

Appendix F – Mercury

An Update to the August 7, 2003 SWMACC TMDL Implementation Plan

March 31, 2008

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SECTION A: OVERVIEW

1. Introduction

The federal Clean Water Act, section 303, requires states to develop water quality standards to support beneficial uses such as drinking water supply, swimming, and fishing. Segments of public water bodies or entire water bodies are placed on “the 303(d) list” if it has been documented that excessive concentrations of any pollutants are present. Water bodies on the 303(d) list must be managed to improve water quality so that water quality standards are eventually attained.

To improve water quality, states determine the maximum amount of a pollutant that a water body can receive and still meet water quality standards. This determination process is known as a Total Maximum Daily Load (TMDL). A TMDL is a “clean water plan” which guides and mandates the improvement of water quality. A TMDL is written for a pollutant after it has been placed on the 303(d) list. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. A TMDL includes an unallocated amount of pollution known as the “margin of safety” and “reserve capacity”. The margin of safety’s existence is an acknowledgement that significant uncertainty surrounds the mathematical calculations which lead to quantifying the allocations. The reserve capacity allows for economic growth, yielding new or increased discharges of the pollutant, without exceeding water quality standards.

In Oregon, the Department of Environmental Quality (DEQ) establishes water quality standards, identifies impaired waters on the 303(d) list, and develops TMDLs to address impaired waters. Under Oregon law, TMDLs must include a Water Quality Management Plan (WQMP) that identifies how the TMDLs will be implemented. DEQ has named certain federal, state and local governments and agencies, including cities, counties, and special districts, as designated management agencies (DMAs) responsible for implementing TMDLs because these agencies and governments have authority to manage and regulate some of the sources of pollutants that are listed in TMDLs. DMAs must develop TMDL Implementation Plans describing management strategies implemented or planned for implementation to address the sources of pollutants over which they have jurisdiction.

The DEQ finalized the Willamette River TMDL document in September 21, 2006 and it was approved by the U.S. Environmental Protection Agency on September 29, 2006. A portion of the Willamette River watershed lies within Clackamas County, so Clackamas County, certain County Service Districts, the City of Rivergrove, and many other local governmental entities were identified as DMAs in the Willamette River TMDL. The TMDL obligates certain DMAs to take measures to assess, and (if applicable) reduce their loading of pollutants regulated by the TMDL.

The Willamette TMDL also required DMAs in the Tualatin River watershed, which has been regulated by at least one TMDL since 1992, to “...update their (TMDL implementation) plans as necessary to address mercury.” See page 14-9 of the TMDL for more information. This appendix (F) is that update to the August 7, 2003 TMDL Implementation Plan for the Surface Water Management Agency of Clackamas County (SWMACC, a County service district), for

Clackamas County, and for the portion of the City of Rivergrove that lies within Clackamas County. A portion of the City of Rivergrove lies in Washington County.

The Willamette River TMDL took into account the mercury pollution from all sources, including but not limited to discharges from industrial facilities, and runoff from farms and forests. “Interim allocations” of mercury were granted to “source sector categories”. All of the legacy mine discharges in the watershed are, collectively, an example of a source sector category in the Willamette TMDL. Point sources of water pollution in the watershed – a factory’s wastewater outfall, for example – are controlled through the DEQ’s National Pollutant Discharge Elimination System (NPDES) permitting process.

Nonpoint sources of water pollution in the watershed, such as stormwater runoff, are controlled by several State of Oregon Departments, including the DEQ, the Department of Forestry (ODF), the Department of Agriculture (ODA), and the Department of Geology and Mineral Industries (DOGAMI). Load Allocations (LA) are issued to nonpoint sources of pollution. Cities, counties, county service districts, and certain types of other local government agencies, such as special service districts, are required to develop and implement Implementation Plans which address their TMDL-related nonpoint sources of water pollution.

This TMDL Implementation Plan update satisfies the obligation to update the plan for Clackamas County, SWMACC, and for much of the City of Rivergrove. This Implementation Plan summarizes Clackamas County’s, SWMACC’s, and the City of Rivergrove’s management strategies for protecting and improving water quality with respect to mercury pollution. The particular focus of this appendix is on strategies for reducing mercury from nonpoint sources in SWMACC to assist in achieving the interim load allocations (see table 3.7 on page 3-36 of the TMDL).

To comply with DEQ requirements for TMDL Implementation Plans (provided in OAR 340-042-0080(3)), the following information is provided for each suspected and known mercury source over which Clackamas County, SWMACC, and the City of Rivergrove have jurisdiction:

- Descriptions of the potential sources of mercury
- Descriptions of management strategies to minimize pollutant sources
- Timelines for implementation of management strategies
- Schedules for completing measurable milestones
- Fiscal analysis of management strategies
- Goals for attainment of the interim allocations
- Performance monitoring

As is required by the September 2006 TMDL document’s Water Quality Management Plan, we are obligated to state in this Implementation Plan that we believe that this Implementation Plan update provides:

- Sufficient evidence of maintenance of effort over time (see TMDL page 14-17), and
- Reasonable assurance of implementation (see TMDL page 14-11).

2. Surface Water Overview

2.1 Organizational summary

Clackamas County – including the Departments of Transportation and Development (DTD), Business and Community Services (BCS), and Water Environment Services – SWMACC, and the City of Rivergrove will all play a role in implementing portions of this Implementation Plan. General responsibilities of each County Department, SWMACC, and the City are outlined in Table 1. Water Environment Services (WES) administers SWMACC, which provides surface/stormwater management services (See Map).

Table 1: County, City, and SWMACC Responsibilities

DMA Name	TMDL IP Responsibility
Clackamas County’s Water Environment Services Dept.	Administers SWMACC. Also administers septic system, grading, and 1200-C (NPDES construction activity permits for erosion prevention and sediment control) programs.
Clackamas County’s Dept. of Transportation and Development	Riparian area use and other land uses, roads; illegal dumping and solid waste nuisances on private property.
Clackamas County’s Business & Community Services Dept.	Management of surplus real estate, and dumpstoppers (an illegal solid waste dumping prevention program)
SWMACC	Stormwater management and riparian area land use service district*. Administered by WES.
City of Rivergrove	Limited to land use authority. Authority applies only within city limits. Most other stormwater management functions in the City are provided by WES.

* = Includes, but isn’t limited to, public education/involvement and erosion control programs.

2.2 Surface/Storm Water Responsibilities

As described above, Clackamas County, SWMACC, and the City of Rivergrove will all play a role in implementing portions of this update to SWMACC’s TMDL Implementation Plan. Each of these organizations has a variety of surface water and water quality management roles and responsibilities. An overview of these responsibilities is provided below to offer context for the overall management of water quality and watershed health in the Tualatin River watershed.

Stormwater enters the Willamette River and tributaries in the Willamette TMDL’s geographic area from lands regulated by NPDES Municipal Separate Storm Sewer System (MS4) permits as well as from areas that are not regulated under the DEQ’s MS4 program. Note that MS4-permitted storm sewer outfalls are considered *point sources* of pollution. This Implementation Plan update focuses on management strategies that address *nonpoint sources* of pollution, including stormwater runoff from areas that are **not** regulated by MS4 permits.

Clackamas County, SWMACC, Rivergrove, and many of the other cities and districts within the County are co-permittees on a Phase I NPDES MS4 permit issued by DEQ. As with other NPDES permits, the TMDLs are being implemented by DEQ through the MS4 permit for discharges from the MS4 permit's coverage area. Thus, discharges from MS4-permitted stormwater outfalls in SWMACC that are owned by the City of Rivergrove, Clackamas County, and SWMACC are not addressed in this Implementation Plan update because they're being addressed by the MS4 permit. The MS4 permit contains an extensive set of requirements which, in sum, minimize the level of pollution in discharges from the MS4 to the Maximum Extent Practicable. Many of the permit's requirements pertain specifically to TMDL pollutants like mercury.

3. Mercury TMDL and Allocations

A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. A TMDL has been issued in the Willamette watershed for mercury. Interim mercury Load Allocations and Waste Load Allocations were granted to source sector categories, such as legacy mine discharges, in the TMDL.

As is depicted in table 3.7 in the TMDL document, a 27% reduction over time is needed from all sources of mercury compared to current loading levels to eventually reduce the average mercury in fish tissue concentrations in the Willamette River. According to table 3.7:

The significant "source sector categories" are:

- Runoff of atmospherically deposited mercury;
- Direct deposition to open water from the atmosphere;
- Erosion of mercury-containing soils in upland areas;
- Legacy mine discharges;
- Instream and riparian area sediment re-suspension; and
- Wastewater treatment plants and industries.

Note that discharges from all public and private storm sewer systems are included in these two categories: erosion of upland soil and atmospheric deposition.

Although the water quality criteria for mercury in the Willamette River's water column is currently being met at all times or nearly all times, excessive levels of mercury have accumulated in certain species of the watershed's fish.

The stated objective of the mercury TMDL is to reduce average fish tissue mercury concentrations in the Willamette River so that all fish species are safe for human consumption. The multiple fish consumption advisories for mercury in the Willamette Basin and the numerous 303(d) listings indicate that this beneficial use is not currently being met. DEQ acknowledges that it may take many years, perhaps even decades, to ultimately achieve the desired reduction in fish tissue concentrations of mercury.

A summary of the current and reduction in mercury loadings necessary throughout the Willamette River watershed follows:

- The sum of the current mercury loads from all source sector categories to the Willamette River is estimated to be 128.5 kilograms per year.
- The total loading capacity of the system – the amount of mercury that can be discharged into the Willamette River and tributaries without exceeding mercury fish tissue limits – is estimated to be 94.6 kilograms per year.
- The overall mercury loading reduction that is needed from all source sector categories in the watershed is estimated to be 33.9 kilograms (or about 74.6 pounds) per year.

4. Goals and Objectives of Plan

The goal of this Implementation Plan is to identify the ongoing and planned management strategies to improve watershed health and address requirements of the Willamette River TMDL related to reductions in mercury loading.

The objectives of this Implementation Plan include applying adequate management strategies for pollution prevention (erosion control, for example), evaluating strategies annually for effectiveness and level of service, and implementing adaptive management, as necessary.

To achieve this goal and these objectives, this Implementation Plan's DMAs (Clackamas County, SWMACC, and the City of Rivergrove) will be implementing the portions of this updated Plan that they are responsible for in a coordinated fashion. A single annual report to DEQ is expected to be submitted by these DMAs each year.

Section B: Pollutant Reduction and Management Strategies

5. Potential Sources of Pollutants

According to the DEQ, specific known or suspected sources of TMDL parameters should be noted in this Implementation Plan update. The potential sources of mercury in SWMACC are discussed below.

Mercury is a naturally occurring element found in high concentrations in cinnabar deposits. In Oregon, mercury was mined commercially and used extensively in gold and silver amalgamation (Brooks, 1971; Park and Curtis, 1997). Mercury is present in other rock types and soil types in Clackamas County, given the role that volcanoes have played in our geologic history. Mercury is also naturally present in geothermal areas and in many types of native vegetation; significant amounts can be released into the atmosphere during range/forest fires.

Mercury has been used historically in fungicide formulations and can still be found in many commercial products, including fluorescent lights, thermometers, automobile switches and dental amalgam. Illegal dumping of solid waste containing mercury can also be a source of mercury loading. Mercury is present in fossil fuels such as coal, diesel fuel, and heating oil. The mercury present in these fuel sources is generally released into the atmosphere upon combustion.

Atmospheric mercury can be transported great distances and is known to be deposited on the landscape via either wet or dry deposition (Sweet et al., 1999, 2003). Research has shown that much of the mercury which enters the Willamette River had been deposited in the watershed by the atmosphere.

Mercury can be present in various physical and chemical forms in the environment (Ullrich et al., 2001; USEPA, 2001b). The majority of the mercury found in the environment is in the form of inorganic or elemental mercury, but these forms of mercury can be converted to organic or methyl mercury by sulfate reducing bacteria. Methyl mercury production is affected by a host of physical and chemical factors including temperature, redox potential, dissolved oxygen levels, organic carbon, sediment particle size, alkalinity, sulfate concentration and pH. Methyl mercury, once formed, represents the most bioaccumulative form of mercury in fish tissue and the most toxic form of mercury for human consumers (USEPA, 2001a). The primary route of human exposure to mercury is via the consumption of freshwater fish, saltwater fish, and other seafood containing mercury (USEPA, 2001a).

Mercury can enter surface water bodies in many ways. One way that mercury can be transported to surface waters is through stormwater runoff. Some of the mercury in stormwater runoff may be washed from impervious surfaces after having been deposited there by the atmosphere. Stormwater runoff can also carry mercury if it has eroded mercury-containing soils.

At this time, Clackamas County, SWMACC, and the City of Rivergrove are not aware of any specific known sources of mercury, although suspected, general sources include:

- Erosion of soils from agricultural, forest management, landscaping, construction, and road maintenance activities if the sediments are not trapped before they leave the site.
- Illegal dumping of solid waste
- Spills and illicit discharges of certain materials

6. TMDL Implementation Responsibilities

Responsibility for implementing the TMDLs in the Willamette River watershed has been designated among a variety of management agencies by DEQ.

This Implementation Plan update addresses mercury that is discharged by these types of stormwater drainage systems:

- Clackamas County and SWMACC-owned storm sewer outfalls that are NOT subject to MS4 permit requirements. The MS4 permit's coverage area in SWMACC is limited to that portion of SWMACC that is in the Urban Growth Boundary (UGB), and most of SWMACC is not within the UGB. Note that the MS4 permit does not regulate discharges to drywells or other injection devices.
- Privately owned storm sewer outfalls if they do not drain agricultural and timber management areas. These outfalls, unless they are permitted by an NPDES permit such as a 1200Z, are nonpoint sources of pollution.
- Overland sheet flow or channelized flows that do not flow through MS4-permitted or privately owned storm sewer outfalls. These drainage systems are nonpoint sources of pollution. They are found on lands with every type of land use. Those drainage systems

that are not in agricultural and timber management areas are addressed in this Implementation Plan update.

It is important to note that Clackamas County's, SWMACC's, and the City of Rivergrove's authority to control sources of pollution from privately owned storm sewer outfalls, overland sheet flow and channelized flows is quite limited. If Clackamas County, SWMACC, and/or the City of Rivergrove are aware of a privately owned conveyance system that is a significant known or suspected source of pollution, the matter will be referred to DEQ if public education and/or source control methods fail to yield water quality improvement.

7. Clackamas County Water Quality Programs and Activities

A variety of surface water management programs, activities, and strategies are employed by Clackamas County, SWMACC, and the City of Rivergrove to improve and protect water quality and overall watershed health. The strategies that are implemented or planned for implementation to address nonpoint sources of mercury in the area covered by this Implementation Plan update include:

1. Stormwater policies, regulations, and administrative procedures
2. Water quality monitoring
3. Industrial/Commercial stormwater maintenance program
4. Other development related and watershed protection regulations
5. Erosion prevention and sediment control
6. Public involvement and education
7. Illegal dumping management
8. Spill response and Illicit Discharge, Detection, and Elimination Program

These management strategies are described in detail in the sections below.

7.1 Stormwater Policies, Regulations, and Administrative Procedures

Description of the potential sources:

After construction has been completed on a property, the private property's homeowners and occupants can have an influence on the amount of mercury that is washed from landscaping activities and enter into the nearest surface water body via a storm sewer system.

Description of the Management Strategy:

This portion of the Implementation Plan update describes the planning procedures for developing, implementing, and enforcing controls to reduce the discharge of mercury from storm sewers which collect stormwater runoff. These post-construction controls are applied to: a) development on private property, and b) Clackamas County, City, and SWMACC-funded capital improvement projects (CIPs), including road and building construction projects.

Specific Management Strategies that are currently employed include:

- a) Unless a waiver is granted, all new/redevelopment in SWMACC is required to infiltrate 100% of the first 0.5 inch of rain in a 24-hour period. Few storm events

each year generate more than 0.5 inches in 24 hours. This has the potential to reduce potential mercury loads, limits the increase in runoff volume that is created by development, and can provide groundwater recharge. Full credit towards satisfying the infiltration requirement can be granted by WES for projects that use injection, such as through drywells, instead of infiltration. Reducing stormwater runoff volumes appears to be among the most effective techniques for reducing mercury loading to waterbodies from upland areas.

- b) Unless a waiver is granted, SWMACC's stormwater treatment requirement also applies to new and redevelopment (see WES chapter 6.6 of the December 15, 2002 Rules and Regulations). While this requirement is aimed at reducing phosphorus levels in stormwater runoff by at least 65%, most stormwater treatment technologies utilized to meet this requirement can probably also reduce mercury loads. For Clackamas County, SWMACC, and City-funded funded CIPs, water quality treatment is usually provided

In addition, WES and DTD Planning Department have recently co-sponsored (through in-kind local matching resources) a DEQ 319 grant that Metro has received. Two tasks envisioned to begin in 2008 under this grant include:

- Completion of a local jurisdiction code review to determine whether the code supports or impedes the use of habitat-friendly development practices. This review will include the jurisdiction's comprehensive plan, zoning code, development code, engineering design and construction manuals as well as capital improvement programs. **Deliverable:** A document outlining the appropriate code sections, existing language, score (promote, partially support, impede, not addressed) and recommendations will be prepared for the local jurisdiction's use.
- Convening and facilitating a discussion between the various County Departments and Divisions regarding the limitations and possibilities of implementing habitat-friendly development practices. Possible participants include Clackamas County's planning (long range/development review/permitting), engineering, building (inspectors/plan reviewers), and other staff that the local jurisdiction deems is necessary to implement habitat-friendly development practices. **Deliverable:** A document outlining department-working relationships, future coordination and opportunities, and proposed implementation plan will be prepared for the local jurisdiction's use. While the focus of the work covered by this portion of the 319 grant is to be in the Clackamas-Happy Valley area, we expect that lessons learned from this process will be used as supporting documentation when SWMACC's rules & regulations and/or administrative procedures that address development are proposed to be revised.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to address limiting factors for watershed health. Assessment of this strategy will include tracking permit applications for new development and redevelopment sites, and tracking the types of low-impact stormwater management measures implemented at development sites.

Fiscal analysis:

This management strategy is currently funded.

7.2 Water Quality Monitoring

Description of the potential sources:

Watersheds can be impacted by development and associated impervious surfaces that contributes to or causes changes in hydrology, habitat, and water quality.. Stormwater runoff from precipitation events can pick up and convey mercury as it travels over impervious surfaces. Monitoring the quality of the water in creeks, and in the stormwater that is discharged to them, can provide information to assess current watershed health impairment, long-term trends, and the effectiveness of current management strategies and determine potential new management strategies to employ.

Description of the Management Strategy:

Clackamas County Water Environment Services conducts routine and periodic stormwater and in-stream water quality monitoring. Monitoring is performed at four instream sites in SWMACC nine times per year (at least 3 of these 9 visits will be during storms) and at two storm sewer outfall sites in SWMACC three times per year (all three of which will be during storms). WES also provides financial support for the USGS continuous surface water flow monitoring station in the Tualatin River at River Mile 1.8.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to meet watershed health limiting factors and needs.

Fiscal analysis

Existing monitoring levels are currently funded.

7.3 Industrial/Commercial Stormwater Maintenance Program

Description of the potential sources:

Stormwater from commercial and industrial areas can wash mercury into waterways. Potential mercury sources at these sites could include land deposition of airborne mercury, soil disturbance, spills, poor housekeeping practices, and leachate from improperly stored solid waste.

Description of the Management Strategy:

The applicable Management Strategies vary depending on the location and type of facility. Water Environment Services' "Non Single Family Residential I Maintenance Agreement Program (NSFRMAP)" is expected to be implemented in fiscal year 2008-2009. WES holds "maintenance agreements" with owners of many of the properties that have been developed or

significantly redeveloped in SWMACC since 1997 for multi-family residential, commercial, industrial, and religious purposes.

The NSFRMAP's agreements obligate the property's owners to inspect, clean, and maintain their storm sewer system. While most of these properties in SWMACC discharge stormwater to the MS4 and drywells, some properties with NSFRMAP agreements discharge stormwater directly to Waters of the State through private storm sewer systems; these are the only properties enrolled in WES NSFRMAP which are addressed by this Implementation Plan update. Letters from WES are expected to be sent before June 30, 2009 to each NSFRMAP agreement holder informing them that, according to their agreement: 1) storm sewer system maintenance and cleaning work may be needed, and 2) annual reports summarizing this work need to be submitted to WES.

If WES staff become aware that an industrial facility may be required to apply for and obtain a 1200Z NPDES permit from DEQ, WES staff will notify the business' owner(s) that they should contact the DEQ for a determination on their eligibility for this permit. While holders of 1200Z permits are not required to monitor for the presence of mercury in their stormwater, permit holders are required to regularly collect and analyze stormwater samples to ensure that stormwater leaving the facility complies with the permit's water quality benchmarks for many other pollutants, including total suspended solids and lead. Facility improvements at 1200Z-permitted sites are often made to improve the quality of stormwater leaving the site so that levels of pollutants with benchmarks are no longer elevated. It is possible that these improvements may also be reducing or preventing mercury loading.

Industrial and commercial facilities in SWMACC which discharge stormwater runoff will primarily be inspected on a complaint-driven basis. Some inspections will be conducted by WES staff during source tracking activity if WES suspects that significant amounts of mercury are or may be present. All facilities that are the subject of a complaint will be contacted, and potentially inspected, in a timely manner by WES staff. The implementation of control measures for stormwater discharges from these facilities will be deemed necessary by WES if the presence of excess levels of mercury or other regulated pollutants can be confirmed to be present in their discharge. In these instances, and in the event that the discharger's initial attempts to improve stormwater quality do not produce the required improvement, WES personnel may continue to provide guidance and technical assistance until the facility's stormwater quality improves. If efforts by the facility fail to achieve the necessary improvement in stormwater quality, WES staff will contact the DEQ and request their support. DEQ has the authority to require most dischargers to halt or modify their discharge if the material contains a significant concentration/load of mercury and is likely to flow into the Tualatin River or a tributary.

Timeline for implementation:

WES' NSFRMAP is expected to be implemented in fiscal year 2008-2009. The first annual letters to commercial property owners will be sent by June 2009, with ongoing work to follow.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness.. Adaptive management will be applied as appropriate to meet limiting factors for watershed health. Assessment of this strategy will include tracking annual letters sent to property owners in the program identifying their requirements and tracking annual reports received from property owners.

Fiscal analysis:

Clackamas County has budgeted 0.1 FTE to implement the NSFRMAP..

7.4 Other Watershed Protection Regulations

Description of the potential sources:

Removal of vegetation in riparian areas can allow stormwater to flow directly to the stream. Intact vegetation reduces soil erosion within the riparian area and in the stream's banks, and thus can keep mercury locked in place on site if the riparian area's soils or stream bank's soils contain mercury. These various functions provided by riparian area vegetation can collectively reduce mercury loading.

Description of the Management Strategy:

Protection of or establishing system potential vegetation in riparian areas is one mechanism that can assist in reducing mercury loads. The following watershed protection regulations that protect streamside vegetation are currently being implemented in SWMACC, including the portion of the City of Rivergrove that is in Clackamas County.

Riparian Area Buffers

Many lands that include riparian areas are subjected to "riparian area buffer regulations" when these lands are developed or re-developed under the County's/City's building permit process. These regulations come in the following four forms in SWMACC:

- **Metro Title 3.** Water Environment Services (WES) administers the equivalent of Metro Title 3 regulations in all portions of SWMACC, except in the City of Rivergrove. The City administers the equivalent of Metro Title 3 regulations within the City's limits. Under these regulations, significant new and re-development that is regulated by Clackamas County and the City near wetlands, springs, natural ponds, creeks, and the Tualatin river generally provides a largely undisturbed buffer area varying in width from 25 feet up to as much as 200 feet in certain cases. Buffer areas apply on each side of the creek or river. Wetland setback areas begin at 50 feet from the delineated wetland boundary. Creek buffer area width depends on several factors, including topography, whether the stream is perennial or intermittent, and how much contributing drainage acreage in the watershed is upstream of the proposed development. The buffer area is protected in one of two ways: a conservation easement or a separate tract of land. In the non-City portions of SWMACC, if an owner proposes to encroach into WES' buffer and can enhance the buffer by creating additional buffer on the property at a ratio of 1.5:1.0, than no other mitigation is required. If a variance is applied for and the applicant cannot create additional buffer at a 1.5:1 ratio the applicant can also mitigate by removing invasive species and replanting the entire buffer area with native vegetation, including shade-yielding trees.
- **Wetlands.** Clackamas County's Zoning and Development Ordinances (ZDO) 1002 and 709 apply in unincorporated, urban areas in SWMACC. The "wetland provisions" of Sections 1002 and 709 of the ZDO regulate disturbances and specify setback distances for wetlands. Disturbances and setbacks to these wetlands are reviewed in accordance with applicable provisions of the ZDO and are dependent upon several factors that are determined on a case-by-case basis. ZDO 1002 and 709 are administered by Clackamas County's Department of Transportation and Development (DTD). **River and Stream**

Conservation Area, ZDO 704. This ordinance applies to all unincorporated private lands in SWMACC and is administered by DTD pursuant to the applicable provisions of the ZDO. Significant new and re-development which is regulated by Clackamas County that occurs on land lots near the Tualatin river and qualifying creeks must provide a largely undisturbed setback area varying in width from 50 feet to 100 feet (ZDO 704.07 requires that no less than 75% of the setback's area be preserved with native vegetation). For the river's riparian area, a setback area wider than 100 feet can be required in certain circumstances such as land adjacent to Tualatin River. The setback distance for creeks is based on whether a creek has been determined to be "small" (50 feet), "medium" (75 feet), or "large" (100 feet). Smaller (non-fish-bearing) streams and all wetlands are unprotected by ZDO 704's provisions. All riparian areas around creeks and rivers that are eligible for protection under ZDO 704 are on Water Protection Rule Classification maps that were compiled pursuant to OAR 629-635-000.

- **Floodplain Management District, ZDO 703.** This ordinance, administered by Clackamas County DTD, only applies on SWMACC's unincorporated lands (a similar ordinance that only applies in the City of Rivergrove is administered by the City). ZDO 703 restricts the types, and in some instances, the magnitude of development that can occur in floodplains. This ZDO tends to direct development away from areas that are directly adjacent to a creek or river's low and high flow channels, making it more likely that native vegetation will provide shade to the water body.

Metro Title 13 (Goal 5)

Clackamas County DTD is currently re-writing portions of the Metro Title 13 (Goal 5) model ordinance and plans to adopt them and associated Habitat Conservation Areas (HCA) maps by December 2008. The City of Rivergrove is expected to adopt Metro Title 13 (Goal 5) by ordinance in the City. The purpose of Title 13 is to (1) conserve, protect, and restore a continuous ecologically viable streamside corridor system, from the streams' headwaters to their confluence with other streams and rivers, and with their floodplains in a manner that is integrated with upland wildlife habitat and with the surrounding urban landscape; and (2) to control and prevent water pollution for the protection of the public health and safety, and to maintain and improve water quality throughout the region. Metro has mapped the areas deemed to be regionally significant and has further designated as "Habitat Conservation Areas" (HCAs) those areas requiring protection. HCAs shall be protected, maintained, enhanced, and restored as specified in the Metro Code Section 3.07.1340, and city and county development codes shall include provisions for enforcement of these performance standards and best management practices. Discretionary development approval standards are designed to first avoid HCA's, next to minimize impacts on HCAs and water quality, and finally to mitigate the impacts to these areas. Additionally, each city and county in the region shall identify provisions in the city's or county's comprehensive plan and implementing ordinances that prohibit or limit the use of a list of habitat-friendly development practices.

Source #2: Sustainability Resolution

Clackamas County established an Office of Sustainability in 2007. In a resolution, adopted February 28, 2008, the Board of County Commissioner's adopted a resolution regarding sustainability. A small portion of that resolution is listed below. The following elements of this resolution can assist in aiding the implementation of management measures to control and reduce mercury loading to rivers and streams:

“We are committed to meeting or exceeding global targets for mitigating climate change by taking actions in our own operations and communities, including the following:

1. Create an action plan for reducing global warming emissions in County operations;
2. Increase recycling rates in County operations and in the community;
3. Make County procurement decisions that minimize negative environmental and social impacts;
4. Continue to practice and promote sustainable building practices using the U.S. Green Building Council's LEED™ program;
5. Adopt and enforce land-use policies that reduce sprawl; preserve open space; create compact, walkable urban communities, and
6. Protect and foster productive and healthy agriculture and natural resource lands;
7. Make energy efficiency a priority, and increase the use of clean, alternative energy;
8. Preserve water resources through education, planning and water supply coordination;
9. Help educate the public, schools, other jurisdictions, professional associations, businesses and industry about reducing the negative impacts of climate change.”

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to address limiting factors for watershed health. Assessment of this strategy will include:

- Tracking the number of approved building and development permits per year with riparian area buffers.
- Tracking the number and acreage of HCAs protected, mitigated, or restored.
- Tracking the number of approved building permits per year which receive a ZDO 703 review.
- Tracking the number of approved building permits per year with wetland-type riparian area buffers.
- Qualitative assessment through interviews with staff.

Fiscal analysis:

Implementation of Metro Title 3 equivalent stream buffer regulations, river and stream conservation areas (ZDO 704), the floodplain management district (ZDO 703), and wetland provisions of ZDO 1002 and 709 is currently funded. Implementation of Metro Title 13 (Goal 5)

in Clackamas County and the City of Rivergrove will require additional resources, estimated at approximately \$100,000 for Clackamas County.

Timeline for implementation:

Clackamas County will adopt Title 13 by December 2008. Other management strategies are currently being implemented.

7.5 Erosion Prevention and Sediment Control

Description of the potential sources:

Mercury is naturally present in some soils. Mercury can also contaminate soil after being deposited on a site by the air. Disturbed soil at construction sites can be eroded by stormwater, potentially contributing increased sediment-laden runoff. Mercury loading can result if present in the soil or from other sources noted above.

Description of the Management Strategy:

Erosion prevention and sediment control is addressed through the issuance of Erosion Control Permits (ECP) for sites undergoing significant development or redevelopment. Inspecting construction sites and providing oversight of regulatory permits can assist in reducing the amount of sediment leaving the site and resultant total suspended solids (TSS) in stormwater runoff. By reducing TSS in stormwater, it is presumed that the concentration of mercury in stormwater, if present, is also reduced.

The erosion prevention and sediment control methods employed at sites with ECPs includes, but is not limited to: phased development of a site, preserving native soils and vegetation, installation of sediment fences, jute matting and other cover applications, temporary sediment ponds, rocked construction access areas, and catch basin silt sacks, planting grass and other cover to re-stabilize disturbed areas, and other similar techniques. ECPs are required by WES for sites in SWMACC where 800 or more square feet of soil are disturbed during construction activities.

The Clackamas County Road Department (Roads) occasionally disturbs soil in their road rights-of-way while performing routine road maintenance and repair work. Roads recently began adhering to the Oregon Dept. of Transportation's *Routine Road Maintenance, Water Quality and Habitat Guide, Best Management Practices, Revised 2004* (ODOT Guide). In 2007, Roads submitted an Endangered Species Act (ESA) 4(d) Limit application seeking coverage under the Routine Road Maintenance No. 10 Limit. Proper erosion prevention and sediment control methods are addressed under several activities within the ODOT Guide, including but not limited to Activity #120 (Ditch Shaping and Cleaning), Activity 112 (Shoulder Rebuilding), and Activity 081 (Stockpiling).

In addition, WES provides these services in SWMACC:

- In response to the development community's request for more education on erosion prevention and sediment control, WES partnered with the Home Builders Association of Metropolitan Portland, Clackamas Community College, and the Cities of Milwaukie and Oregon City on an Erosion Control Certification program. Four hours of training in erosion control every two years provides individuals the opportunity to be certified and

eligible for a discount on erosion control permits. This program went into effect in November 1999, and is expected to continue..

- In 2001, WES partnered with regional jurisdictions, the Oregon Association of General Contractors, the Homebuilders Association of Metropolitan Portland and vendors of erosion control products to create and promote the Annual Regional Erosion Prevention Awards Program. Developed to provide recognition for contractors and developers with outstanding achievements in exceeding local erosion control requirements, the program provides recipients with media recognition, peer recognition, and prizes donated by vendors of erosion prevention and sediment control products and services. The Annual Regional Erosion Prevention Awards Program provides the development community with incentives to seek education regarding erosion prevention BMPs, improve BMP selection and installation, and to better monitor and maintain the BMPs used in their projects. Additional benefits of the program are to provide education for the jurisdiction's inspection staff, progress towards standardization of erosion prevention requirements, and a reduction in noncompliance with erosion control requirements. As of 2007, participants include approximately 25 jurisdictions in 5 counties in Oregon and southern Washington. The awards were given for the Sixth Annual event on June 8, 2007 and received media coverage in the Daily Journal of Commerce and other trade publications. This program is expected to continue.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to address limiting factors for watershed health. Assessment of this strategy will include tracking ECPs issued, inspections performed, enforcement actions taken, and education and outreach activities implemented. In the future, turbidity monitoring may also play a role in assessment of program effectiveness and in terms of future regulatory compliance with the outcome of the proposed and pending turbidity rule.

Fiscal analysis:

This management strategy is currently funded for SWMACC; however, additional resources may be required in the future.

7.6 Public Involvement and Education

Description of the potential sources:

Land management decisions and activities conducted by the public throughout the watershed can affect overall watershed health and may contribute to the potential release of mercury into waterways. Educating the public about the way their practices can negatively or positively impact the health of the watershed is an important component in managing these potential sources.

Description of the Management Strategy:

Clackamas County DTD and WES target public involvement and educational programs and projects to encourage citizens to work and live in ways that are sustainable and help to protect or improve water quality. Public involvement and education is a part of many water quality

management strategies implemented in SWMACC, including Responding to and Preventing Illegal Solid Waste Dumping, Spill Response, Industrial/Commercial Stormwater Maintenance, Erosion Prevention and Sediment Control, and Design/Construction Standards for New/redevelopment.. Specific public involvement and educational activities and strategies employed by Clackamas County, WES and the City of Rivergrove to that can assist in reducing mercury loads to the Tualatin River in SWMACC includes the following:

- Clackamas County's *Citizen News* newsletter. *Citizen News* is U.S. Mailed to every Clackamas County address four times per year. The Summer 2005 issue contained an article titled "Keeping the dirt where it belongs." This large (1/2 page) article addressed the fact that excessive human-caused soil erosion can be harmful to aquatic life, then provided information on ways to prevent and control erosion at construction sites. The Spring 2006 issue contained an article titled "Buffer Zones: Protecting Sensitive Creeks and Streams", which encouraged citizens to maintain their healthy – and enhance their degraded – riparian areas. The Spring 2006 article specifically stated that healthy riparian areas "minimize erosion." One or more future *Citizen News* newsletters may possibly include other similar articles that encourage citizens to reduce or prevent soil erosion on property that they own or rent.
- Clackamas County Fair. In August 2007, WES employees staffed the County's booth at the Fair during about a quarter of the time that the Fair was open. WES literature was available and distributed to the public from the booth during all hours that the Fair was open. Other Clackamas County employees distributed the literature during the times when WES employees were not in the booth. It is expected that WES employees will continue to staff the County's booth about a quarter of the time during Fairs in future years. When citizens have visited the booth during the Fair in the past, WES literature has provided information to the public on the benefits of (and recommended ways to) prevent and minimize soil erosion. If WES staff are present in the booth at the time citizens visit, additional information, advice, and guidance on this subject is provided.
- Metro's Household Hazardous Waste Facility (HHWF) in the City of Oregon City. Metro's public involvement program encourages citizens to take unused amounts of hazardous wastes including insecticide products there for disposal. When inquiries from the public about the proper disposal method for potentially harmful substances (such as mercury-containing products) are received by WES, citizens are promptly forwarded to Metro's informational phone number (503-234-3000) and to the Metro HHWF.
- The Clackamas County Soil & Water Conservation District (CCSWCD). The CCSWCD provides assistance to landowners who are interested in conservation and watershed enhancement. While the CCSWCD is not a Department of Clackamas County, it is noted here for Clackamas County provides some funding to the CCSWCD they work closely together. The CCSWCD helps landowners identify, plan for, and implement conservation measures that reduce soil erosion. The CCSWCD, in partnership with WES, sponsored a seminar on March 1, 2007 in SWMACC that provided horse owners a number of ways to improve the health of their animals by addressing mud issues through mud, water, and pasture management techniques. In November 2006, Clackamas County voters elected to increase fees and provide a stable funding source to the CCSWCD, allowing the CCSWCD to increase the type and level, of services it provides to landowners.
- WES' newsletter, *Streamlines*, contains relevant articles, such as those which encourage citizens to prevent and reduce soil erosion.. *Streamlines* is published quarterly. It is U.S.

mailed to SWMACC ratepayers by WES along with stormwater service bills. Bills are sent twice per year and an edition of *Streamlines* is sent out along with bills..

- Many other WES publications are also available which encourage folks to live and do business in ways which would prevent and reduce soil erosion. For example, the “*What have you done for your watersheds lately?*” brochure includes the following statement: “Plant a buffer of native trees, shrubs, and groundcover near the streams instead of planting lawn all the way to a stream. The trees and shrubs prevent erosion...”
- WES’ website. A relevant example involves advertising Naturescaping workshops on the website. A properly naturescaped area – one with native plants and proper soil stabilizing cover – has little or no soil erosion and limited or no runoff.
- Providing educational opportunities to school-age children. This includes presentations/stories/music and other activities in their classrooms and co-sponsorship of the Children’s Clean Water Festival.
- The Lower Tualatin Citizens’ Advisory Committee, which meets several times/year, advises WES and the Board of County Commissioner on WES’ surface/stormwater management programs in SWMACC.
- Watershed signs are currently displayed at seven locations in SWMACC where County roads cross the Tualatin river or a tributary. These signs advertise the “watershed concept”, notifying road users that the lands surrounding these crossing points are within the Tualatin River watershed and drain to creeks and the Tualatin river. WES believes that some citizens will be more likely to respond to our water quality protection and improvement-related initiatives and programs if they are more familiar with the boundaries of and waterbodies within that they affect.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to address limiting factors for watershed health. Assessment of this strategy will include performing qualitative assessments through interviews with staff, our customers and other stakeholders as well as tracking public education and outreach metrics such as:

- The number of website “hits” per year.
- The number of brochures printed and distributed/year.
- The number of requests for speakers or surveys taken, give-away requests, or for more information.
- The number of attendees at various WES sponsored or project related events.
- Erosion control and other public education and outreach related activities implemented each year.

Fiscal analysis:

This management strategy is currently funded, although additional resources may be needed in the future.

7.7 Illegal Dumping Management

Description of the potential sources:

Illegal dumping of solid wastes can contribute to polluted stormwater. Solid waste that may contain mercury includes, but is not limited to, fluorescent light bulbs, batteries, thermometers, and electronics.

Description of the Management Strategy:

Illegal dumping of solid wastes is addressed by two separate programs, each of which serves their own geographic area within SWMACC. Each program is described separately below:

- **Developed, unincorporated, primarily urban areas:** Illegal dumping in developed, unincorporated, primarily urban areas is addressed by Clackamas County's Department of Transportation and Development's Community Environment Division (CED). The CED administers a solid waste nuisance ordinance which pertains to illegal dumping on public and private property. This ordinance is administered on a priority-rated basis, and illegal dumping that involves household garbage is a high priority for enforcement and resolution. Mediation is an additional tool that CED can utilize to resolve certain types of solid waste issues with landowners that cause or contribute to a condition of unsightliness on private property.
- Clackamas County's Dump Stoppers Program applies in **rural areas**, including the edges of roadways in rural areas. County employees respond to reports of illegally dumped waste and coordinate the removal of these wastes. Crews who have been sentenced to perform community service remove the garbage and properly dispose of or recycle it. County employees install "no dumping" signs, with the program's hotline prominently displayed, in places where dumping has occurred. County employees aggressively sift through the trash in search of clues that can identify the persons who illegally dumped the waste. A Sheriff Deputy who is assigned to this program uses these clues to confirm identities of dumpers, and then tracks down, and if appropriate, cites those persons. The Clackamas County District Attorney's office has assigned a prosecutor to this program, and pursues the most egregious cases. As of March 21, 2007, twenty-eight persons have been convicted by the Dump Stoppers program of illegal solid waste disposal in the County since the program's creation in 2003. During this same time period, 225 cars, 4,398 tires, 24 tons of scrap metal, and 176 tons of other solid wastes have been removed from dump sites throughout the County. This program's success is largely due to effective partnerships between several County Departments, residents, schools, timber companies, and recreational lists.

In addition, Metro's Household Hazardous Waste Facility near the intersection of I-205 and highway 213 in the City of Oregon City accepts products that contain mercury for proper disposal.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service. Adaptive management will be applied as appropriate to address limiting factors for watershed

health. Assessment of this strategy will include tracking the waste removed by the Dump Stoppers Program, tracking the number of persons per year who complete the mediation process for solid waste dumping, and tracking the number of complaints and enforcement actions taken per year for solid waste dumping.

Fiscal analysis:

This management strategy is currently funded.

7.8 Spill Response and Illicit Discharge, Detection and Elimination Programs

Description of the potential sources:

If liquid or sludge-like materials that contain mercury are spilled or illicitly discharged, mercury could potentially flow directly (or indirectly via stormwater) into the Tualatin River or a tributary.

Description of the Management Strategy:

Spill response and Illicit Discharge Detection and Elimination (IDDE) programs are addressed by two different management strategies, the Road Department's and WES', and are as follows:

Clackamas County Roads:

If materials that potentially contain mercury are spilled or are illicitly discharged onto a Clackamas County road's right-of-way, personnel from Clackamas County's Road Department will respond if appropriate. County Road Department crews will ensure that the release of the material is halted and that the material is subsequently cleaned up in a manner that prevents harmful substances from entering surface waters, if possible, or minimizes the amount of material that enters waterways if that is not possible.

WES:

Spill response and IDDE program services are provided by WES in SWMACC, which includes the City of Rivergrove. The spill response and IDDE work performed in SWMACC by WES is limited to spills and illicit discharges that: 1) pass through privately owned storm sewer outfalls, 2) move by overland sheet flow on private property, or 3) move through privately owned ditches. WES staff makes reasonable efforts during business hours to try to: a) halt the release of spilled and illicitly discharged material, and b) get the responsible party to clean up their material. The goal is to prevent or to minimize the release of contaminants including mercury and other potentially harmful substances into waterways. If efforts by WES staff fail to halt the release of the material, and the material is likely to enter surface waters, WES staff will contact DEQ and request their support. DEQ has the authority to regulate most dischargers in urban areas to halt or modify their discharge if the material contains a significant amount of a regulated contaminant like mercury and is likely to flow directly to Waters of the State. Note that all or nearly all of SWMACC is also served by Tualatin Valley Fire & Rescue (TVFR), a fire and life safety service provider. Spill response services are also provided by TVFR. Their engine crews are trained to handle many types of spills and hazards and they can mobilize a TVFR HazMat team, if appropriate, to contain a release which contains mercury.

Timeline for implementation:

This management strategy is currently being implemented and is an ongoing activity.

Measurable milestones (if any):

This management strategy will be evaluated annually for effectiveness and level of service.. Adaptive management will be applied as appropriate to address limiting factors for watershed health. Assessment of this strategy will include tracking the number and quantities where feasible of illicit discharges and spills per year in SWMACC.

Fiscal analysis:

This management strategy is currently funded.

Section C: IMPLEMENTATION

8. Mercury

8.1 Matrix of Management Strategies

Table 2 Lists strategies for reduction and management of mercury

PARAMETER: Mercury						
SOURCE	STRATEGY	HOW	FISCAL ANALYSIS	MEASURE	TIME-LINE	MILESTONE
<i>What sources of this pollutant are under your jurisdiction?</i>	<i>What is being done, or what will you do, to reduce and/or control pollution from this source?*</i>	<i>How will this be done?*</i>	<i>What is the expected resource need?*</i>	<i>How will we demonstrate successful implementation or completion of this strategy?*</i>	<i>When do you expect it to be completed?*</i>	<i>What goals do you expect to achieve, and by when, to know progress is being made?*</i>
1. Stormwater runoff	a. Stormwater regulations	Revise and implement design/construction standards for post-construction phase stormwater management of new/redevelopment within SWMACC UGB subunit.	Currently funded	Track permit applications for new/redevelopment and stormwater management measures implemented.	Ongoing. Revisions to design/construction standards are proposed in the next several years.	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
	b. Water quality monitoring and other stormwater management activities	Upon receipt of final mercury program guidance from DEQ, WES will begin monitoring for mercury as a part of the stormwater and in-stream water quality monitoring program and/or WES will participate in a state-wide study of toxics. WES may implement other stormwater strategies where applicable, including street sweeping. WES may participate in developing a Mercury BMP Manual with ACWA in the future.	Existing monitoring levels currently funded. Additional funds req'd for ACWA Mercury BMP Manual	Review monitoring results annually and evaluate effectiveness of management strategies. Track # of curb miles swept per year and other relevant data.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.

	c. Industrial/Commercial Stormwater Program	Implement the WES "Non-Single-Family Residential Maintenance Agreement Program" (NSFRMAP) The NSFRMAP agreements obligate property owners to clean and maintain their storm sewer system.	0.1 FTE required for NSFRMAP (budgeted for FY08)	Track annual letters sent to property owners in NSFRMAP identifying their requirements; track annual reports received from NSFRMAP property owners.	First annual letters sent by June 2009, ongoing work following	Annual letters sent beginning 2009; receive annual reports from owners. Evaluate measures annually for effectiveness and level of service; apply adaptive management.
	d. Roadway Maintenance	For roads with Full County Maint., apply ODOT Guide. As roads are maintained, repaired and rebuilt, the ODOT Guide's BMPs will be used to address river/stream surface shade where appropriate over time.	Currently funded	Qualitative assessment through interviews with staff.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
	e. Implement Other Watershed Protection Regulations	i. Metro Title 3. The equivalent of this is administered by WES in CCSD#1 and in SWMACC. Clackamas County administers Title 3 in all other areas of County jurisdiction where it applies.	Currently funded	Track the number of approved building and development permits per year with riparian area setbacks.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
		ii. Metro Title 13 (Goal 5) – Clackamas County/WES jurisdictional areas. This will be adopted by ordinance and HCA maps by DTD Planning.	Additional resources needed: (Minimum \$100,000).	Track the number and acreage of HCA's protected, mitigated, or restored.	Ordinance and Map of Habitat Conservation Areas adopted by Dec. 2008	Protection of Class 1 and II HCA's. Report to Metro REIN Program and annually.
		iii. River and Stream Conservation Area (ZDO 704). This is administered by Clackamas County.	Currently funded	Track the number of approved building permits per year with riparian area setbacks.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
		iv. Floodplain Management District (ZDO 703). This is administered by Clackamas County.	Currently funded	Track the number of approved building permits per year which receive a ZDO 703 review.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
		v. Wetland Provisions of ZDO 1002 and 709. These ZDOs, which only apply to wetlands, are administered by Clackamas County.	Currently funded	Track the number of approved building permits per year with wetland riparian area setbacks.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.

		vi. Protect riparian area with potential new tree ordinance for urban areas of Clackamas County. Through initial efforts of citizen group (Urban Green), the County is currently reviewing other tree ordinances and conducting a tree canopy coverage survey.	Additional resources will be required.	Qualitative assessment through interviews with staff.	Ongoing.	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
	g. Public involvement and education	Encourage landowners to voluntarily protect/enhance their riparian areas through public education and involvement.	Currently funded, additional resources may be needed.	Qualitative assessment through interviews with staff.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
2. Illicit discharges and spills	a. Spill response and IDDE	Implement spill response and IDDE program on Clackamas County full service roads and within SWMACC's UGB subunit. Refer other cases to DEQ.	Currently funded	Track the number of discharges/spills per year.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.
3. Runoff and soil erosion from construction sites	a. Erosion control program and public and education and involvement	Implement erosion control programs in SWMACC and Clackamas County DTD service areas. Require erosion control permits as applicable; provide technical assistance, education, and outreach as applicable. Implement road maintenance practices on Clackamas County full maintenance roads according to ODOT BMP manual for water quality and habitat.	Currently funded for CCSD#1, SMWACC, and Happy Valley; additional resources may be needed. Additional resources are needed in DTD service area.	Track erosion control permits issued; inspections performed; enforcement actions taken; and education and outreach activities implemented.	Ongoing	Evaluate measures annually for effectiveness and level of service; apply adaptive management.

8.2 Barriers to Implementation

Research has shown that much of the mercury which enters the Willamette River is more than likely deposited in the watershed by the atmosphere. We will reduce mercury contributions to waterways to the extent possible where we have the authority to regulate stormwater discharges from the locations where mercury is deposited.

The multiple fish consumption advisories for mercury in the Willamette Basin and the numerous 303(d) listings indicate that this beneficial use is not currently being met. DEQ acknowledges that it may take many years, perhaps even decades, to ultimately achieve the desired reduction in

fish tissue concentrations of mercury. In establishing interim water quality guidance values, DEQ considered the criteria and thresholds utilized when fish consumption advisories are issued.

Unfortunately, unregulated and minimally regulated sources of mercury appear to account for the vast majority of the Willamette River's annual mercury loading.

Land ownership categories in SWMACC that are potential sources of mercury loading via nonpoint source stormwater runoff which Clackamas County, SWMACC, WES, and the City of Rivergrove have little or no authority to regulate or control include, but are not limited to:

- Privately owned timberlands
- Privately owned farm, ranch, nursery, and orchard lands
- Highways (I-205, for example) and other State-owned lands
- Lands owned by Metro

Clackamas County, SWMACC, the City of Rivergrove, and WES will take responsibility as a DMA for reducing the fraction of the mercury loading than it can feasibly control.

8.3 Implementation Monitoring, Annual Status Reports and Evaluation Reports

Implementation monitoring will be conducted by Clackamas County's Departments of Transportation & Development, Business and Community Services, and/or Water Environment Services and/or the City Rivergrove to confirm that specific Management Strategies that are outlined in this Implementation Plan were actually implemented. A summary of the work that was performed to implement the Management Strategies will be submitted to DEQ in Annual Status Reports. At this time, Clackamas County, SWMACC, the City of Rivergrove, and WES expect to continue to submit a joint, combined TMDL/MS4 permit report to DEQ for the preceding July 1st to June 30th period by November 1st of every year. Every fifth year, an Evaluation Report will also be submitted for mercury

8.4 Effectiveness Monitoring

Effectiveness monitoring will be conducted to determine if our Management Strategies are effectively reducing mercury loading. At present, WES performs a significant amount of monitoring of various pollutant levels under a DEQ-approved surface/stormwater monitoring plan: a) at two County-owned storm sewer outfalls during storms, and b) in four in-stream creek locations in both dry weather and during storms. Due to the high cost of "very low detection level" mercury analysis, mercury is not one of the pollutants that is currently monitored.

Clackamas County plans to participate in a coordinated mercury monitoring project in the future which will enhance our collective understanding of mercury transport and fate in stormwater flowing through and from MS4-permitted systems. Before this mercury monitoring project can be initiated, the DEQ must issue their Mercury Monitoring Order. Phase I MS4 permit holders – which includes Clackamas County, the City of Rivergrove, and SWMACC – expect to be included in this Order. After mercury monitoring data is available from this expected project, it will be used initially to establish a baseline level of mercury loading. Future mercury data will be compared to this baseline to determine if loading has been reduced by 27% or more (the

TMDL's Interim Load Allocation).

8.5 Timelines

The goal of Clackamas County, WES, SWMACC, and the City of Rivergrove Mercury TMDL Implementation Plan is to attain the nonpoint source mercury interim load allocation through an adaptive management process. We are committed to investing in activities and programs that contribute to overall water quality improvement and watershed health. It is unknown at this time whether the current and planned level of management activities will provide enough mercury load reduction to meet the load allocation given the barriers to implementation described. As monitoring demonstrates progress toward pollutant reduction, we will adaptively manage our activities and programs in order to work toward attaining the interim load allocation for mercury.

Quantifying our role in progressing towards meeting the Willamette River watershed's entire interim load allocation will be challenging due to the many potential sources of mercury and the barriers to implementation discussed above. The amount of mercury that is coming from SWMACC's nonpoint source stormwater runoff has not yet been determined. The attainment of the nonpoint source mercury interim load allocation in SWMACC will likely be due to a partnership with Washington County's Clean Water Services, cities, and private landowners in the entire Tualatin River watershed, in combination with the following three government agencies who provide additional regulatory authority and/or education & technical assistance in SWMACC noted above.

9. Review and Revision of Plan

According to OAR 340-042-0080(3)(a)(C), Clackamas County, the City of Rivergrove, WES, and SWMACC shall "Provide for... periodic review and revision of the implementation plan." We will review and revise this update to our Tualatin TMDL Implementation Plan on an as-needed basis. At minimum, we expect to review and, if deemed necessary, revise this update to our Tualatin TMDL Implementation Plan soon after the Willamette TMDL or Tualatin TMDL is revised in the future by the DEQ. We and the DEQ expect that the Willamette TMDLs' revision date will be in 2011, five years from the date it was issued as an Order in 2006. This Implementation Plan update (Appendix F) may be reviewed and, if we deem it necessary, revised at other times if we learn that one or more cost-effective modifications can be made which, if implemented, will result in attainment, or significant progress towards attainment, of the mercury interim load allocation.

10. Statewide Land Use Requirements

Oregon Administrative Rule 340-042-0080(3)(a)(D) states that – to the extent required by ORS 197.180 and OAR chapter 340, Division 18 – evidence of this Implementation Plan's compliance with the applicable land use requirements shall be provided. Clackamas County, the City of Rivergrove, and WES are currently in compliance with all land use requirements which pertain to this Implementation Plan. This Implementation Plan is consistent with Clackamas County's Comprehensive Plan and land use regulations, and with the City of Rivergrove's Comprehensive

Plan and land use regulations. These Comprehensive Plans have been acknowledged by Oregon’s Land Conservation and Development Commission to be in compliance with the Statewide Planning Goals. This Implementation Plan is consistent with the County’s Comprehensive Plan and the City’s Comprehensive Plan to the extent required by law.

For example, within the Clackamas County Comprehensive Plan’s “Natural Resources and Energy” Chapter, setback distances from streams/wetland/rivers are addressed with broad policies and in specific detail. These broad setback distance policies and details are then repeated and detailed further in Section 704 of the Zoning and Development Ordinance. While the Clackamas County Comprehensive Plan does not specifically mention TMDLs by name, overarching goals that are present in the TMDL – including the need to keep instream water temperatures down during the summer – are addressed in the Comprehensive Plan.

We have concluded that the City of Rivergrove’s and Clackamas County’s Comprehensive Plans have provisions that are relevant to this Implementation Plan update and that this Implementation Plan update is compatible with these provisions.

11. Citation of Legal Authority

SWMACC

Organized under ORS 451 in 1992, SWMACC was empowered with surface/stormwater management authority by Clackamas County Board Order No. 92-289 on March 19, 1992. This Order authorizes SWMACC to provide nonstructural and structural nonpoint source pollution controls to meet state and federal regulations and to, in general, address surface/stormwater quality and flooding problems. These controls are contained with the *Surface Water Management Agency of Clackamas County Rules & Regulations*, revised December 15, 2002, and in the *Surface Water Management Administrative Procedures*, dated January 2003. The surface water management fees charged to customers in SWMACC are levied at the rate of:

- \$4/month per single family home, or
- \$4/month per each 2,500 square feet of impervious area for non-single family development.

Clackamas County Comprehensive Plan, ZDOs, and Other Board Orders

The Clackamas County Comprehensive Plan was last updated on May 31, 2000. The Comprehensive Plan addresses planning goals and policies, including land use, transportation, community and design plans, stormwater drainage, natural resources, and open space/parks. Current policies regarding development, implementation, and enforcement of stormwater controls for new development or redevelopment are identified in the Public Facilities and Services element of the Comprehensive Plan. The Comprehensive Plan provides authority to adopt measures that protect surface/stormwater quality.

Zoning and Development Ordinances (ZDO) provides the rules, regulations, and standards that implement the goals and policies of the Comprehensive Plan. The ZDOs that serve to address and protect surface/stormwater quality are:

- Floodplain Management District (Section 703)
- River and Stream Conservation Area (Section 704)

- Conservation Wetland District (Section 709)
- Willamette River Greenway (Section 705)
- Protection of Natural Features (Section 1002)
- Utility Lines and Facilities (Section 1006)
- Storm Drainage (Section 1008). Includes stormwater quality control, such as detention and erosion control.
- Open Space and Parks (Section 1011)
- Density Standards, Transfers and Bonuses (Section 1012)
- Planned Unit Developments (Section 1013)
- Open Space Review (Section 1103).

County Ordinance and associated HCA map adoption requirements necessary to implement Metro's Title 13 (mandated in part by State of Oregon, Goal 5 regulations) are expected to be approved at the end of 2008 that will provide additional protection for riparian shade.

Existing regulations that prohibit illicit connections to storm sewers are promulgated in ORS 447.140. Clackamas County Board Order 81-1-36 ("An Ordinance Pertaining to Enforcement of the Building Code, Excavation and Grading Standards, and Sewage Disposal System Standards"), as amended pursuant to Ordinance No. 05-2000, provides Clackamas County with the authority to enforce regulations which prevent and control illicit connections. This Order was amended by Board Order 88-179 to include grading and filling regulations.

The Comprehensive Plan, ZDOs, and Board Orders apply during new/redevelopment and during times when development is not proposed or occurring. If a property is not being developed or redeveloped, Clackamas County's Planning and/or Community Environment Divisions administer the applicable portions of the Comprehensive Plan, the applicable ZDOs, and many Board Orders. If a property has been proposed to be developed/redeveloped, all Plans are checked for conformance with the following:

- ZDOs. (Clackamas County)
- Grading and Excavation Ordinances. (WES)
- The Roadway Standards Manual. This document provides requirements for drainage standards, roadway standards, submittal requirements, including a section on hydrology, hydraulics, and water quality. The manual was completed in January 1999. (Clackamas County)
- SWMACC's Rules and Regulations, but only if the property is within SWMACC. Developers may be required to provide stormwater detention, erosion control, post-construction stormwater treatment, and a streamside/wetland setback area. (WES)

The City of Rivergrove's Comprehensive Plan and Codes

The City of Rivergrove's Comprehensive Plan's last major update occurred in 1989. The Comprehensive Plan addresses planning goals and policies, including land use, transportation, community and design plans, stormwater drainage, natural resources, and open space/parks. Current policies regarding development, implementation, and enforcement of stormwater controls for new development or redevelopment are identified in the Public Facilities and Services element of the Comprehensive Plan. The Comprehensive Plan provides authority to adopt measures that protect surface/stormwater quality.

The City of Rivergrove Land Development Ordinance provides the regulations that implement the goals and policies of the Comprehensive Plan. The particular Development Code sections that serve to protect surface/stormwater quality are:

- Subdivision/PUD design and improvement standards (Section 6.130 and Sec. VI, Ord. #70-2001)
- Significant Natural Resource Lands (Section 5.070 and Sections I-IV, Ord. #70-2001)
- Water Quality and Flood Management (Sections I-III and V-VII, Ord. #70-2001)
- Tree Cutting and Preservation (Section 5.100 as amended by Ord. #74-2004)
- Surface Water Runoff and Detention (Section IV, Ord. #70-2001)

Ordinance and associated HCA map adoption requirements necessary to implement Metro's Title 13 (mandated in part by State of Oregon - Goal 5 regulations) are expected to be approved in 2008 that will provide additional protection for riparian shade.

The Comprehensive Plan, codes, and City Council Orders apply during new/redevelopment and during times when development is not proposed or occurring. If a property is not being developed or redeveloped, the City administers the applicable portions of the City's Municipal Code. If a property has been proposed to be developed/redeveloped, all Plans are checked for conformance with the following:

- Conditions of Approval associated with the pertinent land use approval
- Provisions of the Development Code
- The Engineering Design Standards Manual
- SWMACC's Rules and Regulations, but only if the taxlot is in SWMACC (the portion of the City of Rivergrove that is in Washington County is not in SWMACC). Developers may be required to provide stormwater detention, erosion control, post-construction stormwater treatment, and a streamside or wetland setback area.

12. References

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