Department of Community Services
MULTNOMAH COUNTY OREGON

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Doug Drake
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Northwest Region Water Quality
2020 SW 4th Avenue Suite 400
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April 15, 2014

SUBJECT: Multnomah County 2014 Revised TMDL Implementation Plan

Dear Mr. Drake,

I am pleased to submit the enclosed 2014 Revised Multnomah County TMDL Implementation Plan. This submittal fulfills the TMDL requirement of the County as a designated management authority (DMA) identified in the Tualatin River TMDL, Columbia Slough TMDL, Lower Willamette River TMDL and the Sandy River Basin TMDL. The submittal is comprised of the Implementation Plan narrative, a map of TMDL subbasins for which the County is a DMA, and a matrix of implementation actions. The Revised TMDL Implementation Plan follows the County's 5-year TMDL Review Report submitted to DEQ on July 1, 2013.

Please contact Roy Iwai, Water Quality Program, at (503) 988-5050 x 28031 or by email at roy.iwai@co.multnomah.or.us if you have any questions concerning this report.

Sincerely,

Brian Vincent
Road Services Manager

Multnomah County
2014 TMDL Implementation Plan
for the Tualatin, Lower Willamette and Sandy River Basins

April 2014

Water Quality Program
Land Use and Transportation Division
Department of Community Services
Multnomah County

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1.0 INTRODUCTION

Background

Several waterbodies in Multnomah County fail to meet the Oregon state standards for water quality. These standards assure that the beneficial uses of a waterbody - swimming, fish consumption, and aquatic life - are protected. When water quality standards are not met, the waterbody is *impaired*. The Federal Clean Water Act (CWA) requires the state to develop a list of impaired waterbodies every two years; this list is referred to as the *303(d) list*, in reference to the section of the CWA. Section 303(d) also requires that the state establish a Total Maximum Daily Load (TMDL) for those impaired waterbodies. A TMDL determines pollution load reductions for each pollutant in a waterbody and requires jurisdictional authorities, known as Designated Management Agencies (DMA), to reduce the pollutant loads with a clean-up plan that addresses each pollutant.

Multnomah County is identified as a DMA in TMDL plans including the Columbia Slough (1998), the Tualatin River (2001), the Lower Willamette River (2005), and the Sandy River (2006). Reductions for several pollutants are identified in the TMDL plans, including bacteria, temperature, metals, dissolved oxygen, and several organic toxins. These pollutants come from diffuse sources, known as non-point sources, and also discrete point sources, such as stormwater outfalls.

The county has two distinct land use types: urban and rural uses. Expanding city jurisdictions within Multnomah County's urban area have substantially decreased the County's urban jurisdiction in recent years. As a result, many services related to water quality and land use protection have been transferred to the Cities of Portland and Gresham. The remaining rural areas of the County are dominated by timber harvest and agricultural uses and some rural residential development.

The County maintains responsibilities in land use planning, stormwater management, and public education within its remaining jurisdiction. The County coordinates with several partners including the State agencies that have oversight on timber and agricultural practices, and non-governmental organizations, such as watershed councils and Soil & Water Conservation Districts, on water quality issues with private landowners. Maintaining these partnerships is key to achieving pollutants load reduction.

Goals and Objectives

The overall goal of Multnomah County's TMDL Implementation Plan is to prevent, reduce, and eliminate, wherever practicable, sources of pollution to protect and restore impaired waterbodies within the County's jurisdiction and authority. This plan describes a management strategy and actions for reducing pollutant loadings from point sources (Waste Load Allocations) and non-point pollution sources (Load Allocations) within the County's jurisdiction and authority.

The County's strategy includes land use planning, monitoring, interagency coordination, public education, and road maintenance activities. This plan builds on existing County plans and ordinances that provide water quality protection. These include the County's Stormwater Management Plan, Road Maintenance and Operations Manual, Integrated Vegetation Management Plan, East and West of Sandy River Plans, and County land use ordinances. Best Management Practices (BMPs) are the basis for the County's water quality program.

Multnomah County partners with many local and state agencies to fulfill its responsibilities towards water quality protection because pollution may arise from land management activities outside its jurisdictional authority. Interjurisdictional coordination, especially in the rural area, is important to achieve long-term water quality improvement.

This plan will be implemented through an adaptive process in order to integrate new information and plan evaluations over time.

2.0 WATER QUALITY ASSESSMENT

The Department of Environmental Quality (DEQ) developed TMDLs for 303(d) listed impaired streams in the Columbia Slough, Tualatin River, Sandy River and Lower Willamette River, and their tributaries (Table 1). This plan specifically addresses the TMDL Load Allocations (LA) from discrete point sources for temperature, and Waste Load Allocations (WLA) for bacteria, dissolved oxygen, metals, and organic toxins, in the portions of the identified waterbodies, where Multnomah County has jurisdictional authority.

The sections below summarize the TMDL pollutants of concern and provide an assessment of water quality and impacts from various land uses for each sub-watershed. For a complete description of water quality, refer to the TMDL reports for the Lower Willamette River, Tualatin River, Columbia Slough, and Sandy River.

Temperature

The temperature TMDL is focused on meeting the rearing and migration criterion of 18º C for the protection of cold water salmonids. Elevated stream temperatures can induce increased fish mortality from a range of sub-lethal and lethal effects. The temperatures in Multnomah County streams exceed the fish criterion and enter the sub-lethal limit (18 – 23º C/64 -74º F) during July and August, which cause increased exposure to pathogens, negative effects on fish metabolism (impaired feeding, reproductive, and growth), and decreased food supply.

Table 1. Water quality pollutants and TMDL reduction targets for streams within Multnomah County jurisdiction.

Pollutant	Waterbody	WLA/LA	*TMDL*
Temperature	Sandy River	5.9% reduction	*Sandy*
	Gordon Creek	n/d[1]	*Sandy*
	Beaver Creek	n/d	*Sandy*
	Lower Willamette River	n/a[2]	*L. Willamette*
	Johnson Creek	51% reduction	*L. Willamette*
	Tryon Creek	n/a	*L. Willamette*
	Fairveiw Creek	n/a	*L. Willamette*
	Beaverton Creek	60% reduction	*Tualatin*
	Bronson Creek	n/d	*Tualatin*
	Rock Creek	51% reduction	*Tualatin*
	Fanno Creek	69% reduction	*Tualatin*
Bacteria	Beaver Creek	86% reduction	*Sandy*
	Johnson Creek	78% reduction	*L. Willamette*
	Springbrook Creek	n/a	*L. Willamette*
	Fairview Creek	n/d	*L.Willamette*
	Beaverton Creek	n/d	*Tualatin*
	Bronson Creek	n/d	*Tualatin*
	Rock Creek	3000org/100ml runoff	*Tualatin*
	Fanno Creek	n/d	*Tualatin*
Mercury	Lower Willamette River	27% reduction*	*L. Willamette*
DDT (and Dieldrin)	Johnson Creek	77% urban stormwater 94% nonpoint sources	*L. Willamette*
	Columbia Slough	3.24×10^{-6} kg/d	*L. Willamette*
PCB	Columbia Slough	5.3×10^{-6} kg/d	*L. Willamette*
Lead	Columbia Slough	Varies with flow	*L. Willamette*
2,3,7,8 TCDD	Columbia Slough	1.31×10^{-9} kg/d	*L. Willamette*
Dissolved Oxygen, pH, chlorophyll a	Columbia Slough	Total P, BOD varies with flow	*L. Willamette*
	Beaverton Creek	30% reduction SVS	*Tualatin*
	Bronson Creek	30% reduction SVS 0.13 mg/l Total P	*Tualatin*
	Fanno Creek	50% reduction SVS 0.13 mg/l Total P	*Tualatin*
	Rock Creek	30% reduction SVS 0.19 mg/l Total P	*Tualatin*

[1]n/d: not defined. No data analysis was conducted for small tributaries.
[2]n/a: not applicable. See details in plan regarding the particular conditions for each pollutant.
*This is guidance not a WLA

Lack of shading by riparian vegetation is one of the most significant factors influencing stream temperature in both the Sandy and Willamette basins. Effective shade is used as a surrogate measure for thermal load allocations.

Sandy River mainstem – One reach within the County (river mile 14.8 – 16.1) is identified in the TMDL where improvements in riparian vegetation could increase shade conditions. This reach consists largely of publicly-owned forest tracts. One parcel is privately owned where the County has land use authority.

Gordon Creek – Effective shade curves are provided in the Sandy TMDL to estimate shade potential. For small streams in the Willamette Valley Potential Vegetation Zone (near stream disturbance zone < 25'), the shade target is greater than 95%.

Beaver Creeks - Effective shade curves are provided in the Sandy TMDL to estimate shade potential. For small streams in the Willamette Valley Potential Vegetation Zone (near stream disturbance zone < 25'), the shade target is greater than 95%.

Lower Willamette River mainstem – The five Willamette Bridges under County jurisdiction do not significantly influence temperature in the mainstem Willamette River.

Johnson creek – Channel modifications and widening (including instream ponds), reduction of summertime flows, and lack of riparian shading are significant factors affecting temperature for Upper Johnson Creek and its tributaries within the County's jurisdiction. Much of the watershed falls under ODA jurisdiction as agricultural areas.

Tryon and Springbrook Creeks – Although there are small pockets of unincorporated County area in the Tryon Creek and Springbrook Creek watershed, they fall under the City of Portland's land use planning authority through the Urban Planning Area Agreement.

Columbia Slough/Fairview Creek – Multnomah County jurisdiction includes the Interlachen residential area on the north side of Fairview Lake. This area does not have significant potential to contribute shade to the lake.

Beaverton Creek/Rock Creek/Bronson Creek – The headwaters of these Tualatin River tributaries are located in the rural portion of unincorporated Multnomah County. At times during the summer, these headwaters have intermittent flow.

Fanno Creek – Portions of Fanno Creek headwaters are in the urban pockets of unincorporated Multnomah County. These small pockets of unincorporated County area fall under the City of Portland's land use planning authority through the Urban Planning Area Agreement.

Bacteria

Bacteria, viruses, and other harmful pathogenic microorganisms in the water can cause illness for swimmers. The bacteria, *Escherichia coli* (E. coli), are used in Oregon water quality standards as an indicator for swimming (human contact) risks. Sources of pathogens in freshwater include sewage discharge, pet wastes, livestock, and wildlife. Urban and rural runoff is a significant conduit for transporting fecal waste to waterbodies.

The reduction of bacteria needed to meet water quality standards is based on local data specific to each waterbody where available.

Johnson Creek - A 78% reduction is calculated for Johnson Creek watershed and applies to all other tributaries in the Lower Willamette subbasin. Much of this watershed in unincoporated County is in agricultural use, which falls under the jurisdiction of ODA.

Springbrook Creek – Although there are pockets of unincorporated area in Springbrook watershed, they fall under the Westside pocket agreement with the City of Portland. The area is managed by the City of Portland through their stormwater management program.

Fanno Creek - Although there are pockets of unincorporated area in Fanno Creek watershed, they fall under the Westside pocket agreement with the City of Portland. The County also maintains an intergovernmental agreement with Clean Water Services for stormwater services including street sweeping, catch basin cleaning and culvert maintenance. Fanno Creek falls under the Tualatin Watershed NPDES Phase I permit.

Beaver Creek – DEQ applied an average reduction of 86% on Beaver Creek based on measured samples. This reduction applies to both urban and rural land uses. Much of the watershed in the unincorporated County is in agricultural use, which falls under the jurisdiction of ODA.

Fairview Creek/Columbia Slough - Fairview Creek inputs 90% of the stormwater to the Columbia Slough watershed, and 10% of the bacteria. The County owns arterial roadway segments which discharge stormwater to Fairview Creek.

Beaverton Creek/Rock Creek/Bronson Creek – The headwaters of these Tualatin River tributaries are located in the rural portion of unincorporated Multnomah County. At times during the summer, these headwaters have intermittent flow.

Mercury

Mercury is a potent neurotoxin that has the potential to cause permanent damage to the brain, kidney, and developing fetus. Mercury may be present in various physical and chemical forms in the environment; the organic form, methyl mercury, represents the most bioaccumulative form found in fish tissue, and it is the most toxic form of mercury for human consumers.

Mercury is a naturally occurring element in native soils, and soil erosion is a significant source in waterbodies of the Lower Willamette River basin, contributing nearly 48% of the total pollutant load. Atmospheric deposition is also a major source of mercury, contributing approximately 42% of the total. Other minor sources include mining operations (0.6%), wastewater treatment discharge (2.7%), and industrial discharge (1.2%).

DEQ is addressing this pollutant with limited data, however the total mercury load to the Willamette River is estimated at 128.5 kg/yr. An estimated reduction of 26.4% of this load is needed to reduce the mercury levels in fish tissue to provide safe consumption of fish from the Lower Willamette River.

Lower Willamette River (including Johnson Creek) – DEQ is proposing an interim 'across the board' reduction of 27% (to account for new growth/sources) while more data is collected. Sources from the County's area include stormwater runoff from the five Willamette Bridges and soil erosion in the Johnson Creek rural headwaters.

Organic Toxins (DDT, Dieldrin, PCBs, 2,3,7,8 TCDD)

DDT (dichloro-diphenyl-trichloroethane) and Dieldrin are toxic organochlorine pesticides. Historically, DDT and Dieldrin were used extensively as agricultural insecticides and to control insect disease vectors such as mosquitoes. While DDT and Dieldrin were banned from use in 1972 and 1983, respectively, the concentrations of both pesticides in the environment (i.e., soil, water, tissue) still persist above water quality standards. Both are long-lived in soils, and by means of bioaccumulation, they are concentrated as they move up the food chain.

DDT and Dieldrin enter surface waters in Johnson Creek watershed primarily through the erosion and transport of soil. Both have a strong affinity for sediment, binding tightly to particles, and concentrations of these DDT are correlated to instream Total Suspended Sediment (TSS) and turbidity. DEQ identified TSS as a surrogate measure for DDT.

PCBs (polycyclic biphenyl) and 2,3,7,8 TCDD (tetrachloro-dibenzodioxin) were found in fish tissues along with DDT and dieldrin.

Johnson Creek – Data show that pesticide concentrations are highest in the upper watershed where rural land uses are dominant. However, stormwater from urban areas contribute through sediment transport. The reduction of DDT and Dieldrin in urban stormwater (77%) and non-point sources (94%) are needed to meet water quality standards. A TSS target of 15 mg/l was set as a surrogate for non-point sources.

Columbia Slough/Fairview Creek - The County maintains arterial roadways in Fairview. If there are erosion sources from the adjacent land use, this falls under the City of Fairview jurisdiction. NPDES permit coverage for arterial roadways in the watershed. BMPs are identified in the Stormwater Management Plan.

Lead

Modeling of lead loads indicates that stormwater is the largest contributor of lead to the Columbia Slough. However, the modeling results do not correlate with instream concentrations as expected. Existing data shows that commercial, industrial and traffic corridors contribute the largest load of lead in stormwater.

Fairview Creek/Columbia Slough – The County maintains arterial roadways in Fairview. NPDES permit coverage for arterial roadways in the watershed. BMPs are identified in the Stormwater Management Plan.

Dissolved oxygen, chlorophyll a, and pH

Several factors contribute to the deficit of dissolved oxygen on the tributaries of the Tualatin River and the Columbia Slough. Excess nutrients – nitrogen and phosphorus – can exacerbate algal growth (chlorophyll a) which can cause large diel fluctuations of dissolved oxygen and pH concentrations through aerobic respiration. Consumption of oxygen can lead to low dissolved oxygen in the water column, and increased carbon dioxide can decrease pH through the formation of carbonic acid.

Excess input of organic matter from runoff can lead to aerobic decomposition in the bottom sediments. The amount of oxygen consumed during this process is known as sediment oxygen demand (SOD) at the interface of the water and sediment, or in the water column as biological oxygen demand (BOD). SOD reductions are addressed through the allocation of settleable volatile sediment (SVS).

Temperature also has a significant impact on the dissolved oxygen concentration. High temperatures reduce the amount of oxygen that can remain dissolved in water, and also increase the respiration of biological organisms which increases the amount of oxygen consumption.

Stormwater runoff is a major contributor of nutrients and organic matter in the impaired streams. Reducing total and dissolved sediment is key to maintaining dissolved oxygen and pH concentrations instream.

Columbia Slough/Fairview Creek – The County maintains arterial roadways in Fairview. If there are erosion sources from the adjacent land use, this falls under the City of Fairview jurisdiction. NPDES permit coverage for arterial roadways in the watershed. BMPs are identified in the Stormwater Management Plan.

Beaverton, Bronson, Rock Creek – Stormwater runoff from County ditches carry sediment to the Tualatin tributaries. Erosion from agricultural areas in these watersheds is regulated by ODA.

Fanno Creek - Portions of Fanno Creek headwaters are in the urban pockets of unincorporated Multnomah County. These small pockets of unincorporated County area fall under the City of Portland's land use planning authority through the Urban Planning Area Agreement. The County also maintains an intergovernmental agreement with Clean Water Services for street sweeping, catch basin cleaning and culvert maintenance. Fanno Creek falls under the Tualatin Watershed NPDES Phase I permit.

3.0 PLAN JURISDICTION AND AUTHORITY

Multnomah County's TMDL implementation plan covers portions of watersheds identified as having polluted waters. The majority of the County's TMDL area is located in the rural areas of upper Johnson Creek and the Sandy River tributaries, Beaver Creek and Gordon Creek.

The County has jurisdiction over a very small area in the urban area. These areas are identified in the National Pollution Discharge and Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permits for the Portland and Gresham areas. Generally, the area includes five Willamette Bridges, the Interlachen neighborhood north of Fairview Lake, and several miles of arterial roads in Fairview, Troutdale and Wood Village. The County's Stormwater Management Plan defines the BMPs used to reduce pollutants in stormwater discharges covered by these permits.

The land use and road maintenance activities in the pockets of unincorporated urban land in the Portland and Gresham areas have been transferred to the respective cities in recent years. Metro's Urban Planning Area Agreement (1998) and the intergovernmental agreement with the City of Portland, known as the Westside Pocket Area Maintenance Agreement (1984), transferred urban planning activities, road maintenance and stormwater management to the City of Portland. The County transferred the maintenance of many of its roads to the City of Gresham in 1995; the remaining roads were transferred in 2006, pursuant to Senate Bill 1096.

The County maintains the authority over land use planning and stormwater management in the remaining unincorporated areas for this TMDL. Land management in the rural area outside the NPDES area is governed by Rural Area Plans, County land use ordinances and permits.

The County's major responsibilities can be summarized as follows:

- Public involvement and education
- Stormwater management in the NPDES permitted area and unincorporated rural areas
- Construction, operation and maintenance of arterial roads in Fairview, Wood Village and Troutdale
- Construction, operation and maintenance of Willamette River bridges
- Plan review for Right-of-ways in Westside pocket areas

- Land use planning and permitting in the Interlachen neighborhood of Fairview, and in the unincorporated rural areas
- Inspection and permitting of septic systems
- Riparian area management
- Toxic substance reduction in County operations

Existing County Plans related to water quality

Road Maintenance and Operations Manual

The County submitted the Road Maintenance and Operations Manual (RMOM) to the National Marine Fisheries Services for qualification pursuant to limit 10(i) (routine road maintenance) under the 4(d) rule for threatened salmon and steelhead (65 FR 42422, July 10, 2000). This program substantially complies with the Oregon Department of Transportation's *Routine Road Maintenance - Water Quality and Habitat Guide* (2009), a key reference document for the protection of endangered salmonids from road maintenance operations.

The best management practices in the RMOM are "outcome-based" focusing on avoiding and minimizing impacts from sediment, erosion, and pollutants, and maximizing opportunities to improve habitat.The RMOM features 51 maintenance activities grouped into nine maintenance categories to ensure the protection of listed species from County road maintenance practices:

1. General work (e.g., equipment maintenance, material handling)
2. Vegetation management
3. Traffic operations
4. Surface maintenance
5. Right-of-way maintenance
6. Drainage maintenance
7. Emergency work
8. Bridge maintenance
9. In-water work

Integrated Vegetation Management Plan for Right-of-Ways

The Integrated Vegetation Management Plan for Right-of-Ways (IVM) addresses safety, aesthetic, and environmental considerations related to roadside vegetation management.

The IVM is designed to provide a safe road system free of sight-hindering brush and limbs, to maintain adequate drainage and pollution control in drainage systems, and to control noxious or invasive weeds. Public safety and integrity of public facilities will be maintained, but with careful evaluation of impacts of disturbance to the environment.

Native vegetation provides important ecological functions in upland, wetland, and streamside areas. Maintaining and supporting desirable vegetation in sensitive areas is an important objective of the IVM, in addition to controlling unwanted vegetation

throughout the right-of-way (ROW). The IVM combines different methods for vegetation control in an effective and efficient strategy towards this end.

Stormwater Management Plan

The County stormwater management practices are regulated under a NPDES MS4 Phase I permit. The County has maintained permit coverage since 1995. The County's Stormwater Management Plan fulfills the requirements of the permit by implementing a comprehensive series of Best Management Practices to minimize erosion, sediment transport and illegal discharges from public road infrastructure and new development. The plan covers the following management areas:

- Public involvement and education
- Operations and maintenance
- Illicit discharge
- Structural controls
- New development
- Natural systems (Vegetation management)
- Plan management

Reports of implementation are submitted to the Oregon Department of Environmental Quality annually, and the BMPs are reviewed at end of each five-year permit cycle.

Areas under NPDES permit coverage include:

- Five Willamette River Bridges – the County maintains the Sellwood, Hawthorne, Morrison, Broadway, and Burnside Bridges across the Willamette River under the NPDES permit.

- Interlachen area – this is the neighborhood between Blue and Fairview Lakes consisting of residential development.

- Arterials in Fairview, Troutdale and Wood Village – the County maintains approximately 28 miles of arterial streets in the urban permit area. (Note: It is anticipated that the Troutdale and Wood Village arterials will be included in the Gresham/County NPDES permit when it is renewed in 2009)

Rural Area Plans

Multnomah County's TMDL Implementation Plan for the Lower Willamette and Sandy River Basins encompasses two different rural land use plan areas referred to as the East of the Sandy River Rural Plan Area and the West of the Sandy River Rural Plan Area. Each of these two areas contains separate comprehensive plan policies which implement distinct zoning regulations tailored to meet the goals of the individual unincorporated rural area.

The East of Sandy River Rural Plan Area is mountainous, located between the Columbia River Gorge National Scenic Area and the southern County boundary in eastern Multnomah County. The area is generally characterized by natural and commercial timber forests, much of which is within the Mt. Hood National Forest. The western-most portion of this plan area contains a variety of land uses including forest, agricultural, rural residential, and the Springville rural center. In 2002, the East of Sandy River Rural Plan Area contained 731 dwellings. Notable drainages in this plan area include the Sandy River, Big Creek, Howard Creek, Buck Creek, Gordon Creek, Smith Creek, Pounder Creek, Knieriem Creek, Latourell Creek, Trout Creek, Cat Creek, Thompson Creek, Bridal Veil Creek, Donahue Creek and Young Creek.

The West of Sandy River Rural Plan Area is less mountainous than the East of Sandy plan area and is typically characterized by rolling hills. The West of Sandy plan area is bounded on the east and north by the Sandy River, on the south by Clackamas County and on the west by the city limits of Gresham and Troutdale. The plan area encompasses approximately 9,610 acres. Two unincorporated rural communities, Orient and Pleasant Home, are located within this area. The plan area is characterized by rural agricultural land including nurseries, berry farms and pastures with rural style residential development common throughout the area. As of 2002, the West of Sandy River Rural Plan Area contained 1,234 dwellings. Notable drainages in this plan area include the Sandy River, Beaver Creek, Kelly Creek and Johnson Creek.

Zoning in both these unincorporated areas of the watershed requires that new parcels divided under current regulations meet relatively large minimum lot sizes, ranging from 5 to 80 acres in most cases. Over 90% of the land area in the two rural planning areas of the lower Sandy basin is zoned for either farm or forest resource use, with minimum parcel sizes of 20 to 80 acres. Due to these large parcel size requirements, partitions have become relatively infrequent.

Regulation of land uses and development is subject to rules promulgated by several entities, including the State of Oregon Department of Land Conservation and Development (DLCD), Oregon Department of Agriculture (ODA), Oregon Department of Forestry (ODF), Metro, and the County. As noted above, much of this unincorporated land is in either agricultural or forest use. Multnomah County is precluded from regulating any effects to water quality from farm or forest activities on these lands. The County does regulate development associated with other land uses such as new dwellings in these areas to protect water quality. As is the case with partitions, the amount of new development in these areas is relatively low due to the farm or forest resources zoning.

The plan for the West of Sandy River area also includes a Statewide Planning Goal 5 program to protect riparian corridors and wildlife habitat using a watershed approach that extends protection to intermittent streams. In this case, a Significant Environmental Concern (SEC) overlay protects riparian corridors, and a 200-foot riparian buffer or management area is set to minimize development impacts. The SEC overlay zone incorporates the Metro Title III provisions that require mitigation in the form of re-establishing or extending vegetated corridors as a condition of development approval.

All ground disturbing activities (>10,000 square feet) associated with construction within 200-feet of a water body are regulated through the county's Grading and Erosion Control provisions.

The County has completed a Goal 5 riparian corridor protection plan on the east side of the Sandy River. In the East of Sandy River plan area, development of new residential uses within 150' of designated significant streams is prohibited, and other development is limited by the adopted policy. The County also has a Hillside Development Overlay zone in place county-wide. This zone requires geotechnical review for development in areas with slopes steeper than 25%, and includes vegetation protection and replacement requirements. Property on the east side is also subject to County grading and erosion control ordinances.

Through the Rural Area Plans, and implementing zoning rules, Multnomah County regulates the protection of streams and watersheds through specific requirements for Riparian Area Management on private and public property. Policies provide incentives, consistent with current zoning, for new development, which is compatible with and enhances significant streams and adjoining riparian habitat. The County does not own or maintain public lands with stream or riparian areas outside of the road right-of- way. Therefore, stream enhancement by the County is limited to the few access points within the right-of-way. However, the County regulates certain activities on public land, such as development in public parks, unless those activities are exempt, such as farm and forest use.

Toxics Reduction Strategy

The *Toxics Reduction Strategy* was adopted in May 2006 by both Multnomah County and the City of Portland as a plan for minimizing toxic substances of concern in government operations. The goal is to use the "precautionary principle" as a framework to replace toxic substances, materials or products of concern with viable least-toxic alternatives by 2020.

Multnomah County Organization

The TMDL Implementation plan is managed by the Water Quality Program within the Department of Community Services, Land Use, Planning and Transportation Division. Water quality protection is a function of several sections within the County organization:

- Land Use Planning
- Transportation Planning
- Road Engineering and Maintenance
- Bridge Maintenance and Engineering
- Code Compliance
- Sustainability

Figure 2. County Organizational Chart (Shading indicates a significant role in TMDL implementation)

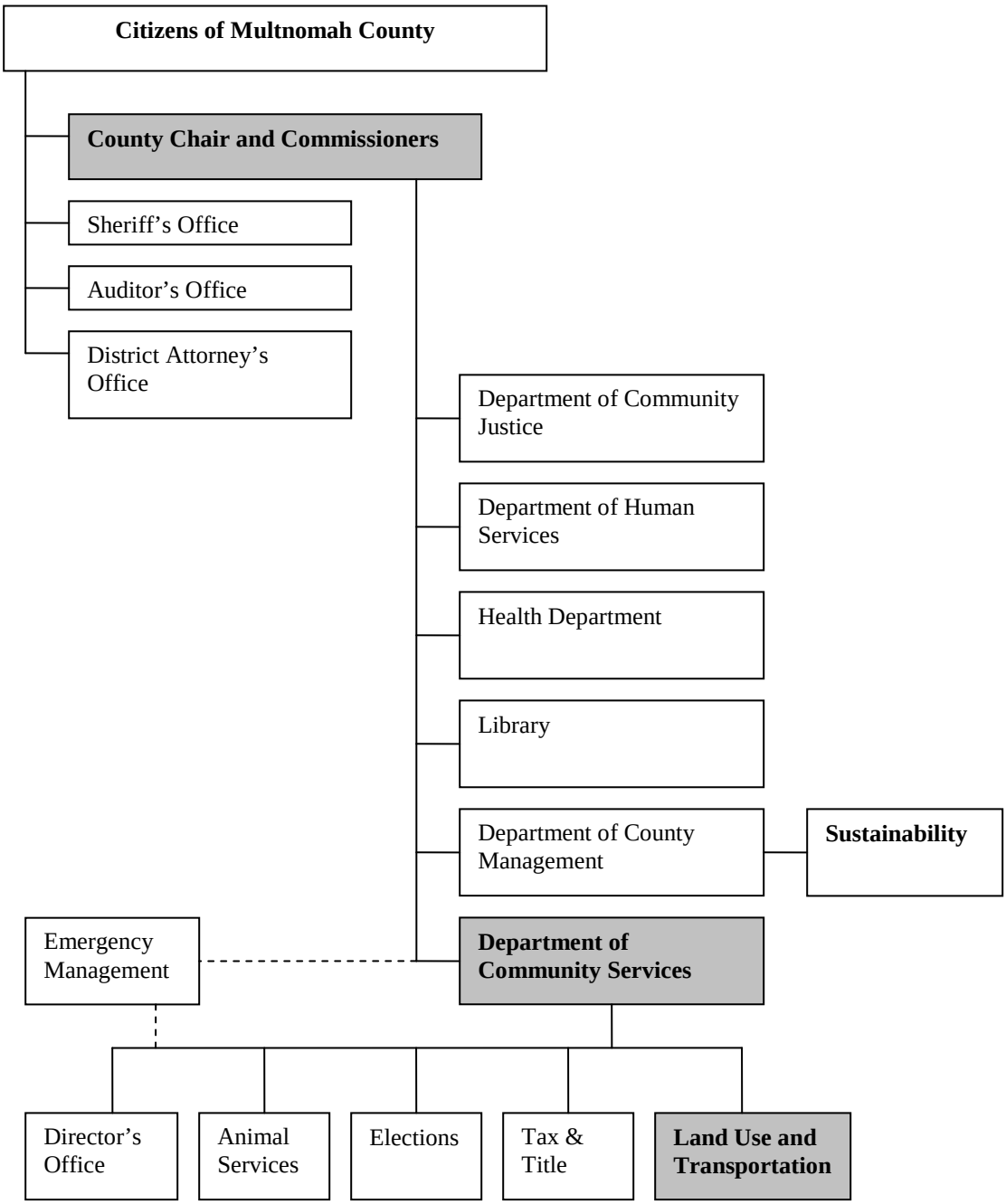
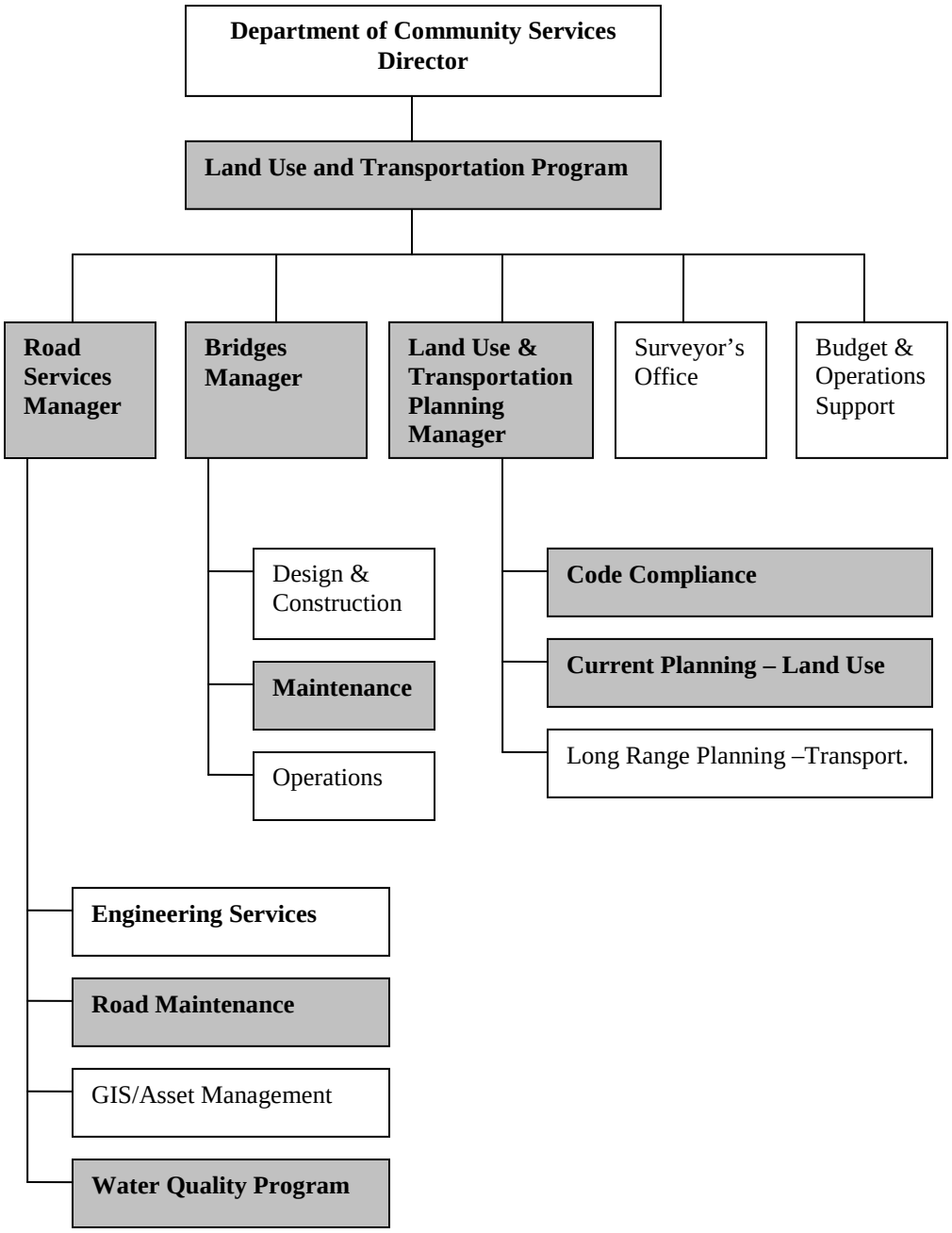


Figure 3. Land Use and Transportation Program Organizational Chart. (Shading indicates a significant role in TMDL implementation.)



The Maintenance sections and Code Compliance section have a significant "on-the-ground" function, while Land Use Planning issues permits to prevent water quality issues. The County's Sustainability Program plays a role through implementation of the County's internal Toxics Reduction Strategy. Figures 2 and 3 show the organization of the County and the Land Use, Planning and Transportation Division, respectively.

Compliance with Land Use Requirements

Oregon has established a strong statewide program for land use planning, originally established in 1973. The foundation of that program is a set of 19 Statewide Planning Goals. The goals express the State's policies on land use and on related topics, such as citizen involvement, housing, natural resources (Goal 5) and water quality (Goal 6). Oregon's statewide goals are achieved through local comprehensive planning.

State law requires each city and county to adopt a comprehensive plan and the zoning ordinances needed to put the plan into effect. The local comprehensive plans must be consistent with the Statewide Planning Goals. Plans are reviewed for such consistency by the State's Land Conservation and Development Commission (LCDC). When LCDC officially approves a local government's plan, the plan is said to be "acknowledged." It then becomes the controlling document for land use in the area covered by that plan. As required by state law, Multnomah County has incorporated these planning goals into an overarching Comprehensive Plan for the county which provides generalized and coordinated policy statements interrelating all functional and natural system management programs. Part of the County's Comprehensive Plan includes the Rural Area Plans, which function as a decision making guide with regard to land use, capital improvements, and physical development (or lack thereof) of the community. These plans are tailored to meet the needs of the individual rural area.

The County has adopted Zoning Ordinances which codify the policies of the Comprehensive Plan. Multnomah County Code Chapter 35 applies to the East of the Sandy River Rural Plan Area and Chapter 36 to the West of the Sandy River Rural Plan Area. Chapter 37 provides the administration and procedures that shall be followed throughout the review process for both areas. Development Chapters 35 and 36 are very specific and provide minimum required best management practices that must be followed for various types of projects in order to assure protection of the identified natural resources.

As required by state law, Multnomah County's Comprehensive Plan has been reviewed and was acknowledged on July 24th, 1980 by the State of Oregon LCDC to be compliant with statewide planning goals. More specifically, The East of the Sandy River Rural Area Plan portion of the Comprehensive Plan was most recently updated and adopted by the Board of County Commissioners July 10th, 1997. Similarly, the West of the Sandy River Rural Area Plan was most recently reviewed and adopted by the Board December 12th, 2002. Below is a brief summary of the most relevant sections of the Comprehensive Plans and Zoning Ordinance as they deal with water quality impacts.

Water quality impacts are regulated through the County's Grading and Erosion Control (GEC) ordinance Chapter 29.330 *et seq.* for the East of Sandy River Area, and Chapter 29.350 *et. seq.* for the West of the Sandy River Rural Plan Area. These regulations are drafted to provide a buffer between ground disturbing activities and any water body, minimize the area of soil disturbance, stabilize the site quickly and avoid off-site transport of turbid water or any effects of hydraulic scouring associated with the project.

Similarly, water quality impacts are also regulated through the county's Hillside Development (HD) ordinance Chapter 33.5500 *et. seq.* for the East of Sandy River Rural Plan Area and Chapter 36.5500 *et. seq.* for the West of Sandy River Rural Plan Area. In addition to considering water quality impacts much like the GEC ordinance, the HD ordinance also focuses on the effects of steep terrain on the construction project. Specifically, the effects of slope stability from a geotechnical perspective are evaluated within the HD permit. In addition to loss of life and property, slope failures can also create water quality concerns.

The purposes of the GEC and HD ordinances are, in part, to implement elements of Framework Plan Policy Number 14 (Development Limitations) and the Drainage Provisions of Plan Policy Number No. 37 (Utilities) – (MCC 29.3300/29.350 & MCC 33.5500/36.5500).

Policy 14

The County's policy is to direct development and land form alterations away from areas with development limitations except upon a showing that design and construction techniques can mitigate any public harm or associated public cost and mitigate any adverse effects to surrounding persons or properties. Development limitations areas are those which have any of the following characteristics:

- *A. Slopes exceeding 20%;*
- *B. Severe soil erosion potential;*
- *C. Land within the 100 year flood plain;*
- *D. A high seasonal water table within 0-24 inches of the surface for 3 or more weeks of the year;*
- *E. A fragipan less than 30 inches from the surface;*
- *F. Land subject to slumping, earth slides or movement.*

Policy 37

- *E. Shall have adequate capacity in the storm water system to handle the run-off; or*
- *F. The water run-off shall be handled on the site or adequate provisions shall be made; and*
- G. *The run-off from the site shall not adversely affect the water quality in adjacent streams, ponds, lakes or alter the drainage on adjoining lands.*

Water quality impacts are also considered through the County's Significant Environmental Concern (SEC) ordinance Chapter 35.4500 *et seq.* for the East of Sandy River Area, and Chapter 36.4500 *et. seq.* The purpose of the SEC regulations are to protect, conserve, enhance, restore, and maintain significant natural features which are of public value, including among other things, river and stream corridors, streams, lakes and islands, flood water storage areas, natural shorelines and unique vegetation, wetlands, wildlife and fish habitats, significant geological features, archaeological features and sites, and scenic views and vistas, and to establish criteria, standards, and procedures for the development, change of use, or alteration of such features or of the lands adjacent thereto (MCC 36.4500 *et. seq*.)

More specifically, in the East of Sandy Rural Plan Area, the SEC regulations protecting significant stream features require that the proposal enhance the protected habitat, requires subsurface storm water disposal (e.g., dry wells or other best management practice methods) and limits soil disturbing activities within a Stream Conservation Area to a period between June 15 and September 15 to minimize erosion/sedimentation potential (MCC 35.4575). In the West of the Sandy River area, the SEC regulations require an encroachment alternatives analysis to be performed if the use must encroach significantly into the protection area. Development standards require minimizing the removal of vegetation and a significant mitigation plan to be implemented to not only restore, but to enhance the riparian corridor (MCC 36.4555).

The purpose of the SEC ordinances are, in part, to implement elements of Framework Plan Policy Number 16D (Fish and Wildlife Habitat), 16E (Natural Areas) & 16G (Water Resources and Wetlands) - (MCC 35.4500 & 36.4500).

POLICY 16-D: Fish and Wildlife Habitat

It is the County's policy to protect significant fish and wildlife habitat, and to specifically limit conflicting uses within natural ecosystems within the rural portions of the County and sensitive big game winter habitat areas.

Strategies

A. *Utilize information provided by the Oregon Department of Fish and Wildlife to identify significant habitat areas, and to delineate sensitive big game winter habitat areas. If necessary, supplement this information with additional professional analysis to identify additional significant habitat areas and natural ecosystems within rural portions of the County.*

B. *Apply the SEC overlay zone to all significant habitat areas not already zoned Willamette River Greenway.*

C. *Include provisions within the Zoning Ordinance to review development proposals which may affect natural ecosystems within the rural portions of the County and sensitive big game winter habitat areas.*

POLICY 16-E: Natural Areas

It is the County's policy to protect natural areas from incompatible development and to specifically limit those uses which would irreparably damage the natural area values of the site.

Strategies

A. Utilize information from the Oregon Natural Heritage Program to maintain a current inventory of all ecologically and scientifically significant natural areas.
B. *Apply the SEC overlay zone to all areas not otherwise protected by Willamette River Greenway zoning or outright ownership by a public or private agency with a policy to preserve natural area values of the site.*

POLICY 16-G: Water Resources and Wetlands

It is the County's policy to protect and, where appropriate, designate as areas of significant environmental concern, those water areas, streams, wetlands, watersheds, and groundwater resources having special public value in terms of the following:

A. Economic value;
B. Recreation value;
C. Educational research value (ecologically and scientifically significant lands);
D. Public safety, (municipal water supply watersheds, water quality, flood water storage areas, vegetation necessary to stabilize river banks and slopes);
E. *Natural area value, (areas valued for their fragile character as habitats for plant, animal or aquatic life, or having endangered plant or animal species).*

4.0 MANAGEMENT STRATEGIES

Multnomah County fulfills its responsibility towards preventing and reducing water pollution by implementing county-wide BMPs and basin specific actions. Because the County's authority is limited by land uses and intergovernmental agreements for service, the County relies on partnerships with other DMAs and non-regulatory organizations to reduce pollutants and achieve its goal for water quality in impaired waterbodies.

In the rural areas, agriculture and forestry land uses predominate, and the County does not have regulatory authority. The regulatory authorities are the Oregon Department of Forestry (ODF) for forestry activities and the Oregon Department of Agriculture (ODA) for agricultural practices. The County supports these state agencies by identifying potential regulatory violations through visual observations or water quality information. The County also participates in the biennial reviews of Agricultural Water Quality Management Area Plans for the Lower Willamette and Sandy River Basins as part of their respective Local Advisory Committees. These agricultural water quality plans serve as the TMDL Implementation Plans for rural land uses.

To implement on-the-ground projects, the County relies on the partnership with the East Multnomah Soil & Water Conservation District (EMSWCD) and West Multnomah Soil & Water Conservation Districts (WMSWCD), which provides landowner assistance on BMP design and installation. The Sandy River Watershed Council and Johnson Creek Watershed Council also work with landowners in a similar capacity as the SWCDs, with an emphasis on riparian restoration and education. For septic issues, the County partners with the City of Portland Sanitary program.

The following sections in this plan describe the pollutant sources and pollutant reduction strategies in detail, with attention given to the responsible parties within the county organization and partnering agencies. Appendix B is a detailed table of County implementation actions for each pollutant, including timelines for action.

Temperature

Solar Loading and Lack of Shade

Increased solar radiation from the modification and removal of native riparian vegetation is one of the causes of increased temperatures in County streams. While there are no public lands along the riparian areas for which the County has responsibility (shade trees cannot be planted in the rights-of-way because safety concerns over sight distance), the County protects riparian areas in private land through land use development codes and ordinances. The County also partners with local jurisdictions, such as through the Beaver Creek Conservation Partnership and the Interjurisdictional Committee of Johnson Creek, to identify restoration opportunities. Outreach work to inform landowners of the benefits of riparian vegetation and on-the-ground restoration work is conducted by partner agencies and non-profits.

The County Land Use services implements protection of stream and watersheds through specific requirements for riparian area management through the County's Rural Area Plans. County land use policies reduce impacts to the natural resource by minimizing development encroachment towards the protected water body, by protecting existing riparian vegetation and requiring native vegetation across the landscape. The Hillside Development and Erosion Control (HD) Ordinance (MCC. 33.5500) requirements for new development require essentially a 100-foot setback from a riparian area for any land-disturbing activity in the watersheds, whenever possible. The HD code provides riparian area mitigation standards that must be followed in the event a buffer must be disturbed.

Specific Best Management Practices referenced within these development regulations include:

- the use of alternative development analyses - MCC 36.4555(A)-(C),
- preservation of contiguous riparian area vegetation - 36.4555(D)(3),
- removal of existing nuisance plants - 36.4555(D)(6),
- prevention of un-regulated storm water facility discharges into a stream- 36.4555(D)(8) & 36.5520(A)(1)(d),
- and compensatory mitigation plantings ranging from 1:1 – 2:1 - Natural Resource Creation : Natural Resource Degradation, 36.4555(D)(2).

Bacteria

Illicit Discharge Detection and Elimination from stormwater

An Illicit Discharge Detection and Elimination program for the urban portion of the County is in place through the NPDES MS4 permit stormwater management program. High risk outfalls are inspected annually for dry weather flow, smell or visual cues, and water quality sampling if necessary. A response plan is also in place if illegal discharge is found. Refer to the County's NPDES program for details.

Septic Systems

Failing systems are both a health hazard and a potential environmental hazard in the rural area. The City of Portland administers the County's sanitary system program throughout the County through an intergovernmental agreement. The Portland Sanitary Program assures proper installation, maintenance and repair of septic systems in Unincorporated Multnomah County. The City of Portland is responsible for enforcement of unresolved septic system failures.

Failing septic systems near County roads are most easily identified during road maintenance activities when staff is in contact with contaminated sediment during ditch and catch basin cleaning. Road maintenance crews are trained to identify suspicious materials and coordinate with the County Water Quality Program for follow up.

Identifying failing septic systems through instream water quality monitoring on the other hand is very difficult. Efforts to collect reach scale E.coli data and identify unique sources using host specific bacteroides markers conducted in Johnson Creek in 2012 yielded unclear results. The obfuscation by different mammal sources and the inconsistency of detection makes follow up a challenge. Dilution of optical brighteners, surfactants and other chemical markers makes use of these other chemical markers challenging. Because of these challenges, new monitoring strategies are needed.

Livestock and agricultural practices

Livestock management fall under the jurisdiction of the ODA's Agricultural Water Quality Program. As we are notified of problems by the public or find related issues to agricultural activities during routine road maintenance, we submit inquiries through the ODA Water Quality Complaint system. The County assists and coordinates with the EMSWCD to distribute outreach materials on land management.

Pet waste

Pet waste is known to be a significant contributor of fecal bacteria. As this is a regional issue, the County coordinates with the Coalitions for Clean Rivers and other regional efforts for the development of educational materials and outreach to the public. The County works with local agencies and non-profits to disseminate materials to local landowners and the general public within the County's jurisdiction.

Illegal Dumping

Garbage, yard debris, RV wastewater and other types of illegal dumping may be a source of bacteria. The County's Road Right-of-Way Inspectors and the Health Department's Nuisance Code Enforcement Officer monitor the right-of-way for illegal dumping. Once alerted, Transportation road maintenance supervisors address non-hazardous dumping with assistance from the Sheriff's Office In-mate work crew program.

Illegal dumping on private property is covered under the solid waste nuisance ordinance that is administered and enforced by Nuisance Code Enforcement Officer. Information and notification of illegal dumping may be reported to Land Use Code Compliance for further action. Code Compliance implements the ordinance on a priority basis.

Illegal dumping from floating homes, boats, and marinas may occur in the Multnomah Channel. County building codes are needed to ensure that the County has permitting authority for floating homes. DEQ has regulatory authority through WPCF permits for large septic systems at marinas. Research is needed to evaluate whether new codes requiring pump out stations would be an effective means to reduce wastewater discharge from boats.

Stormwater runoff

Fecal bacteria sources of birds and mammals are carried with stormwater in the rural and urban area. Stormwater is managed through a variety of BMPs in the County's Stormwater Management Plan for the NPDES stormwater permit.

Sediment reduction (Mercury, lead, organic toxins, and nutrients)

Erosion from non-point sources (agricultural Areas)

The County does not have authority to regulate agricultural practices, and relies on the authority of ODA and technical assistance from EMSWCD to reduce erosion on agricultural lands. The County routinely inspects activities in the right-of-way, and notifies ODA of any potential problems.

Erosion and runoff from roads and urban areas

The County's Stormwater Management Plan and Road Mainteanance and Operations Manual contain a comprehensive suite of BMPs to reduce erosion and sediment transport from the public right-of-way. The BMPs likely to influence the transport of toxics into waterbodies are presented in Appendix A.

Some detail on the most significant actions is presented below:

- Ditch Maintenance in the rural area

  County roadside ditches are a potential conduit for pollutants in County waterbodies (county-wide). The goal of this program is to ensure that road ditches function as required for conveyance and do not add pollutants to waterways. The County has adopted routine maintenance BMPs to allow the ditches to function as intended and reduce erosion from the ditch. The BMPs include reseeding ditches with grass seed, the use of check dams and straw cover, and "skip ditching" where portion of vegetated ditch are alternately scheduled.

- Bridge maintenance

  Stormwater treatment devices have been installed on the Morrison, Broadway and Burnside bridges in recent years as capital improvements were made. The devices use filter cartridges to remove sediment and are maintained by the Transportation Division. The City of Portland cleans the conventional catch basins on the bridge spans and also provides street sweeping services.

- Catch basin and street sweeping

  The County adaptively manages catch basin cleaning to maximize effectiveness in coordination with street sweeping. Estimates of the catch basin fullness are

recorded and analyzed using GIS mapping software and catch basin cleaning frequency and timing are adjusted before the devices lose their sediment trapping effectiveness.

Erosion Control from new development and redevelopment

The Hillside Development and Erosion Control Ordinance (MCC. 33.5500) requirements for new development require essentially a 100-foot setback from a riparian area for any land-disturbing activity in the Sandy Basin.

The Grading and Erosion Control Ordinance (GEC) applies for most "ground-disturbing activities" through plan review and inspections. The County Planning Division requires Hillside Development (HD) or GEC Permits for grading, clearing or fill on any sites within its jurisdictional authority.

HD and GEC Permits standards require temporary and permanent erosion control and water quality protection during construction stages and for long term site stability and mitigation. Inspections are performed by Land Use Planning staff for large grading projects and Right-of-Way inspectors perform inspections for the "minimal impact" projects. Each inspection receives either a pass or fail.

An erosion control review is required by the County whenever:

- 10,000 square feet of ground disturbing activity, or
- Areas disturbed < 200 feet from top of bank of watercourse, or Pre-development slopes are > 10 % , or
- Post construction; unsupported slopes > 33% that exceed five feet in height.

Mercury reduction from County Operations

Through the Toxics Reductions Strategy, a program developed jointly with the City of Portland, several actions are currently implemented to reduce mercury from County operations. The County will begin purchasing alternative products that contain less or no mercury, including low-mercury fluorescent lamps and mercury-free thermostats and switches in vehicles and equipment. The County will also recycle products containing mercury, including all mercury-containing light tubes and non-alkaline batteries, and ensure best management practices be followed for the recycling of electronic waste. In addition, County dental clinics are currently installing dental amalgam separators to prevent mercury disposal into the wastewater stream, ahead of the required deadline.

5.0 MONITORING, COORDINATION, AND REPORTING

The implementation activities are continuously reviewed as new information or data become available. These changes are addressed in the TMDL Annual Report. The Implementation Plan will be updated every 5 years to reflect changes in strategy based on this new information.

Implementation monitoring and reporting

The County will submit the annual TMDL report in conjunction with the annual NPDES report. Implementation of this plan will be tracked using the Plan matrix (Appendix B). A narrative of water quality data analysis, follow up investigations, and resolutions will also be prepared for the annual report. For BMPs included in the Stormwater Managemnet Plan, those efforts will be documented in the NPDES annual report.

Watershed coordination and monitoring

Interjurisdictional coordination is a key element to the successful implementation of County TMDL program. Watershed coordination efforts include three different workgroups as described Table 2.

The County contracts chemical and biological monitoring with the City of Gresham through an IGA tied to NPDES and TMDL programs. Monitoring includes ambient instream water quality samples for Beaver and Fairview Creek. Water samples are analyzed for fifteen constituents including metals, nutrients, and bacteria. Macroinvertebrate monitoring is also conducted annually in Beaver and Fairview Creek. Refer to the County's NPDES MS4 Phase I permit for additional details.

Adaptive management

The effectiveness of this plan relies on the effective the coordination of partnering agencies to reduce pollutants in the TMDL waterbodies, and a review of environmental and programmatic data and information. The County seeks to use and share information with partnering agencies and consider their feedback in revising or modifying actions in this plan. The adaptive strategy will increase plan effectiveness, efficiency, and cost-effectiveness, while working toward achieving pollutant reductions.

Table 2. Interjurisdictional coordination for TMDL implementation.

	Partners	*Activities*
Interjurisdictional Committee of Johnson Creek	Metro City of Portland City of Gresham ODFW DEQ ODA US Geological Survey City of Milwaukie City of Damascus Johnson Creek Watershed Council EMSWCD Clackamas Soil & Water Conservation District Clackamas Water Environment Services Multnomah County	Watershed wide temperature monitoring Watershed wide bacteria monitoring Watershed wide flow monitoring Watershed wide macroinvertebrate monitoring Watershed wide fish survey Riparian restoration prioritization Culvert replacement prioritization
Beaver Creek Conservation Partnership	Metro EMSWCD City of Troutdale City of Gresham ODA ODFW DEQ SOLVE Sandy River Basin Watershed Council Mount Hood Community College Multnomah County	Watershed wide temperature monitoring Watershed wide bacteria monitoring Watershed wide macroinvertebrate monitoring Watershed wide fish survey Flow monitoring (1 gauge) Riparian restoration coordination Culvert replacement prioritization Community outreach strategy
West Multnomah County coordination	WMSWCD Metro USDA-NRCS ODFW Multnomah County	Community outreach Water quality monitoring Macroinvertebrate monitoring Riparian restoration Fish passage assessment

6.0 PLAN MANAGEMENT AND FUNDING

The Water Quality Program of the Road Services Division of the Department of Community Services is responsible for the coordinated implementation of the TMDL plan. Water Quality Program staff assists Division managers and County staff with technical questions, implementation challenges, and program tracking. The Water Quality Program manages compliance with the Endangered Species Act, NPDES MS4 Phase I Stormwater permit, and TMDL plans.

County Road Services funding solely consists of State Road Funds: a portion of State Motor Vehicle funds and a portion of a County gas tax. Existing funding for the Water Quality Program consists of one full-time staff, GIS mapping resources, limited water

quality monitoring, and additional programmatic costs. General funds are budgeted to support the Land Use Planning and Nuisance Code Enforcement programs. We do not expect additional funding needs to implement the TMDL plan during 2014 – 2019.

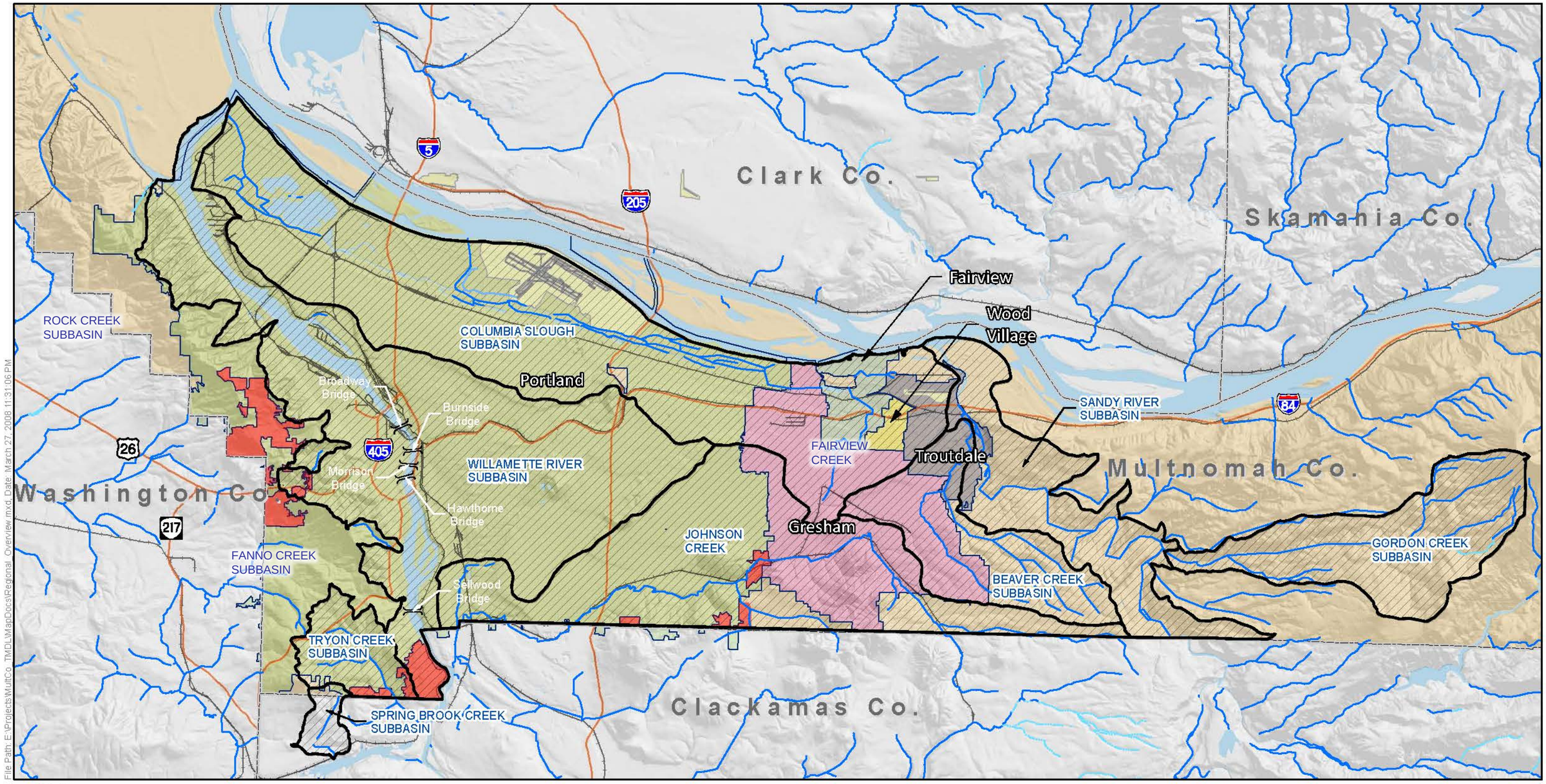
7.0 PLAN SUMMARY

The Multnomah County TMDL Implementation Plan addresses actions to reduce pollutants in the streams identified in the Lower Willamette and Sandy River Basin TMDLs. Pollutants identified in the TMDL include bacteria, temperature, dissolved oxygen, pH, metals and organic toxins. The County priority is to coordinate and lead water quality investigations and actions in partnership with government agencies and non-governmental groups in order that water quality standards are met in the polluted streams. The Water Quality Program in the Department of Community Services Road Services Division manages the TMDL Implementation Plan.

The County will focus on its existing programs to prevent and control erosion through land use regulations, reduce pollutant contributions from stormwater with a Stormwater Management Plan and Road Maintenance and Operations Manual, and reduce mercury waste through the Toxics Reduction Strategy. The Water Quality Program coordinates with the Land Use Planning, Transportation Planning, Road and Bridge Maintenance sections within the department, and with the County Sustainability Program towards this end.

The County also intends to collect, analyze and share water quality data and field observations to develop partnerships that lead to clean up actions. In the rural areas, partnerships with the Oregon Department of Agriculture, Oregon Department of Forestry, local Soil & Water Conservation Districts and watershed councils is essential, because the County does not have regulatory authority over agricultural and forestry activities. The partnership with the City of Portland Development Services is needed to resolve on-site septic system issues.

The County will manage the TMDL Implementation Plan adaptively by collecting, reviewing and sharing environmental and programmatic data and information. Plan modifications through this feedback will increase plan effectiveness to protect and restore impaired waterbodies within the County's jurisdiction and authority.



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Watersheds

Unincorporated Multnomah County

Unincorporated Multnomah County Under Portland Stormwater Management and Land Use Planning Authority

Multnomah County Willamette River Bridges

March 28, 2008

N

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Appendix A
Multnomah County TMDL Watersheds
Lower Willamette and Sandy River Basin
TMDL Implementation Plan

APPENDIX B. Table of Management Strategies

Temperature (Shade)

Sandy River Watershed - Sandy River, Gordon Creek, Beaver Creek
Lower Willamette River Watershed – Johnson Creek, Fairview Creek
Tualatin River Watershed - Beaverton Creek, Bronson Creek, Rock Creek

Issue	*Strategy*	*How*	*Fiscal analysis*	*2014*	*2015*	*2016*	*2017*	*2018*
Preserve and restore stream shading	Ensure vegetated buffers are maintained	Continue plan review for new development and redevelopment	No additional resources needed	●	●	●	●	●
	Enforce stream buffer protection	Continue County code enforcement	No additional resources needed	●	●	●	●	●
	Educate landowners about the benefits of vegetated stream buffers	Work with local Soil & Water Conservation Districts to disseminate outreach materials	No additional resources needed	●	●	●	●	●
	Maintain shade in County right of way where appropriate	Partner with EMSWCD on Division St planting at Beaver Creek	No additional resources needed	●	●	●	●	●

Bacteria

Sandy River watersheds – Beaver Creek
Lower Willamette River watersheds – Lower Willamette, Johnson Creek, Fairview Creek
Tualatin River watersheds – Beaverton Creek, Bronson Creek, Rock Creek

Issue	*Strategy*	*How*	*Fiscal analysis*	*2014*	*2015*	*2016*	*2017*	*2018*
Failing septic systems	Inspect County drainage system for septage	Identify areas with suspicious contaminants or septage in ditches and catch basins	No additional resources needed	●	●	●	●	●
		Inspect outfalls for illicit discharge (See NPDES Stormwater Management Plan)	No additional resources needed	●	●	●	●	●
	Educate homeowners about septic system maintenance	Work with local Soil & Water Conservation Districts to disseminate outreach materials	No additional resources needed	●	●	●	●	●
Livestock manure	Address runoff issues through ODA Water Quality Program	Submit Water Quality Complaint Form to ODA	No additional resources needed	●	●	●	●	●
Pet wastes	Educate pet owners	Develop and disseminate materials through the Regional Coalition of Clean Rivers and Streams (see NPDES Stormwater Management Plan)	No additional resources needed	●	●	●	●	●
Illegal dumping	Enforce Nuisance Code	Report illegal dumping to County Nuisance Code Enforcement (See NPDES Stormwater Management Plan)	No additional resources needed	●	●	●	●	●
Instream monitoring	Identify stream reaches with high E.coli concentrations	Review instream E.coli data from collaborative monitoring efforts	No additional resources needed	●	●	●	●	●
Houseboats and marinas	Adopt building codes for floating homes	Review and adopt Portland building code for floating homes	No additional resources needed	●	●			
	Research code changes to require pump-out stations at marinas	Identify triggers for implementing this requirement	No additional resources needed	●	●			

Sediment (Nitrogen, Phosphorus, Lead, Mercury, Organic toxins)

Lower Willamette River watershed: Johnson Creek, Columbia Slough
Tualatin River watershed: Beaverton Creek, Bronson Creek, Rock Creek

Issue	*Strategy*	*How*	*Fiscal analysis*	*2014*	*2015*	*2016*	*2017*	*2018*
Non-point source sediment from agricultural lands	Address runoff issues through ODA Water Quality Program	Submit Water Quality Complaint Form to ODA	No additional resources needed	●	●	●	●	●
	Educate landowners about erosion impacts to streams	Work with local Soil & Water Conservation Districts to disseminate outreach materials	No additional resources needed	●	●	●	●	●
Soil erosion and sediment transport from roads in urban and rural areas	Avoid and minimize stormwater and pollutant runoff from County drainage network	Implement and update the NPDES Stormwater Management Plan	No additional resources needed	●	●	●	●	●
		Implement and update the Road Maintenance and Operations Manual	No additional resources needed	●	●	●	●	●
Mercury-containing products used in County facilities	Reduce use of products containing mercury	Purchase alternative products that contain lessor no mercury: *Specify low-mercury fluorescent lamps; Ensure that new thermostats and switches in vehicles and equipment are mercury-free.*	No additional resources needed	●	●	●	●	●
	Ensure proper disposal of products containing mercury	Recycle products containing mercury: *Recycle all mercury-containing light tubes and nonalkaline batteries; Ensure best management practices for recycling of electronic waste*	No additional resources needed	●	●	●	●	●