



TMDL Implementation Plan for the City of West Linn, Oregon

Tualatin River Subbasin and Willamette River Basins

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List of Abbreviations

BMP	Best Management Practice	SMP	Surface Water Master Plan
C	Celsius	SVS	Settleable Volatile Solids
CCCSMP	Comprehensive Clackamas County Stormwater Monitoring Plan	SWMP	Stormwater Management Plan (2012)
CDC	Community Development Code	tcr	Tertiary Columbia River Basalt
CFR	Code of Federal Regulations	TMDL	Total Maximum Daily Load
CIP	Capital Improvement Project	TSS	Total Suspended Solids
City	City of West Linn	USEPA	U.S. Environmental Protection Agency
CWA	Clean Water Act	USGS	U.S. Geologic Service
CWR	Cold Water Refugia	WLA	Waste Load Allocation
DEQ	Oregon Department of Environmental Quality	WLMC	West Linn Municipal Code
DMA	Designated Management Agency	WQMP	Water Quality Management Plan
GIS	Geographic Information System		
IP	Implementation Plan		
LA	Load Allocation		
LCDC	Land Conservation and Development Commission		
LID	Low-Impact Development		
OAR	Oregon Administrative Rules		
ODOT	Oregon Department of Transportation		
MS4	Municipal Separate Storm Sewer System		
NPDES	National Pollutant Discharge Elimination System		
Plan	2014 TMDL Implementation Plan update		
PLRE	Pollutant Load Reduction Evaluation		

Section 1

Introduction

The City of West Linn (City) is a Designated Management Agency (DMA) under the 2001 Tualatin Subbasin TMDL, amended in August 2012, and the 2006 Willamette Basin Total Maximum Daily Load (TMDL), amended in February 2021. As a DMA, the City is responsible for development and implementation of strategies to minimize and address the discharge of TMDL pollutants. The City is located in the Willamette River watershed, adjacent to both the Willamette and Tualatin rivers. Tributaries within the City limits do not currently meet state water quality standards for several parameters, including bacteria, mercury, chlorophyll a and pH (total phosphorus as a surrogate measure), dissolved oxygen (ammonia and total suspended solids [TSS] as surrogate measures), and temperature. As such, TMDLs were established to define allowable pollutant load discharges for DMAs in order to meet water quality standards.

As a DMA, the City originally developed and submitted individual TMDL Implementation Plans (TMDL IPs) to the Oregon Department of Environmental Quality (DEQ) to address requirements of the Tualatin and Willamette Basin TMDLs. The original Tualatin TMDL IP was submitted in 2003 and most recently updated in June 2014. The original Willamette Basin IP was submitted in 2008 and most recently updated in April 2014. In conjunction with the end of this last 5-year implementation period, the City completed a 5-year review survey for DEQ in November 2018 that summarized progress made, and limitations associated with both the 2014 Tualatin and 2014 Willamette Basin TMDL IPs. Because management strategies do not vary by watershed, and due to consistent program requirements, a combined (2019) TMDL IP was prepared and submitted to DEQ, reflecting the required 5-year update to the 2014 Tualatin and 2014 Willamette Basin TMDL IPs.,

This 2022 TMDL IP represents an update to the 2019 TMDL IP to address the Revised Willamette Basin Mercury TMDL (effective February 2021), requiring submittal to DEQ 18 months from the effective date of the TMDL revision (February 4, 2021). This plan outlines strategies to address LAs for temperature and references strategies to address WLAs for bacteria, total phosphorus, sediment, and mercury, as implemented through the City's NPDES MS4 permit. This 2022 TMDL IP Plan is organized as follows:

- Section 2 provides jurisdictional and regulatory background information and describes the TMDL applicability related to the designation and definition of point and nonpoint sources in TMDLs.
- Section 3 provides reference to the City's management strategies for bacteria, total phosphorus, TSS, and mercury as outlined under the City's NPDES MS4 permit Stormwater Management Plan (SWMP) for point and nonpoint source areas.
- Section 4 provides a summary of strategies, implementation timeframes, and performance milestones specific for temperature (as a nonpoint source pollutant not otherwise addressed by NPDES MS4 permits).
- Section 5 addresses this Plan's conformance with the City's land use goals and comprehensive plan.
- Section 6 addresses additional items identified by DEQ per the 2007 guidance document.

Section 2

Background and TMDL Applicability

A TMDL specifies the maximum amount of a pollutant load that a water body can receive and still meet water quality standards. A TMDL allocates pollutant loadings among point and nonpoint sources, background levels, reserves for future growth, and a margin of safety. **Point sources** are typically defined as those sources that enter surface waters through a pipe or defined conveyance system (i.e., municipal stormwater, industrial stormwater, and/or wastewater). Waste load allocations (WLAs) are provided in the TMDL for point sources. **Nonpoint sources** are typically defined as those sources that enter surface waters through more diffuse and dispersed overland flow (e.g., surface runoff from agricultural and forested lands). Load allocations (LAs) are provided in the TMDL for nonpoint sources.

The Code of Federal Regulations (CFRs) and OARs include definitions and regulations directing the implementation of TMDLs based on defined point and nonpoint sources of pollutants. The City implements management strategies to comply with TMDL requirements through the Stormwater Management Plan, developed to comply with their National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit for point sources of pollution associated with urban stormwater runoff. NPDES MS4 permit holders may choose to implement their NPDES MS4 SWMP throughout their jurisdiction for implementation consistency and to address nonpoint source areas as well as point source areas (2019 Willamette Basin WQMP, p 94-221). This TMDL IP is for nonpoint sources of pollution not otherwise addressed by management strategies in the City's NPDES MS4 permit SWMP.

This section summarizes applicable watersheds, TMDLs, and the City's NPDES MS4 permit SWMP status as pertaining to applicability of this TMDL IP.

2.1 Jurisdiction Overview

The City of West Linn is located at the confluence of the Tualatin and Willamette Rivers. The City of West Linn covers approximately 7.4 square miles and is located entirely within Clackamas County; bounded on the north by the City of Lake Oswego, on the East by the Willamette River, on the south by the Tualatin River and on the west by unincorporated Clackamas County. The City has an estimated population of approximately 25,000.

Approximately 13 percent of the City discharges to the Tualatin River, while the remaining 87 percent of the City discharges to the Willamette River. Specific to the Willamette Basin TMDL, the City is located in both the Lower Willamette and Middle Willamette subbasins. Figure 2-1 depicts the watershed boundaries of each within the City limits. Major transportation corridors of I-205 and OR-43 run through the City. It should be noted that these highways are under Oregon Department of Transportation (ODOT) jurisdiction and this TMDL Implementation Plan does not cover those areas.

There are a number of perennial streams within the City that drain to the Willamette and Tualatin Rivers. Tanner Creek, Bernert Creek, and Trillium Creek are the larger tributaries that discharge to the Willamette River in the City. Fritchie and Stevens Creek are the larger tributaries that discharge to the Tualatin River. In all, there are 21 tributaries that drain areas within the city limits. Because of the

significant amount of riparian area in the City associated with these tributaries, the City's community development code (CDC), specifically Chapters 28 and 32, and relevant ordinances (e.g., Ordinance 1542) have been established to protect riparian areas from development and address METRO's Title 3 and 13 requirements (see discussion in Section 5).

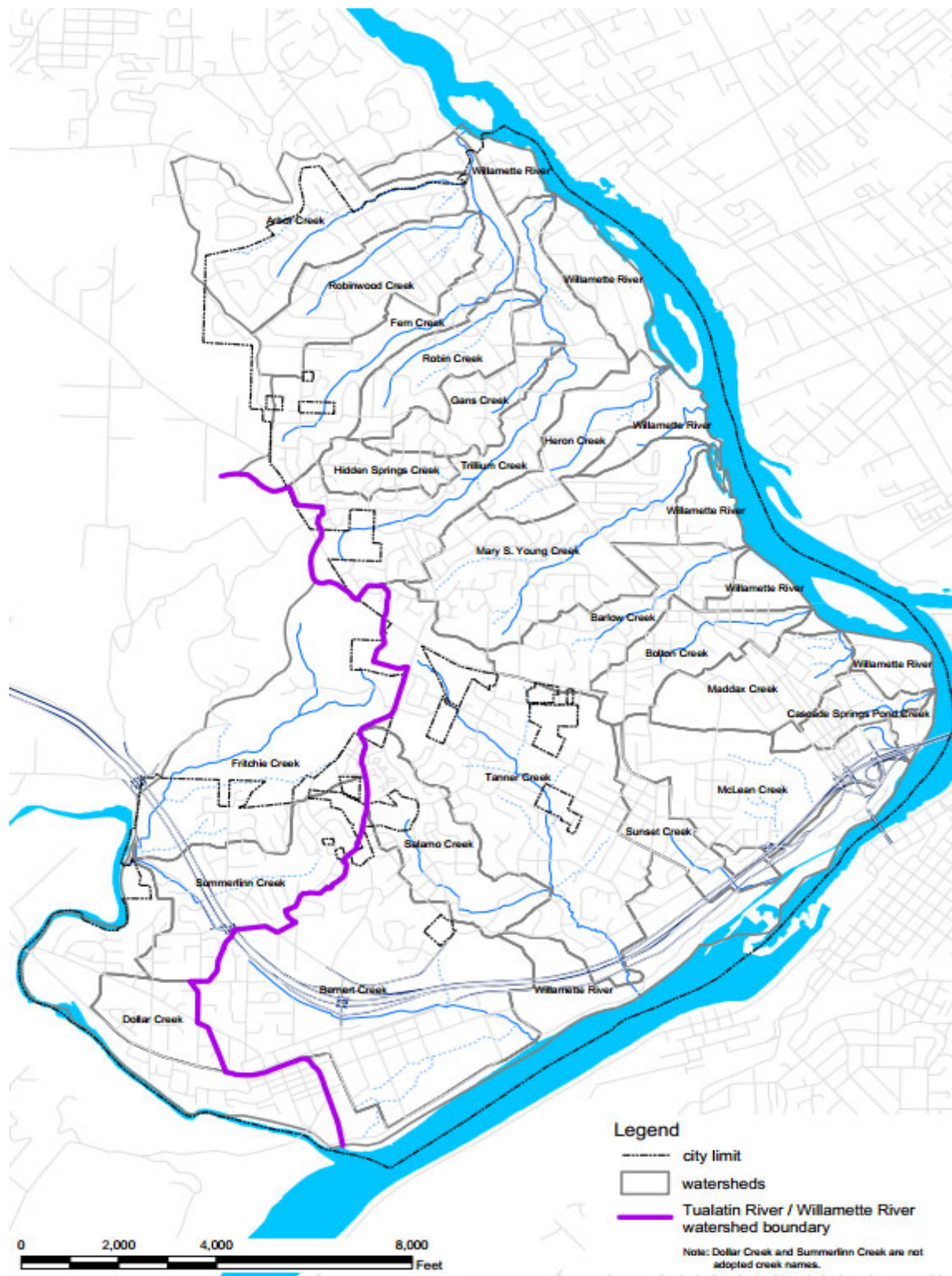


Figure 2-1. West Linn TMDL waterbodies and watersheds

2.2 Regulatory Background and TMDL Applicability

As described in Section 1, TMDLs applicable for the City include: the 2006 Willamette Basin TMDL, the 2019 Willamette Basin TMDL for mercury, and the 2001 Tualatin Subbasin TMDL. The City is referenced as a DMA for the Lower and Middle Willamette subbasins within the overall Willamette Basin TMDL and for discharges direct to the Tualatin River in the Tualatin subbasin TMDL. The Willamette Basin TMDL addresses bacteria, mercury, and temperature. The Tualatin Subbasin TMDL addresses bacteria, chlorophyll a and pH (total phosphorus as a surrogate measure), and dissolved oxygen (ammonia and total suspended solids [TSS] as surrogate measures).

The Federal Clean Water Act (CWA) of 1977 authorized EPA to restore and maintain water quality in all waterbodies within the United States. In response to the CWA, EPA designated certain state agencies (DEQ for the state of Oregon) to develop water quality standards, perform water quality monitoring to understand current conditions, determine sources of pollution, and develop TMDLs as a tool to improve water quality and restore the beneficial uses of surface waters.

A TMDL specifies the maximum amount of a pollutant load that a waterbody can receive and still meet water quality standards. A TMDL allocates pollutant loadings among point and nonpoint sources. The CFRs specifically define wasteload allocations (WLAs) and load allocations (LAs) according to whether the associated discharge is considered a point or nonpoint source (40 CFR 130.2[g] and [h]). Additional documentation from EPA clarifies that NPDES-regulated stormwater discharges (i.e., those covered by a permit) must be addressed by the WLA component of a TMDL and that stormwater discharges from sources not currently subject to NPDES requirements may be addressed by the LA component of a TMDL (EPA, 2002).

Table 2-1 summarizes the TMDL pollutants and associated LAs and WLAs applicable to West Linn.

Table 2-1. TMDL Summary for West Linn						
TMDL	Year	Subbasin(s)	Applicable TMDL parameters	TMDL surrogate parameters	WLA ^d	LA
Willamette Basin	2006 (updated 2021)	Lower Willamette	- Mercury - Bacteria (<i>E. coli</i>) - Temperature	Effective shade (surrogate for temperature) TSS (equivalent parameter for mercury)	- Mercury = 75% and 97% reduction^a - Bacteria = 78% reduction	Temperature ^c = 90%-98% effective shade
Willamette Basin	2006 (updated 2021)	Middle Willamette	- Mercury - Bacteria (<i>E. coli</i>) - Temperature	Effective shade (surrogate for temperature) TSS (equivalent parameter for mercury)	- Mercury = 75% and 97% reduction^a - Bacteria = 75%-88% reduction^b	Temperature ^c = 90%-98% effective shade
Tualatin River ^a	2001 (updated 2012)	Tualatin	- Bacteria (<i>E. coli</i>) - Chlorophyll a - pH - Dissolved Oxygen - Temperature	Total phosphorus (surrogate for chlorophyll a and pH) TSS (equivalent parameter for SVS and mercury, a surrogate for DO) Effective shade (surrogate for temperature)	- Bacteria = 5,000 counts/100mL (winter storm); 12,000 counts/100 mL (summer storm) - Total phosphorus = 0.14 mg/L (summer seasonal) - TSS = 20% reduction (summer seasonal)	Temperature ^c = 90%-98% effective shade

a. The mercury TMDL became effective February 4, 2021. A WLA of 97% for point sources of mercury is being applied to point and non-point source areas within the Lower and Middle Willamette basins because the City applies their NPDES MS4 permit conditions city-wide. Similarly, a WLA of 75% is being applied for point and non-point areas within the Tualatin basin. The WLA will be applied in conjunction with future TMDL benchmark requirements per the NPDES MS4 permit.

b. The WLA for bacteria varies according to season and TMDL watershed. A 75 percent annual reduction in bacteria load is applicable for areas discharging directly to the Willamette River and a 75 percent reduction is applicable during the fall, winter, and spring for areas discharging to tributaries. An 88 percent reduction during the summer is applicable for areas that discharge to tributaries.

c. The range in effective shade is based on shade curves developed by geomorphic classifications and stream aspect.

d. Due to the way MS4 sources are managed in the city, for the purposes of this TMDL IP, the WLAs referenced in the Willamette Basin TMDL and Tualatin Subbasin TMDL for bacteria, total phosphorus, TSS, and mercury apply to point and non-point sources because the City applies their NPDES MS4 permit SWMP city-wide.

2.2.1 Sources Covered

The City of West Linn implements their Phase I NPDES MS4 permit SWMP throughout their entire jurisdictional area, covering both point source areas and nonpoint source areas of stormwater pollution. DEQ implements TMDLs for point source areas through inclusion of TMDL-related conditions in NPDES permits. Therefore, functionally, the City's Phase I NPDES MS4 permit, specifically the SWMP, serves as the mechanism for addressing the bacteria, mercury, total phosphorus, and settleable volatile solids (SVS) TMDLs jurisdiction-wide. These parameters are associated with stormwater runoff and have an established WLA applicable to West Linn; discharges of these pollutants are addressed by best management practices (BMPs) in the City's Stormwater Management Plan (SWMP), developed to comply with the NPDES MS4 permit.

To address mercury TMDL requirements, a mercury minimization assessment was submitted to DEQ on December 1, 2022, in accordance with the City's NPDES MS4 deadlines. The mercury minimization assessment addresses sources of mercury and BMPs to address the sources. Atmospheric deposition of mercury from global sources is presented as the dominant source of mercury in the Willamette River Basin (see Chapter 4 of EPA's 2021 *TMDL for Mercury in the Willamette Basin*). Mercury loads in urban stormwater are believed to be predominantly associated

with atmospheric deposition and active erosion or transport of sediment that is carried in runoff to downstream water bodies.

The NPDES MS4 permit and SWMP are not required to address temperature because municipal stormwater runoff is not considered to be a significant contributor of heat or “thermal loading” to surface waters (pp 14-16 Willamette Basin TMDL, 2006). DMAs that are covered by NPDES MS4 permits are expected to address temperature, as well as any non-point sources of TMDL pollutants (if not addressed by the NPDES MS4 permit SWMP), in a TMDL Implementation Plan.

2.2.2 2019 Revised Willamette Basin Mercury TMDL

In November 2019, DEQ issued the Revised Willamette Basin Mercury TMDL following additional monitoring, modeling efforts, and analysis. EPA disapproved the TMDL after determining the newly established WLAs and LAs would not achieve the TMDL targets. The EPA issued the final TMDL on February 4, 2021, which incorporates elements of the November 2019 version with modified WLAs and LAs for select pollutant sources.

Chapter 13 of the Final Revised Willamette Basin TMDL (November 2019) reflects the Water Quality Management Plan (WQMP). Per Section 13.3.1.11 and Table 13-11 (Table 2-2 below), DEQ refers to six minimum control measures to control mercury from unpermitted urban runoff from cities with populations of 5,000 or greater (e.g., City of West Linn). These six minimum control measures apply to cities with MS4 permits for areas outside of their MS4 permit coverage area, and to cities without MS4 permits (2019 Willamette Basin WQMP, Table 13-11, p 92-221). However, MS4 permit holders may choose to implement NPDES MS4 stormwater management strategies throughout their jurisdiction for implementation consistency, and this exceed requirements in Table 13-11 (2019 Willamette Basin WQMP, p 94-221). The City of West Linn implements its NPDES MS4 permit SWMP strategies jurisdiction-wide and therefore meets the six minimum measures. For reference Table 2-2 summarizes the six minimum measures for mercury (per Table 13-11 of the 2019 Willamette Basin WQMP), as related to the City’s applicable 2021 NPDES MS4 permit schedule. Subsequent updates to this TMDL IP will detail the specific management strategies per the 2021 NPDES MS4 permit and updated (2022) SWMP.

Existing management strategies per the City’s 2012 SWMP are listed in Appendix A and reference to these minimum control measures.

Table 2-2. Correlation between Six Minimum Stormwater Control Measures for Mercury and Phase I NPDES MS4 Permit Requirements

Minimum Stormwater Control Measure	Minimum Stormwater Control Measure Requirements Summary	Associated 2021 NPDES MS4 Permit Schedule
1. Pollution Prevention and Good Housekeeping for Municipal Operations	• Operate and maintain facilities to reduce the discharge of mercury-related pollutants. • Ensure DMA-owned and operated facilities with industrial activities have coverage under a 1200-Z permit and conduct operations and maintenance activities to protect water quality. • Maintain records.	Schedule A.3.f and Schedule A.3.g
2. Public Education and Outreach	• Conduct an ongoing education and outreach program to inform the public. • Track implementation of public education and outreach and assess progress including a qualitative evaluation of one activity.	Schedule A.3.a ¹
3. Public Involvement and Participation	• Implement a public involvement and participation program to provide the public with opportunities to participate in the development of control measures.	Schedule A.3.b
4. Illicit Discharge Detection and Elimination	• Implement and enforce a program to detect and eliminate illicit discharges. • Develop and maintain a current map of the conveyance system. • Prohibit non-stormwater discharges through enforcement of an ordinance or other legal mechanism.	Schedule A.3.c
5. Construction Site Runoff Control	• Refer project sites to DEQ or agent to obtain 1200-C permit coverage. • Require construction site operators to complete and implement an Erosion and Sediment Control Plan for construction project sites that result in a minimum land disturbance of 0.5 acres or more. • Require erosion controls, sediment controls, and waste materials management for qualifying construction projects. • Develop, implement, and maintain escalating enforcement procedures.	Schedule A.3.d
6. Post Construction Site Runoff for New and Redevelopment	• Develop, implement, and enforce a program to reduce discharge of pollutants from new and redevelopment project sites. • Target natural or predevelopment hydrologic function to retain rainfall onsite and treat the remainder of the runoff.	Schedule A.3.e

2.3 TMDL Implementation Plan Requirements

In 2007, DEQ prepared a guidance document for developing TMDL implementation plans in conjunction with issuance of the Willamette Basin TMDL (TMDL Implementation Plan Guidance for State and Local DMAs, dated May 2007). The requirements for a TMDL implementation plan as listed in the guidance are as follows:

(a) *Prepare an implementation plan and submit the plan to the Department for review and approval according to the schedule specified in the WQMP. The implementation plan must:*

(A) *Identify the management strategies the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading;*

¹ A qualitative evaluation of progress will be conducted using tracking measures and annual reporting per the SWMP.

- (B) Provide a timeline for implementing management strategies and a schedule for completing measurable milestones;*
- (C) Provide for performance monitoring with a plan for periodic review and revision of the implementation plan;*
- (D) To the extent required by ORS 197.180 and OAR chapter 340, division 18, provide evidence of compliance with applicable statewide land use requirements; and*
- (E) Provide any other analyses or information specified in the WQMP.*

In addition to the 2007 guidance document, various other documents were referenced in the preparation of this TMDL IP. Chapter 14 of the Willamette Basin TMDL provides a Water Quality Management Plan (WQMP), which presents suggested management measures for jurisdictions discharging to the Willamette River, to comply with the TMDL requirements. Chapter 13 of the Final Revised Willamette Basin Mercury TMDL (November 2019) also includes a WQMP, which provides implementation guidelines for permitted and non-permitted entities, as well as management measures to address mercury for jurisdictions discharging to the Willamette River (see Table 2-2).

It should be noted, as discussed previously, that under the first requirement above, this TMDL IP includes strategies to achieve LAs, which are associated with nonpoint sources. WLAs are covered through water quality permits for those sources (in this case, the City's NPDES MS4 permit).

Section 4 addresses the first three requirements (A, B, and C) specifically for temperature. Section 5 addresses the fourth requirement (D), and reflects the evaluation of this Plan's conformance with the City's land use goals and comprehensive plan. Section 6 addresses additional items identified in the water quality management plan as requested in requirement (E), specifically the following:

- Determine how best to provide for public involvement.
- Analyze funding to determine resources necessary to develop, implement, and maintain the management strategies.
- Include citations and brief descriptions of legal authority used to carry out the management strategies.
- Address cold-water refugia.

Section 3

Management Strategies for Bacteria, Mercury, Total Phosphorus and SVS

As described in Section 2, a TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and it allocates pollutant loadings among point and nonpoint sources. WLAs are provided for point sources (e.g., municipal stormwater and wastewater covered by permits), and LAs are provided for nonpoint sources (e.g., surface runoff from agricultural and forested lands).

The City obtained its most recent National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit from the Oregon Department of Environmental Quality (DEQ) in 2021 for its municipal stormwater discharges to surface waters. West Linn is one of 12 co-permittees on the Clackamas County NPDES MS4 permit. The City's Public Works Department and Planning departments work cooperatively to implement provisions and requirements of the NPDES MS4 permit.

The purpose of this section is to provide an overview and reference for the management strategies, schedules, and monitoring activities that address bacteria, mercury, total phosphorus, and TSS under the NPDES MS4 permit.

3.1 Management Strategies to Address WLAs

Requirements of the City's NPDES MS4 permit are addressed through implementation of a Stormwater Management Plan (SWMP). The SWMP outlines various management strategies in the form of best management practices (BMPs) that address specific permit requirements and specific TMDL parameters. BMPs include control techniques, system design and engineering methods, and other measures the City implements to reduce the discharge of pollutants in stormwater and protect water quality.

The City prepared and submitted its current SWMP to DEQ in May 2012, in conjunction with issuance of its 2012 NPDES MS4 permit. The City was issued a new NPDES MS4 permit from DEQ with an effective date of October 1, 2021. An updated SWMP will be prepared and submitted to DEQ by December 1, 2022, in conjunction with reissuance of its NPDES MS4 permit. The City's SWMP is an evolving document. Adaptive management may result in changes to BMPs that would be reported in the annual compliance reports. Upon approval of the 2022 SWMP by DEQ, the BMP names, measurable goals, and tracking measures may change for consistency with the reissued permit language and requirements. While the 2012 SWMP is undergoing revisions, BMPs summarized in Appendix A represent the 2012 SWMP as currently implemented.

Per requirements of the NPDES MS4 permit, the City conducted a pollutant load reduction evaluation (PLRE) in 2015 and developed TMDL benchmarks in 2017 to show progress towards meeting TMDL WLAs. The PLRE and benchmarks reflect implementation of stormwater controls (both structural and non-structural) as documented in the City's SWMP and applied jurisdiction-wide. TMDL benchmarks

for bacteria, total suspended solids (TSS), and total phosphorus were included in the City's permit renewal application submitted to DEQ in 2017 and are reflective of the entire jurisdictional area.

In conjunction with management strategies outlined in the SWMP, the City implements stormwater-related projects through implementation of their Storm Drainage Master Plan (SMP). The City recently (2019) updated their SMP to include projects and programs to address a variety of water quality and water quantity control objectives. Proposed capital improvement projects (CIPs) and programs encourage the use of low-impact development (LID) techniques for treatment of stormwater runoff.

3.2 Timeline and Implementation Schedule

The City's SWMP includes measurable goals and tracking measures for each BMP. These represent the schedule for implementing the TMDL management strategies for bacteria, mercury, TSS, and total phosphorus. Appendix A includes the measurable goals and tracking measures that are currently listed in the City's 2012 SWMP for each BMP. These goals have the potential to change on an annual basis through adaptive management.

Implementation of CIPs per the SMP occurs in conjunction with the documented schedule. Schedules are typically identified to depict projects as high priority/ short-term (implementation in 0 to 5 years), medium priority/mid-term (implementation in 6 to 10 years), and low priority (implementation in 11 to 20 years as funds are available).

3.3 Monitoring and Reporting

Under the NPDES MS4 permit, the City is required to conduct monitoring. It does this by conducting two types of monitoring: implementation monitoring and environmental monitoring. Implementation monitoring relates to the tracking of BMP (management strategy) implementation and evaluating whether BMP measurable goals and tracking measures are met. Environmental monitoring relates to the analysis and evaluation of stormwater and instream pollutant concentrations.

Results of the program implementation and environmental monitoring are documented in NPDES MS4 compliance reports that are prepared annually by the City, reflecting permit implementation activities from July 1 to June 30 each year. The annual reports are submitted to DEQ by December 1 of each year to summarize annual progress on implementing BMPs described in the SWMP.

3.3.1 Program Implementation Monitoring

Each BMP has a defined measurable goal and tracking measure. Appendix A lists the measurable goals and tracking measures for each BMP.

Subsequent updates to this TMDL IP will include updates to BMPs outlined in Appendix A, in accordance with updates to the SWMP to address 2021 NPDES MS4 permit requirements. Updates to the TMDL IP are described further in Section 4.

3.3.2 Environmental Monitoring

The City conducts environmental monitoring in the form of sample collection and analysis at three instream and one stormwater monitoring site. Environmental monitoring activities are conducted in conjunction with the monitoring requirements listed in the NPDES MS4 permit.

The City is a participant in the Comprehensive Clackamas County Stormwater Monitoring Plan (CCCSMP), a coordinated monitoring plan developed by 10 Clackamas co-permittees to comply with monitoring requirements under the 2012 NPDES MS4 permit. The latest version of the CCCSMP was submitted to DEQ in December 2016 and implementation began in July 2017. In conjunction with the NPDES MS4 permit reissuance, an updated CCCSMP is due to DEQ by December 1, 2022.

Under the CCCSMP, instream and stormwater samples are analyzed for various parameters that include bacteria, nutrients, metals, sediment, and field parameters (e.g., pH, dissolved oxygen, temperature). Biological monitoring is also a requirement under the CCCSMP, and the City conducted biological monitoring in 2018, which included biological sampling and physical condition monitoring at two instream sites. Data from environmental monitoring efforts are included in the NPDES MS4 annual reports.

Section 4

Management Strategies for Temperature

The Willamette Basin TMDL and Tualatin River TMDL require DMAs, including the City of West Linn, to develop TMDL implementation plans to address elevated temperatures. These plans must describe how each DMA will conduct efforts to reduce temperature to meet water quality standards.

Salmonids require cool, well-oxygenated water to survive. Elevated water temperature is a common problem in many tributaries to the Willamette River. Water temperatures in excess of water quality standards make streams unsuitable for cold-water fish and other cold-water aquatic species. Excessively warm streams lead to a variety of ill effects on many salmon and trout species, ranging from decreased spawning success to death (Willamette Basin TMDL, 2006). Depending on the life-stage and species, water temperatures of less than 18 degrees Celsius (C) are necessary for habitat. For spawning, water temperatures of less than 11 degrees C are needed.

Waterbodies that exceed water quality standards for aquatic life and habitat are documented in the TMDLs and have established LAs designed to protect and remedy impaired aquatic habitats.

This section describes the City's TMDL IP to address temperature. Section 4.1 provides a summary of the LAs and shade curves/targets as provided in the Willamette Basin TMDL. Section 4.2 summarizes the shade condition evaluation as conducted for the 2008 Willamette Basin TMDL IP. Section 4.3 outlines the City's proposed management strategies to address the temperature LAs. Section 4.4 outlines the timeline and schedule for implementation, and Section 4.5 summarizes proposed monitoring and reporting.

4.1 TMDL LAs for Temperature

Several factors can contribute to elevated in-stream temperatures, such as changes in channel morphology, climate, geographic location, riparian vegetation, dams, reservoirs, and point sources such as industrial wastewater discharges (DEQ, 2006). DEQ has found that the largest contributor to elevated temperature in the Willamette Basin is the increased impacts from solar radiation loads due to disturbances of riparian vegetation. In response to this finding, DEQ has defined effective shade targets as a surrogate measure for addressing temperature. Effective shade is determined through the use of shade curves developed specifically for particular ecoregions (in the Lower Willamette subbasin) and geomorphic units (in the Middle Willamette subbasin). The shade curves, along with stream orientation and width, provide a target for percent-effective shade and corresponding solar radiation loading (DEQ, 2006).

Three shade curves are applicable to the City, based on the defined ecoregions and geomorphic units within city limits. Per the Lower Willamette subbasin, the City falls in two ecoregions: 1) Willamette Valley Prairie Terraces and 2) Willamette Valley Foothills. Per the Middle Willamette subbasin, the City falls within the Tertiary Columbia River Basalt (tcr) geomorphic unit. The majority of the City falls within the Willamette Valley Prairie Terrace ecoregion, associated with the shade curve depicted in Figure 5.71 of the Willamette Basin TMDL, although all shade curves provide approximately the same effective shade percentage for streams 20 feet wide or less. Figure 4-1 represents the corresponding shade curve for the Willamette Valley Prairie Terrace ecoregion.

Knowing the width of the channel and its direction from the north, this curve will provide the “amount of percent effective shade” assuming soils, vegetation, climate, and topography specific to the City.

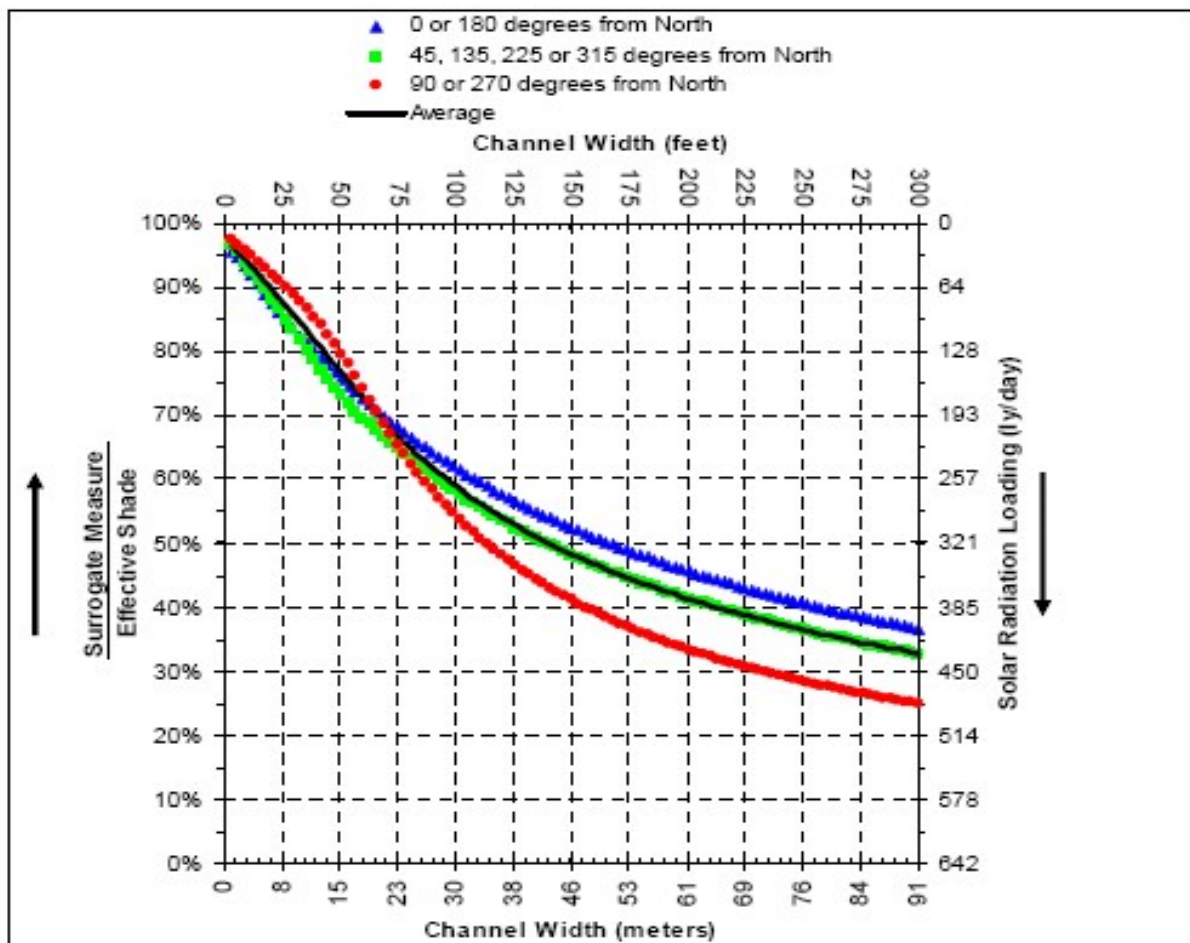


Figure 4-1. Effective shade curve for West Linn

Shade is generally more effective in reducing the temperature in narrower streams (less than 25 feet wide) than in wider streams because shadows from trees in the riparian zone will cover a larger percentage of the water surface. Most tributaries within the City are less than 20 feet wide; therefore, the percent effective shade (effective shade goal) taken from Figure 4-1, based on a channel width range of 0-20 feet is between 90 percent – 98 percent. This is interpreted to mean historically prevalent riparian vegetation would block the majority (at least 90 percent) of solar radiation loading from the streams' water surface. It should be noted that based on this curve, percent effective shade decreases significantly as the width of the channel increases. Because of this, the most effective way to manage temperature in the main stem of the Willamette River is through management of riparian vegetation for smaller, narrower tributaries.

To meet the effective shade goal established by DEQ, the City needs to plant and/or retain the system potential vegetation capable of providing significant shade benefit to surface waters. DEQ's definition of "system potential" does not consider management or land use as limiting factors; it is an estimate of the vegetated condition where the human-generated impacts to riparian vegetation that cause stream warming are minimized.

4.2 Shade Condition Evaluation

In 2008, the City evaluated existing shade conditions along their receiving waters in the Lower and Middle Willamette subbasins, to identify and prioritize opportunity areas for planting and riparian vegetation management. Results of this effort were used to inform planting and vegetation management activities from 2009 to 2018. A summary of the evaluation process can be found in the City's 2014 Willamette Basin TMDL IP.

The 2008 analysis identified 46 high and medium priority shade opportunity sites within the Lower and Middle Willamette subbasin, within the city limits. Prioritization was based on the ease of acquisition/ protection, stream aspect, fish habitat, size, and proximity to cold water refugia. These priority shade opportunities comprise approximately 2.5 miles of shoreline, of which 1.9 miles are publicly owned. Such locations are identified in Table 3-2 of the 2014 Willamette Basin TMDL IP.

It should be noted that shade conditions and opportunity areas were not evaluated for the Tualatin River subbasin, as an effective TMDL for temperature was already in place for the Tualatin River subbasin when the evaluation was conducted.

4.3 Management Strategies to Address LAs

Since 2008, the City has been implementing activities targeted at temperature reduction. Such activities were outlined in the City's prior TMDL Implementation Plans. Activities included utilizing committed funds to support planting and riparian management activities, public outreach to citizen groups and the community, implementation of Community Development Code (CDC) provisions related to water resource area protections, and implementation of design standards to promote infiltration (groundwater recharge).

Management strategies identified for this TMDL IP update build upon these past efforts, but also reflect results of temperature monitoring (conducted by the City and through partnership efforts with the United States Geologic Service [USGS]), indicating presence of cold water refugia and general concurrence with instream water quality standards for temperature. Proposed management strategies are detailed in Appendix B and described below.

4.3.1 Riparian Area Management

The Willamette Basin TMDL defines shade as the surrogate for thermal LAs. Preserving and enhancing riparian vegetation is an important method for reducing stream temperatures. This preservation and enhancement is conducted through enforcement and targeted planting efforts.

4.3.1.1 Enforcement of Riparian Buffers

Metro developed Title 3 and Title 13, two sections of its *Urban Growth Management Functional Plan* that address development in the riparian corridor. Specifically, Title 3 prohibits new development within specified established buffers, and provides replanting requirements for unavoidable new development. Title 13 establishes protected areas (habitat conservation areas) for both upland and riparian wildlife. Appendix C provides additional detail related to Titles 3 and 13.

Since preserving and restoring shade are important strategies for addressing the temperature TMDL, jurisdictions that comply with Titles 3 and/or 13 are already using strategies for addressing temperature. The City implements Title 3 and Title 13 requirements through Chapter 28 (Willamette and Tualatin River Protection) and Chapter 32 (Water Resource Area Protection) of the West Linn CDC.

The City has coordinated with Metro in amendment of their code language to comply with Title 3/13 requirements, and Metro has approved of the City's efforts. The City adopted an amended version of Table 3.07–3 from Metro's model ordinance to require a 100 foot setback from areas defined as riparian corridors by the West Linn Riparian Corridor Inventory as defined in Ordinance 1545. This is more stringent than the setback requirement for secondary protected water features, as required by Title 3. West Linn CDC Chapter 32 establishes a vegetative corridor protected from development with goals of "maintaining or reducing stream temperatures; maintaining natural stream corridors; minimizing erosion, nutrient and pollutant loading into water." Chapter 32 of the City's CDC specifically defines the protection and improvement of microclimate and shade in streamside areas as well as mitigation requirements for replacement of water quality and ecological values as objectives.

Ordinance 1542 of the West Linn Municipal Code (WLMC) encourages and promotes tree conservation and planting to maintain and increase tree canopy coverage in the City, and represents additional controls to minimize uncontrolled cutting or destruction of trees on both public and private property.

Continued enforcement of the CDC and WLMC ensures that adequate riparian buffer and potential shade are preserved with new and redevelopment activities. The City will annually track any updates to the CDC and WLMC related to riparian corridors and tree preservation.

4.3.1.2 Riparian Planting and Revegetation

Much of the tributary stream corridors in the City are currently planted and within an identified protection area.

The City commits to contribute \$5,000 a year for the next five years towards shading and planting activities for identified priority opportunity areas. Efforts will continue to focus on those public, high priority areas as indicated in Table 3–2 of their 2014 Willamette Basin TMDL IP (also included as Appendix D). Ground truthing will be required prior to planting activities, as ground truthing was not conducted when the original opportunity areas were identified for the Willamette Basin. Additionally, opportunity areas have not been specifically identified for the Tualatin Subbasin in accordance with the same prioritization criteria. Revegetation/ vegetation management efforts will be conducted annually in accordance with the allotted funds. Specific activities utilizing committed funds will include:

- Conduct a GIS desktop evaluation and/or ground truthing to evaluate current riparian condition and planting needs in both the Willamette and Tualatin Basins.
- Conduct or contract vegetation management activities city-wide.
- Partner with or provide financial contributions to watershed councils, non-profit organizations (i.e., Friends of Trees), local and state agencies, and private citizens in support of planting activities on public and private property.

Additionally, the City will continue to implement capital projects identified in their updated SMP, and will construct one over the implementation period to address water quality and stream health.

4.3.2 Design Standards for New and Redevelopment

Although shade is the surrogate measure defined by DEQ to address the temperature TMDL, implementation of the City's stormwater design standards (Public Works Standards) also can promote the reduction in surface water temperatures. This occurs through requirements for the installation of stormwater treatment facilities that utilize infiltration.

The City's 2012 NPDES MS4 permit required an update to their post-construction stormwater management standards by November 1, 2014 to ensure that standards prioritize LID and green infrastructure and reduce site-specific post-development stormwater runoff volume, duration, and

rates. Installation of facilities that promote infiltration address these needs. The City implements Section 2 of their Public Works Design Standards to address these requirements.

Most recent updates to the City's Public Works Standards (September 2018) reflect the following adjustments:

- A 1,000 square foot impervious threshold for requiring water quality treatment and a detention.
- Inclusion of single-family residential as non-exempt under the water quality treatment requirements.
- Infiltration testing requirements when infiltration facilities (i.e., sumps and drywells) are proposed.
- Technical guidelines related to application and use of the City of Portland Stormwater Management Manual for facility sizing and design.

Documentation of any changes related to stormwater design standards will be included in TMDL annual reporting.

4.3.3 Public Education, Outreach, and Communication

A number of public education efforts and campaigns are implemented in conjunction with the City's NPDES MS4 permit (see Appendix A).

As part of this plan, targeted public education efforts will focus on stewardship and enhancement of riparian buffers and vegetated corridors on private property. The City will continue to use the City newsletter, website, or other media platform to distribute a minimum of one article related to temperature management and instream water quality. Regional and local programs related to temperature management will be advertised using City outlets.

4.3.4 Environmental Monitoring

The City is conducting environmental monitoring under its NPDES MS4 permit and the associated CCCSMP. Water quality samples are collected from three in-stream sites and one stormwater outfall site and the samples are analyzed for various parameters including temperature. The City will continue collecting stream temperature samples in accordance with the CCCSMP using grab sampling techniques.

4.4 Timeline and Schedule

This Plan is effective for 5 years from the date of original approval by DEQ (i.e., through December of 2023). Typically, every 5 years, the City is required to review the TMDL Implementation Plan to assess progress toward meeting goals and propose changes to the management strategies as appropriate. TMDL Implementation Plans typically have a 5-year implementation period from the date of approval by DEQ. However, this 2022 update falls within the current 5-year implementation term. Future compliance dates and submittal schedules are summarized in Table 4-1.

Table 4-1: West Linn TMDL IP Compliance Dates	
2019 TIP Implementation	3/1/19 - 12/31/23
2022 Mercury Update to the TIP	Due 9/3/22
2022 Updated TIP Implementation	9/3/22 - 12/31/23
TIP Five-year Review	Due 12/31/23
2024 TIP Update	Due 12/31/23
2024 TIP Implementation (anticipated)	1/1/24 - 12/31/28
Annual Reports	December 1 each year (except 2023)

Specific to the management strategies reported in Section 4.3, Appendix B summarizes measurable goals (targets), milestones, and annual tracking measures for each activity. The tracking measures reflect the timeframe and schedule for implementing the specific strategies.

4.5 Monitoring and Reporting

The 2006 TMDL Guidance Document requires the DMA to submit two types of reports to DEQ on a regular basis: a progress report and an implementation plan review report.

The progress report is submitted to DEQ annually and provides information related to implementation of identified management strategies, as described in Section 4.3. To consolidate reporting requirements, DEQ allows the TMDL Implementation Plan annual progress report to be submitted with the NPDES MS4 annual report. Such annual reports are due December 1 of each year, reflecting implementation of activities over the previous fiscal year (July 1 to June 30). Appendix A and B are formatted in a manner that is consistent with how the TMDL Implementation Plan progress reports will be submitted in the future and includes measurable goals and tracking measures for the purposes of monitoring progress.

Every 5 years, the City is required to review the TMDL Implementation Plan to assess progress towards meeting goals and propose changes to the management strategies, as appropriate. The updates are based on a review of existing data and activities relative to pollutant reduction goals. Existing strategies have been refined to reflect progress made over the last 5 years. New strategies have been identified to further address in-stream temperatures. Updates to the TMDL Implementation Plan in 2023 will be based on review of existing data and activities relative to pollutant reduction goals. Existing strategies will be refined to reflect progress made. New strategies will be identified to continue with work to address in-stream temperature.

Section 5

Evidence of Compliance with Applicable Land Use Requirements

OAR 340-042-0080(3)(a)(D) defines one of the required elements of a TMDL implementation plan as evidence of compliance with applicable statewide land use requirements. Per the TMDL Implementation Plan Guidance Document, this consists of the following:

- Identify applicable acknowledged local comprehensive plan provisions and land use regulations.
- Explain how the implementation plan is consistent with these local planning requirements or what steps will be taken to make the local planning requirements consistent with the implementation plan.

West Linn's Comprehensive Plan (Plan) is intended to guide long range development in the City. This Plan was acknowledged by the Land Conservation and Development Commission (LCDC) in 1984 to be in compliance with Oregon Statewide Land Use Goals. The Plan is periodically reviewed by the City in coordination with LCDC and updated to ensure that it continues to comply with LCDC statewide goals. There are specific goals within West Linn's Comprehensive Plan that align with strategies described in this TMDL Implementation Plan. These goals include Goal 5, 6, 11 and 15 and are described below.

Goal 5 of the City of West Linn Comprehensive Plan is titled "Open Spaces, Scenic and Historic Areas, and Natural Resources." Section 2 *Natural Resources* contains policies and recommended actions pertaining to natural resources that correspond to this TMDL IP. Such policies and recommended actions include preservation of riparian wildlife through zoning requirements; enhancing and expanding native vegetation for erosion prevention and improving wildlife habitat; and controlling erosion through enforcement of new development standards.

Goal 6 of the City's Comprehensive Plan is titled "Air, Water, and Land Resources Quality." Section 2 *Water Quality* looks to "maintain or improve the quality of West Linn's water resources." Policies and recommended actions pertinent to this TMDL IP include measures to "reduce storm water runoff, create and implement standards for new development that encourage use or maintenance of permeable surfaces and discourage the creation of impervious surfaces."

Goal 11 of the City's Comprehensive Plan is titled "Public Facilities and Services." Section 3 *Storm Drainage* contains several policies and recommended actions related to the use of impermeable surfaces; use of construction practices that minimize exposed soils and erosion potential; maintenance and preservation of riparian vegetation; and it recommends BMPs are utilized for new and significant redevelopment to reduce stormwater pollutant discharges.

Goal 15, entitled "Willamette River Greenway" has goals, policies and recommended actions related to the protection and enhancement of valuable natural resources provided by the Willamette River, its islands, shores, and natural habitat.

In general, West Linn's acknowledged Comprehensive Plan has components that coincide with the management strategies contained in this TMDL IP. Based on the above findings, this TMDL IP is considered to be compatible with the land use requirements as set forth in the City of West Linn Comprehensive Plan.

Section 6

Additional Requirements

The fifth component of TMDL implementation plans required by OAR 340-042-0025 is “any other analyses or information as specified in the Water Quality Management Plan (WQMP).” The WQMP for the Willamette Basin TMDL requires a fiscal analysis and a summary of legal authority. This section addresses these requirements.

6.1 Legal Authority

The City maintains ordinances that provide authority for implementation of portions of this TMDL IP.

The City currently operates under an NPDES MS4 permit that requires ordinances for illicit discharges, erosion control, and post-construction site runoff, as necessary, to implement the BMPs outlined within it. The NPDES MS4 permit also includes specific management strategies, as described in Section 3, to address bacteria, TSS, total phosphorus, and mercury. NPDES MS4 annual compliance reports submitted to DEQ demonstrate the continued legal authority to implement the programs and BMPs outlined in the SWMP.

As described in Section 4.3.1.1, the City has ordinances to implement natural resource protection efforts. CDC Chapter 28 (Willamette and Tualatin River Protection) and Chapter 32 (Water Resources Area Protection), and Ordinance 1542 (Community Tree Ordinance) include requirements related to preserving riparian buffers and tree cover. Detail related to consistency with the comprehensive plan are described in Section 5. All pertain to the City’s authority to implement the management strategies proposed to address the temperature TMDL.

6.2 Funding

The City currently charges a storm drainage fee that pays for implementation of the BMPs described in their NPDES MS4 permit in order to comply with permit requirements. A fiscal analysis is submitted with the NPDES MS4 annual report, outlining funding sources and expenditures related to implementation of the stormwater program.

Additional funds necessary for vegetation/revegetation efforts and public outreach will also come from the storm drainage fee. Options for additional support of riparian enhancement and streambank stabilization activities through the City’s capital improvement plan will be explored during this TMDL IP cycle.

6.3 Cold Water Refugia

Per the WQMP, the TMDL IPs for areas below river mile 50 of the Willamette main stem “shall look at identifying existing cold water refugia and provide options for protecting or enhancing such areas.” Cold water refugia (CWR) can be described as patches of water within a stream that are one or two degrees cooler than the surrounding ambient stream temperature resulting from the cool in-flow of tributaries and/or upwelling of groundwater. Studies indicate that CWR may provide critical habitat for salmonids in basins affected by warm temperatures (Bartholow 1995). CWR are associated with different aspects of stream morphology, including side channels, alcoves, lateral seeps, and floodplain spring brooks (Ebersole 2003). McIntosh et. al. (1998), in their study of CWR in the

Klamath Basin using forward-looking infrared (FLIR) technology, concludes that areas of CWR appeared to be at junction where tributaries meet.

Because tributary junctions are easy to map, a likely source of cool groundwater, and associated with CWR, these tributary junction points were utilized as potential CWR. Riparian areas at tributary junctions that would be accessible to fish from the main stem Willamette River are identified in Figure 3-1: Riparian Shade Opportunities. To address cold water refugia these identified areas were used in the ranking of shade opportunities (see the 2014 Willamette Basin TMDL IP, Section 3.3.1). If an area was identified as an opportunity area for planting, it received a higher score or ranking if it was also identified as potential cold water refugia. Using this ranking scheme, these areas will likely be addressed first when developing planting plans.

6.4 Public Involvement

The City addresses public involvement for the management strategies described in Section 3 in conjunction with its NPDES MS4 permit requirements.

Public involvement will be provided for this TMDL IP update (and associated management strategies highlighted in Section 4.3) through use of the City's website. This TMDL IP will be posted on the City's website, available for public review, following review and approval by DEQ. Comments will be received, logged, and considered by City staff.

Section 7

References

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Appendix A: SWMP Implementation Activities

Key to pollutant symbols: A full circle (●) indicates the BMP is expected to address the parameter. An empty circle (○) indicates the BMP may be expected to address the parameter. A blank cell indicates that the effect of the BMP is unknown at this time.

Table A-1. West Linn Implementation Activities						
Best Management Practice (BMP) Name	Addresses bacteria?	Addresses phosphorus (pH and chlorophyll a)?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2012 SWMP)	Annual tracking measures
Element #1 Illicit Discharge Detention and Elimination ²						
Implement the Illicit Discharge Elimination Program	●	●	●	Environmental Services Division	- Document and implement the details of the City's IDDE program in a Standard Operating Procedures manual by November 1, 2012. - For identified illicit discharges, conduct appropriate actions to remove the discharge in conjunction with time frames outlined in the City's MS4 NPDES Permit. - Track and record all identified illicit discharges and how such discharges were removed.	(1) Track the status of completing the IDDE SOP manual. (2) Track the number, location, resolution, and enforcement activities related to any illicit discharge investigation conducted.
Conduct Annual Dry Weather Field Screening	○	○	○	Environmental Services Division	- Conduct dry weather, illicit discharge inspections annually at all priority outfall locations. - Develop pollutant parameter action levels to assist in the identification of non-permissible discharges by November 1, 2012. - If necessary, update existing mapping related to outfalls and priority outfall locations in	(1) Track the number and location of high priority outfalls inspected during dry weather illicit discharge inspection activities. (2) Summarize inspection results and indicate outfalls requiring sampling and/or investigations. (3) Indicate the outcome and resolution of any investigation activities conducted.
Implement the Spill Response Program	○	○	○	West Linn Operations Division and Tualatin Valley Fire and Rescue (TVFR) (via contract with the City)	- Respond to minor spills. - Call Tualatin Valley Fire and Rescue to respond to other spills.	(1) Indicate the number of spills reported to the West Linn Environmental Services. (2) Track the number of spills responded to by the West Linn Environmental Services and Tualatin Valley Fire and Rescue. (3) Indicate sources, causes, and types of discharges resulting from identified spill activities.
Element #2 Industrial and Commercial Facilities ³						
Screen Existing and New Industrial Facilities	○	○	○	Public Works Department	Notify DEQ of any existing or new industrial facilities within the West Linn jurisdiction that may potentially be subject to an industrial stormwater NPDES permit.	(1) Track the number of existing or new facilities subject to a stormwater industrial NPDES permit during the permit term.
Conduct Priority Facility Inspections	○	○	○	Public Works Department	Inspect identified priority industrial or commercial facilities once during the permit term.	(1) Track the number and outcome of priority facility inspections conducted over the permit term.
Element #3 Construction Site Runoff Control ⁴						
Implement the Erosion Control Manual	○	●	●	Public Works and Planning Departments	- Require submission of erosion control plans for development greater than 1000 ft². - Require a copy of all 1200-C permit applications for development greater than five acres. - Assess new and redevelopment applications for erosion control compliance during plan review. Require erosion and sediment control plans not in compliance to be amended prior to approval in conjunction with provisions outlined in the Clackamas County Erosion Prevention and Sediment Control Manual (2008).	(1) Report any updates or modifications to the Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (2008). (2) Record the number of erosion control permit (City issued and DEQ issued) applications received. (3) Track the number of erosion and sediment control plan reviews completed.
Provide Educational Information to Construction Site Operators	○	●	●	Public Works and Planning Departments	Provide educational information to construction site operators and the general public via brochures, flyers, pamphlets, and attachments to building and grading permit applications.	(1) Verify that this BMP was conducted.
Conduct Erosion Control Inspections and Enforcement	○	●	●	Engineering Division	- Conduct an initial and a final site inspection on all sites with an erosion control plan for appropriate erosion control. - As necessary, enforce appropriate erosion and sediment control in conjunction with the three-step progression as outlined on the City's website. - Require all disturbed areas to be permanently stabilized or vegetated prior to final engineering or building inspection. - Ensure a minimum of one additional erosion control inspection is conducted during active construction on all sites with an erosion control plan.	(1) Track the number of erosion control inspections conducted each year. (2) Report the number of notices of non-compliance and stop work orders issued, and describe the measures used to resolve the issue.

² Activities associated with Element #1: Illicit Discharge Detection and Elimination address the Minimum Control Measure #4 (Illicit Discharge Detection and Elimination) for mercury.

³ Activities associated with Element #2: Industrial and Commercial Facilities address the Minimum Control Measure #1 (Pollution Prevention and Good Housekeeping for Municipal Operations) for mercury.

⁴ Activities associated with Element #3: Construction Site Runoff Controls address the Minimum Control Measure #5 (Construction Site Runoff Control) for mercury.

Key to pollutant symbols: A full circle (●) indicates the BMP is expected to address the parameter. An empty circle (○) indicates the BMP may be expected to address the parameter. A blank cell indicates that the effect of the BMP is unknown at this time.

Table A-1. West Linn Implementation Activities						
Best Management Practice (BMP) Name	Addresses bacteria?	Addresses phosphorus (pH and chlorophyll a)?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2012 SWMP)	Annual tracking measures
Element #4 Education and Outreach ⁵						
Provide Public Education and Outreach Materials Regarding Stormwater Management	○	○	○	Public Works Department	- Utilize newsletters, brochures, bill inserts, City web page, and radio advertisements to promote public awareness of stormwater quality issues and to provide information to encourage public reporting of illicit discharges. - Continue to make annual monetary contributions to TB PAC.	(1) Track the number, types, and topics of public educational materials dispersed to the public annually. (2) Indicate any large-scale public educational campaigns initiated during a given year. (3) Track coordinated public outreach activities with local co-permittees. (4) Record the number of catch basins stenciled in a given year. (5) Track amount donated to TB PAC each year.
Implement a Pet Waste Program	●	○	○	Parks and Recreation Department	- If pet waste is observed as a problem upon routine maintenance activities at public property, install educational signs and distribute educational door hangers at homes in the immediate vicinity of the identified problem areas. - Continue to provide pet waste baggies and disposal areas in City parks for disposal of domestic animal waste.	(1) Report on activities conducted annually.
Participate in a Public Education Effectiveness Evaluation	○	○	○	West Linn Public Works Department	Coordinate with other local, Phase 1 jurisdictions in providing/ compiling information regarding a public education effectiveness evaluation over the permit term.	(1) Report on activities conducted annually.
Ensure Staff Training for Pest Management	○	●	○	Street Division and Parks and Recreation Department	Provide training to Public Works and Parks department crews once every two years on proper pesticide and fertilizer application rates and techniques in conjunction with guidelines outlined in the IPM Plan.	(1) Report on training conducted every two years.
Ensure Staff Training in Spill Response	○	○	○	Operations Division through a contract with TVFR	Provide OSHA HAZWOPER training and refresher courses to staff initially responding to spills annually.	(1) Track the number of employees receiving OSHA HAZWOPER training annually.
Promote Staff Education Related to Environmentally Friendly Solutions	○	○	○	Public Works Department	- Conduct municipal training for employees associated with stormwater management in the City. - Continue to participate in and attend environmental and water quality related professional meetings and conferences. - Continue to maintain a budget for employee attendance of conferences. - Continue to coordinate with other local Phase 1 jurisdictions regarding regional water quality efforts.	(1) Track the number of employees receiving training in stormwater management annually. (2) Track Operations and Engineering staff participation in professional organizations and attendance at relevant conferences.
Element #5 Public Involvement and Participation ⁶						
Provide for Public Participation with Submittals				Engineering Department	- Provide for public participation with the SWMP and pollutant load reduction benchmarks prior to the permit renewal application deadline. - Provide a public comment period for the updated stormwater monitoring plan and annual reports prior to submittal to DEQ.	
Element #6 Post-Construction Site Runoff ⁷						
Implement Community Development Code and Public Works Design Standards for Stormwater Treatment	●	●	●	Public Works and Planning Departments	Per City's Development Code, review all new development and applicable redevelopment for conformance with current City stormwater standards and ordinances.	(1) Track the number of development applications reviewed for compliance with the current stormwater requirements for treatment and detention. (2) Track any modifications to the list of currently approved structural stormwater treatment facilities. (3) Track private BMPs that are implemented and their associated drainage areas.
Review and Update the Applicable Code and Development Standards related to Stormwater Control	●	●	●	Public Works and Planning Departments	- Review the City's current stormwater treatment standards for compliance with new MS4 NPDES permit language. - Review the City's current public works development code provisions to ensure that applicable barriers related to the use of LID or GI techniques are minimized and eliminated where practicable. - Update the City's existing post-construction stormwater design standards and code language by November 1, 2014.	(1) Track progress related to the review of the City's code and development standards per provisions in the MS4 NPDES permit.

⁵ Activities associated with Element #4: Education and Outreach address the Minimum Control Measure #2 (Public Education and Outreach) for mercury.

⁶ Activities associated with Element #5: Public Involvement and Participation address the Minimum Control Measure #3 (Public Involvement and Participation) for mercury.

⁷ Activities associated with Element #6: Post-construction Site Runoff address the Minimum Control Measure #6 (Post-Construction Site Runoff for New and Redevelopment) for mercury.

Key to pollutant symbols: A full circle (●) indicates the BMP is expected to address the parameter. An empty circle (○) indicates the BMP may be expected to address the parameter. A blank cell indicates that the effect of the BMP is unknown at this time.

Table A-1. West Linn Implementation Activities						
Best Management Practice (BMP) Name	Addresses bacteria?	Addresses phosphorus (pH and chlorophyll a)?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2012 SWMP)	Annual tracking measures
Element #7 Pollution Prevention for Municipal Operations ⁸						
Conduct Street Area Repair	○	○	○	Public Works Department	• Ensure all road maintenance and repair activities implement appropriate erosion and sediment control to address potential water quality impacts.	None
Maintain Public Streets	○	○	●	Operations Division	• Sweep each street between 3 and 6 times per year.	(1) Track the number of sweeps conducted annually. (2) Track the volume of debris removed during sweeping activities. (3) Track the amount (volume) of deicing agent used annually.
Implement an Integrated Pest Management Program	○	●	○	Operations Division and Parks and Recreation Department	• Use the Portland Integrated Pest Management (IPM) Program as a guide for appropriate pesticide and fertilizer application procedures along roadways, within City Parks, and around water quality facilities. • Conduct work within public right-of-way only with certified, licensed applicators.	(1) Track any updates or modifications to the referenced IPM procedures and protocols. (2) Track the amount of money spent on pest management chemicals each year.
Implement a Program to Reduce the Impact of Stormwater Runoff from Municipal Facilities	○	○	○	Environmental Services Division	• Inventory municipal facilities subject to this permit requirement by July 1, 2013. • By July 1, 2013, identify and implement strategies to reduce the impact of pollutant discharges from these facilities.	(1) Track strategies used to minimize pollutant discharge.
Control Infiltration and Cross Connections to the Stormwater Conveyance System	●	○	○	Environmental Services Division	• Annually investigate for cracking and breakage, and repair as necessary based on the results of the inspection, a minimum of 5,000 linear feet of sanitary lines. • Review new and redevelopment plan submittals for possible cross-connections. • Inspect for potential cross-connections during dry weather field screening activities.	(1) Indicate whether any sanitary sewer cross-connections were identified during sanitary line testing, during the plan review process, or during dry-weather field screening activities on an annual basis. (2) Describe any follow-up activities required for identified cross-connections.
Conduct Master Planning for Stormwater Quality Improvement	●	●	●	Public Works Department	• Ensure water quality is considered during the development of flood control CIPs.	(1) Track any updates or modifications to the current Stormwater Master Plan approved by the City. (2) Track the number of CIP projects implemented each year and discuss the added benefit (water quality, habitat restoration, etc.) of each. (3) Map the location and drainage area of water quality CIPs as they are constructed.
Element #8 Stormwater Management Facilities Operation and Maintenance ⁹						
Conduct Stormwater Conveyance System Cleaning and Maintenance	●	○	●	Environmental Services Division	• Perform cleaning and repair promptly based on inspection results.	(1) Track the length of conveyance system inspected. (2) Track the volume of debris removed during cleaning activities.
Conduct Catch Basin Cleaning and Maintenance	●	○	●	Environmental Services Division	• Inspect all public catch basins once per year, and clean as needed based on inspection results. • Repair or replace catch basins promptly based on inspection results. • Update tracking database during each maintenance cycle.	(1) Track the number of catch basins inspected. (2) Track the volume of debris removed during cleaning activities.
Public Structural Control Facility Cleaning and Maintenance	●	●	●	Environmental Services Division	• Inspect public structural water quality facilities annually and maintain based on inspection results.	(1) Track the number and frequency of structural facilities inspected and maintained. (2) Track the volume of debris removed during cleaning activities.
Private Water Quality Facility Maintenance Program	●	●	●	Environmental Services Division	• Require new private water quality facilities to submit maintenance agreements to the City. • Require submittal of annual reports related to inspection and maintenance activities for private water quality facilities with existing maintenance agreements. • Continue to work to identify the responsible parties associated with private water quality facilities that do not have an existing maintenance agreement. • Provide formalized structural stormwater facilities inspection and maintenance documentation to private facility owners by July 1, 2013.	(1) Track the number of new maintenance agreements submitted to the City each year. (2) Track number of new and existing annual maintenance reports received each year.

⁸ Activities associated with Element #7: Pollution Prevention for Municipal Operations address the Minimum Control Measure #1 (Pollution Prevention and Good Housekeeping for Municipal Operations) for mercury.

⁹ Activities associated with Element #8: Stormwater Management Facilities Operation and Maintenance address the Minimum Control Measure #1 (Pollution Prevention and Good Housekeeping for Municipal Operations) for mercury.

Appendix B: Temperature Management Strategies

Table B-1. Management Strategies for Temperature Reduction							
BMP or Activity	Commitment/ Implementation Strategy	Measurable Goal(s)	Implementation Tracking/Performance Measure	Timeline	Milestones	Responsible City Department	Status (to be populated with each annual report)
Riparian Area Management	Enforce riparian buffer ordinances to protect existing vegetation and minimize impacts to surface waters due to development.	Continue to implement West Linn Community Development Code (WLCDC), Chapter 28 (Willamette and Tualatin River Protection) and Chapter 32 (Water Resource Area Protection), related to the following: - Chapter 28 - Implementation of the Willamette and Tualatin River Protection Areas (overlays) and habitat conservation areas (HCA) to comply with Title 3 and Title 13 requirements. - Chapter 32 – Implementation of Water Resource Protection Areas (overlay and buffer widths) to comply with Title 3 and Title 13 requirements. Provisions of Chapter 32 apply to wetlands and riparian buffers city-wide.	Annually track CDC updates related to Title 3/ 13 compliance.	Ongoing	N/A – CDC is currently consistent with Title 3/13 compliance.	West Linn Planning Department	
		Continue to implement Ordinance 1542, relating to the Community Tree Ordinance and efforts to encourage and promote tree conservation and planting to maintain and increase tree canopy coverage.	Annually track code updates related to tree canopy coverage and enforcement.	Ongoing	N/A – Implementation is ongoing.	West Linn Planning Department	
	Utilize annually committed funds to restore and enhance riparian shade conditions and instream habitat at identified public and private areas.	Conduct a desktop GIS evaluation and/or ground truthing to evaluate current riparian vegetation conditions to determine whether replanting or maintenance is required.	Annually document results of the desktop evaluation/ ground truthing efforts. Prepare updated mapping to document findings.	November 2021	- Evaluate the riparian condition of high and medium priority planting opportunity areas identified in the 2009 Willamette Basin TMDL IP by November 2020. Identify maintenance needs. - Assess and identify additional planting opportunity areas in the Tualatin Basin by November 2021. - Prepare a maintenance and planting schedule for identified planting opportunity areas by November 2021.	West Linn Public Works	
		Conduct or financially support riparian planting activities city wide.	Track planting and vegetation management activities conducted city wide. Track planting and vegetation management activities specific to identified planting opportunity areas.	Ongoing	N/A – Implementation is ongoing.	West Linn Public Works	
		Continue partnerships with and/or financial contributions to watershed councils, non-profit organizations, and private citizens in support of riparian planting projects. Partnership may include in-kind staff participation on governing boards or technical support for sponsored projects on public property within the City. Financial contributions may be direct material or monetary.	Annually document partnership efforts. Annually document any shade planting incentives (materials, trainings, etc.) provided to citizens.	Ongoing	N/A – Implementation is ongoing.	West Linn Public Works	
		Implement capital projects with a water quality component.	Complete one capital project with a water quality component to benefit stream health over the 5-year TMDL implementation period.	Annually track status of the City’s master plan update and capital project implementation.	Ongoing	N/A – Implementation is ongoing.	West Linn Public Works
	Design Standards for New and Redevelopment	Implement design standards that promote infiltration.	Promote the use of infiltration for stormwater management through the City of West Linn Public Works Design Standards, Section 2.	As applicable, document changes or updates to the City’s stormwater design standards.	Ongoing	N/A – Implementation is ongoing.	West Linn Public Works
Public Education for Temperature Management	Continue to provide information regarding temperature related issues and shade preservation efforts to the public.	Using the City newsletter, website, or other media platform, annually distribute a minimum of one article related to temperature issues and instream habitat management.	Annually track the number and content of temperature – related articles distributed to City residents.	Ongoing	N/A – Ongoing implementation is addressed through implementation of the City’s SWMP.	West Linn Public Works	
		Promote regional or local programs targeted at improving habitat on private property using City outlets. Instruction to include the importance of maintaining riparian buffers for shade and temperature management.	Annually document the methods of information distribution conducted by the City.	Ongoing	N/A – Implementation is ongoing.	West Linn Public Works	
Environmental Monitoring	Monitor surface water temperature to document status and evaluate trends with respect to water quality standards.	In conjunction with NPDES MS4 requirements and implementation of the Coordinated Clackamas County Monitoring Plan (CCCSMP), conduct sampling for temperature at required instream monitoring locations.	As applicable, annually report any modification to existing instream temperature monitoring activities.	Ongoing	N/A – Ongoing implementation is addressed through implementation of the City’s NPDES MS4 permit.	West Linn Public Works	

Appendix C: Metro Title 3 and Title 13 Summary

Appendix C

Metro Title 3 and Title 13 Summary

Metro Title 3

Title 3, specifically the Title 3 model ordinance, was developed in 1997 by Metro, which is a regional government serving the Portland metropolitan area including 25 cities. The purpose of Title 3 is to implement the Oregon Statewide Land Use Goals 6 and 7 that address protecting streams, rivers, wetlands, and floodplains. Title 3 provides this protection by avoiding, limiting, or mitigating the impact on these areas from development. This title limits development in identified water quality resource areas (WQRAs) and flood management areas (FMAs) and it limits development that would cause any extent of erosion within the Metro Boundary. Title 3 defines the WQRA as the protected water feature and associated vegetated corridor adjacent to the water feature and provides the method for determining the appropriate width of this vegetated corridor. Native vegetation within the WQRA should be maintained, enhanced, or restored, if disturbed. Metro developed the Water Quality and Flood Management Areas map identifying these areas with input from the cities and counties within the Metro region. Table 3.07-3 in Title 3 is shown on the following page and summarizes the vegetated buffer widths for protected water features.

The cities and counties within the Metro region were given three alternatives for implementing Title 3:

1. Amend comprehensive plans and ordinances to adopt all or part of the Title 3 model ordinance or language that substantially complies with the Title, and adopt either the Metro Water Quality and Flood Management Area map or a map that substantially complies with the Metro map;
2. Demonstrate that existing city and county comprehensive plans and ordinances already substantially comply with the performance standards and the intent of Title 3; or
3. A combination of the first two alternatives that substantially complies with all performance standards of Title 3.

To implement Title 3, many cities have adopted Table 3.07-3, along with a portion of the Title 3 model ordinance into their city code. Several exemptions are allowed for various reasons and are outlined specifically in Title 3 (Metro 1998).

Title 13

The Title 13 model ordinance was also created by Metro in 2006. However, it was created to provide clear objective standards and a discretionary review process for implementation of Oregon Statewide Land Use Goal 5. Goal 5 is focused on the protection of natural resources and open space. The purpose of Title 13 is to provide guidelines in order for local jurisdictions to 1) conserve, protect, and restore a continuous ecologically viable streamside corridor that is integrated with upland wildlife habitat, and 2) control and prevent water pollution in order to protect public health and improve the region's water quality.

Title 13 focuses on regulating development that would affect riparian or upland wildlife habitat, as documented on the Habitat Conservation Area (HCA) map that Metro has produced. The HCA map was created by Metro and was intended for adoption by local jurisdictions in the same manner as the Water Quality and Flood Management Areas map developed for Title 3 compliance. HCA priority levels (high, medium, and low) were assigned to areas by cross-referencing habitat classifications (e.g., Class I and Class II Riparian and Class A and Class B Upland Wildlife) and urban development values.

Table 3.07-3 – Protected Water Features

(Section 3.07.340(B)(2)(a))

Protected Water Feature Type (see definitions)	Slope Adjacent to Protected Water Feature	Starting Point for Measurements from Water Feature	Width of Vegetated Corridor
Primary Protected Water Features¹	< 25%	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	50 feet
Primary Protected Water Features¹	> 25% for 150 feet or more ⁵	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	200 feet
Primary Protected Water Features¹	> 25% for less than 150 feet ⁵	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	Distance from starting point of measurement to top of ravine (break in ≥ 25 slope) ³ , plus 50 feet. ⁴
Secondary Protected Water Features²	< 25%	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	15 feet
Secondary Protected Water Features²	$\geq 25\%$ ⁵	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	50 feet

¹ **Primary Protected Water Features** include: all rivers, perennial streams, and streams draining greater than 100 acres, Title 3 wetlands, natural lakes, and springs.

² **Protected Water Features** include intermittent streams draining 50-100 acres.

³ Where the Protected Water Feature is confined by a ravine or gully, the top of ravine is the break in the $> 25\%$ slope (see slope measurement in Appendix).

⁴ A maximum reduction of 25 feet may be permitted in the width of vegetated corridor beyond the slope break if a geotechnical report demonstrates that slope is stable. To establish the width of the vegetated corridor, slope should be measured in 25-foot increments away from the water feature until slope is less than 25% (top of ravine).

⁵ Vegetated corridors in excess of 50-feet for primary protected features, or in excess of 15-feet for secondary protected features, apply on steep slopes only in the *uphill* direction from the protected water feature.

Figure C-2. Title 3 (Table 3.07-3) - required width of vegetated corridor

New development restrictions differ depending on the HCA priority level as well as zoning type.

Cities and counties are given three alternatives for implementation of Title 13:

1. Adopt Title 13 model ordinance and map;
2. Demonstrate that the existing or amended comprehensive plan and ordinances “substantially” comply with the title, and existing or adopted maps also comply with Metro’s HCA map; or
3. Demonstrate that an alternative program with comparable protection and restoration results has been implemented.

Several exemptions are allowed for various reasons and are outlined specifically in the title. In essence, Title 13 promotes vegetative buffers around water bodies for protection of wildlife habitat

through the preservation and improvement of designated habitat conservation areas. Title 13 and its corresponding model ordinance describe specific design and construction practices to minimize impacts on wildlife corridors and fish passage. Performance and implementation objectives and measurable targets are outlined in the title, specifically related to design and construction practices that would be employed.

Metro monitors the region's progress toward implementation of Title 13, and cities and counties are required to submit progress reports on their efforts (Metro 2005).

Title 3 and Title 13 Comparison

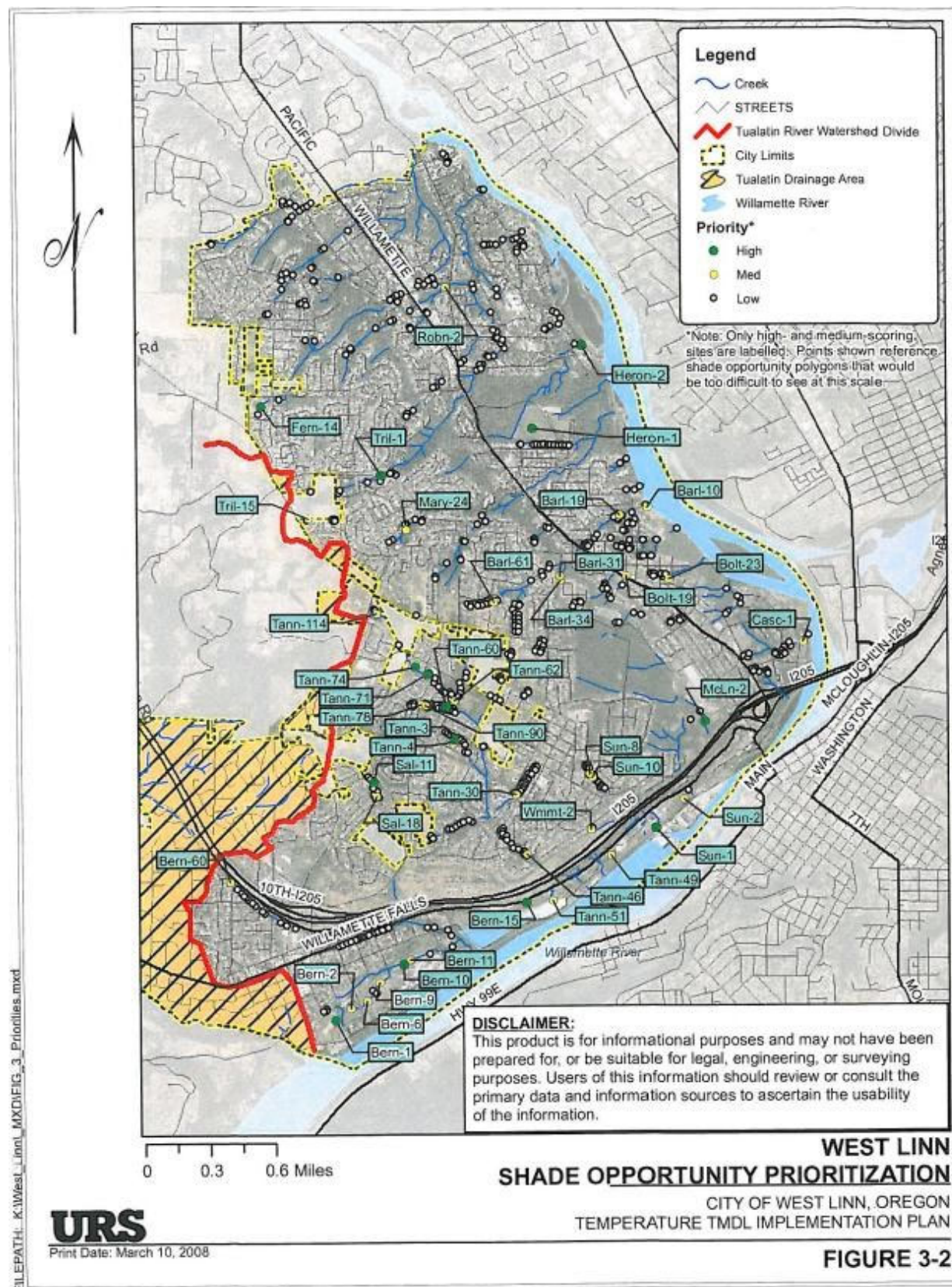
Both Title 3 and Title 13 promote the protection of vegetative buffers around water bodies. The goal for Title 3 is to protect water quality and flood areas while Title 13 aims to protect and improve riparian and wildlife habitat. Because Title 3 and Title 13 have different goals, the methods for implementation and performance standards are not identical. Title 13 is more specific than Title 3 in that it has specific numerical targets. However, Title 13 also enables the cities to use their own discretion when defining the protective buffer areas by evaluating the economic effects (urban development values), which is not a component of Title 3 (Metro 1998 and Metro 2005).

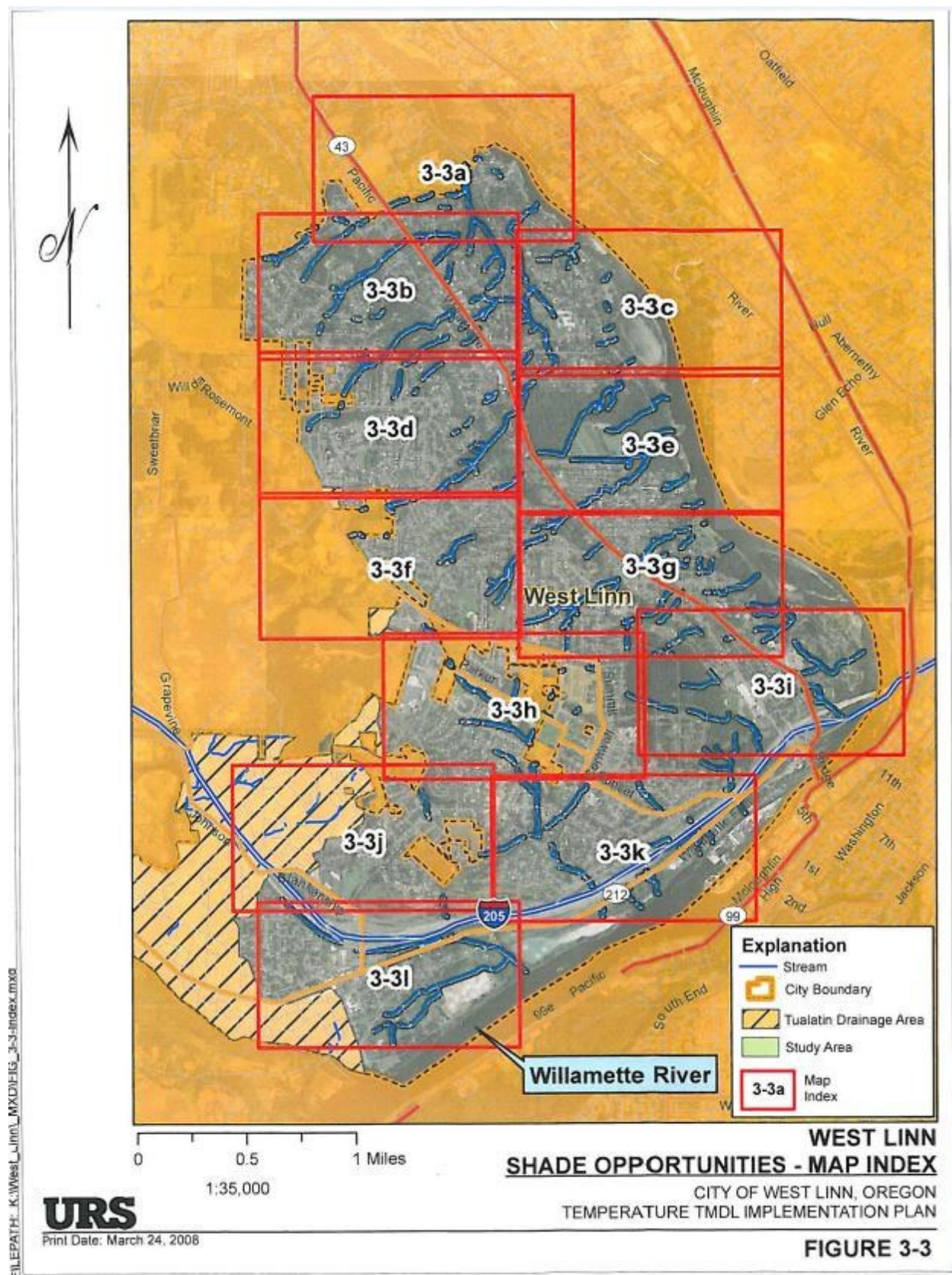
Appendix D: Shade Opportunities

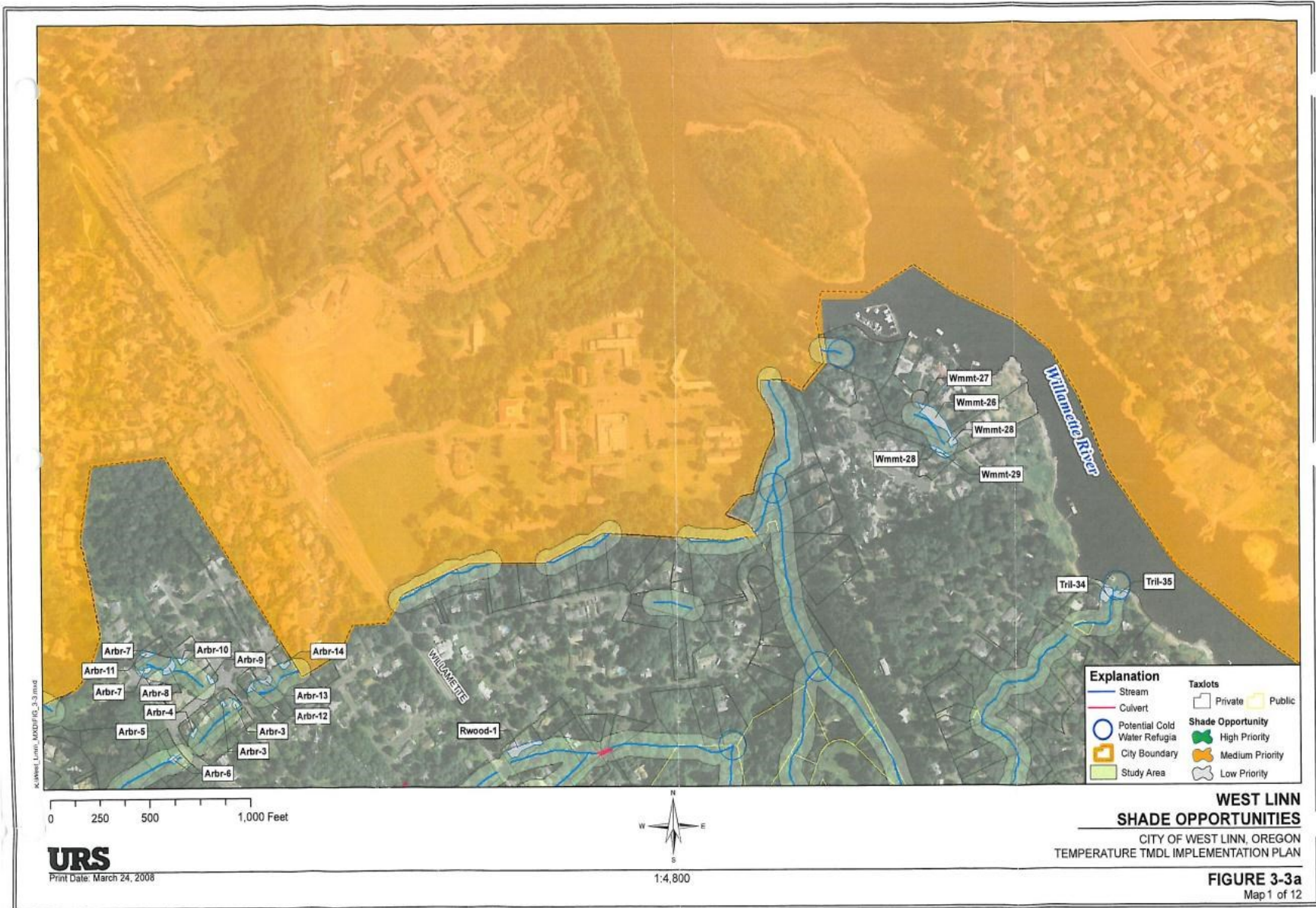
Priority Score	Shade Opportunity	Tax Parcel	Acres	Lineal Shoreline Feet	Aspect	Public?	Upstream of Fish Barrier?	Proximity to Potential CWR	Drainage	Map Rank
18	Tann-3	21E36BB03600	1.22	680	S	YES	NO		Tanner Creek	High
18	Heron-1	21E24 00600	1.33	1383	S,E,N	YES	NO		Heron Creek	High
18	Tril-1	21E23DD07900	0.53	675	S,N	YES	NO		Trillium Creek	High
18	Fern-14	21E23CB04900	1.11	435	S,N	YES	NO		Fern Creek	High
18	Tann-60	21E25CC05900	0.93	1130	S	YES	NO		Tanner Creek	High
18	Tann-74	21E26DA07800	0.64	580	S,N	YES	NO		Tanner Creek	High
17	Bern-10	31E02AA00800	0.63	485	S	NO	NO	50ft	Bernert Creek	High
17	Bern-15	21E36 01700	0.59	490	S,N	NO	NO	50ft	Bernert Creek	High
17	Sun-1	22E31 00800	0.20	100	S	YES	NO	50ft	Sunset Creek	High
17	McLn-2	22E30CD04500	1.54	480	W,E	YES	NO		McLean Creek	High
17	Heron-2	21E24 00300	0.01	21	S	YES	NO	50ft	Heron Creek	High
17	Wmmt-37	21E24 00400	0.01	22	S	YES	NO	50ft	Willamette River	High
16	Tann-71	21E26DA08000	0.25	230	S,N	YES	NO		Tanner Creek	High
15	Bern-1	31E02AC00700	0.32	440	W,E	YES	NO		Bernert Creek	High
15	Sal-11	21E35AB03500	0.93	475	E	YES	NO		Salamo Creek	High
14	Bern-2	31E02AC00800	1.05	500	S,N	NO	NO		Bernert Creek	Med
14	Bern-6	31E02AC01205	1.15	460	S,N	NO	NO		Bernert Creek	Med

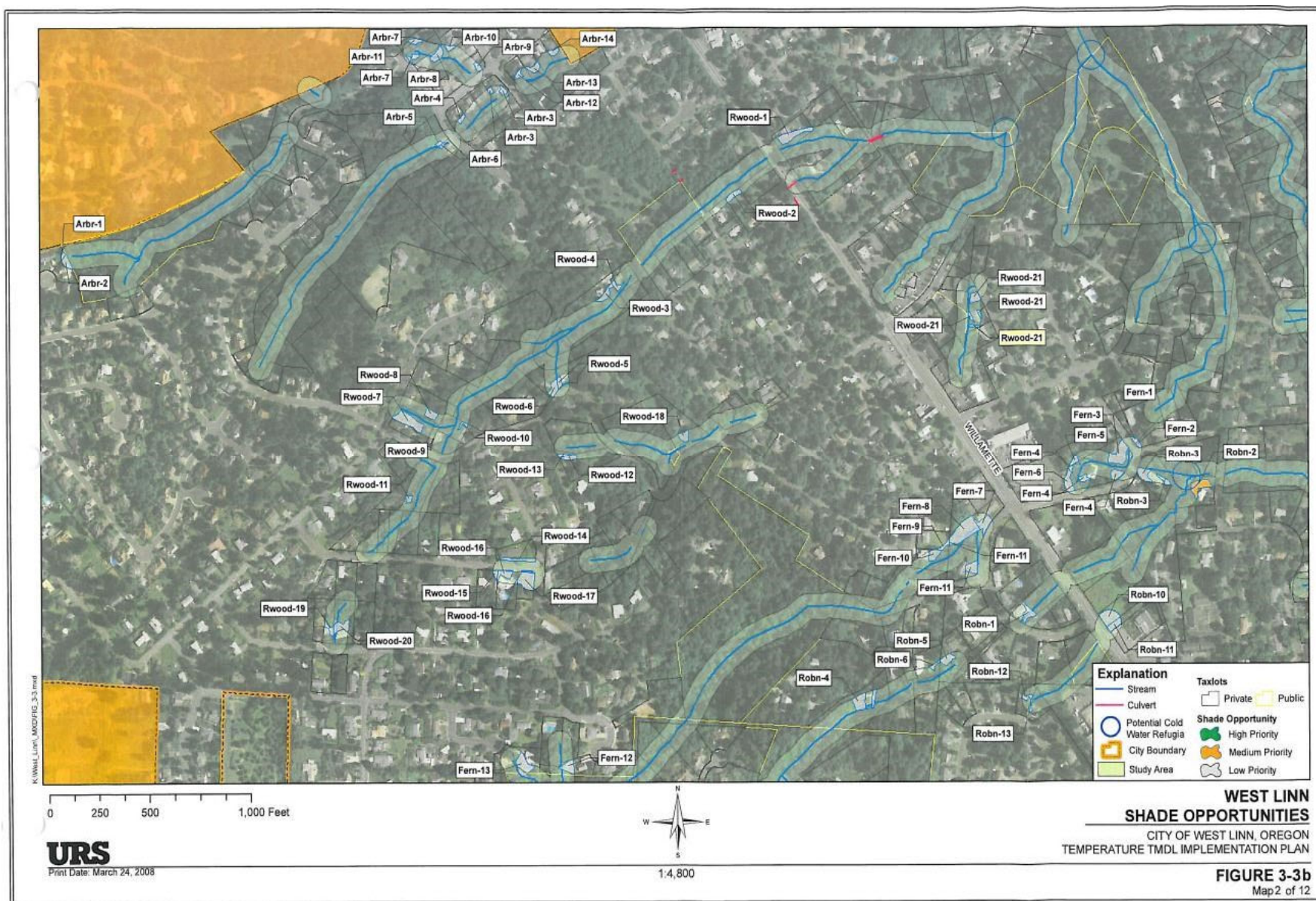
Priority Score	Shade Opportunity	Tax Parcel	Acres	Lineal Shoreline Feet	Aspect	Public?	Upstream of Fish Barrier?	Proximity to Potential CWR	Drainage	Map Rank
14	Bern-9	31E02AA01000	0.86	257	S,N	NO	NO		Bernert Creek	Med
14	Bern-11	31E02 00100	0.93	340	S,N	NO	NO		Bernert Creek	Med
14	Bern-60	21E35CC01000	0.01	35	S	YES	NO		Bernert Creek	Med
14	Sal-18	21E35AC09400	0.42	265	W	YES	NO		Salamo Creek	Med
14	Wmmt-2	21E36DB01800	0.05	60	S	YES	NO		Will. River	Med
14	Tann-49	21E36 02000	0.66	150	W,E	NO	NO	100ft	Tanner Creek	Med
14	Sun-2	22E31 00900	0.36	175	W,E	NO	NO	50ft	Sunset Creek	Med
14	Bolt-19	21E25AD02700	0.02	20	S	YES	NO		Bolton Creek	Med
14	Bolt-23	22E30BC02300	0.05	100	S	YES	NO		Bolton Creek	Med
14	Barl-19	21E25AA04505	0.03	68	S	YES	NO		Barlow Creek	Med
14	Barl-31	21E25AC02223	0.12	115	S	YES	NO		Barlow Creek	Med
14	Barl-34	21E25AC02224	0.05	33	S	YES	NO		Barlow Creek	Med
14	Barl-61	21E25BD03900	0.08	120	S	YES	NO		Barlow Creek	Med
14	Tril-15	21E23CD12500	0.17	145	S	YES	NO		Trillium Creek	Med
13	Sun-8	21E36AB12203	0.22	100	W,E	YES	NO		Sunset Creek	Med
13	Sun-10	21E36AB12202	0.23	90	W,E	YES	NO		Sunset Creek	Med
13	Barl-10	21E25AA02400	0.14	80	S	NO	NO	50ft	Barlow Creek	Med
13	Heron-3	21E24AC00900	0.01	14	S	NO	NO	50ft	Heron Creek	Med

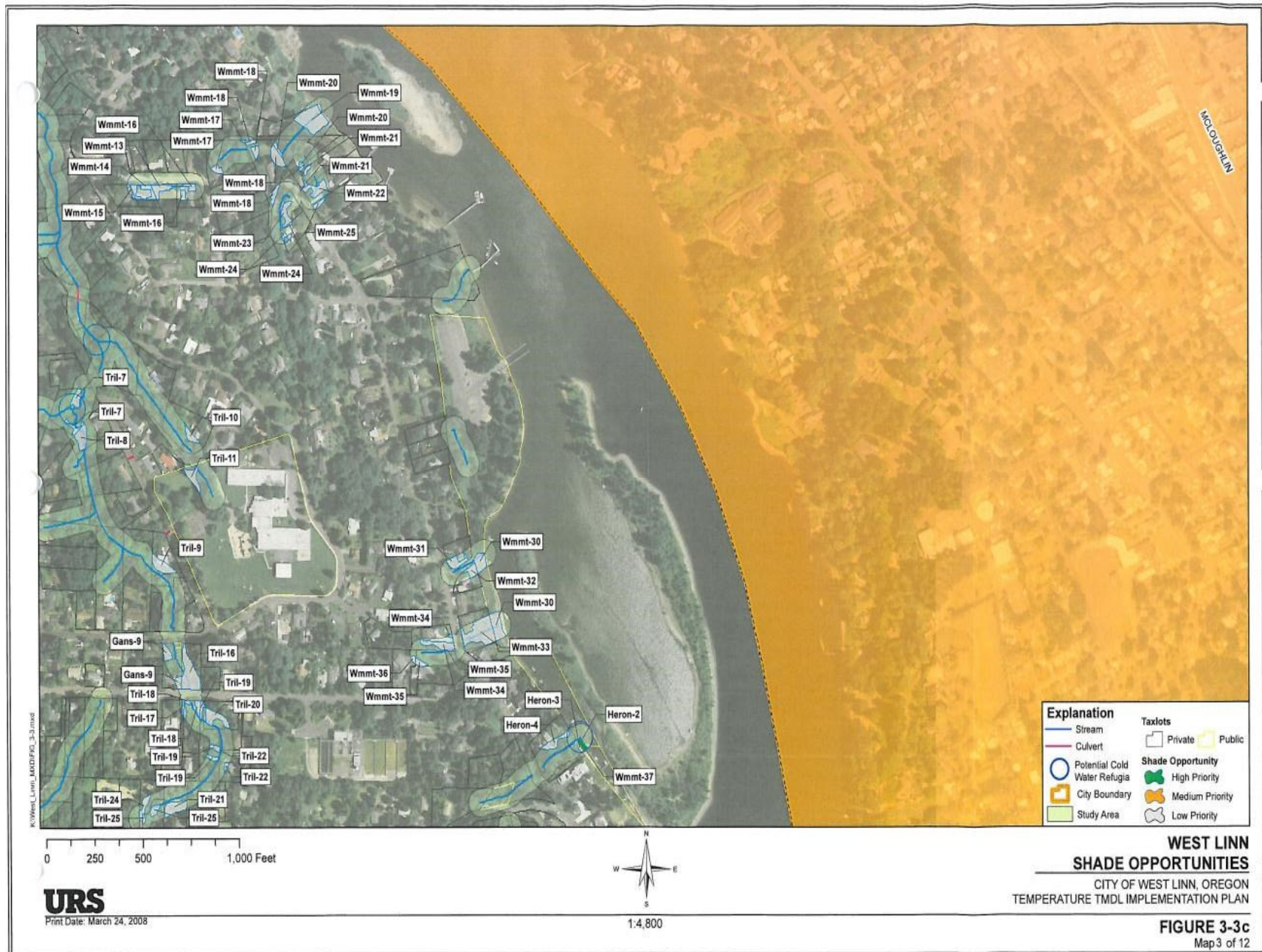
Priority Score	Shade Opportunity	Tax Parcel	Acres	Lineal Shoreline Feet	Aspect	Public?	Upstream of Fish Barrier?	Proximity to Potential CWR	Drainage	Map Rank
13	Casc-1	22E30DB00500	0.08	120	S	NO	NO	50ft	Cascade Springs Pond Creek	Med
13	Tann-51	21E36 02100	0.05	80	S	NO	NO	50ft	Tanner Creek	Med
11	Tann-4	21E36BB03800	0.12	460	S	YES	YES		Tanner Creek	Med
11	Tann-46	21E36CA00159	0.05	48	S	YES	YES		Tanner Creek	Med
11	Mary-19	21E26AA01700	0.15	300	S	YES	YES		Mary S. Young Creek	Med
11	Tann-62	21E25CC00545	0.84	660	N	YES	YES		Tanner Creek	Med
11	Tann-78	21E26DA08100	0.21	80	S,N	YES	YES		Tanner Creek	Med
11	Tann-90	21E25CC06000	0.14	152	S	YES	YES		Tanner Creek	Med
11	Tann-114	21E26A 05000	0.41	290	W	YES	YES		Tanner Creek	Med
10	Tann-30	21E36BD07100	0.29	150	E	YES	YES		Tanner Creek	Med
10	Robn-2	21E13CC05700	0.10	95	S	NO	YES	50ft	Robin Creek	Med

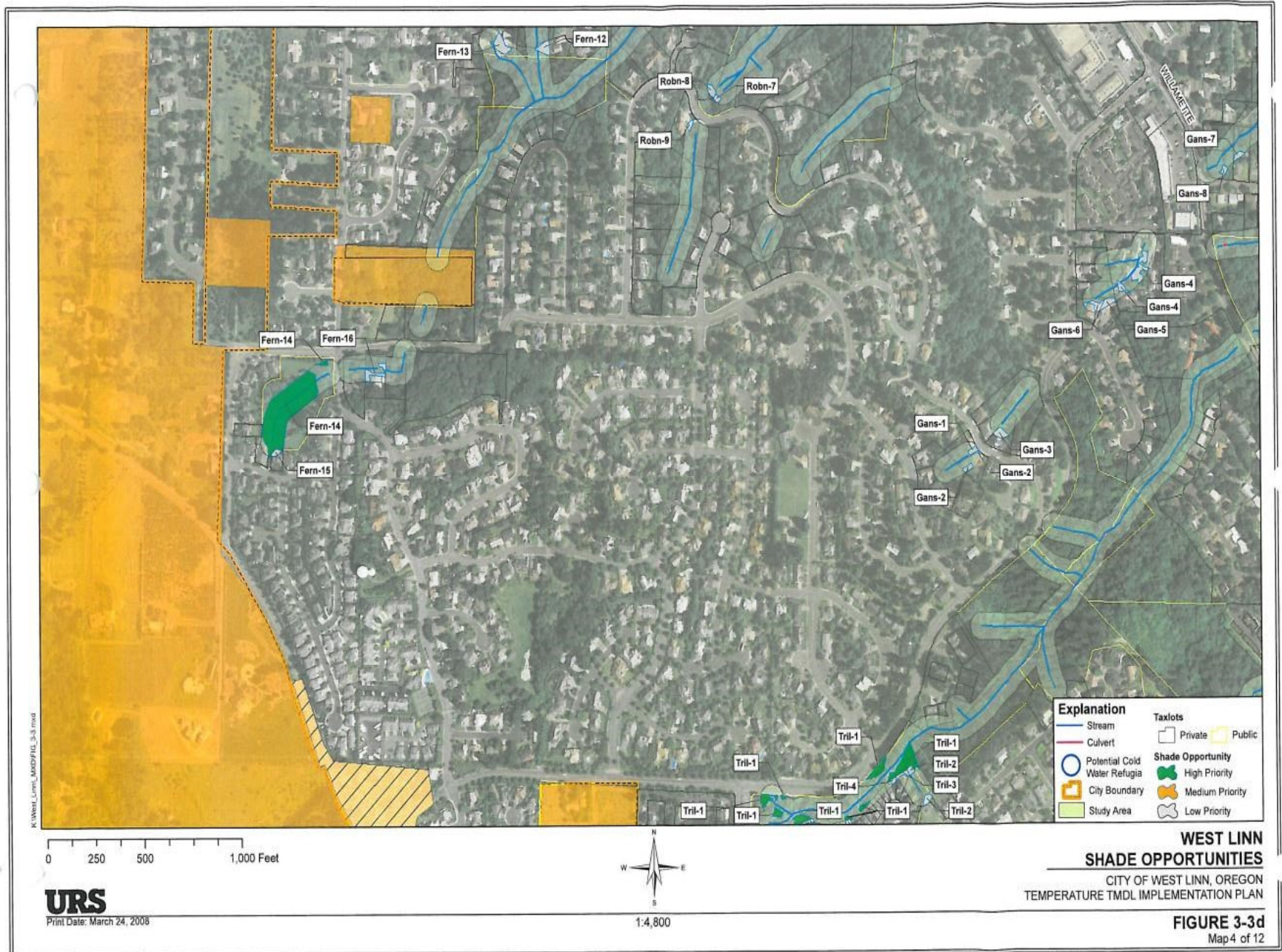


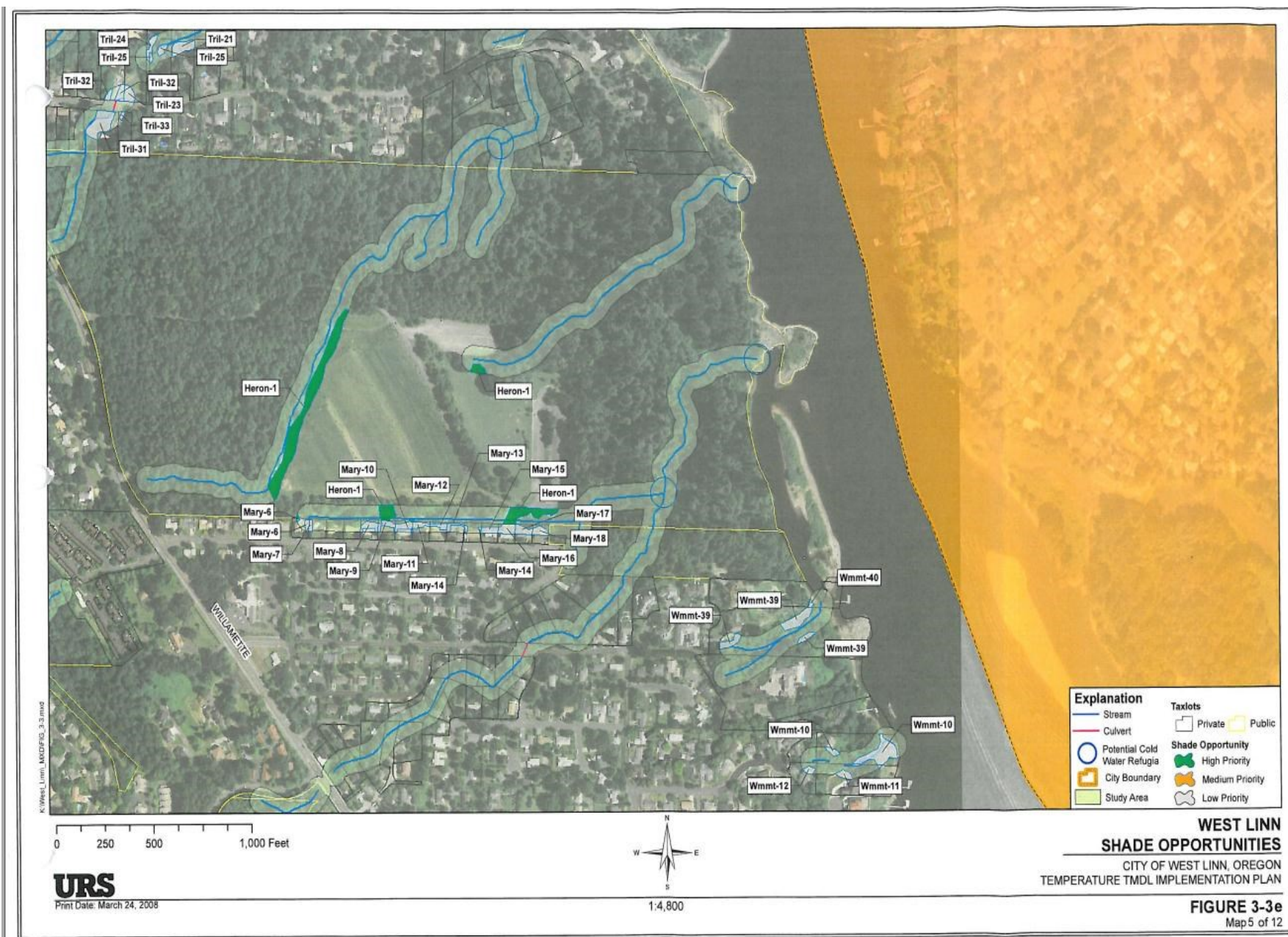


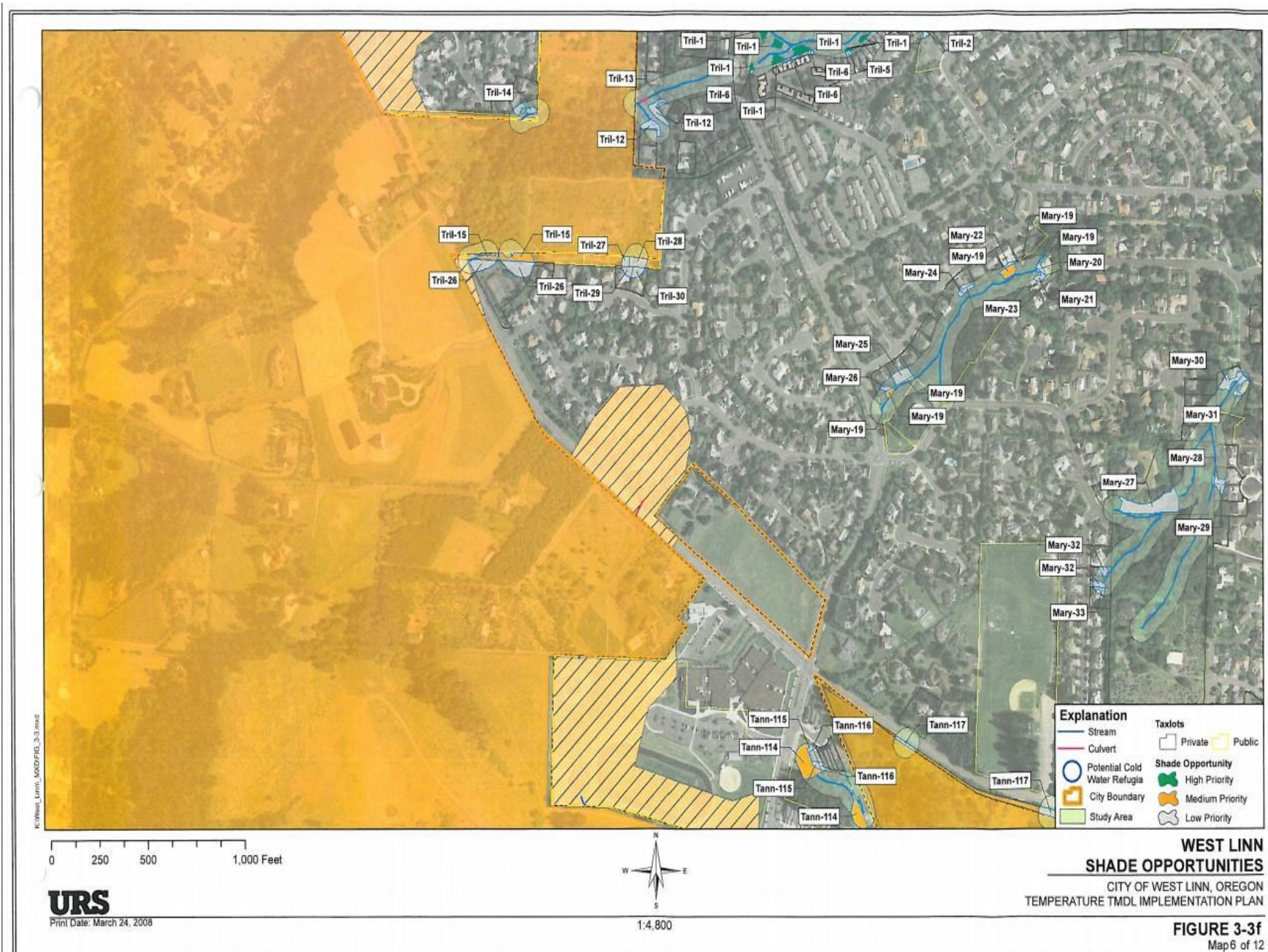


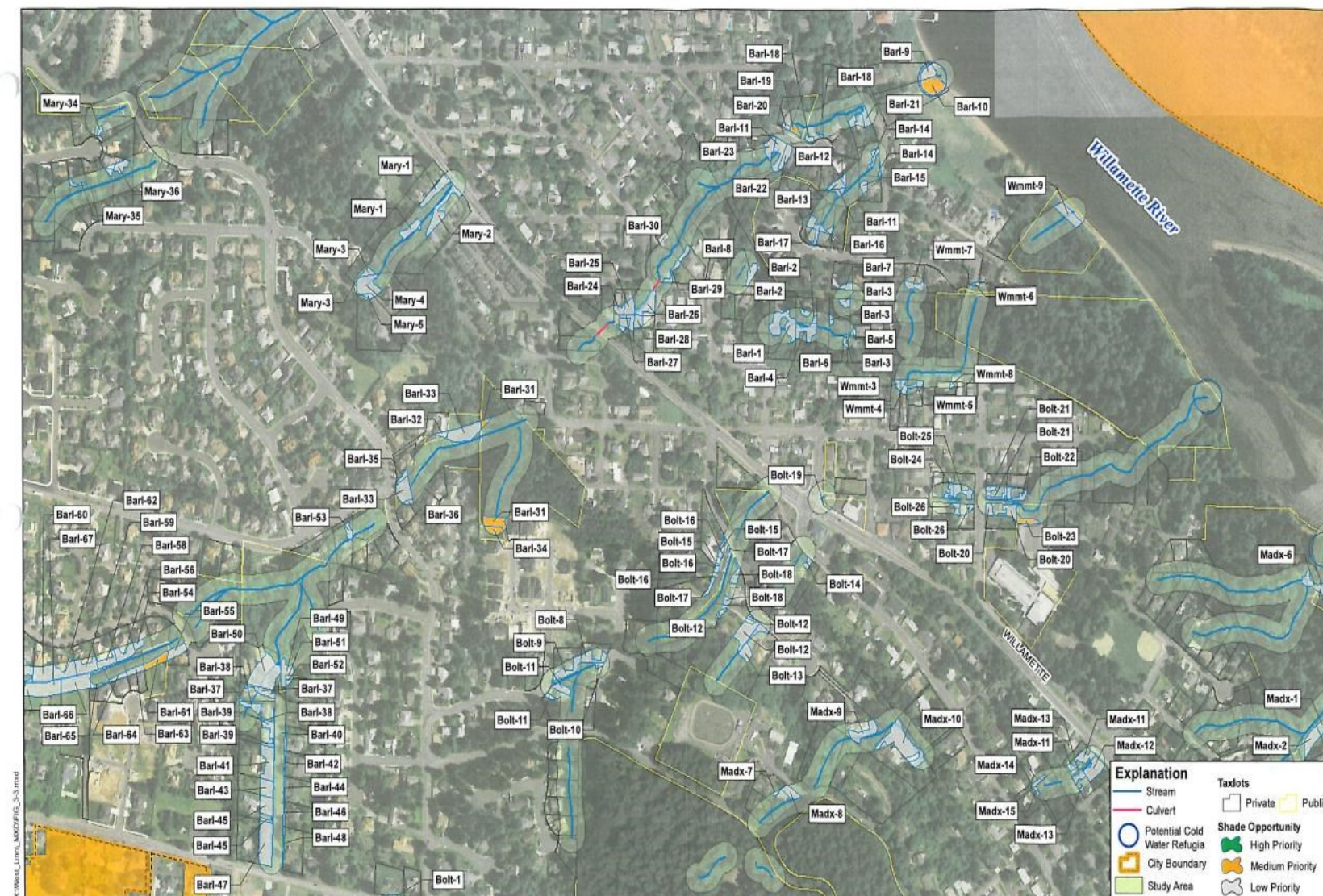












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WEST LINN
SHADE OPPORTUNITIES
 CITY OF WEST LINN, OREGON
 TEMPERATURE TMDL IMPLEMENTATION PLAN

FIGURE 3-3g
 Map 7 of 12

