metro Waterways Restoration Study, and other partnership opportunities. The prioritized Basin Plan capital projects are combined with projects from these other sources, re-ranked, and incorporated into the CIP in a timeframe in-line with available budget.

Tasks
1. Incorporate projects from the Basin Plans into the City's bi-annual Capital Improvement Program and annual budget processes.
2. Include water quality criteria in the ranking of capital projects from multiple sources for the CIP.
3. Maintain a GIS coverage of capital improvement projects including such attributes as location, project or facility type, drainage area and cost.
4. Maintain up-to-date Basin Plans web site, make hard copies available to the public in key locations (Library, Public Works offices).

Measurable Goals	Status of Measurable Goals – FY11
• Incorporate into the CIP projects list the projects identified in the recently completed 2010 River Road-Santa Clara Basin Plan, by September 2010.	• Incorporated into the CIP projects list the 2010 River Road – Santa Clara Basin Plan projects including underground injection control (UIC) projects.
• Implement Stormwater CIP projects including at least one "water quality facilities in high source areas" project over the five-year permit term, and other retrofits as opportunities arise.	• Design completed and construction contract bidding process initiated on the Willamette River Water Quality project.

Tracking Measures	Tracking Data – FY11
• Document completion of River Road-Santa Clara Basin Plan.	• Final draft of the River Road – Santa Clara Basin Plan is posted on the City's web site at: www.eugene-or.gov/stormwater (see "Stormwater Planning" and select "Basin Master Plans"). Adoption pending further discussion with neighborhood groups and Lane County.
• Track the number, type, watershed location and total drainage area of capital improvement projects constructed for water quality.	• [XX] capital projects were constructed specifically for water quality, or that had a water quality component. Location, type of facility, and drainage area tracked for each.

FY11 Activities and Accomplishments

- [List of projects under design and/or construction during reporting period here]
- Preparation for permits and other regulatory documents for future projects [listed here]
- Evaluated current CIP list for updates as needed and prioritized for construction season 2011.

Planned or Considered FY12 Activities

- Continue to evaluate best locations for public water quality capital improvements.
- Seek additional sources of funding for future projects including Oregon Department of Transportation (ODOT) grant funding.
- Continue implementation of capital projects associated with Metro Waterways Study.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.6.2 E3 – Stormwater System Mapping and Data Management

Responsible Department/Division:
Public Works / Engineering

BMP Contact:
City Engineer

BMP Description
Keep up-to-date inventories and maps of the public and private, natural and constructed, stormwater system. Include mapping of public and private water quality and flow control facilities such as grassy swales and detention basins. Develop and integrate asset inventory data and geographic information system (GIS) systems which describe the conveyance system, water quality attributes and related natural resource information. Integrate information generated through BMPs such as E1 (Capital Improvement Projects) and E4 (Development Standards) which create or modify system components and/or change the attributes of the stormwater system.

Tasks
1. Update stormwater system inventory and GIS on a weekly and monthly basis.
2. Develop, upgrade and maintain software applications which make system information available to staff.
3. Update stormwater infrastructure paper map sets annually.
4. Along with adoption of Stormwater Development Standards (E4), help to ensure that data management needs are identified and protocols established for documenting appropriate information to ensure that operations and maintenance, inspection and enforcement, and BMP effectiveness objectives are met.
5. In implementing the capital improvement projects outlined in the 2002 Stormwater Basin Master Plans, help to ensure documentation of location, type and other attributes of stormwater capital projects for purposes of evaluating their effectiveness and reporting progress under our permit.

Measurable Goals	Status of Measurable Goals – FY11
• Enter 95% of all newly constructed stormwater system features into inventory databases and GIS within six months of final construction approval.	• At least 95% of all newly constructed public stormwater systems were inventoried in databases and GIS maps within six months of construction.
• Ensure that 90% of GIS and data application users surveyed rate the GIS/data systems as satisfactory or better.	• No data and GIS application user survey was conducted this year.

Tracking Measures	Tracking Data – FY11
• Report on map and database update activities annually.	• See list below under "FY11 Activities and Accomplishments."
• Survey map and data system users bi-annually.	• No data and GIS application user survey was conducted this year.

FY11 Activities and Accomplishments

Data:

- Developed program to copy stormwater attributes from asset management database system to stormwater map layers, thus streamlining update process.
- Thoroughly reviewed and refined BMP type, BMP basin area, UIC number and PCD type (pollution control device) stormwater attributes in asset management database and stormwater map layers.
- Continued mapping properties that successfully filed for flood zone revisions (LOMA/LOMR)
- Identified potential errors in flood zone map delineations to FEMA.

Maps:

- Produced reference storm system maps of summer smoke testing areas for PW Maintenance
- Prepared map and tabular inserts for CIP report
- Enhanced digital Stormwater Infrastructure Book to facilitate navigation from page to page

Applications:

- Added custom dropdown menu tools to GeoDART2 desktop mapping application to display:
    - Private BMP site features
    - Public BMP linear and site features
    - UICs
    - Water Quality Waterways
    - Water Quality Management Areas
    - Applicable Water Quality Setbacks
    - FEMA Base Flood Elevation (BFE) Contours
    - FEMA Flood Cross Sections
    - FEMA Flood Water Course
- Developed and deployed LaserFiche application to quickly find and display scanned stormwater connection forms

- Developed prototype application to identify sources of illegal pollutants found in the stormwater system

Planned or Considered FY12 Activities
- Inventory and map water wells
- Map depth to groundwater surface
- Complement Eugene stormwater inventory with Lane County data
- Refine stormwater web mapping applications

Proposed Revisions to BMP, Measurable Goals or Tracking Measures
None.

3.6.3 P2 – Bacteria Pilot Study

Responsible Department/Division:
Public Works / Parks & Open Space

BMP Contact:
Parks and Open Space Division Director

BMP Description
Amazon Creek is water quality limited for bacteria and load reductions of 84% are necessary as specified in the 2006 Willamette Basin Bacteria TMDL.

The Bacteria Pilot Study includes three phases: Phase I focuses on efforts to identify source(s) of bacteria, followed by Phase II which focuses on the application of Bacteria Pilot Study BMPs ("BMPs") aimed at reducing bacteria, and followed by Phase III which focuses on evaluating the effectiveness of BMPs that are implemented.

Based on monitoring and site assessment work initiated with the 2005 Stormwater Management Plan the overall strategy for continuation of the Bacteria Pilot Study will be a more targeted approach that will narrow down the number of probable sources for investigation of the root of bacterial pollution within a selected study area. This more targeted approach will lead the City towards implementing Phase II and Phase III of the study.

Tasks
1. Conduct storm sampling and data analysis efforts aimed at specific monitoring locations within the study area that are suspected high source areas.
2. Continue to assess field conditions to confirm or rule out potential bacteria sources.
3. Develop and implement appropriate strategies that will help further identify or rule out potential sources of bacteria to MS4 system. Such strategies may include, but are not limited to: strategies for reducing the use of local waterways by waterfowl and rodents, evaluating historical maintenance activities including street sweeping and catch basin cleaning at

commercial properties and the public system, expanding the current study area to incorporate discrete sites outside of the sub-basin which may assist in meeting study objectives.

4. Evaluate alternative investigative methods, techniques or methodologies including microbial source tracking and sediment analysis.
5. Improve internal communication by creating an electronic case history file that contains all documents generated as a result of field condition assessments and data collection and analysis.
6. When enough information is acquired to logically conclude that a particular condition or activity is a significant contributing source of bacteria, develop and implement BMPs as appropriate to target the specific source. Such BMPs, in the context of this Bacteria Pilot Study, may include, but are not limited to: door-to-door contact with residents and business owners; direct informational mailings; modifications to catch basin cleaning priorities and frequencies in specific areas; modifications to parks rules associated with wildlife feeding; and habitat management and tolerance policies for targeted wildlife species.
7. Conduct follow up stormwater sampling and data analysis to evaluate effectiveness of selected BMPs.

Measurable Goals	**Status of Measurable Goals – FY11**
• Collect and analyze stormwater samples within the study area during at least three (3) significant wet weather storm events per year for the duration of the permit cycle.	• Three storm events were sampled for bacteria during the reporting period. • During each storm event *Escherichia coli* and fecal coliform were sampled at three piped-system locations within the study area and four locations along Amazon Creek, plus Willow Creek for background comparison purposes.
• Report on all field condition assessments completed during the permit year. Show how collected field data is used to confirm or eliminate bacteria sources. • Initiate at least two (2) new BMPs by December 2011 that will either identify or rule out specific sources of bacterial contributions to the MS4 within the study area.	• Staff analyzed data collected so far and evaluated the findings including from field conditions assessments conducted prior to the current reporting year. No new field condition assessments were completed during the reporting period, but are planned for under the new Monitoring Plan effective July 1, 2011. • [Information about source identification activities/BMPs conducted over the reporting period here.]

• Starting in July 2012, initiate at least one new BMP per year that will address identified specific sources of bacteria within the study area.	• Currently staff is still working on source identification and has not moved toward initiating any BMPs at this time.
• Develop an electronic case history file by February 2011 that contains documentation of findings and results that can be utilized by staff to evaluate overall success of study.	• Files that contained bacteria pilot study documentation were organized during the reporting year, and electronic files were posted in one shared location by August 2011.
• Report on results of stormwater sampling and analysis in association with implemented BMPs with emphasis on showing the effectiveness of the BMP selected.	• To-date no BMPs have been put in place that will allow the study team to conduct sampling or analysis to determine effectiveness.

Tracking Measures	**Tracking Data – FY11**
• Track the number of sampling events, samples collected, and resulting bacteria analysis results.	• A total of 3 sampling events were conducted during the reporting period with a total of 32 samples collected. • Analysis of water samples for E. coli and fecal coliform from Amazon Creek monitoring sites show modest changes for both *E. coli* and fecal Coliform with bacteria count decreases at four sites ranging from 36 to 87%. • *Escherichia coli* and fecal Coliform for the 2010/2011 monitoring period are higher at three of eight Amazon Creek basin monitoring sites than historical values. The three higher readings were found in the piped MS4 system.
• Track results of field condition assessments conducted and the corresponding outcome of the assessment. Attempt to correlate noted conditions with results of sampling analysis.	• No field condition assessments were completed during the reporting period. • Two site visits took place during the reporting period to record the current condition of several public and private catchbasins within the study area.

• Document additional strategies that will identify or rule out potential sources of bacteria. Report on any conclusions derived as a result of implementing these strategies.		• Two site visits to Westmoreland Park occurred during the reporting period in an effort to confirm the precise location of the pipe system. • Spring of 2011 two commercial property owners located within the study area agreed to partner with the city to assess bacteria contribution from their commercial properties. The strategy is to isolate a small stormwater drainage basin test area to evaluate whether paved surface sweeping and catch basin clean at private commercial sites mitigates bacteria loads in stormwater runoff. This would include sediment sampling prior to cleaning. • No conclusions have been determined to date.
• Document the use of alternative investigative approaches such as microbial source tracking and sediment sampling.		• During the reporting period the study team contacted two laboratories that conduct bacteria source tracking in an effort to determine cost and whether these laboratories can identify specific hosts.
• Document all follow up sampling and analysis and conclusions derived regarding BMP effectiveness.		• To-date no BMPs have been put in place that will allow the study team to conduct sampling or analysis to determine effectiveness.

FY11 Activities and Accomplishments

- There are no additional accomplishments to report.

Planned or Considered FY12 Activities

- Continue to work with the two commercial property owners contacted during the previous reporting year and conduct bacteria sampling both prior to and after sweeping and catch basin cleaning to evaluate the effectiveness of these BMPs to mitigate stormwater bacteria contributions from private commercial sites.

- The bacteria pilot study team plans to initiate at least two (2) new BMPs by December 2011 that will either identify or rule out specific sources of bacterial contributions to the MS4 within the study area.
- The bacteria pilot study team may also consider evaluation of local dog parks to determine the contribution of bacteria from dog waste.
- Continue to analyze sediment samples that were gathered in summer of 2011and assess bacteria contributions from sediment sources within the study area, including private catchbasins.
- Consider additional monitoring at existing sites and other sites within the basins, as well as use of precipitation data to better estimate stormwater flow runoff.
- Complete six field condition assessments within the study area and potentially other areas as needed.
- Staff will continue to evaluate Bacteria Source Tracking as a method to determine the origins of bacterial contamination in stormwater. The activities that will be considered include looking for funding opportunities and investigating the different methodologies currently in use.
- Bacteria pilot study files will be kept updated in one location and will remain accessible.
- Organizing and making more accessible all monitoring data associated with the bacteria pilot study.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures
None.

3.7 Status of Industrial Controls

3.7.1 W1 – Industrial Stormwater Management Program

Responsible Department/Division:
Public Works / Wastewater

BMP Contact:
Wastewater Division Director

BMP Description
Provide oversight of stormwater discharges and washing activities from industrial facilities, screening new businesses for those that may require NPDES Permits, conducting inspections and providing technical assistance to industries with NPDES Permits, and responding to spills at facilities with permits.

Tasks
1. Manage 1200Z and 1700A NPDES permit files.
2. Evaluate new and existing facilities for requiring NPDES permits.
3. Determine permit compliance with existing NPDES permitted facilities.
4. Issue Request for Corrective Action letters for permit noncompliance.
5. Conduct periodic monitoring for compliance determination.
6. Provide technical assistance to permitted facilities.
7. Retain copies of Stormwater Pollution Control Plans for each permitted industry.
8. Retain copies of facility inspections.

Measurable Goals	Status of Measurable Goals – FY11
• Conduct site inspections on 20% of permitted facilities annually.	• Completed

Tracking Measures	Tracking Data – FY11
• Percentage of permitted facilities inspected.	• 25%
• Number of corrective action letters sent and follow up responses.	• 12 request for corrective action letters were sent and associated responses were received.
• Number of Action Plans prepared by permit registrants.	• 34 Action Plans were prepared by permit registrants.

FY11 Activities and Accomplishments
- Currently there are seventy-six active 1200Z NPDES general stormwater permits and six active 1700A NPDES (wash water) permits.

- During this reporting period, four new 1200Z NPDES permit were issued, two permits were transferred to City of Eugene Oversight from DEQ, and two 1200Z NPDES permits were terminated. No new 1700A NPDES permits were issued, one 1700A permit was terminated, and one 1700A permit was transferred to DEQ as the business was registered to an address located outside of the Eugene Urban Growth Boundary.
- Three sites were evaluated and approved for No Exposure Certification status. Currently twenty approved No Exposure Certifications are on file.
- Six sites were evaluated for the need of a 1200-Z Permit or No Exposure Certification and it was determined that a permit was not required.
- Six new Stormwater Pollution Control Plans were reviewed and approved.
- Six existing Stormwater Pollution Control Plans were modified and approved.
- Sixty two informal site visits were conducted at 1200Z NPDES facilities during the reporting period.
- Currently sixty 1200Z NPDES permittees have initiated monitoring reduction waivers. Waivers are allowed for individual benchmarks once four consecutive monitoring results achieve compliance with benchmarks.
- No Notices of Non-Compliance were issued.
- One permittee was referred to DEQ for formal enforcement. Pacific Recycling, had three documented instances of failure to clean up spilled materials in the past three years. A sampling effort was conducted to determine the impact of the stormwater discharge from this site on the pollutant concentrations in the City of Eugene's MS4 and Waters of the State of Oregon.

Planned or Considered FY12 Activities

- The 1200-Z permit is being reissued and the City of Eugene will assist businesses and the DEQ with the reapplication process.
- Stormwater pollution control plans will be reviewed at each 1200-Z permitted facility.
- Formal inspections and informal site visits will be conducted at 1200-Z and 1700-A permitted facilities to assist with and assess permit compliance.
- Stormwater sampling will be conducted at industrial and commercial facilities if there is a particular concern that the stormwater discharge from a site is significantly impacting the MS4 or Waters of the State of Oregon.
- New and existing businesses will be evaluated to determine the need for NPDES permitting and compliance with stormwater pollution related local ordinances.

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

3.8 Status of Permit Management

3.8.1 E5 – Permit Management & Reporting

Responsible Department/Division:
Public Works / Engineering

BMP Contact:
City Engineer

BMP Description
Administration of the overall NPDES permit compliance effort, including permit renewals, annual reports, program evaluations and documentation of the City's adaptive management processes, and updates to the City's TMDL benchmark assessment.

Tasks

1. Coordinate with all City divisions and groups that administer BMPs described within the SWMP to review program commitments, gather tracking data, and where appropriate, assist with program evaluation and additional goal setting or BMP enhancements.
2. Evaluate programs and BMPs as described in the SWMP to ensure that the overall NPDES permit objectives are being met, including reduction of pollutants on the DEQ 2004/2006 303(d) list and established TMDLs as compared to the pollutant load reduction benchmarks.
3. Conduct appropriate public involvement efforts related to various NPDES permit elements such as SWMP/Monitoring plan updates or proposed adaptive management. May include presentations to advisory groups, elected officials, and public notices.

Measurable Goals	Status of Measurable Goals – FY11
• Submit Annual Reports to DEQ, that summarize implementation of the requirements as described in the City's MS4 permit, Schedule B.	• Annual report for FY2010 submitted December 1, 2010.
• Evaluate progress towards meeting TMDL pollution reduction benchmarks for each five year renewal submittal.	• Not applicable to this year's report
• Conduct public involvement within an appropriate time to meet legal requirements for the five year renewal submittals, and for on-going adaptive management as appropriate.	• Published notice in the Register Guard for 2 week period soliciting public comments for 2010 Stormwater Annual Report. • Kept MS4 web page up to date, and included staff contact information, for interested persons.

Tracking Measures	Tracking Data – FY11
• Track public involvement events and number of people reached.	• One person submitted comments on the City's draft 2010 Annual Stormwater Report.
• Post Annual Reports on City's web site.	• Final 2010 Annual Report posted on City's web site.

FY11 Activities and Accomplishments

- Submitted updated SWMP to DEQ by April 1, 2011 as required by Schedule D.6.
- Submitted updated Monitoring Plan to DEQ on XX as required by Schedule B.2.
- Kept Stormwater Policy team and Stormwater Management team apprised of permit discussions with DEQ and Association of Clean Water Agency peers.
- Coordinated with ACWA peers and City of Eugene stormwater managers to document and facilitate the City's adaptive management process.

Planned or Considered FY12 Activities

- Finalize and submit 2011 Stormwater Annual Report by December 1, 2011.
- Cross reference MS4 web page with other related web pages and information for a more comprehensive regulatory and policy perspective.
- Work with other City stormwater managers to ensure that permit due dates continue to be met and, for multi-year efforts, that we stay on track to meet permit due dates.
- Coordinate with City stormwater managers and staff to continue implementing the adaptive management process of "develop – implement – collect data & information – evaluate – assess needs – modify."

Proposed Revisions to BMP, Measurable Goals or Tracking Measures

None.

4 MONITORING PROGRAM

4.1 Ambient Monitoring Results Summary

Water quality results for surface water samples collected from Amazon Basin monitoring locations in Eugene, Oregon indicate statistically significant long-term decreasing concentration trends occur at specific sites for arsenic, cadmium, chromium, lead, mercury, nickel, fecal Coliform, ortho and total phosphorus, total Kjeldahl nitrogen, total suspended solids, and turbidity. Statistically significant long-term increasing concentration trends also occur at specific sites for zinc and field pH.

Significant decreasing and increasing concentration trends for pollutants in the Amazon Basin occur at monitoring locations downstream of the urban environment, and serve as an indicator of the effectiveness of the sum of stormwater program elements as described in the previous sections of this report.

While significant water quality improvements have occurred at downstream monitoring locations, activities within the permit area continue to have a measurable impact on levels of pollutants observed in Amazon Basin streams and channels. Intra-basin upstream and downstream water quality comparisons indicate the concentration of metals, turbidity, temperature, oxygen demand, and occasionally nutrients (nitrogen and phosphorus) increase as Amazon Creek flows through the urban environment. Counts of *E. coli* and fecal Coliform, dissolved oxygen, pH, and occasionally nutrients (nitrogen and phosphorus) decrease. Analytes for the A3 Channel are greater than those measured for Amazon Creek; turbidity is an exception. Amazon Creek analyte concentrations are greater than those measured for Willow Creek; magnesium is an exception. The Willow Creek drainage basin serves as a background water quality site because of its relatively low development compared to the urbanized permit area.

Statistical tests also indicate Amazon Basin water samples collected during the 2010/2011 permit year at specific sites had significantly lower analyte concentrations when compared to historical data, including cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, Kjeldahl nitrogen, ortho and total phosphorus, and biochemical oxygen demand. Zinc increased significantly at Willow Creek, and field pH and ammonia increased slightly at three other sites.

Water quality results for samples collected from the Willamette River indicate statistically significant long-term decreasing concentration trends occur at specific sites for arsenic, chromium, mercury, nickel, total calcium and magnesium (hardness), and ortho phosphorus; an increasing trend is observed for conductivity at one site, and field pH at another.

As the Willamette River flows through the Eugene urban environment, analyte concentrations increase for arsenic, copper, lead, mercury, molybdenum, nickel, silver, and zinc metals; nutrients (nitrogen and phosphorus), oxygen demand, turbidity, solids, conductivity, calcium and magnesium (hardness), and bacteria (*E. coli* and fecal Coliform) also increase.

A comparison of water quality for Delta Ponds with recently restored riparian habitat to the Willamette River at Owosso Bridge indicates the former site has higher metal concentrations for

arsenic, lead, molybdenum, nickel, and zinc; chromium and mercury concentrations are lower in Delta Ponds. Other analytes with statistically significant higher concentrations in Delta Ponds include total calcium and magnesium (hardness), conductivity, oxygen demand (correlated with a decrease in dissolved oxygen), and ortho phosphorus; pH, turbidity, and total phosphorus concentrations are lower.

In some instances the concentration of pollutants measured at Amazon Basin and Willamette River sites exceed Oregon water quality standards and beneficial uses for surface waters defined in Chapter 340, Division 41 of the Oregon Administrative Rules (OAR). For example, arsenic concentrations in Amazon Basin streams and channels and the Willamette River, commonly exceed the human health criterion established for drinking water. Toxicity criteria applicable to fish species are commonly exceeded for copper, lead, mercury, zinc, dissolved oxygen, bacteria, pH, and temperature at Amazon Basin sites, and periodically at Willamette River sites. Note, however, that exceedances of some of these pollutants also occur at the monitoring location upstream of the Eugene urban area, and in Willow Creek, indicating that these analytes either occur naturally in aquatic environments, or are affected by human activities upstream and outside of the permit boundary.

Water quality trends and comparisons indicate measurable progress is being made toward improving the water quality of channels, streams and rivers receiving stormwater runoff from the City of Eugene. Continued improvements are anticipated through continuation and refinement of existing BMPs, and implementation of new ones as needed.

4.2 Objectives of the Monitoring Program

Permits issued under the Stormwater National Pollutant Discharge Elimination System (NPDES) regulations for Municipal Separate Storm Sewer Systems (MS4) require ongoing water-quality monitoring to assess the chemical, biological, and physical effects of stormwater on receiving water bodies. The monitoring described in this report was conducted under the City's previous NPDES Stormwater Discharge Permit Number 101244 issued on 2 March 2004, and Chapter 8 of the Stormwater Monitoring Plan (SMP). On 30 December 2010, the Oregon DEQ issued a new stormwater NPDES permit to the City with requirements for continued water-quality monitoring supplemented with additional types of pollutants such as pesticides, dioxin, and methyl mercury to assess contributions, if any, from the permit area. Monitoring for these and other new requirements will be conducted under the City's new Stormwater Monitoring Plan, which became effective on 1 July 2010; hence, this report only includes data collected through 30 June 2010.

For the purposes of the SMP, the term monitoring includes water quality monitoring (sample collection), monitoring activities (such as construction) in a watershed, monitoring changes in a watershed, or monitoring the success of BMPs. This section describes the overall program effectiveness by means of analysis of water quality data and assessment of water quality trends for representative major surface water bodies receiving stormwater discharges from the City's MS4.

In addition to the regulatory requirements specified in the permit, the objectives of the Stormwater Monitoring Plan have been to:

- Identify pollutants of concern and their source;
- Identify the degree to which stormwater discharges may be contributing to water quality criteria exceedances in receiving waters;
- Identify, to the best practical extent, the impact of stormwater discharges to the aquatic environment of receiving waters;
- Identify the most effective best management practices (control measures);
- Refine estimates of annual and seasonal pollutant loads;
- Determine the frequency of monitoring required to reveal water quality trends and assess the effectiveness of control measures; and
- Maintain efficient and effective tools for storage, retrieval, and analysis of data collected, and assure data quality.

The monitoring plan was designed to provide technical information to assist in meeting the stated objectives to the maximum practical extent given available resources.

4.3 Organization of the Water Quality Monitoring Program

Water quality monitoring for the annual period covered by this report includes three program elements:

- Stormwater quality monitoring
- Ambient receiving water quality monitoring; and
- Data management, analysis, and reporting.

The following sections will focus on analysis of ambient monitoring activities to assess overall stormwater program effectiveness by reviewing historical water quality trends for those water bodies receiving stormwater. Sampling sites are located in or near the permit boundary for the City of Eugene. Maps of the sampling locations to assess ambient water quality and referenced in the following paragraphs are included at the end of Section 4. All sampling follows the protocol established in the Stormwater Monitoring Plan, including appropriate sampling, handling and analysis methods described by the EPA and in the guidelines of 40CFR136 establishing test procedures for the analysis of pollutants. Quality assurance and controls were applied to all elements of the monitoring program, including sample collection, handling, laboratory analysis, and reporting. The Eugene/Springfield Environmental Laboratory performed analytical services under a DEQ-approved Quality Assurance Plan. Documentation and data management activities follow environmental management systems described in ISO 14001:2004(E); the Eugene/Springfield Wastewater Management Facility is registered as conforming to the ISO 14001 standard.

4.4 Program Activities

Program activities for the permit period primarily consisted of field surveys, illicit discharge response, storm event monitoring, ambient water quality monitoring, structural BMP performance, and bacteria monitoring in the MS4 as well as receiving water bodies.

Illicit Discharge Response – Pacific Recycling

A member of the City of Eugene's Erosion Team visited Cross Street to become familiar with the area prior to a pre-construction meeting for street improvements. Turbid water with a heavy oil sheen was observed in the roadside ditch and it was traced back to sheet flow originating from Pacific Recycling's eastern driveway (near MH 80916 shown in Figure 4-4). The oily turbid discharge was then tracked to the outfall location at the Roosevelt Channel and an impact was observed. City of Eugene's Industrial Stormwater Staff was notified of the discharge the next morning and an unannounced 1200-Z NPDES Industrial Stormwater Discharge Permit inspection was performed, which revealed multiple instances of non-compliance. A formal letter was later sent to address the non-compliance with the 1200-Z permit and a stormwater sample was collected to assess the impacts to the public system.

As the source of the observed discharge was sheet flow rather than the regulated point-source discharge, the matter was taken to the City of Eugene's Stormwater Enforcement Team. It was determined that a civil penalty would be issued, though due to confusion regarding one of the values on the penalty calculation matrix, the City of Eugene's Attorney was contacted for clarification and the team is awaiting a response.

Underground Injection Control (UIC) Monitoring

Stormwater flow to a sedimentation manhole UIC was sampled during two storm events over the most recent reporting period. Table 4-1 presents the results at the Anderson/Briana UIC device (MH75938) located in a north Eugene residential subdivision (see Figure 4-4). The concentrations reported for nearly all analytes were less than or similar to the Oregon numeric groundwater quality maximum contaminant levels and the median of mean effluent concentrations established by the EPA/ASCE International Stormwater Best Management Practices Database. Geometric mean count for *Escherichia coli* is 29 MPN (colonies per 100 mL), which is above the Oregon DEQ groundwater quality reference level of < 1 MPN; the mineral matrix of the soil column should act as a filter to prevent infiltration of bacteria to subsurface aquifers when the UIC meets applicable federal and state design requirements. The geometric mean, or geomean, is used rather than the arithmetic mean to minimize the influence of extreme values; the central tendency of environmental data tends to be better represented by the geometric mean rather than the arithmetic mean. Geomean values for total lead, total phosphorus, suspended solids and Kjeldahl nitrogen for the 2010/2011 monitoring period are slightly greater than historical geomean values but within the range of concentrations observed in the historical data set; *E. coli*, cadmium, chromium, dissolved lead, ammonia and nitrate+nitrite as nitrogen concentrations are lower than historical values.

Table 4-1 UIC Storm Event Monitoring Summary Anderson at Briana						
2010/2011 Sampling Dates	**Analyte**	**2011 Data GeoMean**	**Historical Data GeoMean**	**Median EMC EPA ASCE Database**	**Oregon DEQ Groundwater Quality Reference Level**	**Units**
12/14/2010 & 2/14/2011	Escherichia coli	29	33		< 1	MPN
	Cadmium, Dissolved	0.0254	0.0351	0.52		µg/L
	Cadmium, Total	0.0553	0.0649	0.93	10	µg/L
	Chromium, Dissolved	0.423	0.620	1.9		µg/L
	Chromium, Total	0.332	0.818	2.5	50	µg/L
	Lead, Dissolved	0.0606	0.197	1.25		µg/L
	Lead, Total	0.436	0.352	8.1	50	µg/L
	Ammonia – N	0.10	0.14			mg/L
	Nitrate + Nitrite – N	0.050	0.068	0.09	10	mg/L
	Total Kjeldahl Nitrogen	0.63	0.55	1.6		mg/L
	Phosphorus, Total	0.126	0.103			mg/L
	Total Suspended Solids	7.7	6.5	24		mg/L
Shaded cells indicate the higher analyte concentration in the comparison.						

Storm Event Water Quality Monitoring

Storm event monitoring was conducted at four sites to assess stormwater quality, including West 5th Avenue at Seneca Road (MH63693) whose outfall is the A3 Channel (see Figure 4-1 for monitoring locations), Chambers at 18th Avenue (MH55404) whose outfall is the Amazon Creek, Copping Street (MH77793) with its outfall to the Willamette River, and Willow Creek at 18th Avenue site, which is relatively undeveloped and is used to represent background conditions for comparison purposes. Stormwater samples collected from the 5th Avenue/Seneca monitoring site receives runoff from industrial and commercial properties. Samples from the Chambers at 18th Avenue sampling site is primarily from commercial, recreational and educational land uses, and that of the Copping Street site is residential. Within the Willow Creek drainage basin, primarily parks (25%), agriculture (22%), timber (17%), and vacant lands (17%) comprise the land use categories. About 16% of the basin is comprised of single family, industrial, and roadway land uses with the remainder in other categories.

Laboratory data for stormwater samples collected from these four locations are presented in Appendix A Tables A-1 through A-4 with color codes to indicate percent change of geomeans of the 2010/2011 compared to historical data. Boxplots of all data are shown in Appendix B Figures B.1 through B.16. In general, the storm event data have the following characteristics:

Willow Creek – Background Location – Surface Water

One storm event was sampled for the full suite of water quality analytes and three storm events for bacteria during the 2010/2011 monitoring period. Of the 39 analytes values reported about 64% (25 analytes) for the single storm event are lower than or equal to historical values. Analyte concentrations greater than historical values include dissolved and total nickel and zinc, total silver, nutrients nitrogen and phosphorus, dissolved solids, and oil and grease (SGT-HEM; silica gel treated hexane extractable materials). Observed differences are mostly modest and only dissolved lead was an order of magnitude greater than historical values; no explanation could be developed from the data for the observed increase in lead in the dissolved fraction of the sample.

Four stormwater samples were collected over the year for *E. coli* and fecal Coliform yielding mixed results, the E. coli and fecal Coliform values modestly lower and higher respectively.

Comparisons of the Willow Creek stormwater data to state water quality standards indicate arsenic and TDS values exceed the criterion. High concentrations of arsenic in streams can be mostly attributed to the origins of Willamette valley soils, which are volcanic and contain high concentrations of naturally occurring arsenic. However, soil disturbance caused by human activities can cause arsenic mobilization during storm events and often is associated with higher turbidity and dissolved solids.

The concentrations of all other metals and analytes in the single stormwater runoff event sample are below the referenced criteria.

NE Chambers & West 18th Avenue (MH 55402 / 55404) – Piped System

This drainage basin includes commercial properties, portions of Westmoreland Park, and Jefferson Middle and Magnet Arts schools. Impervious surfaces, including rooftops and paved parking areas at these properties, as well as a section of West 18th Avenue, a minor arterial roadway, are sources of stormwater runoff influencing water quality characteristics at this piped system monitoring location (MH 55402/55404). Two storm events were sampled for the full suite of water quality analytes, 59% of which had geomean concentrations modestly lower than or equal to historical values. Arsenic and chromium were about 20 times greater than historical values with the remainder of the analytes showing more modest increases.

Comparison of stormwater quality values for this piped MS4 system to state water quality standards indicate concentrations of arsenic, copper, lead, zinc, and total dissolved solids, turbidity, and bacteria in stormwater are greater than the lowest listed chronic or human health criterion (see Appendix B Figures B.1 through B.17). Copper and zinc in stormwater also exceed the state's acute toxicity criteria of 4.6 µg/L and 36 µg/L respectively. Amazon Creek, which is the receiving waterbody for this MS4, frequently exceeds applicable state water quality standards for the same pollutants both upstream and downstream of the NE Chambers & West 18th Avenue MS4 outfall. In addition, statistically significant concentration increases occur for most of these pollutants in the reach of Amazon Creek 2.5 miles upstream to the 29th Avenue monitoring site and 4.5 miles downstream to the Railroad Track Crossing monitoring site with respect to the location of this MS4 outfall. Later sections of this report discuss significant water quality trends for stormwater receiving waterbodies in the ambient monitoring program.

Comparison of MS4 stormwater quality to ambient receiving waterbody quality is useful in assessing relative pollutant loading. Figure 4-1 compares all stormwater quality data for the site to the nearest upstream monitoring site at Amazon Creek at 29th Avenue. Multiple analytes exceed an equivalence ratio of one, that is, the ratio of the stormwater analyte value to that of the receiving water body value. Average concentrations for a few analytes in stormwater samples from this site range from about 10 to 50 times greater than the receiving water body, including cadmium, lead, silver, and fecal Coliform. At this time, cadmium and silver concentrations in Amazon Creek at the 29th Avenue site do not exceed water quality criteria (see Figures B.90, B.91, B.106, and B.107); however, downstream at the Railroad Track Crossing, total silver concentrations do exceed the chronic criterion of 0.12 µg/L and at least on one sampling event approached the acute criterion of 0.32 µg/L. Given the magnitude of the concentration ratios for total and dissolved silver and the observed downstream water quality exceedance, examination will be made of the flow-proportional data being collected for the MS4 site to characterize pollutant loads for silver as well as cadmium and lead. Amazon Creek is listed for lead on the 2004/2006 303(d) list.

The equivalent ratios are useful in terms of assessing which pollutants are of potential concern in stormwater runoff when compared to receiving waterbody quality. Additional sampling events conducted over the course of the permit term will be evaluated to refine pollutant mass loading estimates and BMP strategies that target activities and/or sources for these and other pollutants of concern. Water quality ratios obviously depend on the relative analyte concentrations in the waterbodies being compared. For example, many of the analytes in the Willamette River tend to be lower than those observed for Amazon Creek (see Table A-7) so water quality ratios will tend to be lower for comparisons of stormwater runoff to Amazon Creek and other smaller waterbodies in the City's monitoring program as opposed to the Willamette River, as is seen below.

Figure 4-1a

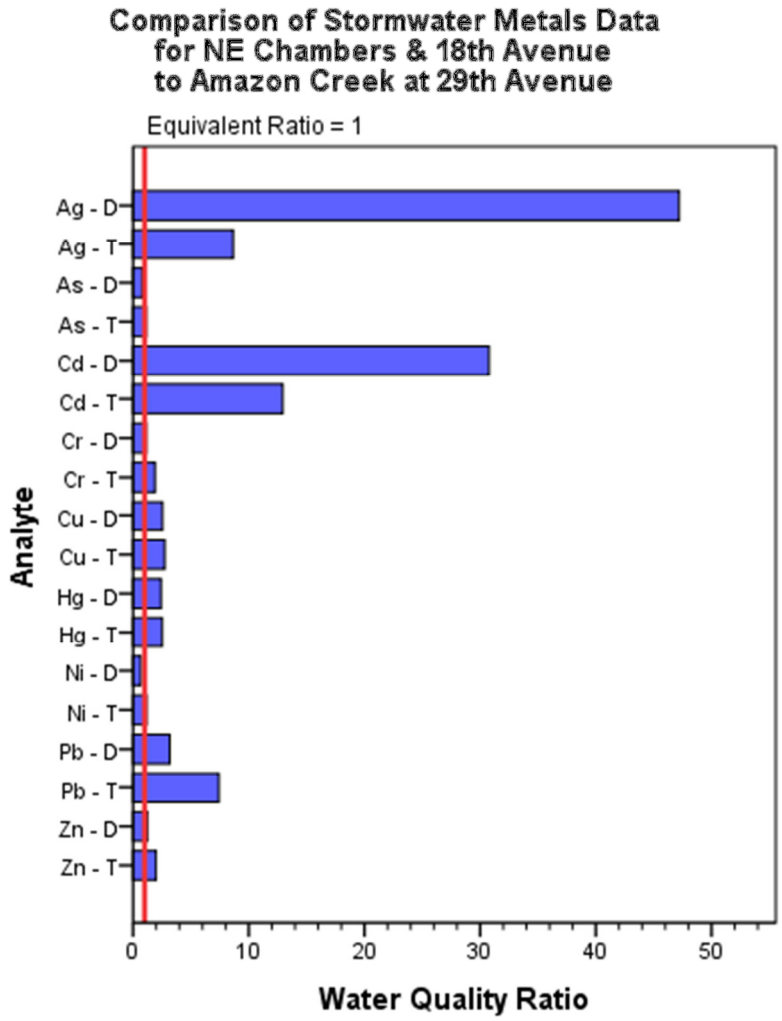
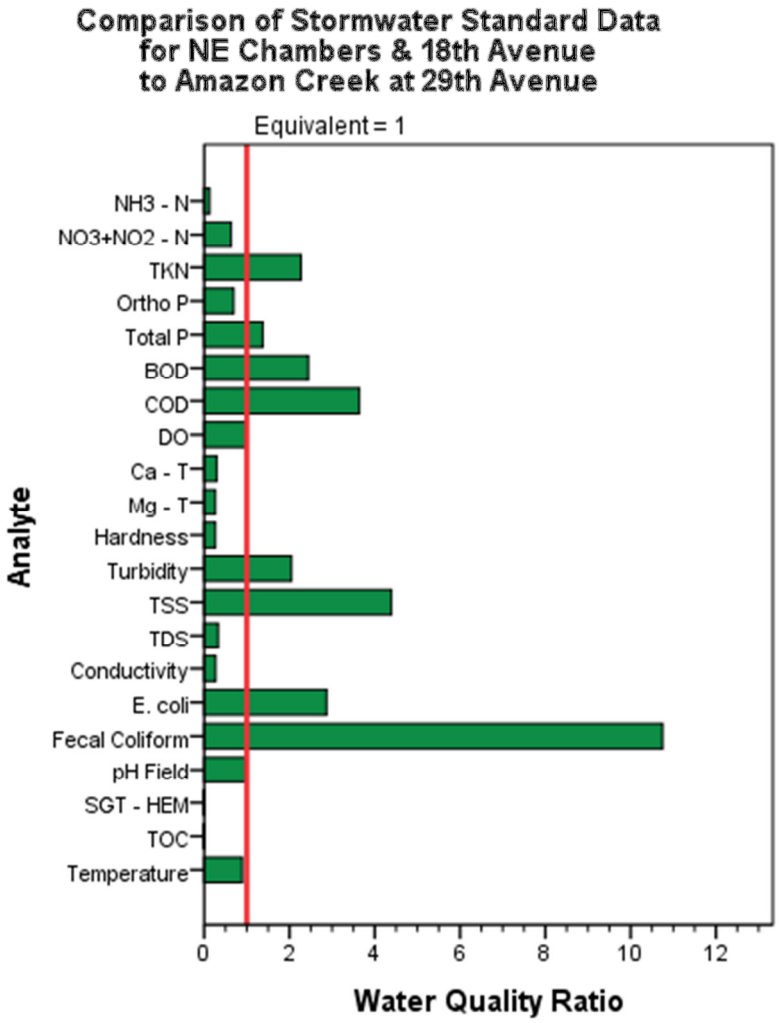

Comparison of Stormwater Metals Data
for NE Chambers & 18th Avenue
to Amazon Creek at 29th Avenue
Equivalent Ratio = 1
Analyte
Ag - D
Ag - T
As - D
As - T
Cd - D
Cd - T
Cr - D
Cr - T
Cu - D
Cu - T
Hg - D
Hg - T
Ni - D
Ni - T
Pb - D
Pb - T
Zn - D
Zn - T
0
10
20
30
40
50
Water Quality Ratio

Figure 4-1b



W 5th Avenue at Seneca – Piped System

Five storm events were sampled at this monitoring location, two events included the full suite of metals and conventional analytes; two events for bacteria, oil and grease (silica gel treated – hexane extractable materials; SGT-HEM) and field measurements (dissolved oxygen, temperature, and pH). One of these events also included 1,1-dichlroethene and tetrachloroethene. The fifth event included a more comprehensive list of chlorinated hydrocarbons (see Table A.4 for analytical results). The W 5th Avenue at Seneca site was selected to assess pollutant sources of 1,1-dichloroethene and tetrachloroethene to the A3 Channel because it is on Oregon's 303(d) list of impaired waterbodies for both pollutants. Dichloroethylene is a degradation byproduct from trichloroethene. Neither chlorinated compound was detected in stormwater samples collected during the 2010/2011 monitoring period at this location.

Of the 59 analytes tested on the five sets of stormwater samples, nearly 82 percent of results had geomean concentrations that were equal to or lower than historical data for this site. Overall, changes were mostly modest with the exception of silver and zinc, where concentrations for the 2010/2011 monitoring period were about twice that of historical values.

A comparison of stormwater runoff from this piped MS4 system to state water quality standards indicates concentrations of arsenic, cadmium, copper, lead, mercury, silver, zinc, bacteria, dissolved solids and turbidity in stormwater are greater than the criteria (see Appendix B Figures B.1 through B.16); concentrations for these pollutants in the receiving water body also frequently exceed applicable state water quality standards, including arsenic, copper, lead, mercury, zinc, dissolved solids, bacteria, and turbidity as will be described later in this report.

The ambient monitoring location on the A3 Channel at Terry Street is downstream of the W 5th and Seneca MS4 monitoring site so a comparison would include the pollutant contributions from this MS4 site and would not prove helpful in evaluating concentration ratios; however, an ambient monitoring site is located on Amazon Creek at the Railroad Crossing, which is just above the confluence with the A3 Channel. Comparing stormwater quality from this industrial and commercial MS4 to ambient water quality for the Amazon Creek site in Figure 4-2 indicates that the geomean stormwater concentrations of silver, cadmium, and lead range from about 10 to 20 times more than ambient concentrations. Smaller ratios are observed for the conventional pollutants.

Currently, stormwater runoff from the MS4 monitoring location may contribute toward exceedance of water quality standards for copper, lead, mercury, zinc, dissolved oxygen, bacteria, and turbidity (see applicable Figures B.94 through B.125, and Figures B.170 through B.175). Flow proportional water quality data are being collected and will be evaluated during the next monitoring period to better characterize pollutant loading from this site.

Figure 4-2a

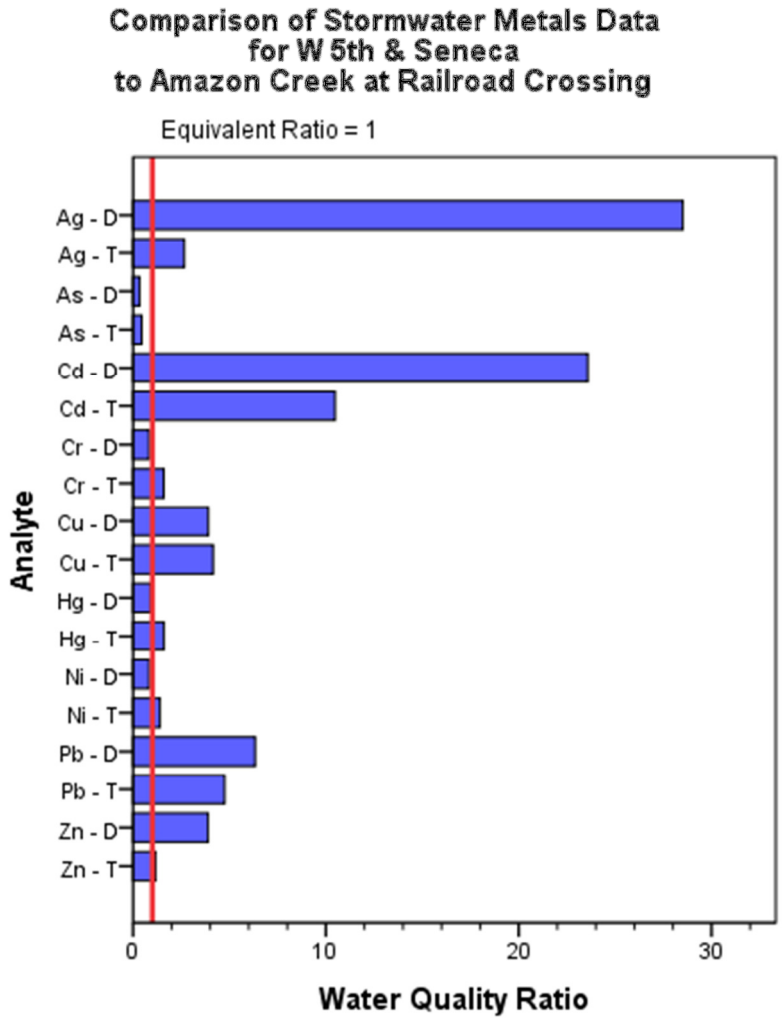
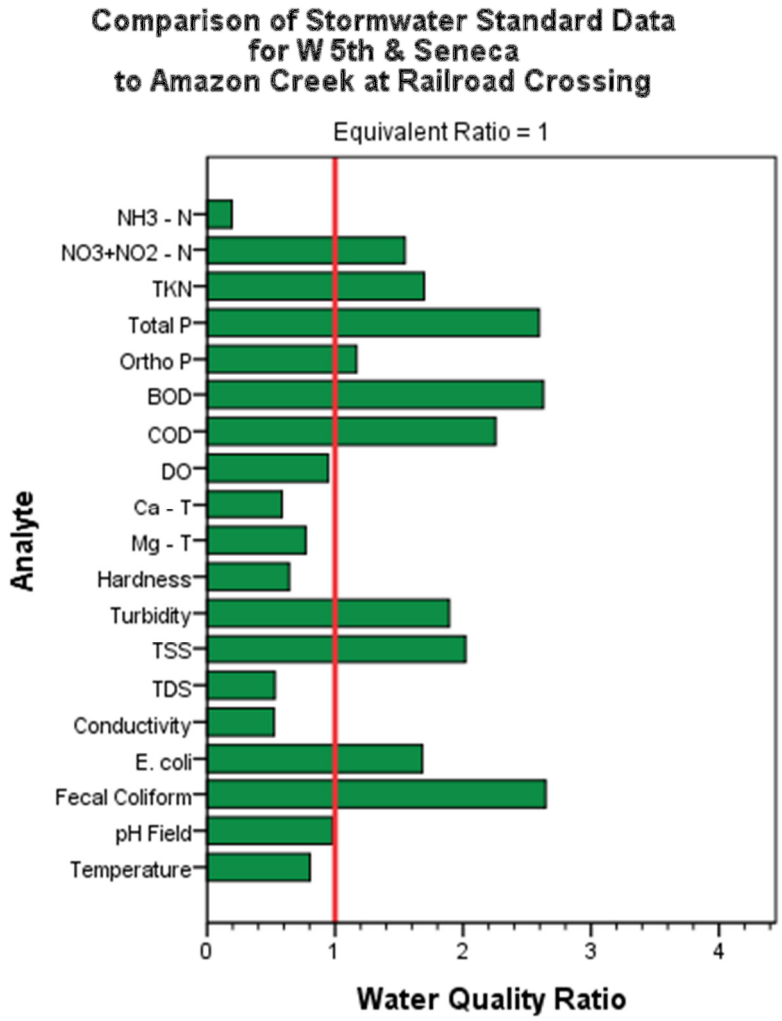

Comparison of Stormwater Metals Data
for W 5th & Seneca
to Amazon Creek at Railroad Crossing
Equivalent Ratio = 1
Analyte
Ag - D
Ag - T
As - D
As - T
Cd - D
Cd - T
Cr - D
Cr - T
Cu - D
Cu - T
Hg - D
Hg - T
Ni - D
Ni - T
Pb - D
Pb - T
Zn - D
Zn - T
0
10
20
30
Water Quality Ratio

Figure 4-2b



Copping Street – Piped System

Two storm events were sampled at this residential MS4 site, one for the full suite of metals and conventional pollutants, and one with an abbreviated analyte schedule because of inadequate stormwater flow. Of the analytes tested for these two sampling events, the concentrations of nearly 72 percent were less than historical values; concentrations for arsenic, chromium, mercury, and nitrogen and phosphorus nutrients, were about 10 to 30 times higher than historical values. Values for arsenic, lead, zinc, and bacteria were higher than state water quality criteria.

Cadmium, lead, silver, and zinc concentrations were 20 to nearly 100 times higher than those measured in the Willamette River at Knickerbocker Bridge as indicated in Figure 4-3. Statistical tests described later in this report also indicate significant concentrations of lead are added to the Willamette River between the Knickerbocker Bridge and the next downstream ambient monitoring location at the Owosso Bridge. Tire weights fallen from vehicle tires and subsequently ground to dust on roadways are the primary source of particulate lead in stormwater (EPA); lead-acid batteries are also a significant source of lead in MS4 runoff,

although this residential MS4 drainage basin likely contributes only a fraction of the total lead concentration leading to the observed increase between the two Willamette River monitoring sites. No additional statistically significant changes occurred for any other water quality analyte between these two monitoring locations. Additional studies are planned over the permit term to characterize pollutant loads from residential MS4 drainage basins. The results of these studies will be used to assess the appropriateness of BMP development and implementation focusing on lead contributions from the MS4, as well as other pollutants of concern.

Figure 4-3a

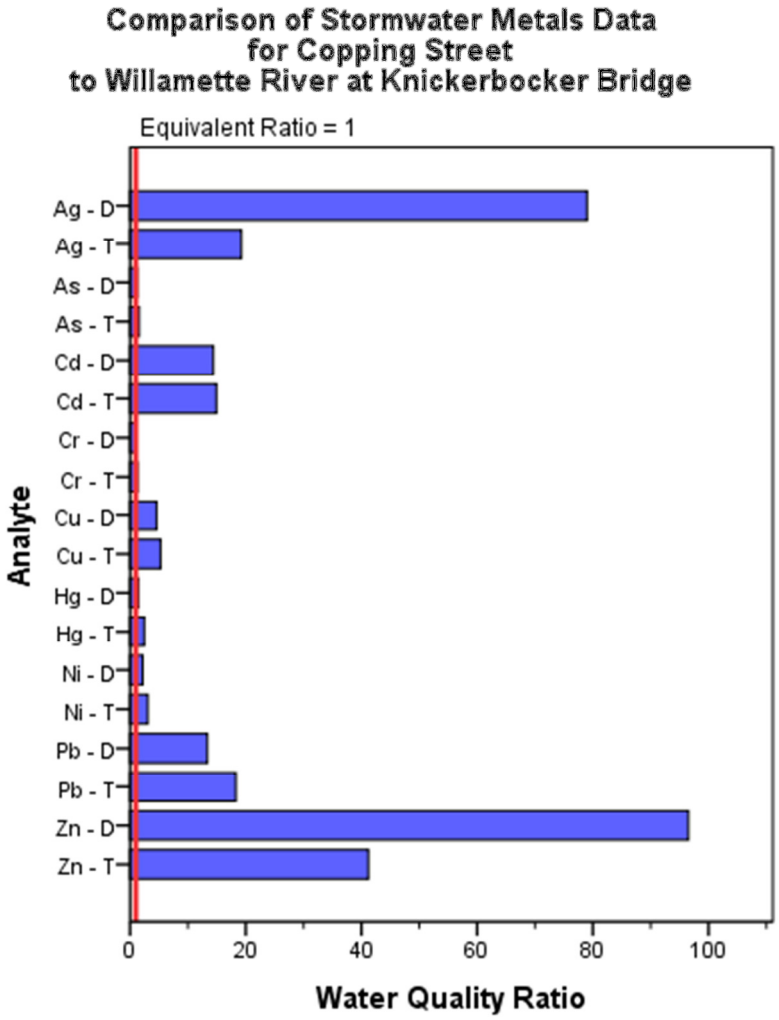
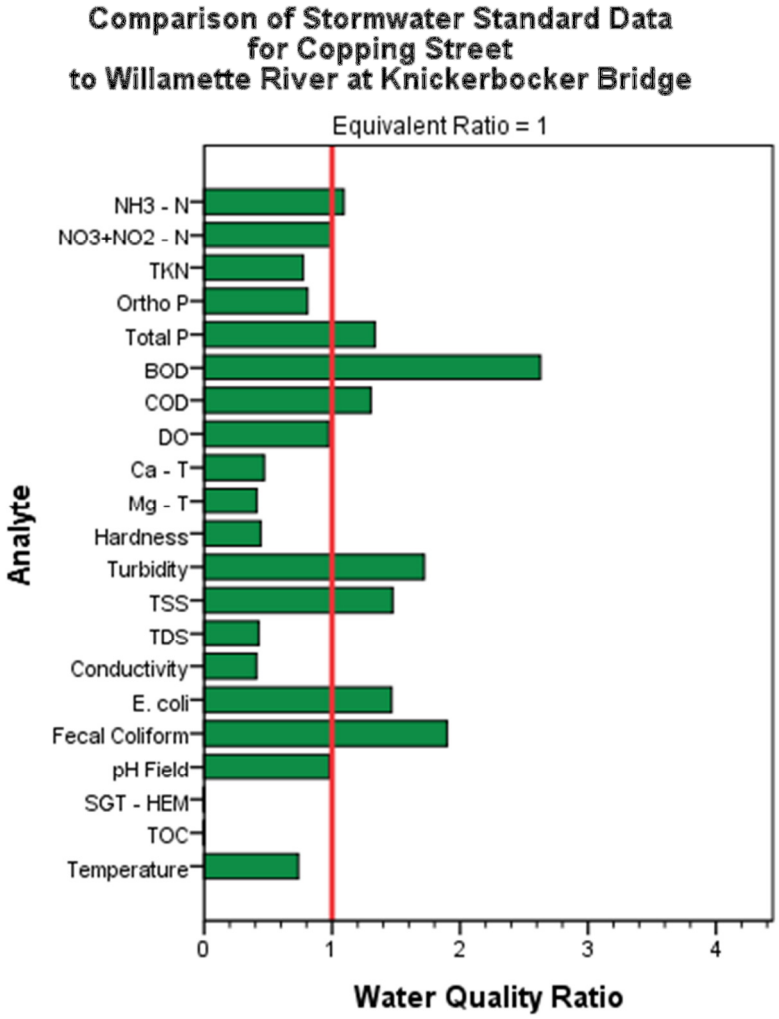


Figure 4-3b



Bacteria Study – Westmoreland Park, Polk Sub-Basin

The A3 Channel, Amazon Diversion Channel, and Amazon Creek are on the state's 303(d) list as "water quality limited" for bacteria. Stormwater monitoring data suggest that bacteria concentrations in Eugene's stormwater contribute toward exceedance of the state water quality criterion. Under ideal conditions a multitude of variables would be measured to enable assessment of bacteria source contributions adequately, including stream flow, stormwater runoff flow from various land use types, storm event magnitude and duration, MS4 basin characteristics, focused land use sampling, and, among others, an ability to predict precisely storm event properties to enable collection of representative stormwater samples. Recognizing resource constraints and the complexity of collecting this information, the City of Eugene has focused on a specific drainage basin area with known characteristic and from which information can be acquired while minimizing project complexity.

Our bacteria study was first outlined in the December 2005, Second Annual Report. Goals of the study include: 1) to better understand bacteria source contribution areas through observation and monitoring; 2) design and implement BMPs to reduce bacteria loads to stormwater; and 3) assess through additional monitoring BMP effectiveness in reducing bacteria loads to stormwater and, ultimately, to Amazon Creek. The most effective BMPs would likely be considered for other areas within the Amazon basin with the objective of reducing bacteria in the A3 Channel, Amazon Diversion Channel, and Amazon Creek. During the 2010/2011 permit year our investigations continued with sampling and analysis of bacteria in stormwater from piped and open channel systems, including Amazon and Willow Creeks.

Figures 4-5 and 4-6 delineate drainage basin areas and sampling locations. The monitoring station on Amazon Creek at Jefferson represents stormwater runoff and stream flow from a large portion of the city, some 5100 acres total. The Willow Creek drainage comprises the next largest area at about 1200 acres; the smallest is the Westmoreland Park area at 5.4 acres.

Bacteria data for the storm events sampled are summarized in Table 4-2 and coded to indicate percent change of the 2010/2011 geometric mean compared to historical data. Location order in the table is by flow direction – upstream to downstream – with piped system outfall locations inserted where they enter Amazon Creek; hence, Amazon Creek at Jefferson is the uppermost upstream monitoring station while Amazon Creek at Chambers is lowermost downstream. Willow Creek is placed at the top of the order for comparison purposes.

Boxplots of all bacteria data are presented in Appendix B Figure B.17 and are ordered similarly. The vertical line in the box marks the median of the sample set; the median splits the ordered sample set in half. Each box represents the central 50 percent of data values; the outer edges of the box mark the 25th and 75th percentiles. Whiskers extending from the box mark the range of values that fall within 1.5 box-lengths from the 25th or 75th percentile. Values that are more than 1.5 box-lengths from the 25th or 75th percentiles are identified as outliers and are denoted by an open circle; extreme values are more than 3 box-lengths and are denoted by an asterisk.

Sampling for *Escherichia coli* and fecal Coliform was done at three piped-system locations within the study area and four locations along Amazon Creek, plus Willow Creek for background comparison purposes. Tiara (MH51267) is unique in that the sampling location is within a short length of piped system that is immediately downstream of a small urban stream that courses through the back yards of a residential neighborhood so it is categorized as a surface sample. The steep-gradient stream is deeply incised with steep banks near the south hills headwaters area of Eugene. Stormwater flow from Tiara eventually discharges to Amazon Creek immediately downstream of the Polk monitoring site.

Table 4-2 Bacteria Storm Event Data 2010/2011 Monitoring Period Westmoreland Park, Polk Sub-Basin								
Location	Parameter	N	GeoMean	Mean Std. Deviation	Median	Minimum	Maximum	% Change from Historical GeoMean
Willow Creek at W 18th Ave	Escherichia coli	4	27	31	17	30	16	-24
	Fecal Coliform	4	29	59	64	45	6	37
Amazon Creek at Jefferson	Escherichia coli	3	1,614	1,843	964	2,400	730	-55
	Fecal Coliform	3	195	200	56	190	150	-87
Friendly at W 16th Ave	Escherichia coli	3	1,387	1,513	797	1,200	920	92
	Fecal Coliform	1	1	1	0	1	1	*
Amazon Creek at Polk	Escherichia coli	3	1,410	1,577	835	1,600	730	-66
	Fecal Coliform	3	931	1,207	890	1,200	320	-36
Tiara	Escherichia coli	3	815	943	655	580	550	-78
	Fecal Coliform	3	874	1,010	689	700	530	-55
Blue Heron Pedestrian Bridge	Escherichia coli	3	1,260	1,267	153	1,300	1,100	-61
	Fecal Coliform	3	427	577	435	600	130	-68
NE Chambers & W 18th Ave	Escherichia coli	6	1,534	2,228	1,633	2,419	240	16
	Fecal Coliform	5	1,197	3,064	5,018	990	230	27
Westmoreland Park	Escherichia coli	4	898	1,735	1,821	1,350	240	49
	Fecal Coliform	4	1,089	1,555	1,344	1,300	320	211
Amazon Creek at Chambers	Escherichia coli	3	925	983	375	1,200	550	-67
	Fecal Coliform	2	179	180	28	180	160	-87

Escherichia coli units: MPN
Fecal Coliform units: col. / 100 mL
* Multiple "Too Numerous To Count" values; cannot compute statistic.

Escherichia coli and fecal Coliform for the 2010/2011 monitoring period are higher at three of eight Amazon Creek basin monitoring sites than historical values (values are expressed as MPN or colonies per 100 mL, hereinafter referred to as counts). Increases range from 16% at NE Chambers & 18th, to 210% at Westmoreland Park, which had the highest calculated increase. Changes in fecal Coliform counts could not be calculated at the Friendly at 16th site because multiple values were reported as “too numerous to count” but are presumed to be greater than the historical geomean. The Friendly, NE Chambers, and Westmoreland sites are in the piped MS4. Fecal Coliform counts increased slightly at Willow Creek, while *E. coli* counts decreased.

Modest changes for both *E. coli* and fecal Coliform were seen at all Amazon Creek monitoring sites with bacteria count decreases at all four sites ranging from 36 to 87%.

Nearly all bacteria geometric means are above the state water quality criterion of 406 organisms per 100 mL, except that for Willow Creek at 18th Avenue, which consistently has lower bacteria counts than the criterion.

Geometric means for bacteria are greatest at the upstream site of Jefferson Avenue and decrease as stream flow passes through the urban area to Chambers Avenue; this phenomenon is also observed for ambient monitoring and was determined to be statistically significant.

Immediately downstream of the Amazon Creek at Jefferson is the piped system site at Friendly whose *E. coli* count is greater than three times that of the water quality standard at 1387 counts; fecal Coliform counts are believed to be higher than this since they could not be quantified using serial dilution. This small sub-basin within the Polk drainage area is an established residential area.

The Tiara sampling site is located far from Amazon Creek but stormwater from this small drainage area contributes a measurable amount of bacteria to the MS4 system, which eventually discharges to Amazon Creek between the Polk and Blue Heron Pedestrian Bridge monitoring locations (see Figures 4-5 and 4-6 for the extent of these drainage basins and monitoring locations). During this annual monitoring period, bacteria counts were about twice that of the water quality standard.

Moving downstream in Amazon Creek to the next monitoring sites we have two smaller sub-drainages that discharge before the Amazon Creek at Chambers site; one located in a commercial lot on the northeast corner of NE Chambers and West 18th Avenue, and one located in Westmoreland Park. Bacteria geometric mean counts from the NE Chambers site is 1534 while that from the park site is 1089. Bacteria counts in Amazon Creek at Chambers decrease to 925.

Interpretation of bacteria monitoring results is somewhat simplistic at this time pending refinement of a bacteria load model to enable better characterization of source contributions within these drainage basins. Additional inputs to the model may include additional monitoring at these and other sites within the basins, as well as precipitation data to better estimate stormwater flow runoff.

Geometric means summarized in Table 4-2 indicate that most of the storm event samples collected for the 2010/2011 monitoring period exceed the state's water quality criterion for bacteria of 406 organisms per 100 mL; only Willow Creek – the relatively undeveloped background site – has consistently had means that are less than the criterion. All bacteria data were used to generate the boxplots in Figure B.17 and are compared to the state water quality criterion, which is marked by the vertical green line.

Ambient Water Quality Monitoring

Surface water quality monitoring has continued at eleven monitoring locations, including four sites on the Willamette River, one near the Delta Ponds outlet, and six in the Amazon Basin.

Surface flows through the Delta Ponds, which consists of sloughs and former aggregate excavation sites, are to the Willamette River. Extensive riparian restoration efforts were made by the US ACOE and the City of Eugene to create and enhance riparian habitat for fish spawning and rearing. The Delta Ponds also receives stormwater discharges from surrounding development; thus assessment of water quality from this area is important to determine the effects, if any, of stormwater on Delta Ponds and the Willamette River. The ambient sampling sites are listed in Table 4-3 below and locations shown in Figures 4-7 and 4-8. Sampling is generally conducted at each site every other month such that sampling events are representative of both the rainy season (October through April), and drier months (May through September). All ambient sampling is conducted utilizing clean sampling techniques; both total and dissolved metals are analyzed as well as other water quality parameters.

Analytical results and statistical analyses characterizing receiving water quality at the monitored sites are described here. For the most part grab samples collected every other month represent snapshots of ambient water quality – analytical results may not necessarily represent average water quality, or the full range of water quality variability. Six additional sampling events were done since the last annual reporting period, the data of which have been added to the historical data set that begins in January 1997. For the current permit year sampling events occurred between July 2010, and June 2011.

Table 4-3 **Ambient Water Quality Monitoring Sites**
Amazon Basin Sampling Sites: Amazon Creek – Site M2 – at 29th Avenue Willow Creek 450 feet north of 18th Avenue Amazon Creek at Railroad Track Crossing Amazon Diversion Channel at Royal Avenue A3 Channel at Terry Street Amazon Creek at Royal Avenue
Willamette River Sampling Sites: Upstream of Urban Growth Boundary (River Mile 186.9) At Knickerbocker Bridge (RM 183.9) At Owosso Bridge (RM 178.6) Delta Ponds North of Beltline Bridge & Upstream of Willamette River Confluence Downstream of Beltline Bridge (RM 176.8)

4.5 Results

Ambient water quality data were screened for outliers before applying statistics tests. In general, outliers are anomalous measurements that do not appear to be within the bounds of an historical data set. Outliers may result from any number of factors, including sample collection and

handling procedures, analytical methodologies, transcription error, etc. Inclusion of anomalous measurements in statistical tests used to assess water quality characteristics can result in incorrect conclusions. However, distinguishing anomalous measurements from an actual elevated pollutant concentration due to some site disturbance can be difficult if methodical evaluation of all probable factors is not performed. The methods commonly used to test for outliers include skewness, kurtosis, and Shapiro-Wilk assume normal distribution of water quality measurements; it was found, however, that most of the analytes did not follow a normal distribution. Identification of an outlier using these methods does not preclude investigation into the anomaly and its possible cause. Outliers were investigated and corrected if possible, including traceable error such as transcription and dilution error.

For data sets whose distributions are not normal, best professional judgment was applied when selecting outliers to exclude from further statistical analysis. Best professional judgment may include reanalysis of the sample provided the holding time has not been exceeded.

Multiple outliers were identified in the 2010-2011 ambient dataset; some dissolved oxygen measurements were found to be biased due to the measurement technique used and were excluded from the report tables. In addition, a few chromium values were excluded from report tables due to analytical bias or sample contamination. Excluded dissolved oxygen and chromium values are denoted as "outlier" in report tables. Outliers were also identified in the historical data set, and while these are ultimately excluded from final statistical analysis results, the outliers are only temporarily excluded; they are added to the data pool at the beginning of each annual data analysis for distribution tests as applicable. Analytical data for the most recent monitoring period are presented in Tables A-5 and A-6. Note that there are no data for specific dates at Willow Creek and Delta Ponds above the Willamette River Confluence near Beltline Bridge because these sites were dry at the time of sample collection.

Censored data, those values reported as less than the reporting limit, are included in the summaries utilizing the restricted maximum likelihood estimation technique for miscellaneous parameters, and the delta distribution estimator for the metals data. These estimators reduce the problems associated with censored data when calculating mean and standard deviation, and are superior to substitution of censored data with one-half the reporting limit. Means and standard deviations for the ambient historical data set are summarized in Tables A-7 and A-8.

Seasonal Trends

The Seasonal Kendall statistic, Z, is used here to describe long-term analyte trend with consideration given to seasonal variation. This trend estimator is free of distributional assumptions. Developed by the U.S. Geological Survey[1], the Seasonal Kendall statistic is the most frequently used test to assess trend in environmental data. In assessing analyte trends, we presume in-stream flow is the result of multiple water pathways in the hydrologic cycle, including overland flow, ground-water discharge, and precipitation; precipitation directly and indirectly influences the concentration of analytes as measured in samples collected from the

[1] Dennis R. Helsel, Mueller, David K., and Slack, James R., Computer Program for the Kendall Family of Trend Tests: U.S. Geological Survey SIR 2005-5275.

Amazon basin streams and the Willamette River, and may also contribute trace amounts of pollutants through atmospheric deposition, such as mercury. The temporal distribution of the precipitation events, including intensity and duration, influences analyte concentration; however, data for these factors are not available, are not easily obtained, and their effects on seasonal pollutant concentration difficult to assess.

Our simplified approach assumes these factors are intrinsic to the period during which the sampling event occurs. Average monthly precipitation for Eugene was divided into four "seasons," or periods, based on average monthly precipitation and trend increase or decrease. The periods should help to identify seasonal variations in analyte concentration. The wet season (Period 1: November, December, January) is followed by a drying trend extending into July. The drying trend is subdivided into Period 2 (February, March, April) and Period 3 (May, June, July), the latter being the driest period. Months leading to the wet season comprise Period 4 (August, September, October) and are progressively wetter. Precipitation data is from the Eugene, Oregon airport weather station (#352709) with a period of coverage from 1939 to 2000. Each sampling event for the entire data set (historical and current year data) is assigned to a period based on the sampling date.

The USGS has developed a DOS-executable program to run the Seasonal Kendall test statistic. In this application, rejection of the null hypothesis of no trend is calculated at $2\rho = 1\%$, that is, a 2ρ value of 0.01 indicates there is a 1% probability of the observed trend due to random sample variability. Program output includes slope estimator, m, to describe the overall analyte trend.

Results of trend analysis using the Seasonal Kendall test statistic indicate significant trends at 9 of 11 monitoring locations, including Amazon Creek at 29th Avenue, Amazon Creek at the Railroad Crossing, the Amazon Diversion Channel at Royal Avenue, the A3 Channel at Terry Street, Amazon Creek at Royal Avenue, the Willamette River Upstream of the Urban Growth Boundary, the Knickerbocker and Owosso Bridges, and downstream of Beltline Bridge. No significant water quality trends were observed for Willow Creek and the Delta Ponds site. Water quality trends for these waterbodies tend to be subtle; hence, those noted in previous reports but not observed here and vice versa are commonly influenced by the most recent water quality data such that statistical significance of the trend changes upon addition of new analyte results.

Figures B.18 through B.70 (Appendix B) show the historical data sets plotted against time with trend lines; a summary of the program output is presented in Table A-9 in Appendix A. All significant long-term concentration trends are summarized in Table 4-4 below. A number of pollutants listed are on Oregon's 2004 303(d) list of pollutants requiring a TMDL. Results of the Seasonal Kendall test statistic indicate significant progress is being made to reduce pollutants in the listed impaired waterbodies.

We note for the Amazon Basin sites that long-term decreasing concentration trends were observed for at least some analytes at all monitoring locations; these are sites which are located downstream or within the urban environment and are influenced by the sum of human activities that occur within their drainage basin areas. We attribute the decreasing pollutant trend to the sum of stormwater program BMPs applied within these drainage basins to control stormwater pollutants caused by human activities within the urban environment. Decreasing trends are

primarily observed for metals, including arsenic, cadmium, chromium, lead, magnesium, mercury, and nickel. Ortho and total phosphorus, Kjeldahl nitrogen, and suspended solids also showed decreasing trends at a few monitored sites.

An increasing trend is observed zinc at Amazon Creek at 29th and Royal Avenues. A slight increasing trend for conductivity in the Willamette River at the Knickerbocker Bridge site could be related to a combination of factors, such as weathering and dissolution processes of soils. Interestingly, decreasing trends are observed for total magnesium upstream and downstream of the Knickerbocker Bridge site, somewhat conflicting with the conductivity trend. Increasing pH trends were observed at two sites, in Amazon Creek at 29th Avenue and the Willamette River upstream of the UGB. These trends may in part be influenced by not only anthropogenic activities, but also changes in measurement technique and/or instrumentation as the variability of measurements is noticeably more pronounced in early sampling events when compared with those taken later.

Table 4-4 Summary of Seasonal Kendall Water Quality Analyte Trend Analysis [1]		
Monitoring Location	**Trend of Water Quality Analyte**	
	Decreasing Concentration Trends	**Increasing Concentration Trend**
Amazon Basin Sites:		
Amazon Creek at 29th Avenue – Site M2	Chromium, Total Lead, Total Mercury, Dissolved & Total Nickel, Total	Zinc, Dissolved Field pH
Amazon Creek at Railroad Tracks	Cadmium, Total Chromium, Total Mercury, Total Nickel, Dissolved	None
Amazon Diversion Channel at Royal Avenue	[2] Arsenic, Dissolved & Total Nickel, Dissolved & Total Ortho Phosphorus Total Kjeldahl Nitrogen	None
A3 Channel at Terry Street	[2] Arsenic, Dissolved Cadmium, Dissolved & Total Chromium, Total Nickel, Dissolved & Total Total Phosphorus	None
Amazon Creek at Royal Avenue	Cadmium, Total Chromium, Total [2] Lead, Total Mercury, Dissolved & Total Nickel, Total Ortho & Total Phosphorus Total Suspended Solids Turbidity	Zinc, Dissolved
Willamette River Sites:		
Upstream of Urban Growth Boundary	[2] Arsenic, Total Chromium, Dissolved & Total [2] Mercury, Dissolved & Total Nickel, Dissolved Calcium, Total Magnesium, Total Hardness	Field pH
Knickerbocker Bridge	Nickel, Total Ortho Phosphorus	Specific Conductance
Owosso Bridge	Magnesium, Total Ortho Phosphorus	None
Downstream of Beltline Bridge	Chromium, Dissolved & Total Hardness	None

[1] Significant at $2\rho = 0.01$
[2] On Oregon 2004/2006 303(d) list.

There is a small probability that some decreasing trends may not have been identified by the Seasonal Kendall test because the laboratory used to perform the metals analysis was changed in February 2007, though after careful review of the data it is believed all likely and significant trends have been summarized above. Beginning with the February 2007 sampling event, the Eugene/Springfield Water Pollution Control Facility (E/S WPCF) Laboratory performed all metals analysis. While the laboratory uses the same analytical methodology, specifically, EPA 200.8, the reporting limits are somewhat greater than those observed prior to February 2007, when a contract laboratory performed the analyses. Analytical results reported since early 2008 indicate that the E/S WPCF laboratory was able to achieve lower reporting limits for nearly all metals when compared to the first few sampling events. The facility continues to review its analytical procedures to ensure optimum instrumentation performance is attained so that continuity of historical trends observed over the last ten years is maintained to the fullest extent possible.

Water Quality Changes: 2011 Permit Year vs. Historical Data Set

The Mann-Whitney test statistic is used here to assess whether any water quality changes have occurred over the most recent monitoring period compared to the historical data compiled for each sampling location. Mann-Whitney is a nonparametric calculation based on the sums of ranks for independent samples and is suitable for censored data sets. Table A-10 in Appendix A summarizes significant average analyte values for the period, which consists of sampling events for the 2010/2011 period, and the average for the historical data set; comparisons are significant at $\alpha = 0.05$. The full program output for the statistic is shown in Tables A-11 and A-12.

Note that some analytes in Table A-10 are annotated, indicating that the data set includes some censored values which have been set at one-half the reporting limit. In general, mean corrected averages cannot be reasonably estimated on small data sets with a large number of censored values. For example, with few exceptions cadmium and selenium values for Amazon Basin and Willamette River sites consist of censored values, hence the statistical significance of annotated means whose population of censored values is greater than 50 percent is questionable and therefore generally excluded from tables summarizing statistically significant comparisons. Values reported as INS indicates insufficient uncensored data are available to compute the statistic (see Tables A-7 and A-8).

Amazon Basin Sites

Referring to Table A-10 in Appendix A, all six Amazon basin monitoring sites have recent analyte averages that differ from historical means. Overall 22 of 23 analytes, or about 96%, show statistically significant concentration decreases. One analyte, pH at the Amazon Creek at 29th Avenue M2 site, is significantly higher than the historical mean.

Willow Creek originates just south of a preserve held by The Nature Conservancy and has similar geomorphologic characteristics to the upper reaches of Amazon Creek; its headwaters flow through some rural residential properties and receive some stormwater from the Hynix facility (a silicon chip manufacturer whose operations ceased during the 2007/2008 period though maintenance of stormwater facilities continue). The water quality characteristics of

Willow Creek, which is for the most part a local, minimally-urbanized stream, serves as a reasonably good baseline for comparing the water quality characteristics observed at Amazon Creek, specifically, the 29th Avenue M2 site. We noted significant concentration increases for dissolved and total zinc, which nearly doubled during the 2010/2011 monitoring period; total Kjeldahl nitrogen decreased slightly.

Four samples were collected from Willow Creek during the monitoring year because the stream was dry for two of the sampling events. Extended dry periods also occurred during the 2009/2010 monitoring year and is unusual in that on only two other occasions since 1997 could samples not be collected due to lack of flow.

Field pH increased at the Amazon Creek at 29th Avenue M2 site, from an historical average of 7.54 to 7.93. At least three pH measurements were 8.0 or greater during the 2010/2011 monitoring period, yet, with the exception of Kjeldahl nitrogen, no other analyte has been affected by this significant pH change. No activity or mechanism has been identified in the Amazon basin near this monitoring site that would explain the marked pH changed.

At the remaining downstream Amazon basin monitoring sites, including Amazon Creek at the railroad crossing, Amazon Diversion Channel, A3 Channel, and Amazon Creek at Royal Avenue, the concentrations for multiple metals in ambient samples collected during the 2010/2011 monitoring period are commonly a fraction of historical averages. Particularly noteworthy is the A3 Channel at Terry Street site where a large number of analyte concentrations are significantly less than historical averages. These include cadmium, chromium, lead, mercury, nickel, selenium, silver, biochemical oxygen demand, and total phosphorus.

Willamette River Sites

Analyte comparisons summarized in Table A-10 in Appendix A show that only Delta Ponds had recent analyte averages that differed from historical means. Overall, 5 of 6 analytes show statistically significant decreases, metals values about 40 to 50% lower, and dissolved solids 30% lower. Turbidity increased twice that of historical values, while pH decreased slightly. These water quality changes can be attributed to diversion of Willamette River flow through the ponds to create and enhance riparian habitat for fish spawning and rearing.

The number of analytes showing lower concentrations for the monitoring period comprises a small portion of the overall number of analytes in the water-quality monitoring program. Noticeably fewer Willamette River sites are listed in Table A-10 for analytes showing significant concentration decreases compared to previous reports; conversely, no analytes were found to increase over the monitoring period, which is also an important finding in that water quality degradation has not occurred for those pollutants monitored.

The concentration trends described above for the Amazon basin sites and Willamette River, and the comparison of recent water quality data to historical data are good indicators that BMPs applied in the permit area are effective and have resulted in measurable pollutant decreases in receiving water bodies, including many pollutants on the state's 303(d) list.

Intra-Basin Water Quality Differences

In addition to temporal changes in water quality, intra-basin differences are of interest in that water quality comparisons are made between an upstream and downstream monitoring site. The Mann-Whitney test statistic is used here to assess water quality differences between any two sites within the same stream basin. Mann-Whitney is a nonparametric calculation based on the sums of ranks for independent samples and is suitable for censored data sets. Comparisons described utilize the historical data set for each monitoring location, including the data recently acquired in 2010/2011. Table A-13 and A-14 in Appendix A summarize significant average analyte values; comparisons are significant at $\alpha = 0.05$. The full program output for the statistic is shown in Tables A-15 and A-16.

Amazon Basin Monitoring Locations

Intra-basin comparisons include the analysis of the 29th Avenue M2 site on Amazon Creek compared to the site on Willow Creek (see Figure 4-7), streams which originate in the same low hills south of Eugene but drain different sub-basins.

The concentration of metals, nutrients and bacteria are higher in Amazon Creek at the 29th Avenue site in comparison to Willow Creek. Of the 41 water quality analytes monitored, the concentrations of 16 analytes were found to be statistically higher in Amazon Creek at the 29th Avenue site, including dissolved and total chromium, copper, lead, molybdenum, zinc, *E. coli*, fecal Coliform, nitrate+nitrite as nitrogen, ortho and total phosphorus, and field pH.

Relative percent concentration differences (the difference divided by the mean of the two values) range from 32% for dissolved copper, to 154% for *E. coli*, for analytes having statistically significant differences. Dissolved and total copper are 32 and 35% higher in Amazon Creek at 29th Avenue, dissolved and total chromium are 45 and 50% greater respectively, dissolved and total lead are 37 and 83% higher, dissolved and total molybdenum 62 and 65% higher, and dissolved and total zinc 103 and 104% higher, respectively, at the Amazon Creek at 29th Avenue site. Only total arsenic and magnesium are higher at Willow creek by 28.

Nutrients and bacteria are also greater at the 29th Avenue site; fecal Coliform and *Escherichia coli* averages are 4 and 8 times greater than, respectively, bacteria counts observed at Willow Creek. Ortho and total phosphorus, NO_3+NO_2, and pH are also higher at the Amazon Creek site. The higher metal, nutrient and bacteria concentrations observed in Amazon Creek are pollutants commonly associated with urbanized environments. These comparisons are summarized in Table 4-5 below.

Table 4-5 Intra-Basin Water Quality Comparison of Willow Creek and Amazon Creek Using Mann-Whitney Statistic [1]				
Analyte	**Units**	**Willow Creek**	**Amazon Creek at 29th Avenue**	**Relative % Difference**
Arsenic – Total	(*µg/L*)	1.46	1.10	-28
Chromium – Total		0.896	1.49	50
Chromium – Dissolved		0.435	0.691	45
Copper – Total		2.29	3.27	35
Copper – Dissolved		1.23	1.70	32
Lead – Total		0.265	0.645	83
Lead – Dissolved		0.0263	0.0383	37
Molybdenum – Total		0.147	0.289	65
Molybdenum – Dissolved		0.147	0.281	62
Zinc – Total		6.49	20.4	104
Zinc – Dissolved		3.67	11.4	103
Escherichia coli	(*Col./100 mL*)	123	957	154
Fecal Coliform		83	339	121
Magnesium – Total	(*mg/L*)	8.43	8.35	-1.0
Nitrate+Nitrite – as Nitrogen		0.061	0.32	136
Phosphorus – Ortho		0.026	0.054	70
Phosphorus – Total		0.056	0.10	60
Field pH	(*Units*)	7.2	7.6	4.8

[1] Mann-Whitney test statistic comparisons significant at $\alpha = 0.05$.
Shaded cells indicate the higher analyte concentration in the comparison.

Comparing water quality data for at Amazon basin monitoring sites we generally find that as stream flow passes through the urban environment the concentrations of metals, oxygen demand, total phosphorus, and temperature increase at respective downstream monitoring sites; dissolved oxygen, *E. coli*, fecal Coliform, NO_3+NO_2, ortho phosphorus, and dissolved zinc concentrations tend to decrease at respective downstream monitoring sites. The 29th Avenue site is the uppermost monitoring location on Amazon Creek, followed by Amazon Creek at the Railroad Crossing, the Amazon Diversion Channel at Royal Avenue, and Amazon Creek at Royal Avenue. The A3 Channel at Terry Street drains into the lower Amazon Creek (see Figure 4-7). There are a few notable exceptions:

- A3 Channel at Terry Street (upstream) compared to Amazon Creek at Royal Avenue (downstream)

  - 24 of 26 analytes having statistically significant difference have historical averages that are greatest upstream at the Terry Street site, including BOD, COD, hardness (calcium and magnesium), conductivity, TDS, TSS, ortho and total phosphorus, ammonia, NO_3+NO_2, and TKN; metals include total and dissolved cadmium, molybdenum, nickel and zinc, and total copper, lead and mercury.

  - Turbidity and dissolved mercury averages are greater downstream at the Amazon Creek Royal Avenue site.

- Amazon Creek at 29th Avenue (upstream) compared to Amazon Creek at Railroad Track Crossing (downstream)

  - 18 of 28 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at 29th Avenue. Dissolved zinc is greatest upstream, as are DO, hardness (calcium and magnesium), pH, ortho phosphorus, NO_3+NO_2, and *E. coli* and fecal Coliform.

  - BOD, COD, temperature, as well as total and dissolved arsenic, lead, mercury, molybdenum, and nickel, as well as total cadmium, copper, selenium, silver, and zinc average concentrations are greatest downstream at the Railroad Track Crossing monitoring site.

- Amazon Creek – Site M2 – at 29th Avenue (upstream) compared to Amazon Diversion Channel at Royal Avenue (downstream)

  - 7 of 29 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at 29th Avenue site. Dissolved zinc is greatest upstream, as are DO, NO_3+NO_2, pH, ortho phosphorus, *E. coli* and fecal Coliform.

  - Total and dissolved arsenic, cadmium, copper, lead, molybdenum, nickel, and total chromium, mercury, selenium, and silver have higher average concentrations at the downstream monitoring location. BOD, COD, hardness (magnesium), total phosphorus, TKN and temperature are also greater downstream.

- Amazon Creek at Railroad Track Crossing (upstream) compared to Amazon Diversion Channel at Royal Avenue (downstream)

  - 4 of 16 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at Railroad Track Crossing, including total and dissolved mercury, and *E. coli* and fecal Coliform.

- Total and dissolved copper, molybdenum, and nickel, as well as BOD and COD, hardness (magnesium), total phosphorus, and TKN are greater downstream.

Average concentrations for analytes with statistically significant differences are summarized in Tables A-13 and A-14 in Appendix A.

Willamette River Monitoring Locations

Results of the Mann-Whitney test statistic applied to historical data for the Willamette River monitoring locations indicate that analytes statistically significant at $\alpha = 0.05$, had concentrations that were greater at downstream sites than at corresponding upstream sites. Most of these water quality differences occur at two monitoring locations, upstream and downstream of the urban growth boundary (see Figure 4-8). Of the 41 analytes compared between these two sites, 26 are statistically different, all of which have higher average concentrations downstream of Beltline Bridge. Table 4-6 below summarizes those pollutants whose concentrations increase as the Willamette River flows through the urban growth area, and includes total and dissolved arsenic, copper, lead, molybdenum, nickel, and zinc, as well as dissolved mercury and total silver. Bacteria counts for *E. coli* and fecal Coliform, as well as hardness (calcium and magnesium), dissolved solids and conductivity, nutrients nitrogen (NH_3 – as N, NO_3+NO_2 – as N, and TKN), phosphorus (total and ortho phosphorus) concentrations also increase as the Willamette River courses through the urban area.

An examination of water quality changes over shorter stream reaches indicates fewer statistically significant differences in analyte concentrations. Comparing data sets for the uppermost site above the Urban Growth Boundary to the Knickerbocker Bridge resulted in eight statistically significant differences among the analytes tested, including total and dissolved arsenic and copper, calcium (hardness), and *E. coli* and fecal Coliform, all of which have higher values downstream.

Between the Knickerbocker Bridge and the Owosso Bridge, the concentration of total lead, and *E. coli* and fecal Coliform increase over the stream reach.

Table 4-6
Comparison of Willamette River Average Analyte Concentrations Upstream and Downstream of the Urban Growth Boundary Using Mann-Whitney Statistic [1]

Analyte	Units	Upstream of Urban Growth Boundary (RM 186.9)	Downstream of Beltline Bridge (RM 176.8)
Arsenic – Total	(*µg/L*)	0.268	0.323
Arsenic – Dissolved		0.205	0.255
Copper – Total		0.588	0.813
Copper – Dissolved		0.330	0.469
Lead – Total		0.0826	0.107
Lead – Dissolved		0.0129	0.0218
Mercury - Dissolved		0.00089	0.00098
Molybdenum – Total		0.0640	0.0790
Molybdenum - Dissolved		0.0565	0.0802
Nickel – Total		0.311	0.352
Nickel - Dissolved		0.202	0.233
Silver – Total		0.00843	0.0116
Zinc – Total		1.13	1.81
Zinc – Dissolved		0.441	0.932
Escherichia coli	(*col./100 mL*)	22	43
Fecal Coliform		16	36
Ammonia – as Nitrogen	(*mg/L*)	0.050	0.084
Nitrate+Nitrite – as Nitrogen		0.053	0.13
Total Kjeldahl Nitrogen		< 0.2	0.3
Phosphorus – Ortho		0.026	0.051
Phosphorus – Total		0.035	0.077
Total Dissolved Solids		42	46
Calcium – Total	(*mg/L*)	4.7	5.1
Magnesium – Total		1.5	1.7
Hardness	(*mg eq $CaCO_3$/L*)	18	20
Specific Conductance	(*µmhos/cm*)	47	54

[1] Mann-Whitney test statistic comparisons significant at $\alpha = 0.05$.
Shaded cells indicate analyte value at downstream monitoring site greater than upstream site.

Between the Owosso Bridge and the site downstream of Beltline Bridge above the McKenzie River confluence, 14 analytes have statistically significant values, all of which are greater at the downstream monitoring location, including total and dissolved copper and zinc, dissolved lead and molybdenum, conductivity, nutrients nitrogen (NH_3 – as N, NO_3+NO_2, and TKN), and phosphorus (ortho and total phosphorus). Suspended solids and turbidity are also higher downstream at the Beltline Bridge site.

Tables A-13 and A-14 in Appendix A includes a summary of all Willamette River monitoring site analytes having statistically significant differences using the Mann-Whitney test statistic; Tables A-15 and A-16 present the full program output.

A final comparison is between Delta Ponds and the Willamette River at the Owosso Bridge. Nineteen of 27 analytes having statistically significant differences are associated with higher concentrations at the Delta Ponds site. Average values for total and dissolved arsenic, molybdenum, nickel and zinc, and dissolved lead, as well as total phosphorus, TKN, TSS, TDS, hardness (calcium and magnesium), oxygen demand (BOD and COD), and conductivity values are also higher for the Delta Pond site. Average DO, ortho phosphorus, turbidity, pH, and interestingly, total and dissolved mercury and chromium values were higher in the Willamette River at the Owosso Bridge site. As mentioned in a previous section, flow management of the Delta Ponds along with extensive restoration of riparian habitat has been conducted by the City of Eugene and the US Army Corps of Engineers. The effect of these activities on water quality has been to reduce copper and molybdenum, pH and TDS; turbidity has increased slightly but this measure along with other water quality improvements are expected once this major restoration effort is completed and planted vegetation becomes established.

Comparison of Ambient Water Quality Data to Oregon Standards

Water quality standards and beneficial uses for surface waters are defined in Chapter 340, Division 41 of the Oregon Administrative Rules (OAR). Analytical results for surface water samples collected from Amazon Basin and Willamette River sites are assessed in this section for overall conformance to Oregon water quality standards.

Boxplot charts are shown in Appendix B Figures B.71 through B.87 of water quality data from the Amazon Basin and Willamette River monitoring sites and compared to Oregon standards. The horizontal line in the middle of the box for each analyte marks the median of the sample set; the median splits the ordered sample set in half. The box represents the central 50 percent of data values; the outer edge of each box mark the 25th and 75th percentiles. Whiskers extending from the box mark the range of values that fall within 1.5 box-lengths from the 25th or 75th percentile. Outliers and extreme values are also depicted in the figures and are defined using different criteria than those used to identify anomalous measurements. Values that are more than 1.5 box-lengths from the 25th or 75th percentiles are identified as outliers and are denoted by an open circle; extreme values are more than 3 box-lengths and are denoted by an asterisk. The total number of samples in each data set, n, is also indicated.

All six monitoring stations in the Amazon Basin are grouped together to obtain a visual synopsis of the analytical data, as are the data for the Willamette River. Note that all total and dissolved metals values are grouped together for each analyte. The boxplots provide a means of visually characterizing the data sets in terms of the types of analytes and percentile of sampling events exceeding the applicable water quality standard. Appendix B (Figures B.88 through B.169) presents boxplots for all data charting each water quality parameter by individual monitoring location. Boxplots also depict applicable Oregon water quality standard for each analyte. The water quality standard is defined by a vertical line through the concentration axis with the applicable criterion listed at the top of the chart. Metals toxicity criteria are adjusted for hardness using the equations of Table 20 in OAR 340-041.

In the case of arsenic (Figure B.71), all samples – both total and dissolved fractions – collected from the Amazon Basin and Willamette River monitoring locations exceed the human health criterion, which is 0.0022 µg/L; the highest observed concentrations from Amazon basin sites exceed the standard by almost four orders of magnitude, while data for Willamette River exceed the standard by about two orders of magnitude. Willamette valley soils are volcanic in origin and contain relatively high concentrations of naturally occurring arsenic; in some locations total arsenic concentrations in soil can be as high as 20 mg/kg.

Copper concentrations measured at monitoring sites from Willamette River (Figure B.74) are for the most part less than the chronic criterion with the exception of an extreme value. In the Amazon Basin over 25% of values in the data set exceed the chronic criteria by up to seven times the 3.5 µg/L criterion; values within 1.5 times the 75th percentile as defined by the extent of the whisker (about 7.0 µg/L) also exceeds the criterion.

Most of the stream samples collected from the Amazon Basin also exceed the chronic criterion for lead at 0.54 µg/L (Figure B.75). No values from the Willamette River sites exceed the chronic criterion.

Multiple extreme values and outliers at Amazon Basin sites exceed the mercury criterion of 0.012 µg/L; the extent of the whisker at 1.5 times the 75th percentile is near the mercury criterion. At the Willamette River sites a couple of extreme values exceeded the chronic criterion for mercury.

The chronic criterion for silver is 0.12 µg/L and is exceeded by a few extreme values in the Amazon Basin; no Willamette River values exceed this water quality standard (Figure B.80).

Amazon Basin samples occasionally exceed both the acute and chronic criteria for zinc (Figure B.81), which are 36 µg/L and 32 µg/L, respectively. The extend of the whisker exceeds both criteria. No samples collected from the Willamette River sites exceed the water quality criteria for zinc.

Exceedances of non-metal water quality standards are also observed for samples collected from the Amazon Basin and Willamette River. These included DO, bacteria, pH, temperature, and turbidity. Minimum DO criteria are not met at either the Amazon Basin or Willamette River sites for at least some periods of the year. For the Amazon Basin samples this would typically

occur during summer months when water temperatures are warmer and stream flows are lower. Boxplots in Figure B.82 indicate that over a quarter of samples measured at the Amazon Basin sites may not meet the 6.5 mg/L minimum DO criterion. Sampling protocol does not strictly meet the 30-day mean definition of the criterion; however, the values are strong evidence that depleted oxygen conditions persist in the waterbody. The DO criterion for the Willamette River is for the period extending from October 15 to May 15 (the spawning period for salmonids); nearly half of the samples measured at the Willamette River sites did not meet the 11.0 mg/L minimum DO criterion, though this may be somewhat skewed by the Delta Ponds samples which, on average, have 6 mg/L DO. Boxplots in Figure B.157 indicate that about half of the samples collected from Willamette River sites met the 11.0 mg/L DO criterion during the spawning about half do not. Pollutants transported by stormwater likely contribute to oxygen depletion of the river through biological and chemical processes.

Escherichia coli counts exceed the criterion of 406 organisms per 100 mL in about 30 percent of samples collected from the Amazon Basin sites (Figure B.83); no samples from Willamette River sites exceed the criterion although a few extreme values approach the limit. The magnitude of exceedance for outliers and extreme values at the Amazon Basin sites is nearly two orders of magnitude greater than the criterion; the majority of samples are within two times the criterion. Unlike the Amazon Basin sites where bacteria counts tend to decrease downstream, bacteria counts in samples from the Willamette River increase as the river flows through the urban growth area (see Table 4-6 above). Fecal Coliform values exceed the criterion less frequently as shown in Figure B.84; values for the Willamette River do not exceed the criterion.

Field pH measurements from Amazon Basin sites sometimes exceed both the minimum and maximum pH criteria of 6.5 and 8.5 pH units respectively; some samples from the Willamette River sites exceed the minimum pH criterion ((Figure B.85).

Over half of the samples collected from the Amazon Basin exceed the salmon and trout rearing and migration temperature criterion of 18 ˚C (Figure B.87), effective over the period of May 16th through October 14th; a few samples from the Willamette Basin also exceed this criterion. The salmon and steelhead spawning temperature criterion of 13 ˚C (Figure B.86) is applicable to the Willamette River and is effective over the period of October 15th through May 15th; a few samples collected from the four main-stem monitoring sites exceed this criterion.

Figures B.170 through B.175 in Appendix B are boxplots of turbidity measurements compared to the applicable flow-based turbidity target defined in Chapter 10 on page 212 of the Willamette Basin TMDL; boxplots in Figure B.170 summarize the data by criterion. DEQ derived the Amazon Creek turbidity targets using Long Tom River flows near Noti as a reference river discharge. Collection dates for historical turbidity values measured under the ambient monitoring program were correlated to river flows on the Long Tom recorded by the USGS. The applicable turbidity target was then derived for each turbidity value; boxplots of the data sets are grouped by the applicable turbidity target, as defined on each chart. Most of the turbidity values exceed the applicable criterion, though it is instructive to note that the median of turbidity values for Willow Creek tends to center on the target at higher turbidity values. Given that Willow Creek represents baseline water quality conditions it would suggest the model used to develop the turbidity target is conservative. Turbidity values for Amazon Creek at 29th Avenue are

comparable to – and often times less turbid than – Willow Creek, suggesting the upper reach of Amazon Creek may already exhibit turbidity levels that would otherwise occur for an undisturbed stream originating within this basin. Additional efforts will be needed at downstream sites to improve water quality such that it meets the turbidity targets required by DEQ.

OAR 340-041-0036 describes the turbidity criterion applicable to the Willamette River, which states that no more than a ten percent cumulative increase in natural stream turbidities may be allowed as measured relative to a control point immediately upstream. A statistically significant difference was observed for turbidity between the Owosso Bridge and Downstream of Beltline Bridge sites; the average turbidity increasing from 6.8 NTU to 6.9 NTU downstream, less than the criterion of ten percent cumulative increase. Interestingly, there was no statistically significant difference between the most distal sites compared, that is, upstream and downstream of the Eugene urban growth boundary (see table above). Figure B.163 presents turbidity boxplots for the Willamette River sites.

4.6 Data Management, Documentation and Record-Keeping

Laboratory analysis performed at the Eugene/Springfield Water Pollution Control Facility is performed under an Environmental Management System (EMS) for which the facility has earned certification under the International Organization for Standardization (ISO). Organizations that earn ISO certification under the 14001:2004(E) standard commit to develop an environmental policy, establish objectives and processes to achieve policy commitments, take action as needed to improve its performance and demonstrate the conformity of the system to the requirements of the ISO standard. ISO 14001 elements include establishing, implementing and maintaining procedures applicable to legal requirements, documentation and records determined to be necessary to ensure effective planning, operation and control of processes, control of records and documents, evaluation of legal compliance, defining roles, responsibilities and authority of staff, competence and training requirements, and management review. In addition, the E/S WPCF's EMS is audited by internal auditors and external auditors on a frequent basis to ensure conformance and compliance to the policies and objectives established by and applicable to the E/S WPCF.

As such, all sampling and analysis of stormwater, stream, and MS4 samples performed by staff at the E/S WPCF falls under the umbrella of the EMS program. Documents and records associated with stormwater monitoring elements are readily available through the E/S WPCF electronic document control system, including the facility's QAP and all SOPs associated with sample collection, handling, analysis, and reporting. All laboratory and field measurements collected to meet the stormwater NPDES monitoring requirements is controlled through the E/S WPCF's Laboratory Information Management System (LIMS), which has strict controlled data entry requirements and access restrictions.

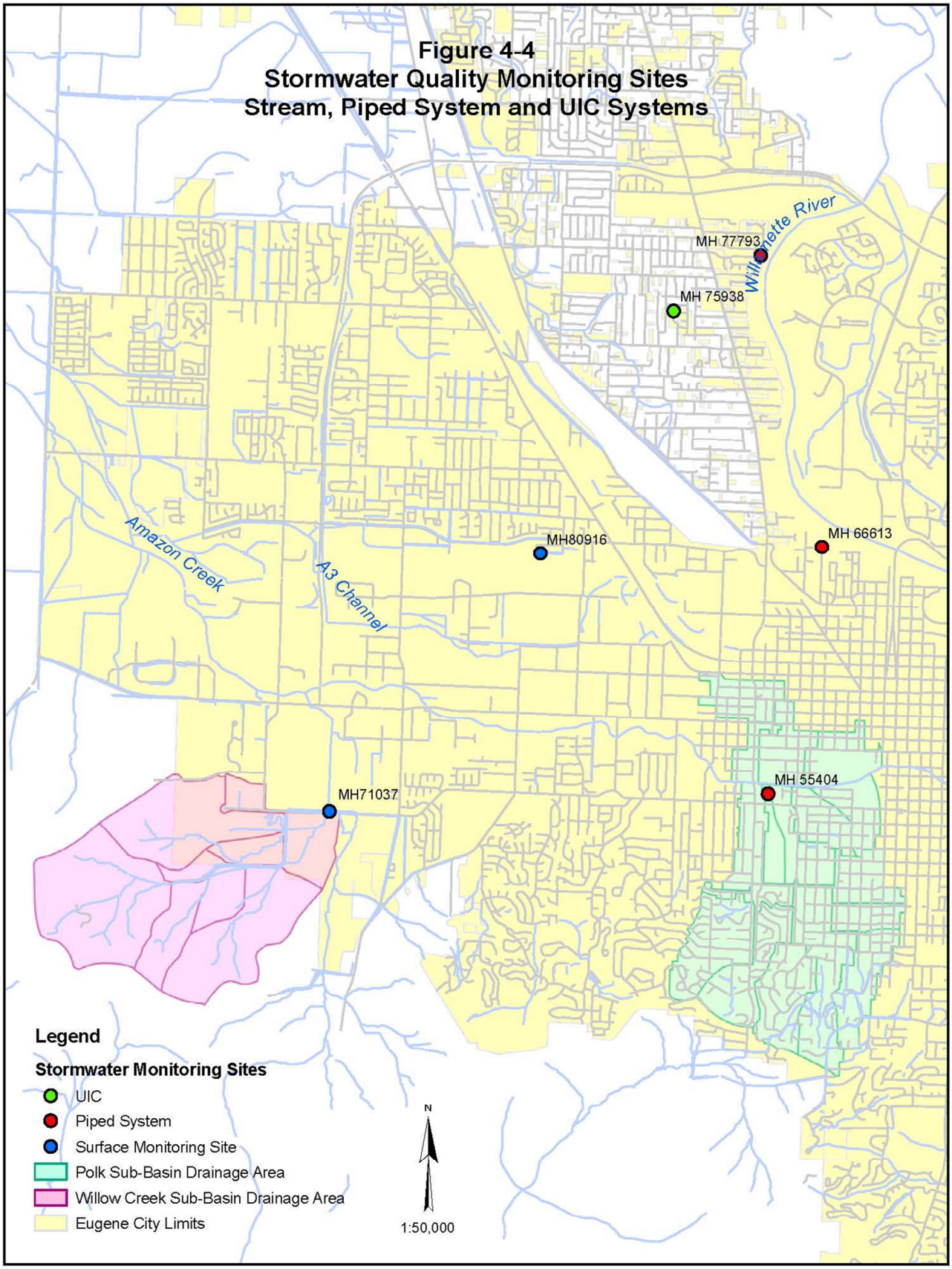


Figure 4-4
Stormwater Quality Monitoring Sites
Stream, Piped System and UIC Systems
Willamette River
MH 77793
MH 75938
MH 66613
MH80916
Amazon Creek
A3 Channel
MH 55404
MH71037
Legend
Stormwater Monitoring Sites
UIC
Piped System
Surface Monitoring Site
Polk Sub-Basin Drainage Area
Willow Creek Sub-Basin Drainage Area
Eugene City Limits
N
1:50,000

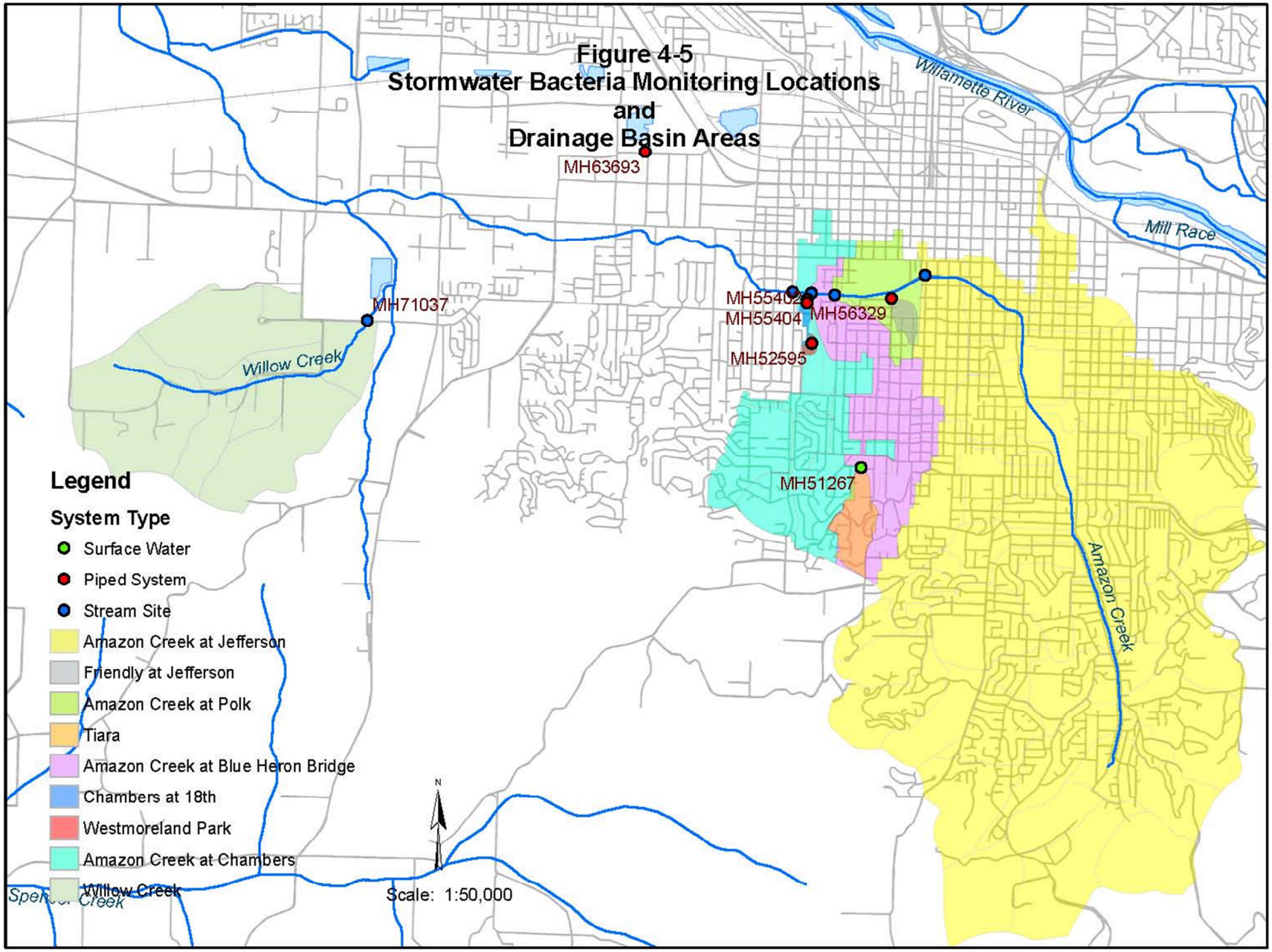


Figure 4-5
Stormwater Bacteria Monitoring Locations
and
Drainage Basin Areas
MH63693
Willamette River
Mill Race
MH71037
Willow Creek
MH55402
MH55404
MH56329
MH52595
MH51267
Amazon Creek
Legend
System Type
Surface Water
Piped System
Stream Site
Amazon Creek at Jefferson
Friendly at Jefferson
Amazon Creek at Polk
Tiara
Amazon Creek at Blue Heron Bridge
Chambers at 18th
Westmoreland Park
Amazon Creek at Chambers
Willow Creek
N
Scale: 1:50,000

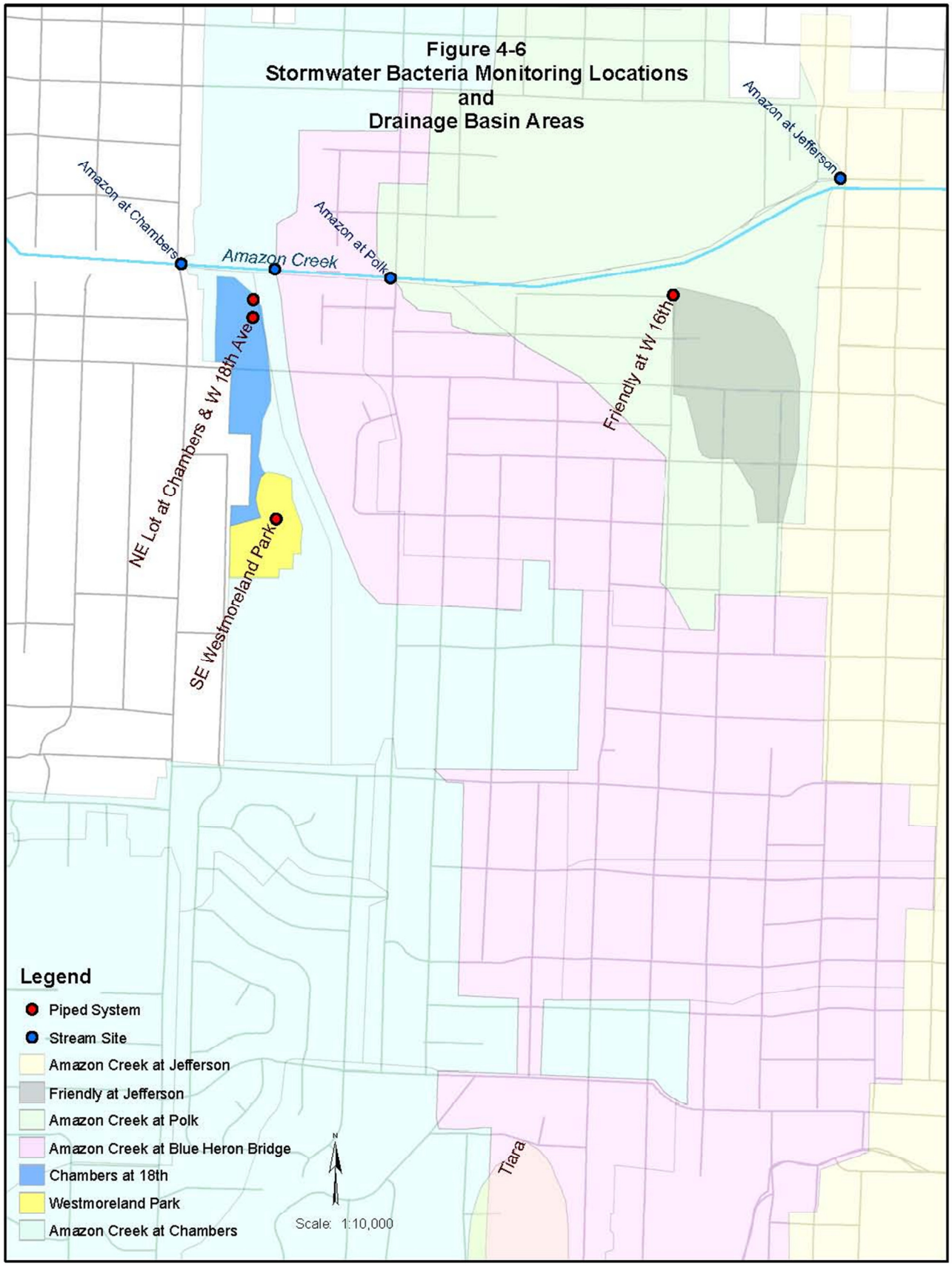


Figure 4-6
Stormwater Bacteria Monitoring Locations
and
Drainage Basin Areas
Amazon at Jefferson
Amazon at Chambers
Amazon at Polk
Amazon Creek
NE Lot at Chambers & W 18th Ave
Friendly at W 16th
SE Westmoreland Park
Tiara
Legend
Piped System
Stream Site
Amazon Creek at Jefferson
Friendly at Jefferson
Amazon Creek at Polk
Amazon Creek at Blue Heron Bridge
Chambers at 18th
Westmoreland Park
Amazon Creek at Chambers
N
Scale: 1:10,000

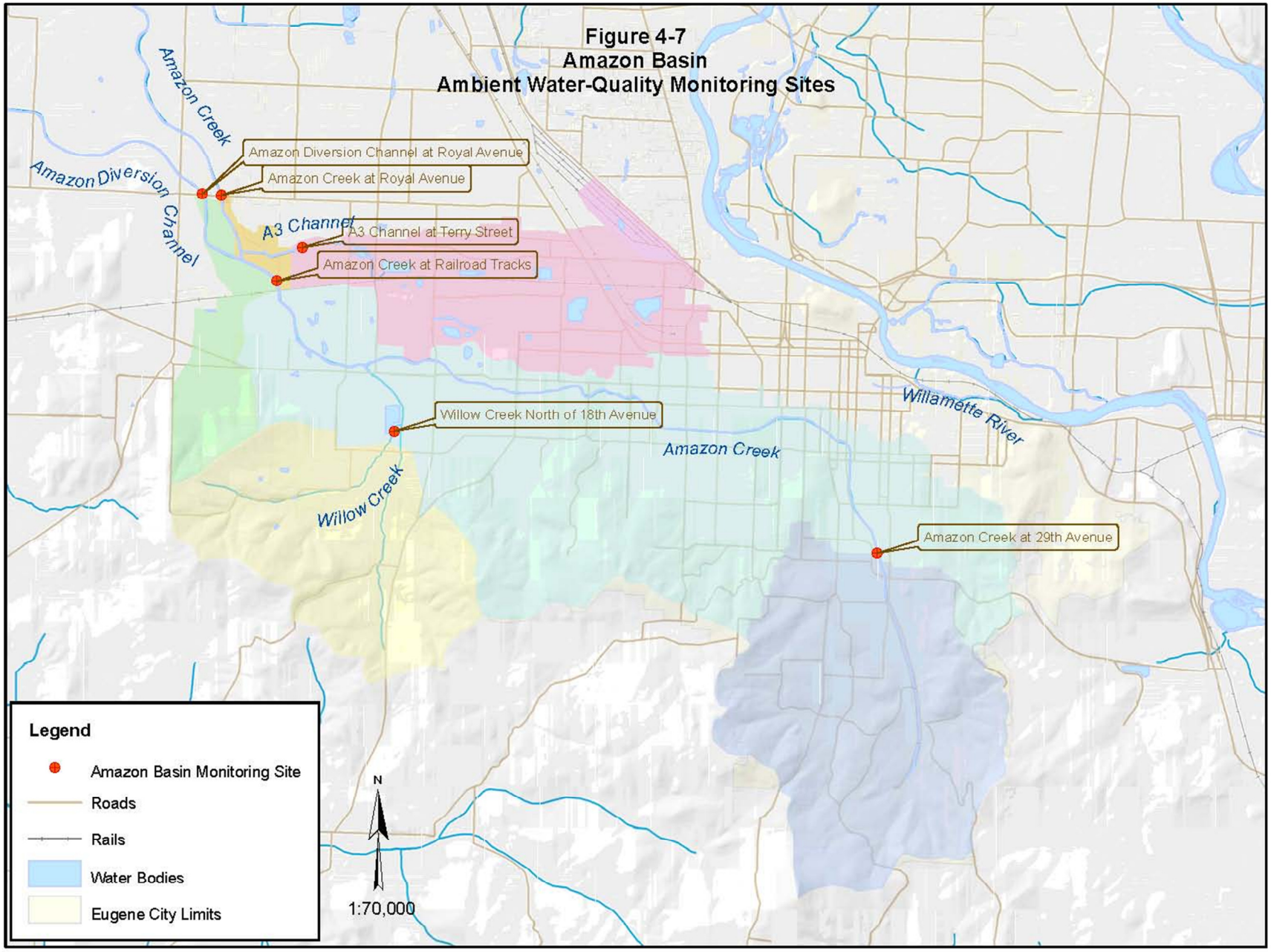


Figure 4-7
Amazon Basin
Ambient Water-Quality Monitoring Sites
Amazon Creek
Amazon Diversion Channel
Amazon Diversion Channel at Royal Avenue
Amazon Creek at Royal Avenue
A3 Channel
A3 Channel at Terry Street
Amazon Creek at Railroad Tracks
Willow Creek North of 18th Avenue
Willow Creek
Amazon Creek
Willamette River
Amazon Creek at 29th Avenue
Legend
Amazon Basin Monitoring Site
Roads
Rails
Water Bodies
Eugene City Limits
N
1:70,000

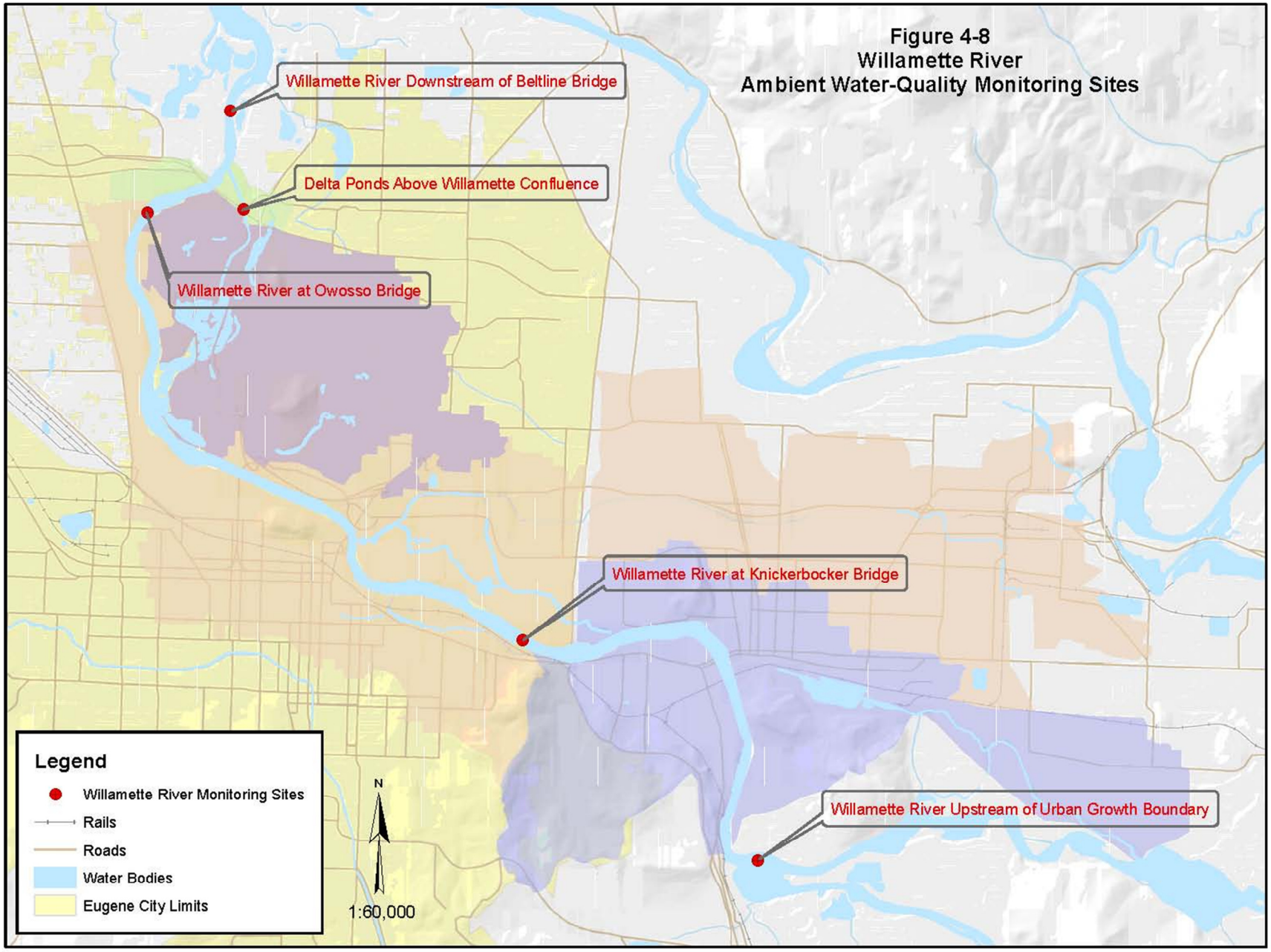


Figure 4-8
Willamette River
Ambient Water-Quality Monitoring Sites
Willamette River Downstream of Beltline Bridge
Delta Ponds Above Willamette Confluence
Willamette River at Owosso Bridge
Willamette River at Knickerbocker Bridge
Willamette River Upstream of Urban Growth Boundary
Legend
Willamette River Monitoring Sites
Rails
Roads
Water Bodies
Eugene City Limits
N
1:60,000