Falls City

Total Maximum Daily Load Plan

Approved

October 19, 2009

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CHAPTER 1

Introduction

Oregon Administrative Rule (OAR 340-042-0080) requires local governments and other agencies to develop a total maximum daily load (TMDL) implementation Plan. The objective of developing a TMDL plan is to implement pollution reduction strategies for three (3) main pollutants affecting the Willamette River Basin - temperature, mercury and bacteria.

TMDL Plans are a response to state and federal water quality standards that are designed to protect beneficial uses of waterways such as drinking, fishing, swimming, fish spawning, and irrigation. Streams, lakes and rivers that do not meet state and federal water quality standards are included in a list of statewide list of impaired water bodies (303(d) List). Water bodies that are placed upon the 303(d) list are required to establish total maximum daily loads (TMDLs), which describe the amount of each pollutant a waterway can receive and still not violate water quality standards.

On September 21, 2006, the Department of Environmental Quality (DEQ) signed the Willamette Basin TMDL Order. The TMDL Order requires designated management agencies that include cities, counties, and state and federal land management agencies to improve water quality through a TMDL implementation plan. The TMDL plan must address the following five (5) items:

1. Management strategies that will be used to achieve TMDL objectives

2. A timeline and schedule to achieve measurable milestones

3. A plan for periodic review and revision of the implementation plan

4. Evidence of compliance with applicable statewide land use requirements

5. Any other analyses or information as specified in the Water Quality Management Plan.

This plan is intended to address the requirements of a TMDL implementation plan specified above. The plan is organized into three (3) chapters. **Chapter 1** provides an introduction to the plan including a description of state and federal water quality requirements, and a description of the current conditions in Falls City. **Chapter 2** includes an analysis of the three (3) TMDL pollutants - temperature, mercury and bacteria. **Chapter 3** includes a description of the management strategies that will be used to achieve TMDL objectives to protect and improve water quality. Chapter 3 also includes a timeline for completing

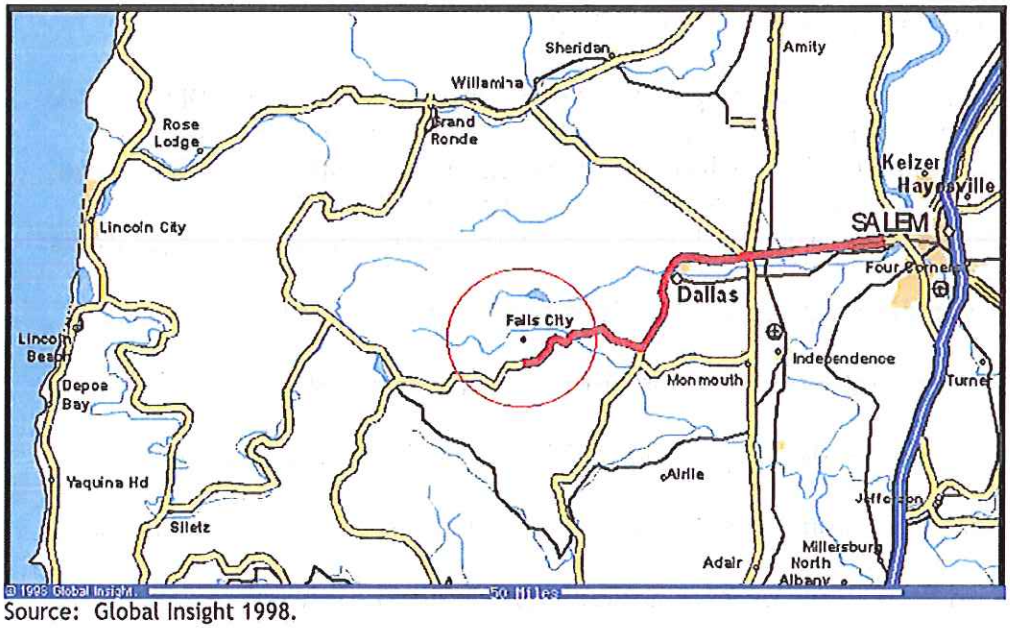
these strategies and a plan for periodic review and revision of the implementation plan.

Background

DEQ has named certain federal, state and local governments and agencies, including cities, counties, and special districts, as Designated Management Agencies (DMAs) because these agencies and governments have authority to manage and regulate sources of pollutants that are listed in the Willamette TMDL. DMAs are required to develop and submit TMDL implementation plans that address the TMDL pollutants and additional requirements to DEQ.

The City of Falls City is listed as one of the designated management agencies in the Willamette Basin. The City of Falls City is located in the Luckiamute River Watershed of the Willamette River in Polk County, Oregon (See map, Figure 1).

Figure 1. Falls City Location Map



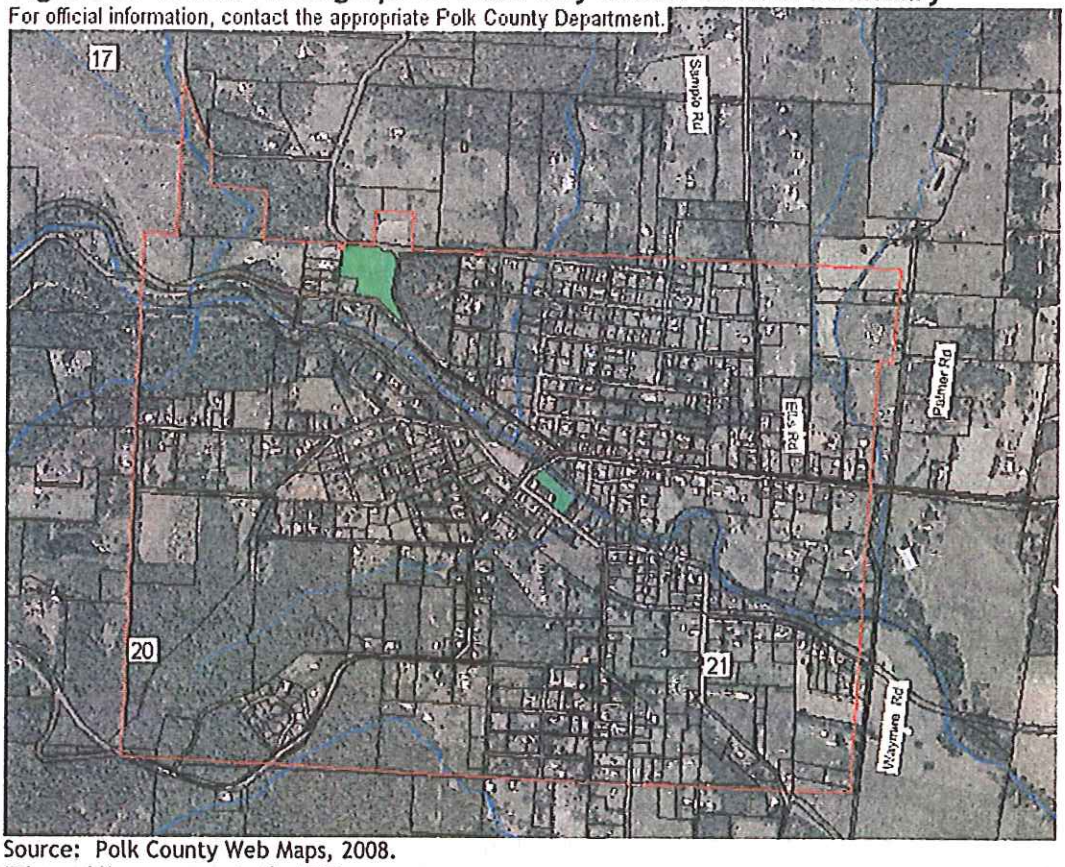
Source: Global Insight 1998.

Land Use

Falls City was incorporated in 1891 and was historically a timber processing community with small-scale agricultural activities. No lumber mills remain today although commercial timber harvest continues in the surrounding forestlands. Falls City is a 15-30 minute commute to the nearby cities of Dallas and Salem. The estimated population of Falls City in 2007 was 965 according to the Population Research Center at Portland State University.

The Falls City UGB is rectangular and is coincident with the city limits with one small exception on the north boundary where a single tax lot is outside the city limits but within the UGB (See map, Figure 2). The area within the UGB is approximately 764 acres. The central core of the city contains commercial businesses and residences on small to medium lots. The rest of the UGB is rural residential in nature with homes surrounded by forest and pasture lands. Based upon a review of the Falls City Comprehensive Plan, land within the Falls City Urban Growth Boundary is primarily zoned and used for residential purposes (63 %). The next highest land designation is for forest uses (12 %), followed by industrial (10 %), public (9 %), and commercial uses (5 %).

Figure 2. Aerial Photograph of Falls City Urban Growth Boundary*



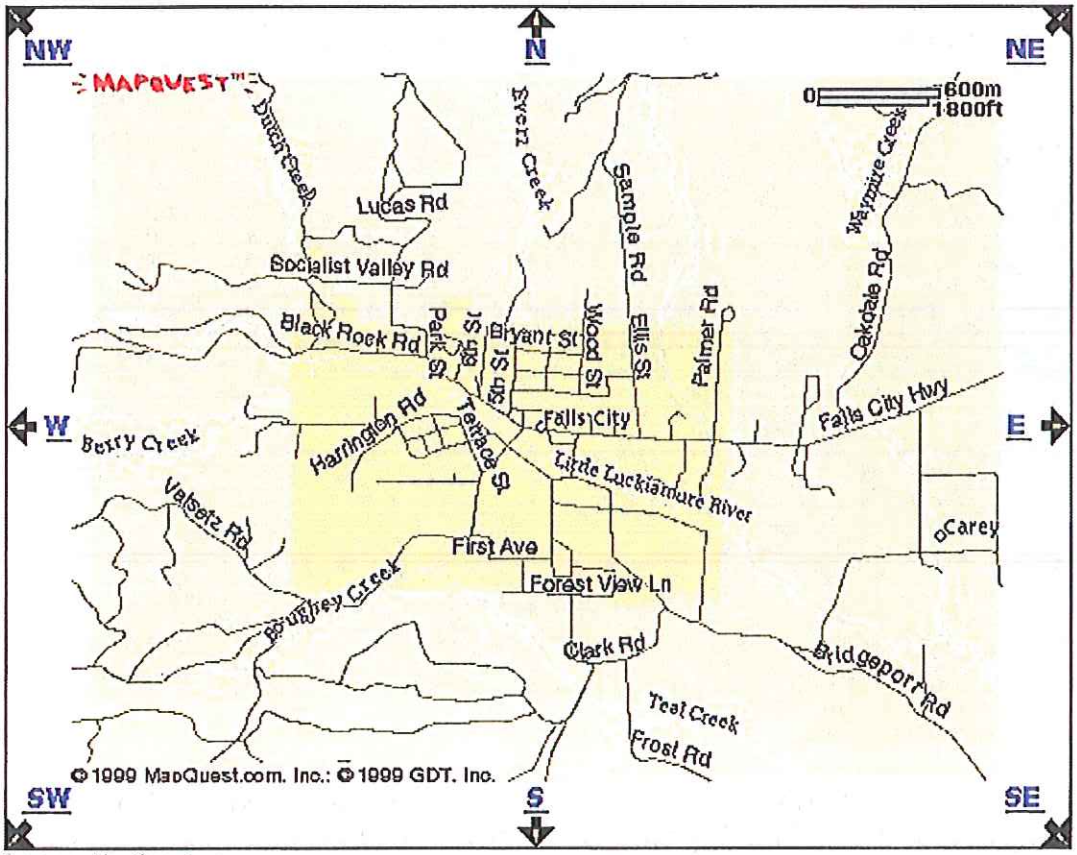
Source: Polk County Web Maps, 2008.
*The red line represents the UGB.

The most recent population forecast for Falls City anticipates a population of 1,316 by the year 2020. The City anticipates 97 new housing units and 17 acres of commercial and industrial development by the year 2020.

Hydrology

Falls City is located entirely within the Little Luckiamute River sub-watershed of the Luckiamute River Watershed in the Upper Willamette River hydrologic unit of the Willamette River Basin. The Little Luckiamute River, a perennial stream, flows through the middle of Falls City from northwest to southeast. The Little Luckiamute River is feed by a number of stream tributaries that flow through the city including Dutch Creek, Berry Creek, Everz Creek and three unnamed tributaries (See map, Figure 3.). Boughey Creek drains the southwest corner of the city and is a tributary of Teal Creek, which joins the Little Luckiamute River several miles downstream of Falls City. The Little Luckiamute River (from River Mile 0-26) was listed as a 303(d) stream for temperature in 2004.

Figure 3: Map of Waterways in Falls City



Source: MapQuest.com

It has been estimated that the Luckiamute Watershed supports more than 1,000 species of native plants, 225 species of vertebrates, and an unknown number of invertebrate species (Luckiamute Watershed Council 2004). Upper Willamette winter steelhead spawn and rear in the upper Luckiamute Watershed (Willamette Basin Watershed Councils 2005). Fluvial cutthroat trout spawn and rear in the Luckiamute and Little Luckiamute Rivers and their tributaries.

Figure 4: Red legged frog in the Luckiamute River headwaters.

Resident populations of cutthroat also inhabit the watershed and an isolated population exists above the Falls City natural waterfall on the Little Luckiamute River.

CHAPTER 2: TEMPERATURE, MERCURY AND BACTERIA

The three (3) main pollutants affecting the Willamette River Basin for which DEQ issued final TMDLs for on September 21, 2006 include: temperature, mercury and bacteria. An analysis of each of these pollutants including the source of each pollutant, a description the total daily maximum load (TMDL) for each pollutant, and efforts to reduce pollution levels is provided as follows:

1. Temperature

Temperatures in the Willamette Basin are often too warm at certain times of year to support healthy cold-water fish species such as salmon and trout (DEQ 2007). Causes of stream warming include a number of factors such as, climate, elevation, geology, hydrology, streamside vegetation, water diversions, and wastewater from industrial and municipal treatment facilities. Potential sources of thermal pollution within the Falls City UGB include removal of streamside vegetation and wastewater discharge from the City's municipal treatment facility.

Streamside Vegetation

A principal cause of stream warming beyond natural temperatures has been the removal of trees and other shade-producing vegetation from stream banks. Removal or disturbance of streamside vegetation negatively impacts stream temperature due to the loss of shade cover (DEQ 2007). The most effective way to minimize stream warming is by reducing the amount of solar radiation that reaches the water. This is accomplished by protecting and reestablishing vegetation along waterways to provide shade cover.

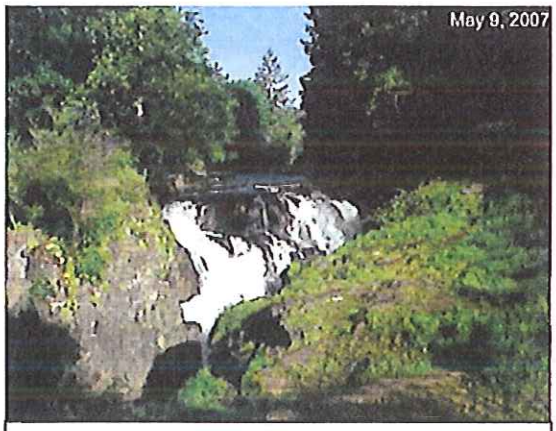


Figure 5. Vegetation along the Little Luckiamute River, Falls City, OR.

Low water flows, combined with warm air temperatures also result in high stream temperatures in significant portions of the Luckiamute watershed (Willamette Basin Watershed Councils 2005). High stream temperatures within the Luckiamute watershed have been identified as a limiting factor to optimal survival and growth of cool water fishes, such as steelhead, cutthroat trout, and coho salmon. Decreasing diverted water flows for irrigation and reestablishing floodplain connectivity would provide more in-stream flow and cooler water temperatures.

Most of the riverbanks along the Little Luckiamute River in Falls City are lined with mature trees. The City owns approximately 3.6 acres of parkland adjacent to the Little Luckiamute River.

Activities within the City's UGB that may result in the loss of streamside vegetation include urban development for residential, commercial and industrial uses in or near riparian areas. Additionally, there are a number of large tracts of land located in the northwest and southwest portion of the City's UGB that are currently privately owned and managed for timber production. Removal of streamside vegetation in these areas also has the potential to increase stream temperatures.

Wastewater Effluent

Wastewater from municipal treatment facilities may also be a source of heat when discharged to streams (DEQ 2007). The City of Falls City owns and operates its own public sewer system that was constructed in 1986 to serve limited areas of the City. As noted in the City's Wastewater Facilities Plan completed in 2001, the City operates two types of sewer systems in the city - small diameter gravity (SDG) and septic tank effluent pump (STEP). Both types have a septic tank installed at each service with the septic tank effluent either flowing by gravity through the collection system (SDG) or pumped through a pressure system (STEP) to the collection site.

The City of Falls City's wastewater treatment plant is located south of the high school. Septic tanks at individual homes or businesses provide primary treatment by capturing gross solids, grease, grit and other material that may cause problems to transport in the small-diameter gravity mains and treat in the gravel-filter treatment facilities. The City operates a re-circulating gravel filter (RGF) wastewater treatment system. Treatment effluent is diverted either to 1) a subsurface drain field area or to 2) Ultraviolet (UV) disinfection, and then discharged into the Little Luckiamute River during wet weather peaks.

DEQ regulates wastewater from municipal treatment facilities through the existing National Pollution Discharge Elimination System (NPDES) Permit Program. The City of Falls City has an active NPDES Permit for the City's sewage system that was first issued on May 16, 2000 (Permit Application Number 982344) and will expire on June 30, 2012. The current NPDES permit does not allow river discharge during the low river flow period (May 1 - October 31). The City currently relies on subsurface disposal except for periods of high inflow.

Based upon a review of the Falls City Wastewater Facilities Master Plan, the average effluent temperature is 58 degrees. The City is currently monitoring effluent and river temperature as a condition of its renewed DEQ discharge

permit to determine if there is a possibility of an increase in river temperature due to the discharge of effluent.

Based upon a recent review of DEQ's Water Quality - Wastewater Permits Database, the City has one (1) other water quality permitted facility on record inside the City. The Green Haven RV Park, located at 200 Church Street in Falls City, was issued a wastewater permit (Permit No. 975737) on May 10, 2002, for a wastewater facility with a standard or alternative subsurface system with a design flow less than 20,000 gallons per day.

Total Maximum Daily Load for Temperature

The maximum temperature increase in the waters of the state from all human activities can be no more than 0.3 degrees C. This was designated by the State of Oregon in Oregon Administrative Rule 340-041-0028. In the TMDLs, this allowance is known as the Human Use Allowance and is split up between various sources of human-caused thermal pollution. Models indicate that restoring shade cover to natural levels could reduce temperatures in the main stem Willamette River by 0.7 degrees Celsius.

The amount allocated to each source of thermal pollution varies by location, but, generally, non-point sources are allowed to contribute no more than 0.05 degrees C, point sources can contribute up to .25 degrees C, and the TMDL allocates 0.0 degrees C to the U.S. Army Corps of Engineers Willamette Project reservoirs. The DEQ factors in .05 degrees as a reserve capacity that will be set aside now to accommodate future growth by meeting the increased demand for industrial and municipal wastewater discharges. On average, waterways in the Willamette Basin need to receive 23 percent less thermal input than is currently being received (DEQ 2004).

Temperature Reduction Efforts

Efforts to reduce thermal pollution include the protection and restoration of streamside vegetation. Examples of options available to local governments and land management agencies to address thermal pollution include:

- Develop materials that explain why landowners should preserve natural streamside vegetation.
- Implement demonstration projects on public land to illustrate potential riparian management techniques.
- Institute a riparian ordinance that prohibits the removal of native streamside vegetation.
- Acquire critical streamside property.

- Become involved in a water quality-trading program.

- Actively restore riparian areas on public land and help private property owners restore riparian areas on private land.

Vegetation within the riparian area adjacent the Little Luckiamute River and stream tributaries in Falls City is currently protected through the development review process which requires subdivisions and partition of land to protect existing scenic vegetation and/or natural features through establishing conservation easements that prohibit development (Falls City Zoning and Development Ordinance (FCZDO) Section 2.207.09). Additionally, new multi-family residential, commercial, industrial and public uses must retain existing natural features on site as a criterion of site development review approval (FCZDO Section 3.203(G)(6)). The City also provides notice of land use applications in areas that may impact wetlands or waterways identified on the National Wetland Inventory (NWI) Maps.

2. Mercury

Mercury is a potent toxin that can cause damage to the brain and nervous system. Humans are at risk for exposure to mercury primarily through the consumption of fish or seafood containing elevated levels of mercury. To protect public health, especially that of pregnant women and young children, the Department of Human Services (DHS) has issued advisories recommending that people limit the amount of fish they consume from certain waterways.

Mercury can be transported in the air after soil disturbance, automobile emissions, and industrial emissions across many miles and deposited by rainfall. Air deposition from emissions is one of many ways that mercury moves through the environment. Some point sources, including timber processing plants and mills, discharge low levels of mercury in their wastewater effluent.

Stormwater runoff suspends mercury molecules and carries them to waterways. Mercury is naturally occurring at low levels, but when native soil erodes at an accelerated rate those molecules are released in abnormal amounts. Mercury is also set in motion when sediment that has been deposited long ago is re-suspended due to high flows or a significant disturbance.

The City of Falls City routinely tests the source of the City's public water system (Glaze and Teal Creeks) for the presence of heavy metals, including mercury. Mercury levels have been present only in trace amounts. While mercury pollution does not appear to be a significant pollutant in the City's

water supply source, land development activities within the City may result in increased mercury levels in the Little Luckiamute River and creeks located in the City's UGB through increased stormwater run-off and erosion.

Stormwater Run-off

Stormwater run-off within the City's UGB is served by a series of existing drainpipes along North Main Street that serve to drain the main part of town. The rest of the town is drained by a series of ditches that drain into several creeks, which eventually drain into the Little Luckiamute River. The city storm water system is one of random placement without an overall design concept, as the City does not currently have a stormwater master plan. There are no documented problems created by the existing system of stormwater, but the system will need to be improved to accommodate new development and protect surface water resources.

Based upon recent storm drainage requirements adopted into the City's Zoning and Development Ordinance (FCZDO) in 2006, all new residential land partitions, subdivisions, planned unit developments, multi-family developments, commercial developments, industrial developments, and reconstruction or expansion of such developments, are required to submit a plan for storm drainage and erosion control that is prepared by an engineer registered in the State of Oregon and approved by the City (FCZDO 2.206). The plan and site improvements for the development must convey all storm water runoff to a public storm sewer or natural drainage channel having adequate capacity to carry the flow without overflowing or otherwise causing damage to public and/or private property.

Erosion

Based upon a review of the City's Comprehensive Plan, the erosion hazard for many soil types in Falls City is moderate to high due to steep slopes. East of the City, the landscape is less resistant to erosional forces, being older and rolling in character. West of the City, the landscape is young and steep in character and is more resistant to erosional forces.

Vegetation removal, inadequate storm drainage, or increasing the steepness of slopes are all factors that could cause increased erosion problems in the City.

Private forestry activities in the northwest and southwest portions of the City's UGB, including road construction and use, timber harvesting and mechanical preparation for the planting of trees may also cause increased erosion and water quality problems in the City (U.S. EPA 2007). These activities are of particular concern as they occur upstream of the City's drinking water intakes on Glaze and Teal creeks and are a potential source of contamination to the City's drinking water supply (DEQ 2003).

An additional source of erosion and sedimentation within Falls City that is outside of the City's control comes from logging trucks that serve local commercial forestry operations. Local logging trucks rely on city streets such as Main Street, to transport timber outside of the area. Sediment carried by local logging trucks is often deposited on city streets, where it has the potential to enter into the city's stormwater system.

Total Maximum Daily Load for Mercury

The goal of the mercury TMDL is "to reduce mercury levels in the basin to a point where fish are no longer unsafe to eat" (DEQ 2007). DEQ's analysis suggests that a 27 percent reduction in the total mercury load is needed to reduce mercury in fish tissues to a safe level. To reach this level, DEQ has established interim targets and allocations for the mercury TMDL. Final targets and allocations will be completed in 2011 following additional data collection, analysis and stakeholder outreach.

Mercury Reduction Efforts

Implementation plans must include a mercury reduction strategy "that includes feasible measures to minimize mercury runoff" (DEQ 2006). There is an array of options available to local governments and land management agencies to reduce mercury pollution. Many of the management strategies that address mercury pollution also address bacteria and temperature. Potential management strategies include:

- Establishing a stormwater plan with water quality protection components.
- Stormwater detention and treatment prior to discharge into waterways
- Establishing an erosion prevention and sediment control program
- Regular street sweeping and stormwater system maintenance
- Limiting land disturbance whenever possible (DEQ 2006).

The Falls City Zoning and Development Ordinance (FCZDO) requires new development to provide a stormwater and erosion control plan and construct improvements needed to minimize erosion and reduce degradation of water quality (FCZDO 2.206). At a minimum the plan must show the methods to be used to minimize the amount of runoff, siltation, and pollution created from the development both during and after construction; show plans for the construction of storm sewers, open drainage channels, and other facilities; and provide design calculations for all drainage facilities. In addition to City storm

drainage requirements, DEQ also requires a 1200-C stormwater permit (with an approved stormwater management plan) for any development over one (1) acre.

The City also requires a geotechnical evaluation on new development in steep sloped areas that is prepared by a registered professional soils engineer or engineering geologist (FCZDO 2.205.05). The report must make recommendations of construction measures required to adequately mitigate the potential soil, slope hazard, or mass wasting hazards as well as a grading plan and erosion control measures adequate to minimize on-site and off-site impacts.

3. Bacteria

The presence of bacteria in water can affect people participating in water activities such as swimming, wading, wind surfing, water skiing, boating or fishing. Ingestion or contact with water contaminated with bacteria can cause skin and respiratory ailments, gastroenteritis and other illnesses in humans (DEQ 2006).

Figure 6: Recreation swimming on the Little Luckiamute River, Falls City, OR.

Bacteria violations of water quality standards are most common in creeks and streams that drain urban and agricultural land. The main stem Willamette River is water quality limited for bacteria during the high flows of the fall-winter-spring months, but is in compliance during summer low flows when there is the least amount of runoff. The major sources of bacteria in the urban and rural residential areas are stormwater runoff, erosion, domestic and wild animal waste, failing septic systems, and municipal sewer overflows. Other sources of bacteria include livestock, irrigation runoff, and stream bank erosion. Major sources of bacteria pollution within the Falls City UGB include stormwater run-off, erosion, sewage effluent and failing septic systems.

Wastewater Effluent

The City currently relies on subsurface effluent disposal except for periods of high inflow. Based upon the conditions found in the City's current NPDES Permit, the City is allowed to discharge up to 25,000 gallons of effluent per day into the Little Luckiamute River during the wet season (November through April).

The City has experienced problems with its effluent receiving sufficient treatment before being discharged to a subsurface disposal system and into the Little Luckiamute River. Effluent from the City's wastewater system has not been able to consistently achieve concentration/loading limitations for biochemical oxygen demand (BOD_5) and total suspended solids (TSS). This resulted in the City signing a Mutual Agreement and Order (MAO) with the Department of Environmental Quality (DEQ) in 2000. The MAO included interim discharge limits the City needed to meet until upgrade improvements were completed to the City's wastewater treatment facility.

Pursuant to the MAO issued in 2000, the City completed a collection system evaluation aimed at documenting inflow and infiltration (I/I) sources. The City also completed improvements to the wastewater system, including upgrades to the UV disinfection facility. The MAO expired in 2007 and the City is currently working with DEQ staff through its NPDES permit to monitor biochemical oxygen demand (BOD_5) and total suspended solids (TSS) levels.

Failing Septic Systems

Over half of the City's current dwellings have privately owned and maintained on-site septic systems that do not connect to the City's sewer system. The quality of existing on-site septic systems within the UGB today generally varies by the age of installation, with the quality decreasing with age (Falls City Wastewater Facilities Plan 2001). This is generally due to the lack of standards and regulatory oversight when the older systems were installed. The City's Wastewater Master Plan identified no specific area where there has been a concentration of failed septic systems. Problems with failing septic systems within the City has generally been due to poor design and installation (2001).

In general, soils north of the Little Luckiamute River are less suitable for septic systems due primarily to high groundwater conditions and shallow depth to bedrock (Falls City Comprehensive Plan 2001). However, the majority of soils in the Falls City area are satisfactory for properly designed and installed septic tanks and drain fields (Falls City Wastewater Facilities Plan 2001).

On-site septic systems, if designed, installed and maintained properly, have limited impact upon groundwater other than nitrate contamination (Falls City Wastewater Facilities Plan 2001). There is also a concern regarding the use of onsite systems and the possibility of contamination from household chemicals. Use of chemicals in onsite systems can damage biological processes within the septic tank and can be highly mobile in the subsurface environment.

The continued use of onsite septic systems in a manner that does not negatively impact water quality depends largely upon the regulatory oversight during design and installation, and how well the systems are maintained (Falls City Wastewater Facilities Plan 2001).

Total Maximum Daily Load for Bacteria

According to the Willamette Basin TMDL, point sources in the upper reaches of the Willamette Basin cause less than a one percent increase in the bacteria concentrations over natural conditions (DEQ 2006), so the focus of the TMDL implementation efforts should be on non-point sources. Models indicate that if these allocations are met within each subbasin, the entire upper reach of the main stem Willamette River will be in compliance with water quality standards.

The bacteria targets are generalized into percent reduction ranges that are applied in all the subbasins of the Willamette Basin. These planning targets have been allocated between the two major land uses that contribute bacteria to waterways; agricultural and urban. The Willamette Basin Bacteria TMDL states that urban areas must reduce their bacteria contributions by 80-94% to meet water quality standards.

Bacteria Reduction Efforts

Local jurisdictions can focus on urban issues to ensure that the quality of water does not degrade due to current land use, population growth, and land use changes. Strategy options to address bacteria in the urban area include:

- Preventing erosion and controlling sediment from new construction.
- Detaining and treating stormwater prior to discharge into waterways.
- Keeping stormwater conveyance channels clear of organic matter.
- Controlling animal waste.
- Maintaining and restoring riparian buffers.
- Encouraging better site design to decrease runoff.
- Preventing non-stormwater and illegal discharges.
- Developing stewardship and educational programs to prevent pollution.
- Street sweeping.
- Fence horses and cows away from streams and provide alternative watering devices.

- Properly maintain septic systems, including the drain field. Follow manufacturer instructions regarding pumping and maintenance service. This prevents discharge of raw sewage into storm drains and nearby rivers following heavy rainfall.

As indicted under efforts to reduce mercury pollution above, the City's Zoning and Development Ordinance currently requires a stormwater and erosion control plan for new developments.

Current city efforts to maintain riparian buffers include requirements in the Falls City Zoning and Development Ordinance that require new multi-family, commercial and industrial developments to retain existing natural features on site. The City's Zoning Ordinance also requires subdivisions and partition of land to protect existing scenic vegetation and/or natural features through establishing conservation easements that prohibit development.

Wastewater effluent is currently monitored through the conditions of the City's NPDES Permit as required by DEQ. Installation of on-site septic systems is currently reviewed and approved by the Polk County Sanitarian.

CHAPTER 3: TMDL IMPLEMENTATION MANAGEMENT STRATEGIES

As described in the previous chapter, the City is already doing many things to protect and restore water quality. Additionally, the Falls City Comprehensive Plan includes a number of goals, objectives and polices to support the protection of water resources and water quality as documented in Appendix A, Compliance with Statewide Land Use Requirements. The Falls City Zoning and Development Ordinance implements the City's Comprehensive Plan goals, objectives and policies through a number of requirements designed to help protect water quality.

Management strategies that will be used to help the City achieve TMDL objectives are identified in the TMDL Implementation Tracking Matrix found in Table 1 below. Table 1 also includes a timeline and schedule to implement these management strategies.

TMDL PLAN MONITORING AND REVIEW

Target dates for having implementation completed are identified for each strategy in the Falls City TMDL Implementation Tracking Matrix.

The City of Falls City and the DEQ will periodically review the Implementation Plan and implementation progress. The Plan will be adapted as necessary. At the City of Falls City or DEQ request, the DEQ will meet with the City annually to review implementation progress and any barriers to implementation success. A report of the City's TMDL Plan progress will be submitted to DEQ every year.

Every five (5), a more comprehensive review will take place and the Plan will be adapted if necessary. The review will identify which strategies in the matrix were implemented and if there are strategies in the matrix that have not been completed within the targeted time frame, the City will identify why the strategy was not completed and an estimation of when the strategy will be completed or removed from the list of implementation measures. The review will also identify any changes within the City that may influence how water quality management should be addressed. A report of the City's TMDL Plan review will be submitted to DEQ every five (5) years. The City will review and revise the TMDL Implementation Plan as needed following DEQ evaluation of the City's Plan.

Table 1: TMDL IMPLEMENTATION TRACKING MATRIX, Falls City, OR

POLLUTANT *What pollutants does the TMDL address?*	**SOURCE** *What sources of this pollutant are under your jurisdiction?*	**STRATEGY** *What is being done, or what will you do to reduce and/or control pollution emanating from this source?*	**HOW** *Specifically, how will this be done?*	**MEASURE** *How will you demonstrate successful implementation or completion of this strategy?*	**TIMELINE** *When will the strategy begin? Be completed?*	**BENCHMARK** *What intermediate goals will be achieved, and by when, to know progress is being made?*	**POTENTIAL FUNDING RESOURCES**
Temperature	1. Solar radiation input	a. Maintain existing riparian vegetation.	FCZDO 2.207.09 and 3.203(G)(6) contains vegetation protection requirements.	Final site plan and subdivision/partition approvals.	Beginning in 2009. On-going.	Compare aerial photographs at five (5) year intervals to determine the state of and changes to riparian areas.	Development review fees.
		b. Partner with the Luckiamute Watershed Council (LWC) and Falls City High School on riparian restoration projects.	Identify a local liaison to the LWC. Build a volunteer support network for local projects. Contact LWC to identify and prioritize potential project sites. Secure funding resources to complete projects.	Monitoring the number of riparian restoration projects completed.	Beginning in 2009. On-going.	At least one riparian tree planting project completed every two (2) years.	Watershed restoration grants.
		c. Reconsider proposed amendments to Comprehensive Plan and Zoning Ordinance to comply with Goal 5 Safe Harbor protection requirements for riparian corridors.	Initiate amendments by council vote. Notify DLCD and affected property owners. Conduct public hearings before Planning Commission and Council. Adopt proposed amendments by ordinance. Provide notice of adoption to DLCD.	Adoption of an ordinance that complies with the Safe Harbor riparian protection requirements.	Beginning in October 2009. Completed in March 2010.	Copies of public hearing notices and minutes from Council meetings.	General fund.
		d. Public education and outreach regarding the importance of riparian restoration conservation.	Create information brochure and make available through newsletter, city hall and city's web site.	Completed information brochure. Website posting. Newsletter mailing.	Beginning in November 2009. Completed by May 2010.	Heightened public awareness.	General fund, technical assistance from local watershed council, DEQ.

Table 1: TMDL IMPLEMENTATION TRACKING MATRIX, Falls City, OR

POLLUTANT *What pollutants does the TMDL address?*	**SOURCE** *What sources of this pollutant are under your jurisdiction?*	**STRATEGY** *What is being done, or what will you do to reduce and/or control pollution emanating from this source?*	**HOW** *Specifically, how will this be done?*	**MEASURE** *How will you demonstrate successful implementation or completion of this strategy?*	**TIMELINE** *When will the strategy begin? Be completed?*	**BENCHMARK** *What intermediate goals will be achieved, and by when, to know progress is being made?*	**POTENTIAL FUNDING RESOURCES**
Temperature	2. Wastewater treatment plant discharge	Maintain low effluent temperatures.	Meet requirements of DEQ Discharge permit.	Monitor effluent temperature.	Beginning in 2009. On-going.	Compliance ensures effluent from the FC sewage treatment does not impair the river.	Sewer user fees.

POLLUTANT *What pollutants does the TMDL address?*	**SOURCE** *What sources of this pollutant are under your jurisdiction?*	**STRATEGY** *What is being done, or what will you do to reduce and/or control pollution emanating from this source?*	**HOW** *Specifically, how will this be done?*	**MEASURE** *How will you demonstrate successful implementation or completion of this strategy?*	**TIMELINE** *When will the strategy begin? Be completed?*	**BENCHMARK** *What intermediate goals will be achieved, and by when, to know progress is being made?*	**POTENTIAL FUNDING RESOURCES**
Bacteria	1. Wastewater treatment plant discharge	a. Implement improvements identified in the Wastewater Master Plan	Review master plan to identify prioritized improvements. Apply for and secure funding resources.	Monitor wastewater improvement projects completed.	Beginning in 2009. On-going.	Grant funds secured. Compliance with discharge permit requirements.	Grants, loans, user fees
		b. Reduce illicit municipal waste discharge.	Provide staff training on proper sewage treatment plant maintenance and best management practices.	Compliance with DEQ NPDES permit requirements.	Beginning in 2009. On-going.	NPDES permit reviews for the municipal wastewater treatment facility.	General fund.
	2. Stormwater run-off	a. Complete a Stormwater Master Plan.	Identify available grant resources for stormwater plan assistance. Apply for and secure funding resources.	An adopted stormwater master plan.	Beginning in 2009. Project completion subject to securing adequate funding.	List of potential grant resources by March 2009. Completed grant application forms December 2009.	Grants, city funding when available.

Table 1: TMDL IMPLEMENTATION TRACKING MATRIX, Falls City, OR

POLLUTANT *What pollutants does the TMDL address?*	SOURCE *What sources of this pollutant are under your jurisdiction?*	STRATEGY *What is being done, or what will you do to reduce and/or control pollution emanating from this source?*	HOW *Specifically, how will this be done?*	MEASURE *How will you demonstrate successful implementation or completion of this strategy?*	TIMELINE *When will the strategy begin? Be completed?*	BENCHMARK *What intermediate goals will be achieved, and by when, to know progress is being made?*	POTENTIAL FUNDING RESOURCES
Bacteria	2. Stormwater run-off	b. Require new development to manage stormwater run-off.	FCZDO 2.206 Contains stormwater improvement requirements for new development.	As-builds of completed stormwater improvements from new developments.	Beginning in 2009. On-going.	Stormwater plan approvals by City Engineer. Inspections of stormwater improvements by city/county staff.	Development review fees.
	3. Failing septic systems	Public education and outreach regarding proper septic maintenance and how to detect failing septic systems.	Create information brochure and mail out with water bills. Provide a copy of the brochures with new septic permits and make available at city hall and city's web site.	Completed information brochure. Number of brochures printed and mailed.	Beginning in 2009. Completed by April 2010.	Heightened public awareness.	General fund, technical assistance from Polk County, DEQ.
	4. Pet waste	a. Public education and outreach regarding proper pet waste disposal.	Create information brochure and make available through newsletter, city hall and city's web site.	Completed information brochure. Website posting. Newsletter mailing.	Beginning in March 2010. Completed in September 2010.	Heightened public awareness.	General fund, technical assistance from local watershed council, DEQ.
		b. Install park improvements such as signage, kiosks and trash receptacles.	Research project costs and identify available funding resources.	Development of a project budget and list of potential grant resources.	Beginning in January 2010. Project completion subject to securing adequate funding.	Project budget and list of potential grant resources by June 2010.	TBD.

Table 1: TMDL IMPLEMENTATION TRACKING MATRIX, Falls City, OR

POLLUTANT *What pollutants does the TMDL address?*	**SOURCE** *What sources of this pollutant are under your jurisdiction?*	**STRATEGY** *What is being done, or what will you do to reduce and/or control pollution emanating from this source?*	**HOW** *Specifically, how will this be done?*	**MEASURE** *How will you demonstrate successful implementation or completion of this strategy?*	**TIMELINE** *When will the strategy begin? Be completed?*	**BENCHMARK** *What intermediate goals will be achieved, and by when, to know progress is being made?*	**POTENTIAL FUNDING RESOURCES**
Mercury	Erosion and sedimentation	Limit erosion.	FCZDO requires geotechnical evaluations on properties with steep slopes and an erosion control plan for all new multi-family, commercial and industrial developments.	City and county building review staff will monitor and review compliance with Code requirements.	Beginning in 2009. On-going.	Geotechnical evaluation and erosion control plan approvals. Development inspections by city and county staff.	Development review fees.
			Inform developers about 1200c permit requirements and require a copy of the permit to be provided to the city	Copies of land use approvals and 1200 C permits from developments disturbing over 1 acre.	Beginning in 2009. On-going.	Include 1200c permit requirements as a condition of development approval.	Development review fees.
			Review and comment on the development of forest management plans.	Copies of comments submitted on forest management plans.	Beginning in 2009. On-going.	Identify and monitor notice lists for forest management plan adoption. Adopted forest management plans that address erosion and pollution concerns.	General fund
			Work with DEQ, Dept. Forestry, and local logging companies to identify and implement strategies for reducing erosion and sedimentation within Falls City.	Development an action plan that identifies specific strategies, responsible parties, project timelines and funding sources.	Beginning in 2009. On-going.	Research possible funding sources. Identify and meet with contacts from DEQ, Dept. Forestry, and local timber companies. Contact other jurisdictions to see how they address this issue.	Technical assistance from DEQ, Dept. Forestry, grants, private funding and city funding when available.

APPENDIX A: COMPLIANCE WITH APPLICABLE STATEWIDE LAND USE REQUIREMENTS

The Falls City TMDL Plan is consistent with the following applicable Statewide Planning Goals:

Goal 1: Citizen Involvement: To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process.

The Falls City Council reviewed the draft TMDL Plan on July 21, 2008 during a public meeting. The City provided a 30-day comment period on the plan to afford citizens and affected agencies, such as the Oregon Department of Environmental Quality, the opportunity to review and comment on the plan prior to its adoption.

Additionally, land use types of strategies identified in this plan (such as the creation of riparian protection requirements) are instituted through ordinances that are subject to public review and comments through a hearings process.

Goal 2: Land Use Planning: To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

The Falls City TMDL Implementation Plan is consistent with the Falls City Comprehensive Plan, which identifies the City's goals and policies to guide the growth and development of the city. The Falls City TMDL Implementation Plan includes the factual basis for the management strategies included in the plan.

Goal 5: Open Spaces, Scenic and Historic Areas, and Natural Resources: To protect natural resources and conserve scenic and historic areas and open spaces.

The TMDL plan is consistent with the following goals, objectives and policies found in the Falls City Comprehensive Plan that pertain to GOAL 5 Resources:

Goal: Protect natural resources and conserve scenic and historic areas, and open spaces.

Objective: To support regional efforts to improve water quality, wildlife habitat and restore fish habitat in the Luckiamute River Watershed.

Policies:

1. Falls City will participate in watershed-based efforts to improve fish and wildlife habitat and water quality in the Luckiamute River Watershed. Participation will include having a representative on the Luckiamute River Watershed Council or coordinating with the small city representative.

2. Falls City will contribute to, or comment upon, regional water quality improvement planning and fish recovery plans undertaken by state and federal agencies by reviewing and responding to proposed policies and plans.

In addition to existing requirements found in the City's Zoning and Development Ordinance to protect Goal 5 resources, the TMDL Implementation Plan includes management strategies to reconsider adoption of additional riparian protection requirements that would comply with Goal 5 Safe Harbor provisions to protect significant riparian resources.

Goal 6: Air, Water and Land Resources Quality: To maintain and improve the quality of the air, water, and land resources of the state.

The City's TMDL Plan is consistent with the following goals, objectives and policies found in the City's Comprehensive Plan that pertain to Goal 6 Air, Water and Land Resource Quality:

Goal: To maintain and improve the quality of air, water and land resources in Falls City.

Objective: To support regional efforts to improve water quality in the Luckiamute Watershed.

Policies:

1. Falls City will ensure that land use and development do not degrade water quality associated with fish habitat.

The TMDL Plan includes management strategies that support and implement the City's goals, objectives and policies to protect air, water and land quality resources. Specifically, the Plan identifies management strategies that would protect riparian vegetation resources to reduce thermal pollution to water resources; requires management of stormwater and erosion from developments to limit mercury and bacteria pollutants into the Little Luckiamute and other stream resources found in the UGB. The Plan also includes management strategies to educate property owners regarding proper septic tank

maintenance to reduce pollutants entered into the water system through failing septic systems.

Goal 7 - Areas Subject to Natural Disasters and Hazards: To protect life and property from natural disasters and hazards.

The City's TMDL Implementation Plan is consistent with the following Goal 7 goals, objectives and policies currently found in the City's Comprehensive Plan:

GOAL: To protect life and property in Falls City from natural disasters and hazards.

Objective: Develop and integrate a hazard mitigation plan for natural hazards in Falls City.

Policies:

1. Falls City will require additional geotechnical investigations and hazard mitigation measures for development and construction occurring in Building Limitations areas or on slopes in excess of 25 percent. Development shall not occur unless the geotechnical investigation demonstrates that the property can be safely developed as proposed.

2. In hazard areas outside the floodplain, Falls City shall review proposed development plans for compatibility with public safety.

The City's TMDL Plan includes management strategies that incorporate requirements found in the Falls City Zoning and Development Ordinance (FCZDO) and implement the City's goals and policies pertaining to the protection of life and property from natural hazards. Specifically, the Plan includes requirements for geotechnical evaluations on properties with steep slopes (2.205.05), a floodplain development permit for any development proposed in a special flood hazard area (2.205.06).

Goal 11 - Public Facilities and Services: To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

GOAL: To maintain and enhance the quality of water service to all customers.

Objective: Implement the water facilities plan adopted in 1993.

Policies: Water System

9. Meet the requirements of the Federal Safe Drinking Water Act.

GOAL To provide a continuing program for sanitary sewer service that represents the most cost-effective approach for providing service to existing and future residents.

Objective: Strive for the most cost-effective approach to provide sewage treatment capacity that accommodates the projected sewerage flows, and that meets the objectives of DEQ's state water quality management plan.

Policies: Sewage Treatment Facilities

3. The city will further investigate alternatives for sewer system improvements needed to accommodate planned future population growth. A Capital Improvements Program will be prepared to guide and schedule needed improvements.

GOAL: To provide existing and future development areas with an adequate storm drainage system.

Objectives:

1. Adopt and implement a storm drainage master plan.
2. Eliminate flooding from stormwater runoff within the service area.

Policies: Storm Drainage System

1. All storm drainage shall be channeled into an effective storm drainage system.

2. All new developments shall install engineered and city-approved storm drainage facilities along with other improvements.

3. Developers shall provide their subdivisions and developments with drainage facilities that connect to drainage ways and storm sewers outside the subdivision at the developers' expense. The design shall consider the capacity and grade necessary to maintain unrestricted flow from areas draining through the subdivision.

4. The city will improve its storm drainage system through already-improved lands as the need arises using resources of bond issues or other funds depending upon the scope and expense of the project.

The City's TMDL Plan includes management strategies that relate to the provision of water, sewer and stormwater facilities in a manner that minimizes the impact of temperature, mercury and bacteria pollutants into the Little Luckiamute River and streams found in the UGB. Specifically the Plan calls for the management of wastewater treatment discharge in a manner that meets the requirements of the City's NPDES permit, complete improvements identified in the City's Wastewater Master Plan, complete a stormwater master plan and require new developments to complete a storm drainage plan and construct storm drainage facilities.

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