

Willamette Basin TMDL Implementation Plan

City of Oregon City, Oregon

Submitted: March 31, 2008

Revised: May 9, 2009

Updated: May 30, 2014 by the City of Oregon City

Updated: January 29, 2019 by the City of Oregon City and finalized August 23, 2020

Prepared for:



*625 Center Street
Oregon City, Oregon 97045*

Original Prepared by:

URS

111 S.W. Columbia, Suite 1500
Portland, Oregon 97201-5814
25696582

Page left intentionally blank.

Table of Contents

1.0	Introduction and Background	1
1.1	Total Maximum Daily Loads Summary	1
1.2	Willamette River and Middle Willamette and Clackamas Subbasins	2
1.3	City of Oregon City Background.....	3
1.4	TMDL and Implementation Plan Goals.....	3
1.5	TMDL Implementation Plan Requirements.....	4
2.0	Bacteria and Mercury TMDLs	6
2.1	Management Strategies.....	6
2.2	Timeline and Schedule.....	7
2.3	Monitoring	7
2.3.1	Implementation Monitoring.....	7
2.3.2	Environmental Monitoring	7
3.0	Temperature TMDL	9
3.1	TMDL Load Allocations for Temperature	9
3.2	Existing Shade Conditions in 2008.....	11
3.3	Implementation Strategies	11
3.3.1	Riparian Planting	11
3.3.2	Preservation of Existing Shade.....	12
3.3.3	Other Measures	12
3.4	Timeline and Schedule.....	14
4.0	Evidence of Compliance with Applicable Land Use Requirements.....	15
5.0	Additional Requirements	17
5.1	Legal Authority.....	17
5.2	Funding	17
5.3	Cold Water Refugia	17
5.4	Public Involvement	18
5.5	Record Keeping and Reporting.....	18
6.0	References.....	20

List of Figures

Figure 3-1 Effective Shade Curve for Oregon City.....	10
---	----

List of Tables

Table 1-1 Acronyms and Abbreviations.....	ii
---	----

Table 1-1 Acronyms and Abbreviations

ACWA	Oregon Association of Clean Water Agencies
BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Federal Clean Water Act
CWR	Cold Water Refugia
DEQ	Oregon Department of Environmental Quality
DMA	Designated Management Agency
ESA	Endangered Species Act
FTE	Full Time Equivalent
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
OM	Operations and Maintenance
PE	Public Education
PF	Program Funding
PI	Public Involvement
QA/QC	Quality Assurance and Quality Control
ROW	Right-of-Way
SWMP	Stormwater Management Program
TMDL	Total Maximum Daily Load
UGB	Urban Growth Boundary
USEPA	United States Environmental Protection Agency
WPCF	Water Pollution Control Facilities
WQ	Water Quality
WQRA	Water Quality Resource Area

1.0 Introduction and Background

The Oregon Department of Environmental Quality (DEQ) has set Total Maximum Daily Loads (TMDLs) for specific water quality parameters affecting water bodies located in the Willamette River Basin. Any agency or municipality that has legal authority over activities or areas considered a source of pollutant discharge to the affected water body is known as a Designated Management Agency (DMA). DMAs must develop an Implementation Plan describing strategies to address TMDL pollutants (DEQ 2006).

The City of Oregon City, located in the Clackamas River and Middle Willamette subbasins of the Willamette River Basin, must comply with this requirement. The TMDL parameters for these subbasins are temperature, bacteria, and mercury. This document represents the TMDL Implementation Plan for the City of Oregon City, specifically addressing the Willamette Basin TMDL for temperature. A detailed overview of management strategies for bacteria and mercury is also provided in this plan, although compliance with the TMDL for these parameters is covered by the City's municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) stormwater permit.

This document is arranged in five sections. Section 1.0 provides an overview of the TMDL Implementation Plan and provides background on the Willamette Basin TMDL with respect to Oregon City. Section 2.0 provides an overview of how the City's NPDES MS4 permit addresses TMDL compliance with respect to bacteria and mercury. Section 3.0 provides the temperature portion of the TMDL Implementation Plan. Section 4.0 provides evidence of compliance with land use requirements. Section 5.0 discusses additional elements required in the Water Quality Management Plan (WQMP) of the Willamette Basin TMDL including: public involvement, fiscal analysis, legal authority, and cold water refugia.

1.1 Total Maximum Daily Loads Summary

The Federal Clean Water Act (CWA) of 1977 gave authorization to the U.S. Environmental Protection Agency (EPA) to restore and maintain water quality in all water bodies within the United States. In response to the CWA, the 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. When a water body is found not to meet water quality standards, it is first placed on the 303(d) list as an impaired water body, and the development of a TMDL follows.

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 both 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 and industrial stormwater and/or wastewater). Wasteload 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.

Implementation plans are a DMA's response to the TMDL, describing management strategies that they will implement and monitor to mitigate excess loading of nonpoint sources of TMDL pollutants (DEQ 2006). Point sources of TMDL pollutants are covered through NPDES permits.

In September 2006, DEQ issued a TMDL for nine subbasins within the entire Willamette Basin to protect and restore the beneficial uses of the Willamette River. The Willamette Basin TMDL was the largest TMDL undertaken by the DEQ. The Willamette Basin is divided into 12 subbasins. Mercury, bacteria, and temperature are constituents which have been identified to exceed water quality standards for the Willamette River. Additional pollutants have been identified as exceeding standards for specific tributaries and portions of the mainstem Willamette River; these pollutants are dissolved oxygen, turbidity, and toxics and are not covered under the scope of this plan as they are not listed in the TMDL for any tributaries covered by Oregon City (DEQ 2006).

Chapter 14 of the Willamette Basin TMDL provides a Water Quality Management Plan, which presents suggested management measures for jurisdictions discharging to the Willamette River, in order to comply with the TMDL requirements. In addition, a TMDL Implementation Plan Guidance for State and Local DMAs (May 2007) developed by DEQ is available for jurisdictions to assist in preparing their individual TMDL Implementation Plans. Both documents are referenced in the preparation of this TMDL Implementation Plan.

1.2 Willamette River and Middle Willamette and Clackamas Subbasins

The Willamette River watershed encompasses 11,500 square miles and is home to 70% of Oregon's population, which equates to over two million people (DEQ 2006). The Willamette River and its tributaries are an important resource for residents of the watershed, providing beneficial uses such as private and public drinking water supply, industrial water supply, irrigation, recreation, aesthetic quality, natural habitat, and other functions.

Oregon City falls within the boundaries of two Willamette River subbasins: the Clackamas River and Middle Willamette Subbasins. Together, these two subbasins include portions of five counties and 20 cities, encompassing a total of 1,698 square miles.

The Clackamas Subbasin boundary extends northwest from the Mt. Hood National Forest to the Willamette River. Two wilderness areas, Bull of the Woods Wilderness Area and Salmon Huckleberry Wilderness Area are located within the subbasin collectively protecting 79,500 acres. The U.S. Forest Service manages most of the publicly owned land within the basin. Approximately one quarter of the Clackamas Subbasin is privately owned with a large portion of that land owned by timber companies. Most commercial and industrial land use is situated near the mouth of the Clackamas River as well as near the small urban areas and major roadways. Additionally, a small portion of the Warm Springs Indian Reservation is within the Clackamas Subbasin (DEQ 2006). The Clackamas River itself has a TMDL for temperature and bacteria and is included as Chapter 6 of the Willamette Basin TMDL.

The Middle Willamette Subbasin includes the Willamette River from Willamette Falls at River Mile 26.6 to River Mile 108. From the East, the Middle Willamette Subbasin drains a portion of the Cascade foothills and the Coast Range from the West. The subbasin is further divided into

the following four smaller watersheds: Abernethy Creek Watershed, Mill Creek Watershed, Rickreal Creek Watershed, and Willamette River tributaries/Chehalem Creek Watershed.

Although there are small areas of public land located throughout the subbasin, it is comprised primarily of private land. Chief land uses include agriculture, forestry, and urban activities.

1.3 City of Oregon City Background

Oregon City is located in Clackamas County, 13 miles south of Portland, Oregon. It has a rich history as Oregon's first capital and incorporated city. Oregon City has a population of approximately 35,483 residents (2010 Census). The city occupies a total of 8,092 acres, with 6,474 acres within the city limits and 1,618 acres outside the city limits but within the Urban Growth Boundary (UGB). Urbanization at the edge of Oregon City is constrained by the Willamette River and the City of West Linn to the west, the Clackamas River and the City of Gladstone to the north, and steep topography to the south and east. The City is comprised of mostly low-density residential land use with most commercial and industrial land in the southeast portion of the City. There are no identified agricultural or forest lands within the City limits (Oregon City Comprehensive Plan 2004).

The City is divided into 13 watersheds draining to the Willamette and Clackamas Rivers. Several tributaries flow through the City, feeding both the Willamette and Clackamas Rivers creating the City's physical configuration and providing unique topographic and ecologic areas. Within the City, the Clackamas River, as well as Abernethy, Newell, Holcomb, Potter, and other creeks provide essential spawning and rearing habitat for steelhead trout, cutthroat trout, and coho salmon (Oregon City Comprehensive Plan 2004).

Oregon City has an NPDES MS4 permit from DEQ for its municipal stormwater discharges to surface waters as a co-permittee on Clackamas County's Phase 1 NPDES MS4 permit. The City's municipal stormwater discharges are considered point sources since they are covered by this permit. Oregon City includes some stormwater discharges that flow overland and enter receiving waters directly without first entering the City's stormwater conveyance system or MS4. While these discharges would technically be considered nonpoint sources, they have been included and covered under the City's NPDES permit for ease in management; therefore, the management strategies covered in Section 2.0 for bacteria and mercury cover both point and nonpoint sources of these pollutants as the City's NPDES permit covers both areas.

Because stormwater is not considered to be a source of water quality temperature exceedances, temperature is managed as a nonpoint source issue that needs to be addressed through a TMDL Implementation Plan as opposed to being addressed through an NPDES MS4 permit.

1.4 TMDL and Implementation Plan Goals

The primary goal of the Willamette Basin TMDL is to ensure that levels of temperature, bacteria and mercury are not exceeded because waterways that are too warm will not support healthy salmon and trout; bacteria-contaminated water can cause illness in humans; and elevated levels of mercury have resulted in health advisories to limit the amount of fish that can be safely consumed. The goal of this implementation plan is to show how Oregon City addresses TMDL requirements through management strategies and schedules to minimize nonpoint source

pollutant loads of heat energy (temperature). Another goal is to provide an overview (for reference purposes only) of management strategies and schedules that are implemented under the City's NPDES MS4 stormwater permit to comply with the bacteria and mercury TMDLs applying to point sources.

1.5 TMDL Implementation Plan Requirements

DEQ created a WQMP for the Willamette Basin TMDL in 2006 meant to provide the framework for the management strategies to attain and maintain water quality standards within the Willamette Basin (Oregon Administrative Rule (OAR) 340-042-0040-(4)). Per the WQMP, these strategies are to be submitted by DMAs to the DEQ in a TMDL Implementation Plan. The TMDL Implementation Plans need to identify activities that the City is currently conducting, or planning to implement, to address nonpoint sources of the TMDL parameters and minimize their effects on receiving water quality. For the Willamette Basin, the DMAs were to develop and submit these plans to the DEQ within 18 months after the release of the final TMDLs.

The Willamette Basin TMDL was published on September 21, 2006. The City submitted a TMDL Implementation Plan for the Clackamas River, Middle Willamette River, and tributaries on March 31, 2008. The plan was approved by DEQ in May 2009 with updates, and implementation was initiated thereafter. In conjunction with the end of the 5-year implementation period, the City submitted an updated plan in May 2014 that reflected progress made associated with the 2008 TMDL Implementation Plan and identified activities the City would conduct during the next five-year period (2014 to 2019).

This plan reflects the required 5-year update to the 2014 TMDL Implementation Plan. It outlines updated strategies and activities the City is proposing to continue compliance with the Willamette Basin TMDL and addresses requirements (A) through (E) as listed below per OAR 340-042-0080(3):

1. Management strategies that the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading;
2. A timeline and schedule to achieve measurable milestones;
3. A plan for performance monitoring and periodic review and revision of the implementation plan;
4. Evidence of compliance with applicable statewide land use requirements; and
5. Any other analyses or information as specified in the Water Quality Management Plan.

This plan is organized as follows:

- Section 2.0 provides an overview and reference regarding strategies in the City's MS4 NPDES permit that address TMDL compliance for bacteria and mercury.
- Section 3.0 addresses the first three requirements listed above specifically for nonpoint sources of temperature exceedances.

- Section 4.0 addresses the fourth requirement listed above and reflects evaluation of the plan's conformance with the City's land use goals and comprehensive plan.
- Section 5.0 addresses additional items identified in the WQMP. These items include:
 - Determine how to best provide for public involvement;
 - Analyze funding to determine what additional resources are necessary to develop, implement, and maintain the management strategies;
 - Include citations and brief descriptions of legal authority used to carry out the management strategies; and
 - Address cold water refugia.

2.0 Bacteria and Mercury TMDLs

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, background levels, reserves for future growth, and a margin of safety. Wasteload allocations are provided for point sources (e.g., municipal stormwater and wastewater) and load allocations are provided for nonpoint sources (e.g., surface runoff from agricultural and forested lands). Excess bacteria and mercury in the Willamette River Basin come from both “point” and “nonpoint” sources.

Oregon City obtained its most recent NPDES MS4 permit from DEQ for its municipal stormwater discharges to surface waters (i.e., their point sources) in 2012. The City does not operate its own wastewater treatment plant; therefore, all municipal point sources of bacteria and mercury are represented by stormwater discharges and covered under the City’s NPDES MS4 permit. The 2012 NPDES MS4 permit expired in February 2017 and is currently (as of January 2019) under administrative extension.

As described in Section 1.0, Oregon City includes some stormwater discharges that flow overland and enter receiving waters directly without first entering the City’s conveyance system (i.e., nonpoint sources). However, for ease of management, the NPDES MS4 permit is applied citywide to both point and nonpoint source areas. Therefore, the City does not have any nonpoint sources of bacteria and mercury that would be subject to load allocations under the TMDL. The City’s NPDES MS4 permit serves as the Willamette Basin TMDL compliance mechanism for bacteria and mercury. The purpose of this section is only to provide an overview of the strategies, schedules and monitoring activities that address bacteria and mercury that are included as part of the NPDES MS4 permit.

2.1 Management Strategies

DEQ addresses TMDL requirements within the City’s NPDES MS4 permit, as they pertain to wasteload allocations for stormwater runoff. The NPDES MS4 permit requires implementation of a Stormwater Management Plan (SWMP), which outlines various management strategies in the form of best management practices (BMPs) that address specific permit requirements and 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 NPDES MS4 permit also required Oregon City to develop benchmarks towards meeting TMDL wasteload allocations for bacteria and requires an adaptive management approach that focuses on refining BMPs over time with the goal of eventually achieving WLAs.

SWMP management strategies are listed and summarized in Appendix A. More detail related to each of these practices is provided in the City’s Stormwater Management Plan (SWMP) that was updated in May 2012 to correspond with permit language reflected in the City’s 2012 NPDES MS4 permit. Because the NPDES MS4 permit is under administrative extension, no changes to the SWMP may be made until permit reissuance. Upon permit reissuance, BMP names, measurable goals, and tracking measures may change to reflect reissued permit language and any new requirements associated with the new permit. SWMP management strategies listed in

Appendix A represent the 2012 SWMP only as currently implemented. Permit reissuance is currently anticipated in 2020 and the SWMP will likely be updated as a result.

2.2 Timeline and Schedule

The City's SWMP includes measurable goals and tracking measures for each BMP. These represent the schedule for implementing the TMDL implementation strategies for bacteria and mercury. The table in Appendix A includes the goals and schedules that are currently listed in the City's SWMP for each BMP.

Per requirements of the NPDES MS4 permit, the City conducted a pollutant load reduction evaluation in 2015 and developed TMDL benchmarks in 2017 to show progress toward meeting TMDL WLAs. The pollutant load reduction evaluation and benchmarks reflected implementation of stormwater controls (both structural and non-structural) as documented in the City's SWMP. TMDL benchmarks for bacteria were included in the City's permit renewal application submitted to DEQ in 2017. NPDES MS4 permit implementation currently requires adaptive management over time to refine stormwater management efforts with the goal of eventually meeting WLAs.

Mercury is a phased TMDL where monitoring was required for the first phase to support DEQ's development of wasteload allocations for the second phase. A permit requirement for the development of benchmarks did not apply to mercury as wasteload allocations for mercury have not yet been developed.

2.3 Monitoring

Two types of monitoring are described in this section. Implementation monitoring relates to the tracking of BMP (management strategy) implementation and ensuring that BMP implementation goals are met. Environmental monitoring relates to the analysis and evaluation of stormwater and instream concentrations of pollutants.

2.3.1 Implementation Monitoring

With respect to implementation monitoring, Oregon City submits an annual compliance report by November 1 of each year to summarize implementation activities for all BMPs in their NPDES stormwater management plan. Appendix A lists the measurable goals and tracking measures for each BMP in the SWMP.

2.3.2 Environmental Monitoring

The City of Oregon City has been conducting environmental monitoring in the form of sample collection and analysis at various instream and stormwater outfall sites throughout the City. Environmental monitoring activities are conducted in conjunction with the monitoring requirements listed in the NPDES MS4 permit.

The City of Oregon City is a participant in the Comprehensive Clackamas County Stormwater Monitoring Plan (CCCSMP), a coordinated monitoring program developed with ten other Clackamas County co-permittees. The latest version of the CCCSMP was submitted to DEQ in December 2016 and implementation began in July 2017. Under the CCCSMP, Oregon City is

currently collecting water quality samples from six instream sites and two outfall sites. Samples collected from these sites are analyzed for various parameters that include bacteria, nutrients, metals, sediment, pesticides, and field parameters (e.g., pH, dissolved oxygen, temperature). Biological monitoring is also a requirement under the permit and included in the CCCSMP. The City conducted biological monitoring in 2018, which included biological sampling and physical condition monitoring at three instream sites. Mercury monitoring was also conducted at one outfall during one wet-weather storm event and one dry-weather storm event between October 1, 2012, and September 30, 2013, per the City's NPDES MS4 permit.

Data from environmental monitoring efforts are included in the NPDES MS4 annual reports. Oregon City's monitoring as outlined in the CCCMP has the potential to change as a result of permit issuance when that occurs.

3.0 Temperature TMDL

DMAs, including the City of Oregon City, must develop TMDL Implementation Plans to address TMDL exceedances for temperature, as mandated in the Willamette Basin TMDL. These plans must describe how each DMA will reduce temperature in order to meet water quality standards.

The method most often used for reducing water temperatures is the installation of riparian vegetation where it is lacking along the banks of a stream. As riparian vegetation matures, it produces shade and creates a microclimate around the waterway that regulates and minimizes heating from solar radiation. Although other techniques are available for reducing water temperatures, the installation of native riparian corridors provides a cost-effective and relatively simple (low engineering/earthwork) approach that provides ancillary benefits beyond temperature regulation. Ancillary benefits include primary production of organic materials, source of large woody debris for in-stream channel complexity and habitat features, wildlife corridor connectivity, displacement of noxious vegetation, improved bank stability, and improved visual aesthetics.

Salmonids require cool, well-oxygenated water to survive. Elevated water temperature is a common problem in many tributaries to the Willamette River, resulting in TMDL load allocations and waste load allocations designed to protect and remedy impaired aquatic habitats. Water temperatures in excess of water quality standards make streams unsuitable for coldwater fish and other coldwater 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 (EPA 2003).

The purpose of this section is to describe Oregon City's development of a TMDL implementation plan to address temperature. Section 3.1 provides a summary of the load allocations and shade curves that are provided in the Willamette TMDL document. Section 3.2 summarizes existing shade conditions in Oregon City's riparian areas. Section 3.3 describes the City's strategies for addressing temperature, and Section 3.4 outlines the timeline and schedule for implementation.

3.1 TMDL Load Allocations for Temperature

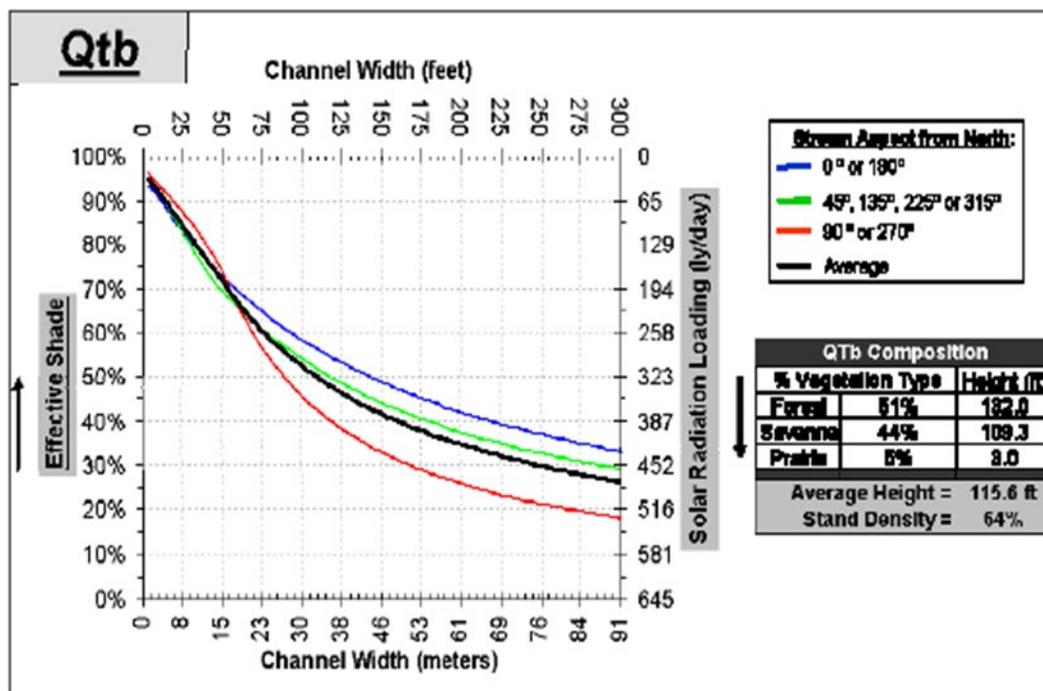
As mentioned above, there are several factors that can contribute to elevated instream temperatures such as changes in watershed processes and channel morphology, climate, geographic location, riparian vegetation, dams, reservoirs, and point sources such as municipal and industrial waste water discharges (DEQ 2006). DEQ has found that the largest contributor to temperature 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 on a region-specific basis. DEQ developed shade curves for 15 different geomorphic units. The shade curves, along with stream orientation and width, provide a target for percent effective shade and corresponding solar radiation loading (DEQ 2006).

Shade is more effective on narrower streams than wider streams because shadows from trees in the riparian zone will cover a larger percent of water surface. Since most tributaries to the

Willamette are 20 feet wide or less including those within the City boundaries, riparian vegetation casting shade over the streams is expected to be very effective. This can be projected through the use of the shade curves.

Using Figures 6.11 in Chapter 6 for the Clackamas Subbasin and Figure 7.8 in Chapter 7 for the Middle Willamette Subbasin in the Willamette TMDL, the primary corresponding geomorphic unit for the City is QTb (Quaternary Boring Lava). Figure 3-1 is the corresponding shade curve for geomorphic unit QTb. This curve is specific to the soils for the City. By knowing the width of the channel and its direction from the north, this curve will provide the “amount of percent effective shade that each geomorphic unit tree composition provides to the stream based on the stream’s channel width and stream aspect from north” (DEQ 2006).

Figure 3-1 Effective Shade Curve for Oregon City



Since most tributaries within the City of Oregon City’s UGB are less than 20 feet wide, the percent effective shade was taken from Figure 3-1 using a channel width range of 0-20 feet. This resulted in an effective shade goal for the City of between 85% - 95%. This is interpreted to mean historically prevalent riparian vegetation should block the majority (at least 85%) 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 mainstem of the Willamette River is through its smaller, narrower tributaries. To relate these shade goals to Oregon City, an analysis was conducted in 2008 to evaluate the current condition of riparian areas and to identify opportunity areas for shading. The analysis is described in the following section.

3.2 Existing Shade Conditions in 2008

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

The 2008 analysis identified 85 shade opportunity sites within city limits and an additional 25 shade opportunity sites outside of city limits but within the City's UGB. An opportunity site included all individual shade opportunity patches within an individual tax parcel. Although some shade opportunity sites are contiguous with other opportunity sites located on an adjacent tax parcel, it was assumed that they would require separate land use and protection agreements, and thus were considered different sites. These shade opportunities comprised approximately 21 acres. Acreage was determined assuming a planting area of 50 feet on either side of the stream. In many cases, the stream width is significantly smaller than the estimated 20 feet, and therefore a planting area less than 50 feet on either side of the stream is enough to provide shade for the stream.

Beginning in 2009, the City implemented two major strategies to address shade targets, stemming from results of this analysis: 1) work towards providing shade where opportunities exist, and 2) implement protection measures for areas that are already currently shaded. As of January 2019, all high priority, private property land owners have been contacted regarding planting activities. All public opportunity sites have been planted.

3.3 Implementation Strategies

This section describes the strategies that the City will undertake to continue to restore riparian shade along creeks and streams within the city limits where opportunities exist. This section also describes additional measures the City will conduct to protect riparian areas, promote groundwater recharge and conduct outreach. Implementation strategies for the next 5-year implementation period (2020 – 2025) will build on activities conducted from 2009-2018.

Temperature management strategies are summarized below and documented in a table in Appendix B.

3.3.1 Riparian Planting

The City plans revisit priority shade opportunity sites identified in the 2008 TMDL Implementation Plan and referenced in the 2014 Plan and continue to work towards improving shade cover in the identified stream corridors. The City will continue to allocate \$10,000 per year over the duration of this implementation plan to fund the following activities:

- Prepare updated mapping and conduct a GIS desktop analysis and ground truthing of public sites to assess progress to date and to confirm public sites requiring replanting or substantial maintenance. A schedule for replanting needs will be developed.
- Prepare maintenance and planting plans for public priority planting sites.

- Conduct planting and maintenance activities at selected public sites.
- Track plant survivability over time.
- Allocate \$5,000 per year to continue the City’s partnership with the Greater Oregon City Watershed Council (GOCWC) to identify and help fund shade plantings on private sites where possible. Coordinate with the GOCWC to ensure tracking of private property planting.

3.3.2 Preservation of Existing Shade

Encouraging the preservation and enhancement of riparian vegetation, especially shade-producing riparian vegetation, is one of the most important methods for reducing stream temperatures. Based on the results of the riparian analysis conducted in 2008, a majority of Oregon City’s riparian areas are already shaded. Therefore, protecting the vegetation that already exists in these areas is an important implementation strategy.

Metro developed Title 3 and Title 13, two sections of Metro’s Urban Growth Management Plan that address development in the riparian corridor. Detail related to Title 3 and Title 13 requirements are included in Appendix C. Jurisdictions that currently comply with Title 3 and/or Title 13 are already utilizing strategies for addressing temperature.

The City implements the Oregon City Municipal Code (OCMC) Chapter 17.49 (Willamette River, Water Quality Resources Area Overlay District), to meet requirements of the Title 3 model ordinance. This chapter establishes a water quality resources overlay district to “provide a vegetated corridor to separate protected water features from development.” One of the main functions of the corridor, as described in the code, is to “maintain or reduce stream temperatures.” Chapter 17.49 of Oregon City’s development code also provides specific mitigation requirements when it has been demonstrated that no practicable alternatives to development in the water quality resource area exist.

In addition to the City’s compliance with Metro’s Title 3 through OCMC Chapter 17.49, Oregon City was deemed to be in substantial compliance with Title 13 per a Metro letter dated June 3, 2009 with the passage of:

- Ord. No. 08-1014, §§ 1—3 (Exhs. 1—3), 7-1-2009; and
- Ord. No. 10-1003, § 1 (Exh. 1), 7-7-2010.

The City will continue enforcing Chapter 17.49 to address Title 3 and Title 13 requirements and tracking relevant updates to the OCMC.

3.3.3 Other Measures

Although shade is the surrogate measure defined by DEQ to address the temperature TMDL, other City activities including stormwater design standards that result in infiltration of stormwater runoff, implementation of hydromodification projects as outlined in the City’s current Stormwater Master Plan, and public education and outreach promote reduction in surface water temperatures as described in the following subsections.

3.3.3.1 Implement Stormwater Design Standards

As development occurs, increases in impervious areas can decrease the natural pre-development levels of groundwater recharge. Because less water infiltrates into the ground, less groundwater recharge occurs. This can result in a reduction of summer stream base flows, which in turn results in higher temperatures due to unnaturally shallow base-flow conditions. By using best management practices associated with development that promote the infiltration of runoff, groundwater recharge is increased thus augmenting streamflow during the warmer dry season, and reducing temperature impacts.

Oregon City defines its stormwater policies, minimum requirements, and design standards (for stormwater quality and quantity) and procedures for stormwater management in Chapter 13.12 of their development code and in their Stormwater and Grading Design Standards (2016).

The City's Stormwater Grading and Design Standards prioritize the use of low impact development (LID) design practices to encourage infiltration where feasible and include design requirements that address flow duration. Barriers to LID were identified and eliminated with the adoption of this manual.

The City requires use of their Stormwater Grading and Design Standards for both public and private projects. The Standards are available in hard copy and on the City's website. The City frequently offers trainings to staff and the engineering community on use of the Standards and the associated BMP Sizing Tool.

3.3.3.2 Hydromodification Projects

The City is currently completing their Stormwater Master Plan, which includes a prioritized list of capital improvement projects (CIPs) to address water quality, flow control, and maintenance. CIPs identified include projects to improve areas where hydromodification has been observed as documented in the City's Hydromodification Assessment dated 2015. Hydromodification projects address erosion and incision in stream channels promoting health corridors and protecting riparian vegetation.

The City's goal is to complete two hydromodification-related projects over the 5-year implementation period in conjunction with finalization and implementation of the City's Stormwater Master Plan (anticipated for adoption in 2019).

3.3.3.3 Public Education and Outreach

The City implements public education and outreach regularly as part of their NPDES MS4 permit requirements. To address temperature, the City will ensure a minimum of one temperature-related piece of informational material (i.e., article, signage, etc.) is distributed annually. Efforts may be conducted in conjunction with the distribution of the City newsletter or through direct mailings. In addition, City staff will attend regularly scheduled coordination meetings of the GOCWC to promote the distribution of educational materials and signage.

3.4 Timeline and Schedule

This Plan is effective for 5 years from the date of approval by DEQ.

Specific to the management strategies reported in Section 3.3, Appendix B summarizes measurable goals, performance measures and milestones for each activity.

4.0 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 to be evidence of compliance with applicable statewide land use requirements. Per the TMDL Implementation Plan Guidance Document, this would consist of the following:

1. Identify applicable acknowledged local comprehensive plan provisions and land use regulations, and
2. 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.

Per item #1 above, Oregon City's comprehensive plan was acknowledged by the Land Conservation and Development Commission (LCDC) in 1982 to be in compliance with the Statewide Planning Goals. The plan underwent a major revision that was completed in June 2004. The City's Comprehensive Plan is founded on a number of principles, meant to shape the City's future growth and development. As the City's comprehensive plan aligns with LCDC statewide goals, there are three specific sections within Oregon City's comprehensive plan that contain intentions similar to the strategies described in this TMDL Implementation Plan. These are Sections 5.0, 6.0, and 11.0.

Per item #2 above, this TMDL Implementation Plan is consistent with the City's acknowledged comprehensive plan to the extent required by law. The above mentioned sections of the City's comprehensive plan (Sections 5.0, 6.0, and 11.0) align with specific components of the TMDL Implementation Plan, as the two documents contain similar goals and methods for improving water quality.

Section 5.0 of the City of Oregon City comprehensive plan is titled "Open Spaces, Scenic and Historic Areas, and Natural Resources," which recognizes the importance of protecting the City's valuable natural resources. Goal 5.4 under Section 5 addresses natural resources and water quality, specifically discussing the importance of the conservation and restoration of riparian corridors to increase shade, reduce erosion and provide habitat for salmonids and other aquatic species. Section 5.0 of the comprehensive plan aligns with management strategies to preserve and enhance riparian vegetation as described in Section 3.0 of this plan.

Section 6.0 of the City's comprehensive plan covers air, water, and land resources quality. Specifically, Goal 6.2 Water Quality states "prevent erosion and restrict the discharge of sediments into surface and groundwater by requiring erosion prevention measures and sediment control practices." TMDL strategies as described in Section 2.0 and 3.0 address erosion control and removal of sediment.

Finally, in Section 11.0, Goal 11.4 of Oregon City's comprehensive plan addresses the City's storm drainage system. Policies listed under Goal 11.4 states that green streets standards should be adopted to reduce the amount of impervious surface; parking lot designs should mitigate stormwater impacts through a reduction in runoff and use of systems to allow infiltration; flow

control must be considered for discharge to surface water bodies; and stormwater management services should be consistent with the NPDES MS4 permit requirements. The TMDL Implementation plan includes reference to NPDES MS4 permit requirements and to stormwater design standards to address stormwater pollutants (e.g., bacteria and mercury) and promote infiltration to address temperature.

In general, Oregon City's acknowledged comprehensive plan contains goals and strategies that coincide with the management strategies contained in this TMDL Implementation Plan. Based on the above findings, this TMDL plan is considered to be compatible with the land use requirements as set forth in the comprehensive plan.

5.0 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.” The WQMP for the Willamette Basin TMDL requires a fiscal analysis, a summary of legal authority, and requires that cold water refugia is addressed for DMAs below river mile 50 of the Willamette mainstem. This section addresses these requirements.

5.1 Legal Authority

The City has existing ordinances that provide authority for implementation of portions of the TMDL Implementation Plan. As the City currently operates under an NPDES MS4 permit, ordinances for illicit discharges, erosion control, and post-construction site runoff, as necessary to implement the BMPs outlined in their permit, are also in place to implement the management strategies described in Section 2.0 for bacteria and mercury. Ordinances to implement Title 3 requirements, including the establishment of a Water Quality Resources Area Overlay District, in addition to having a comprehensive plan that addresses the LCDC statewide planning goals are also in place to address the temperature TMDL (Section 3.0).

5.2 Funding

The City currently charges a monthly stormwater fee that pays for implementation of the BMPs described in their NPDES MS4 permit in order to comply with permit requirements. On June 20, 2012 the City Commission approved the following stormwater rate increases from the current \$8.55 (2013) per Equivalent Residential Unit, to \$8.80 (2014), to \$9.05 (2015), to \$9.35 (2016), to \$9.65 (2017), to \$9.94 (2018), to \$10.24 (2019). Rate increases take effect January 1 of each year noted.

The City is committing \$5,000 per year towards partnership with the GOCWC for potential plantings, revegetation of opportunity sites identified through the desktop analysis and ground truthing, plant maintenance during establishment periods, and supplemental watering. These funds will come from the stormwater fee as well, but other methods of funding may be explored and utilized. In Appendix D of the NPDES MS4 annual report, the City will include details on financial contributions to the stream shade planting project as well as planting reports for each location.

The City will continue to allocate \$5,000 per year over the duration of this implementation plan to fund the following activities: maintenance, planting plans and investigation of survivability at priority public sites. In Appendix D of the NPDES MS4 annual report, the City will include details on financial contributions to the stream shade planting project as well as planting reports for each location.

5.3 Cold Water Refugia

Per the WQMP, the TMDL Implementation Plans for areas below river mile 50 of the Willamette mainstem “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), concludes that areas of CWR appeared to be at a junction where tributaries meet.

In March 2020, DEQ published their CWR study in response to the 2015 National Marine Fisheries Service (NMFS) Endangered Species Act Biological Opinion and interpretation of the narrative water quality criterion provision of Oregon's temperature standard. Findings from the study confirm the Willamette River as a salmon and steelhead migration corridor, and as such, must have sufficiently distributed CWR. The study identified a total of 48 CWR locations, with 20 locations large enough for use by migrating adult salmon and steelhead. Locations relevant to the City include Abernethy Creek and the Clackamas River.

Because tributary junctions are a likely source of cool groundwater, the shade opportunity areas identified in 2008 included and prioritized tributary junction points. Using this prioritization scheme and findings from DEQ's March 2020 study, these areas will be reviewed as part of the desktop analysis and ground truthing analysis (subsection 3.3.1) and reprioritized as necessary.

5.4 Public Involvement

DEQ has promoted public involvement for the TMDL and TMDL Implementation Plans with existing interest groups having an interest in the Willamette TMDLs. The City addresses public involvement for management measures described in Section 2.0 through their NPDES MS4 permit and SWMP. Public involvement will be addressed for the vegetation efforts and for the TMDL Plan using the City's newsletter, website, and involvement with the GOCWC (subsection 3.3.3.3). The TMDL plan will also be posted on the City's website, available for public review.

5.5 Record Keeping and Reporting

The TMDL Guidance Document requires the DMA to submit two types of reports to DEQ on a regular basis: 1) progress report and 2) 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 3.3 and 5.3. 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 November 1 of each year, reflecting implementation of activities over the previous fiscal year (July 1 to June 30). Appendix B is 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, performance measures and milestones for 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. This plan reflects the second update. It is based on review of existing data and activities relative to pollutant reduction goals. Existing strategies have been refined to reflect progress made over the last 10 years. New strategies have been identified to continue with work to address in-stream temperature.

6.0 References

- Bartholow, J.M. and J.A. Henriksen. 2006. Assessment of Factors Limiting Klamath River Fall Chinook Salmon Production Potential Using Historical Flows and Temperatures. USGS Open File Report 2006-1249. 111 p.
- City of Oregon City. 2018. Oregon City Municipal Code. Chapter 13.12: Stormwater Management, Chapter 17.49: WR Water Quality Resources Area Overlay District, Chapter 17.52: Parking Lot Landscaping. Oregon City, Oregon.
- City of Oregon City. 2004. Comprehensive Plan. Oregon City, Oregon. City of Oregon City website. <http://www.oregoncity.org/>
- Ebersole, Joseph L., William J. Liss, and Christopher A. Frissell. 2003. Cold Water Patches I Warm Streams: Physicochemical Characteristics and the Influence of Shading. *Journal of the American Water Resources Association (JAWRA)* 39(2):355-368.
- Majidi, Kathy. 2007. VOLUME III: Gresham's Temperature TMDL Implementation Plan, Natural Resources Program Watershed Management Division, Department of Environmental Services, City of Gresham, Oregon.
- McIntosh, Bruce and Hiram W. Li. 1998. Klamath Basin Pilot Project: Coldwater Refugia Study and Videography. U.S. Department of Commerce, National Technical Information Service. Springfield, Virginia.
- Metro. 1998. Title 3 Model Ordinance. Portland, Oregon. Metro. 2005. Title 13 Model Ordinance. Portland, Oregon.
- ODEQ (Oregon Department of Environmental Quality) 2006. Willamette Basin TMDL, Chapter 6, Chapter 7, Chapter 14.
- Van Staveren, John. 2007. Gresham's Response to Temperature TMDLs. Presentation made at the Clean Water Act & TMDLs Conference. January 26, 2007. Portland, Oregon.
- WDOE (Washington Department of Ecology) 2000. FOCUS: Effects of Elevated Water Temperatures on Salmonids. Focus Publication Number 00-10-046. Olympia, Washington.

APPENDIX A

Summary of Strategies to Address Bacteria and Mercury for the Willamette Basin TMDL

Page left intentionally blank.

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.

APPENDIX A. Status of Implementing Components of Oregon City's 2012 SWMP							
Best Management Practice or Activity	Addresses Bacteria?	Addresses Mercury?	Responsible Department	Measurable Goals (2012 SWMP)	Tracking Measures (2012 SWMP)	Annual Report Information: Tracking Measure Status, Permit Year 2012-2013	Additional Detail Related to Activities Conducted
Element #1: Illicit Discharge Detection and Elimination							
BMP 1-1: Implement the Illicit Discharge Elimination Program	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Document and implement updated Standard Operating Procedures for the IDDE Program by November 1, 2012. Conduct actions to remove identified illicit discharges in conjunction with timeframes outlined in the City's MS4 NPDES Permit. Track and record all identified illicit discharges and how such discharges were removed. 	<ol style="list-style-type: none"> Track status of documenting and updating the IDDE SOP. Track the number, location, type of discharge, resolution and enforcement action for any illicit discharge investigation conducted. 	<ol style="list-style-type: none"> The City of Oregon City developed an IDDE SOP (effective date: November 1, 2012), in conjunction with other Clackamas County co-permittees. The SOP includes guidelines for identification and enforcement of illicit discharges. No illicit discharge investigations were deemed necessary as a result of annual Dry Weather Field Screening conducted during this reporting period. See BMP 1-2, below. 	
BMP 1-2: Conduct Annual Dry Weather Field Screening	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Conduct dry-weather field screening once per year, at a minimum, at major outfalls. Characterize dry weather flows as permissible, non-permissible, or unknown. Conduct sampling, analysis, and investigations for non-permissible and unknown dry weather discharges. Maintain maps of major outfalls and dry weather field screening locations. Notify the Public Works Operations Manager of all identified illicit discharges and take necessary steps to eliminate them. Update procedures for dry weather field screening by November 1, 2012. 	<ol style="list-style-type: none"> Track the number and location of outfalls inspected annually. Summarize inspection results and track the number and location of outfalls requiring monitoring and/or investigations. Report the outcome and resolution of any investigation activities. Report the outcome and resolution of any code enforcement actions. Track the status of updating standard procedures. 	<ol style="list-style-type: none"> 15 outfalls were inspected as part of the annual dry weather field screening activities. Outfalls were inspected on 8/10/12. Flow was observed at seven of the outfalls; discharge was characterized as permissible so no monitoring and/or investigations were required. N/A N/A The City of Oregon City developed an IDDE SOP (effective date: November 1, 2012). The SOP includes procedures for conducting dry weather field screening. 	Dry weather screening was conducted at the following outfalls: <ul style="list-style-type: none"> South Willamette at 99E & 5th Street (OC001 A & OC001 B) Abernethy Creek at 14th John Adams (OC002) Park Place Creek at Abernethy Road at Tri-Let (OC003) Livesay Creek at Beemer Way (OC004) Park Place Creek at Clackamas River Drive (OC005) Clackamas River at Metro Wetlands Pond (OC006) Coffee Creek at Barker Road (OC007) Singer Creek at Linn Ave and Charman Street (OC008) Singer Creek at Holmes Lane (OC009) Mud Creek at Kaen Road (OC010) Mud Creek at Meyers Road (OC011) Caufield Creek at Falcon Drive (OC012) Newell Creek at Falcon Drive (OC013) Newell Creek at Beaver Creek and Hwy 213 (OC014)
BMP 1-3: Implement the Spill Response Program	○	○	Clackamas Fire District #1 (Hazardous Materials Team) and Oregon City Public Works Department	<ul style="list-style-type: none"> Respond to reports of hazardous and non-hazardous spills and follow the Oregon City Spill Response Plan. Report all hazardous and non-hazardous spills to DEQ as necessary. 	<ol style="list-style-type: none"> Indicate the number of spills reported to Public Works and DEQ. Track responses to reported spills. Indicate sources, causes, and types of discharges resulting from spill activities. Track any changes to the Oregon City Spill Response Plan. 	<ol style="list-style-type: none"> Three spills were reported to Oregon City Public Works (OCPW) during the 2012-2013 reporting period. None required DEQ reporting. OCPW responded to these spills by cleaning with absorbent pads, sweeping, and proper disposal. These were minor fuel or oil spills resulting from vehicle accidents or mechanical failure. No discharges resulted and no DEQ reports were required. In June 2013 Oregon City Public Works Revised its Spill Response Plan. 	In June 2013, Oregon City revised its Spill Response Plan for hazardous & non-hazardous spills to reflect the most current guidelines provided by Oregon DEQ. Training regarding these revisions was conducted with the Oregon City Public Works Operations employees on August 21, 2013.
Element #2: Industrial and Commercial Facilities							
BMP 2-1: Screen Existing and New Industrial Facilities	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Review the business license inventory for 1200Z industries once over the permit term. Notify DEQ of any existing or new industrial facilities within the City that may be subject to an industrial stormwater NPDES permit. 	Track the number of existing or new facilities subject to a stormwater industrial NPDES permit during the permit term.	In development of the City's Industrial/ Commercial Facility Inspection Program Standard Operating Procedures (SOP) (completed July 1, 2013), City staff queried the DEQ database and identified seven current, active industrial stormwater permittees. An initial screening of the City's business license database in June 2013 did not identify additional facilities potentially subject to an industrial stormwater permit. The Water Quality Coordinator continues to review all new business license applications for potential water quality-related issues. 133 business license applications were reviewed during the 2012-2013 reporting period.	DEQ provided additional guidance on industrial facility screening in June 2013. Oregon City's consultant has coordinated with DEQ related to the methodology and process for identifying "potential" 1200-Z permittees.
BMP 2-2: Implement an Industrial/ Commercial Inspection Program for High Priority Facilities	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Pursue approval to hire staff to implement a business inspection program. Develop a priority list of industrial/commercial facilities for inspection. Investigate 25% of the City's manufacturing businesses once during the permit term. Develop an industrial/commercial inspection procedure by July 1, 2013. 	<ol style="list-style-type: none"> Track the number of inspections conducted. Report on inspection results and follow up actions. Report on status of documenting and updating procedures. 	<ol style="list-style-type: none"> No inspections were conducted during the 2012-2013 reporting period. N/A The City developed an Industrial/ Commercial Facility Inspection Program Standard Operating Procedures (SOP) July 1, 2013. The SOP includes procedures and guidelines related to facility screening, DEQ notification of potential industrial stormwater permit needs, and high pollutant source facility inspections. The SOP identifies a total of 31 manufacturing businesses potentially subject to inspection. 	The City has currently not been able to hire staff to implement the business inspection program; the City may utilize seasonal/intern assistance until additional staff can be added.

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.

APPENDIX A. Status of Implementing Components of Oregon City's 2012 SWMP							
Best Management Practice or Activity	Addresses Bacteria?	Addresses Mercury?	Responsible Department	Measurable Goals (2012 SWMP)	Tracking Measures (2012 SWMP)	Annual Report Information: Tracking Measure Status, Permit Year 2012-2013	Additional Detail Related to Activities Conducted
Element #3: Construction Site Runoff Control							
BMP 3-1: Implement the Erosion Control Ordinances	●	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Review erosion control plans for all developments greater than 1,000 square feet. Require erosion and sediment control plans not in compliance with standards to be amended and approved prior to construction. By November 1, 2014, adopt the Clackamas County erosion control manual or revise the City's manual in accordance with the MS4 NPDES permit requirements. 	<ol style="list-style-type: none"> Record the number of erosion control plan reviews completed and approved. Track the number of erosion control permits issued annually. Report on the status of adopting the Clackamas manual or updating the City's manual. 	<ol style="list-style-type: none"> 248 erosion control plans were reviewed and approved. 248 erosion control permits were issued. The City continues to consider adoption of all or part of Clackamas County's Manual and will comply with the November 1, 2014 due date per MS4 NPDES permit requirements. 	
BMP 3-2: Provide Educational Information to Construction Site Operators	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Continue to provide the City's most current erosion control manual on the City website. Continue to offer discounts on erosion control permits to contractors completing the Erosion Control Certification Program. 	Track the number of contractors receiving a discount on erosion control permit fees.	No contractors received a discount on permit fees.	
BMP 3-3: Conduct Erosion Control Inspections	●	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Conduct a minimum of three erosion control inspections at each permitted site. Conduct appropriate enforcement activities for erosion control violations. 	<ol style="list-style-type: none"> Record the number of erosion control inspections conducted annually. Report the number of notices of non-compliance issued during inspections. 	<ol style="list-style-type: none"> A total of 620 erosion control inspections were conducted this permit year. Due to the time frames with which construction occurs, some sites had all three required inspections, and some sites have only had one or two inspections at this time (construction is still ongoing). Two notices of non-compliance were issued. One stop work order was issued. 	The total number of inspections are comprised of: <ul style="list-style-type: none"> 278 Initial site visits, Inspection 1 254 Random inspections, Inspection 2 88 Final inspections, Inspection 3
Element #4: Education and Outreach							
BMP 4-1: Provide Public Education and Outreach Materials Regarding Stormwater Management	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Include a water quality related article in each City newsletter, distributed to citizens three times per year. Participate in the Regional Coalition of Clean Rivers and Streams. Seek out opportunities to partner with other agencies/ jurisdictions/ organizations to educate and promote watershed health and low impact development. Periodically install signs near water quality structures and around the City promoting water quality. Sponsor the volunteer catch basin stenciling program. Distribute an annual water quality report to Oregon City residents. 	<ol style="list-style-type: none"> Track the number, types and topics of public educational materials distributed to the public. Report any large scale public educational campaigns initiated during a given year. Track coordinated public outreach activities with other permittees. 	<ol style="list-style-type: none"> The following educational activities were conducted (see Appendix C for details): <ul style="list-style-type: none"> A total of 7 water quality-related articles were included in Trail News. OC promoted and/or participated in a total of 4 special events. The September utility bill included a message about car washing – soap up your car, not your river! Mailed 15,658 copies of the Annual Water Quality Report to OC residents. Stormwater banner displayed at city hall (5/31/13-6/14/13). No large scale public education campaigns were initiated. Coordinated efforts included: <ul style="list-style-type: none"> Continued to sponsor the "Do the Right Thing" campaign via KOIN media outlets. Continued participation in the Regional Coalition of Clean Rivers and Streams. Continued participation with other agencies to promote water quality education through Clackamas River Water Providers. 	<ul style="list-style-type: none"> Specific details on the public education and awareness activities conducted by the City of Oregon City are available in Appendix C. During this reporting year the Regional Coalition of Clean Rivers and Streams (Coalition) continued to utilize online media, websites, and social media profiles to implement a diverse campaign. The Coalition's annual report summarizes these efforts. Oregon City continues to conduct catch basin marking and stenciling to increase public awareness. During this reporting period 1,318 "No Dumping, Drains to Waterway" markers were installed at catch basins. 436 catch basins were stenciled with the message "Dump No Waste – Drains to Stream".
BMP 4-2: Participate in a Public Education Effectiveness Evaluation	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Coordinate with other local, Phase I jurisdictions in providing/compiling information regarding a public education effectiveness evaluation by July 1, 2015. 	Report on activities conducted annually.	The ACWA Stormwater Committee initiated a coordinated effort to compile existing educational survey information and develop conclusions to inform how public education efforts result in behavioral change. A proposal was received from DHM Consulting. ACWA coordinated with DEQ to ensure that the study would meet DEQ's intended requirements. ACWA developed a cost share breakdown among interested Phase I and Phase II communities, and Oregon City has agreed to participate in the effort.	
BMP 4-3: Conduct Staff Training for Pest Management	○	○	Oregon City Public Works Department and Parks Department	<ul style="list-style-type: none"> Ensure Public Works and Parks staff conducting pest management activities are certified for spraying activities according to OSHA requirements. Ensure licensed staff attends annual refresher courses. 	<ol style="list-style-type: none"> Track the number of employees licensed for spraying activities. Report number of employees that attended initial or refresher training. 	<ol style="list-style-type: none"> Public Works staff licensed for spraying activities = 5; Parks Dept staff = 5 5 Public Works staff and 5 Parks Dept staff attended refresher training classes during the reporting period. 	

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.

APPENDIX A. Status of Implementing Components of Oregon City's 2012 SWMP							
Best Management Practice or Activity	Addresses Bacteria?	Addresses Mercury?	Responsible Department	Measurable Goals (2012 SWMP)	Tracking Measures (2012 SWMP)	Annual Report Information: Tracking Measure Status, Permit Year 2012-2013	Additional Detail Related to Activities Conducted
BMP 4-4: Conduct Staff Training in Spill Response	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Provide non-hazardous spill response training annually through monthly safety meetings. Coordinate annual training and refresher courses for staff initially responding to spills using OSHA hazardous materials educational resources. 	Track spill-related training and education.	During a safety meeting on March 19, 2013 a representative from SAIF provided OCPW staff information on changes to Hazard Communication and new labeling requirements.	This training provided important information for anyone responding to a spill incident.
BMP 4-5: Ensure Municipal Staff Training in Stormwater Pollution Prevention	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> Conduct municipal training for employees associated with stormwater management in the City. Coordinate with other Clackamas County co-permittees regarding regional water quality efforts. Participate in training and advisory committee opportunities available through state and local agencies and groups. Conduct regular stormwater staff meetings one to two times per year. 	<ol style="list-style-type: none"> Track the number of employees receiving training in stormwater management annually. Track Oregon City staff participation in groups, committees, and organizations relevant to stormwater quality management. Track regular stormwater staff meetings and staff attendance at those meetings. 	<ol style="list-style-type: none"> Employees receiving training in stormwater management: <ul style="list-style-type: none"> Three OCPW employees attended the Annual ACWA Stormwater Summit 6/4/13. OCPW Director attended APWA conferences 10/3/12-10/5/12 and 4/2/13-4/5/13. OCPW Operations Manager attended APWA conference 4/2/13-4/5/13. Four OCPW employees attended the annual NWPCA Water Environment School 3/26/13-3/28/13. OC Erosion Control Officer attended IECA conference 2/10/13-2/13/13. OC staff participates in the following groups and organizations: <ul style="list-style-type: none"> Association of Clean Water Agencies (ACWA) and active participant in the ACWA Phase I Stormwater subcommittee. Continued collaboration with other co-permittees on Comprehensive Clackamas Stormwater Monitoring Program (CCCSMP). Greater Oregon City Watershed Council (GOCWC). Clackamas Water Education Team. Regional Coalition for Clean Rivers and Streams. There were 18 stormwater staff meetings conducted during the 2012-2013 reporting period. Dates, topics, and attendees are summarized in Table 4 in Section 6.0 of the 2012-2013 NPDES MS4 annual report. 	
Element #6: Post-Construction Site Runoff							
BMP 6-1: Implement Municipal Construction Standards	●	●	Oregon City Community Development Department	<ul style="list-style-type: none"> Per City's Development Code, review all new development and applicable redevelopment for conformance with current City stormwater standards and ordinances. 	<ol style="list-style-type: none"> Track the number of development applications reviewed and approved for compliance with stormwater regulations. Track the number, type, and drainage area of treatment facilities constructed annually. 	<ol style="list-style-type: none"> 38 development applications were reviewed and approved for compliance with water quality/water quantity standards. Four treatment/ detention facilities were constructed during the reporting period of 7/1/2012 through 6/30/2013: <ul style="list-style-type: none"> 3 detention pipes/tanks and 1 swale Total Drainage area = 110,460 sq ft 	Details of treatment facility construction: <ul style="list-style-type: none"> TRG Logistics Site – 5 sumped catch basins (private) and stormtech detention; Total contributing drainage area = 22,700 sq ft Warner Milne Professional Offices Site - 2 sumped catch basins and a 75'x48" diameter detention pipe; Total contributing drainage area = 8,000 sq ft Crabtree Terrace No.2 Site - 8 sumped catch basin and a bioswale; Total contributing drainage area = 13,760 sq ft Providence Willamette Falls Parking Lot Addition Site – 3 sumped catch basins and a detention tank; Total contributing drainage area = 66,000 sq ft
BMP 6-2: Review and Update Code and Development Standards related to Stormwater Quality Control	●	●	Oregon City Community Development Department	<ul style="list-style-type: none"> Review the City's current/ planned stormwater treatment and detention standards for compliance with new MS4 NPDES permit language. Review the City's current public works development code provisions to ensure that applicable barriers to LID or green infrastructure (GI) are minimized and eliminated where practicable. If necessary, update the City's post-construction stormwater design standards and code language by November 1, 2014. 	<ol style="list-style-type: none"> Track progress related to review of the City's code and development standards per provisions in the MS4 NPDES permit. Track any code/ standards modifications made by ordinance. 	<ol style="list-style-type: none"> The City's consultant conducted a review of the pending LID Design Manual and Standards per the updated MS4 NPDES permit language. Modifications to the pending standards would be required to address the current MS4 NPDES permit language. The City began their code and development standard update process September 2013. 	Completion of design standards and code updates is not required until November 1, 2014.

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.

APPENDIX A. Status of Implementing Components of Oregon City's 2012 SWMP							
Best Management Practice or Activity	Addresses Bacteria?	Addresses Mercury?	Responsible Department	Measurable Goals (2012 SWMP)	Tracking Measures (2012 SWMP)	Annual Report Information: Tracking Measure Status, Permit Year 2012-2013	Additional Detail Related to Activities Conducted
Element #7: Pollution Prevention for Municipal Operations							
BMP 7-1: Conduct Street Sweeping and Roadway Repair Activities	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Sweep city streets every 3-4 months on average, more frequently in high traffic areas and during leaf pick up and following deicing activities. 	<ol style="list-style-type: none"> Track the average number of citywide sweeps per year. Estimate the miles of streets swept per year. Track volume of debris removed. 	<ol style="list-style-type: none"> 4.07 citywide sweeps for this reporting period. During the 2012-2013 reporting period, 2,996 miles of roadway were swept. 574 cubic yards of debris were removed as a result of sweeping and leaf pickup activity. 	
BMP 7-2: Minimize Pollutant Discharges Associated with Landscape Management Practices	○	○	Oregon City Public Works Department and Parks Department	<ul style="list-style-type: none"> All chemical applicators, both contractor and city, must follow state laws related to the use of pesticides. Applicators will complete spray reports for the application of chemicals. 	Track any program changes regarding chemical application practices used by the City.	Both city and contracted chemical applicators comply with 2300-A, pesticide general permit requirements. Pesticide applications are kept at least three feet away from any water's edge.	
BMP 7-3: Implement a Program to Reduce the Impact of Stormwater Runoff from Municipal Facilities	○	○	Oregon City Public Works Department	<ul style="list-style-type: none"> By July 1, 2013, inventory municipal facilities subject to this permit requirement. By July 1, 2013, identify whether there is a need for additional strategies to minimize discharge from these facilities. 	Track updates to strategies used to minimize pollutant discharge from municipal waste storage facilities	The City developed a Stormwater Pollution Prevention Strategy document for municipal operations (SWPPS) July 1, 2013. The SWPPS include a description of each of the City's six facilities that treat, store, or transport municipal waste. Additionally, it identifies potential pollutant sources as well as short and long term pollution reduction strategies.	
BMP 7-4: Control Infiltration and Cross Connections to the City's Stormwater Conveyance System	●		Oregon City Public Works Department	<ul style="list-style-type: none"> Review new and redevelopment for possible cross-connections. Eliminate cross connections upon identification. 	Report whether any cross connections were discovered and describe follow up activities.	No cross connections were discovered during this reporting period.	
BMP 7-5: Coordinate with Local Fire Department related to Pollutant Discharge from Fire Fighting Training Activities			Oregon City Public Works Department	<ul style="list-style-type: none"> By November 1, 2012, contact Clackamas Fire District #1 to determine what activities are conducted to minimize pollutant discharges associated with fire fighting training activities. As applicable, provide educational information to Clackamas Fire District #1 by November 1, 2012. 	Track contacts made with Clackamas Fire District #1.	On 9/12/12 Oregon City's Water Quality Coordinator contacted Clackamas Fire District #1 to discuss fire fighting training activities conducted in Oregon City. Per an email dated 9/13/12 the Battalion Chief for Training & Safety confirmed that all foam drills were conducted at their primary training facility in Clackamas. Any training activities at the four Oregon City stations use water only.	
BMP 7-6: Conduct Master Planning and Implement Capital Projects for Stormwater Quality Enhancement	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> The Citywide Master Plan will be updated by the end of the permit term. Prioritize CIPs by funding availability and water quality/flood control benefit. Update maps to include location and drainage area of any new stormwater quality CIPs. 	<ol style="list-style-type: none"> Track master planning activities. Track number and cost of major (water quality) CIP projects and discuss added benefit. Map the location and drainage area of water quality related CIPs. 	<ol style="list-style-type: none"> The City continues with the planning phase for updating their existing Citywide Drainage Master Plan. A total of six water quality related CIP projects were constructed during this reporting period. <ul style="list-style-type: none"> One project was contracted out, for a total cost of \$108,000. Five projects were completed in-house, for a total cost of \$63,500. Mapping: <ul style="list-style-type: none"> The one contracted CIP is pending. Three of the five in-house CIP projects have been mapped; two pending. 	Following are details of the contracted CIP projects completed during this reporting period: <ul style="list-style-type: none"> OR213:I-205 – Redland Rd Improvements Project – Six water quality swales along local roadways and a water quality pond for local roadways and highway drainage. Following are details of the in-house CIP projects completed during this reporting period: <ul style="list-style-type: none"> 317 Pearl St – installed one sumped catch basin and 145 ft of pipe 19438 McCord Rd – installed one sumped catch basin 1722 Jackson St – installed three sumped catch basins and 225 ft of pipe 19446 McCord Rd – installed three sumped catch basins and 170 ft of pipe 1610 10th St – installed 165 ft of pipe to eliminate erosion/sinkhole issue

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.

APPENDIX A. Status of Implementing Components of Oregon City's 2012 SWMP							
Best Management Practice or Activity	Addresses Bacteria?	Addresses Mercury?	Responsible Department	Measurable Goals (2012 SWMP)	Tracking Measures (2012 SWMP)	Annual Report Information: Tracking Measure Status, Permit Year 2012-2013	Additional Detail Related to Activities Conducted
Element #8: Stormwater Management Facilities Operation and Maintenance							
BMP 8-1: Conduct Stormwater Conveyance System Cleaning and Maintenance	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Maintain, repair, and/or replace conveyance system components when needed, based on ongoing inspections. Update the stormwater system map when discrepancies are found. 	1) Estimation of the volume of debris removed per year during public conveyance system cleaning activities (in conjunction with BMP 8-2).	1) See BMP 8-2.	
BMP 8-2: Conduct Catch Basin Cleaning and Maintenance	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Inspect at least 33% of the public catch basins annually. Schedule the repair, and replacement of catch basins as needed, based on inspections. Update the stormwater system map when discrepancies are found. 	<ol style="list-style-type: none"> Track the percentage of total public catch basins inspected and/or maintained annually. Track the volume of sediment removed during cleaning activities conducted annually (also includes volume from BMP 8-1). Track the number of catch basin replacements annually. Track the number of public catch basins added to the City's catch basin inventory annually. 	<ol style="list-style-type: none"> 42% of public catch basins were maintained during this reporting period. 132 cy of sediment were removed (includes sediment from pipes, culverts, manholes, open channels, and catch basins). Two catch basins were replaced. Eight catch basins were added to, and two catch basins were removed from, the City's inventory. 	42% = 1,757 public catch basins
BMP 8-3: Public Structural Control Facility Cleaning and Maintenance	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Inspect and maintain public structural control facilities in accordance with documented frequencies and procedures. Update the public structural control facility inventory as needed. Update the stormwater system map in accordance with new public facility installations and when discrepancies are found. 	<ol style="list-style-type: none"> Track the number of public structural facilities inspected and maintained. Track the volume of sediment removed during cleaning. Track changes to the public structural control facility inventory as needed. 	<ol style="list-style-type: none"> 142 public structural facilities and 2,175 feet of bioswale were inspected during the reporting period. See the next column for maintenance details. 32 cy of sediment were removed during maintenance/cleaning. One new water quality facility was added to the inventory: <ul style="list-style-type: none"> Sunset Meadows – 180 ft vegetated swale 	<ol style="list-style-type: none"> The following public structural facilities were inspected and maintained during the reporting period: <ul style="list-style-type: none"> Ponds = 76 inspected; 76 maintained Swales = 2,175 ft maintained Raingardens = 3 inspected; 3 maintained Detention Pipes = 20 inspected; 6 cleaned WQ Vaults = 1 inspected; no maintenance required Pollution Control Manholes = 42 inspected; 15 cleaned
BMP 8-4: Private Structural Control Facility Cleaning and Maintenance	●	●	Oregon City Public Works Department	<ul style="list-style-type: none"> Require new private water quality facilities to submit maintenance agreements to the City. Compile an inventory of existing private structural water quality facilities and work to collect maintenance agreements for these by July 1, 2013. Implement an inspection strategy for private water quality facilities by July 1, 2013. 	<ol style="list-style-type: none"> Track the number of maintenance agreements submitted to the City each year. Track progress related to the inventory and mapping of existing private structural facilities. Track the status of updating the inventory and map of private water quality facilities. Track the status of developing procedures in accordance with permit requirements. 	<ol style="list-style-type: none"> The City continues to require maintenance agreements for private water quality facilities. No maintenance agreements were received during this reporting period. Files have been reviewed for existing private structural facilities. An inventory list has been created. Initial mapping is complete; refinements ongoing. The City developed standard operating procedures (SOPs) for public water quality facilities and private water quality facilities July 1, 2013. The SOPs outline procedures for ongoing mapping and inventory activities, as well as facility inspections. For private facilities, the City requires a maintenance agreement and submission of annual inspection records. 	

APPENDIX B

Summary of Strategies to Address Temperature for the Willamette Basin TMDL

Page left intentionally blank.

APPENDIX B: Table B-1. City of Oregon City Summary of Strategies to Address Temperature							
Best Management Practice or Activity	Responsible Division	Commitment/ Implementation Strategy <i>What will be done in the next 5 years?</i>	Measurable Goal <i>Specific ways to implement strategy (Fiscal analysis as needed)</i>	Performance Measure <i>How implementation will be demonstrated</i>	Timeline <i>When goal will be achieved?</i>	Milestone <i>Intermediate indicators of progress</i>	Status <i>Progress update for reporting period (Gap analysis discussion as needed)</i>
Planting	Public Works	Utilize annual committed funds towards shading and planting activities for identified public and private opportunity areas. (\$10,000 allocated annually for planting related activities.)	Conduct a desktop GIS evaluation and ground truthing to evaluate planting progress since 2009, and to identify whether replanting or maintenance is required for identified public planting opportunity areas shown in Appendix D.	<ul style="list-style-type: none"> Document results of the desktop evaluation and ground truthing. Update maps to help catalog and schedule replanting needs for public and private property. 	<ul style="list-style-type: none"> Compile mapping information per Appendix D and updated aerial imagery by December 2020. Visit all public sites as part of the ground truthing efforts by July 1, 2021. Prepare maintenance and planting schedule for public priority planting sites based on ground truthing exercise by November 1, 2021. 	All public sites will be visited, verified and reprioritized for planting by February 1, 2022.	
			Assess opportunities to enhance cold water refugia (CWR) in accordance with public planting sites.	<ul style="list-style-type: none"> Review results of DEQ's CWR study (March 2020) and identify relevant CWR opportunity areas as part of the desktop GIS evaluation. Prioritize CWR opportunity areas in conjunction with future public planting activities. 	<ul style="list-style-type: none"> Integrate CWR opportunity areas (if applicable) into updated mapping by July 2021. Incorporate CWR as a prioritization factor for future planting activities by November 1, 2021. 		
			Conduct or financially support planting activities at identified for priority public and private shade opportunity areas.	<ul style="list-style-type: none"> Track and map public planting and maintenance activities in accordance with funding activities. Annually monitor previous year's plantings to evaluate survivability. 	By July 2021, develop field inspection forms and procedure for monitoring planting activities in conjunction with routine stormwater inspection activities.	Beginning in July 2022, dedicated funds will be spent preparing, planting and/or maintaining identified public or private shade opportunity areas for the duration of this plan.	
			Continue partnership and funding towards the Greater Oregon City Watershed Council (GOCWC) to identify shade planting opportunities on private lands. To receive funding, GOCWC will be responsible for clearing, planting and maintenance for 2 years.	<ul style="list-style-type: none"> Attend quarterly GOCWC meetings to discuss potential sites, objectives and timelines. Track and map private property planting activities in accordance with funding activities 	Ongoing throughout the implementation period.	The GOCWC will provide annual progress reports noting planting activities to the City,	
Hydromodification Projects	Public Works	Complete two Hydromodification Projects identified in the 2015 Hydromodification Assessment or Stormwater Master Plan during this implementation period.	Prioritize the list of hydromodification sites based on access, land ownership, partnerships, and necessity. Efforts may occur in conjunction with the finalization of the stormwater master plan.	Document results of the site prioritization effort.	Prepare prioritized project list by November 1, 2021.	At least one project will have been completed and one project will have started during the implementation period.	
			Initiate design and construction efforts in accordance with the site prioritization.	Track internal meetings related to project implementation.	Ongoing throughout the implementation period.		
Implement Stormwater Design Standards	Public Works	Implement Chapters 13 of the City's development code, which includes provisions for use of infiltration-based stormwater treatment systems and tree planting.	Adhere to the management standards, set forth in OCMC 13.12 and the City's updated (2016) Stormwater Design Standards.	<ul style="list-style-type: none"> Provide the standards to local engineers, developers, builders, and City staff through trainings and the City's website. Track private and public water quality facility installations, based on completion of Maintenance Covenant and Access Easement Agreement. 	Ongoing throughout the implementation period.	Minor editorial revisions and updates to design standards will be conducted approximately every 3 years as needed.	
Preservation of Existing Shade	Planning and Public Works	Continue to refine and enforce Chapter 17 of the City's code pertaining to the protection of riparian vegetation and buffer areas.	Continue to implement Chapter 17.49 of the City's NROD development code to address Title 3 and Title 13.	<ul style="list-style-type: none"> Track modifications to Chapter 17.49 in accordance with Title 3 and Title 13 objectives. Track any enforcement actions taken to protect existing shade. 	Ongoing throughout the cycle.	N/A	
Public Education	Public Works	Distribute temperature- related educational materials in the City newsletter and through direct mailings and signage.	Ensure distribution of a minimum of one temperature-related piece of educational material (i.e., flyer, signage) during each year of the implementation period.	Record temperature- related educational materials distributed annually.	Ongoing throughout the cycle.	N/A	

APPENDIX C

Summary of Title 3/Title 13 Requirements

Page left intentionally blank.

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 C-1 shown below, summarizes the vegetated buffer widths for protected water features per Title 3.

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 (see Table C-1), 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).

Table C-1 Title 3– Required Width of Vegetated Corridor**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 Features ¹	< 25%	<ul style="list-style-type: none"> Edge of bankfull flow or 2-year storm level; Delineated edge of Title 3 wetland 	50 feet
Primary Protected Water Features ¹	≥ 25% for 150 feet or more ⁵	<ul style="list-style-type: none"> Edge of bankfull flow or 2-year storm level; Delineated edge of Title 3 wetland 	200 feet
Primary Protected Water Features ¹	≥ 25% for less than 150 feet ⁵	<ul style="list-style-type: none"> 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 Features ²	< 25%	<ul style="list-style-type: none"> Edge of bankfull flow or 2-year storm level; Delineated edge of Title 3 wetland 	15 feet
Secondary Protected Water Features ²	≥ 25% ⁵	<ul style="list-style-type: none"> Edge of bankfull flow or 2-year storm level; Delineated edge of Title 3 wetland 	50 feet

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

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

³Where 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).

⁴A 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).

⁵Vegetated 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.

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 should be adopted 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.

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.

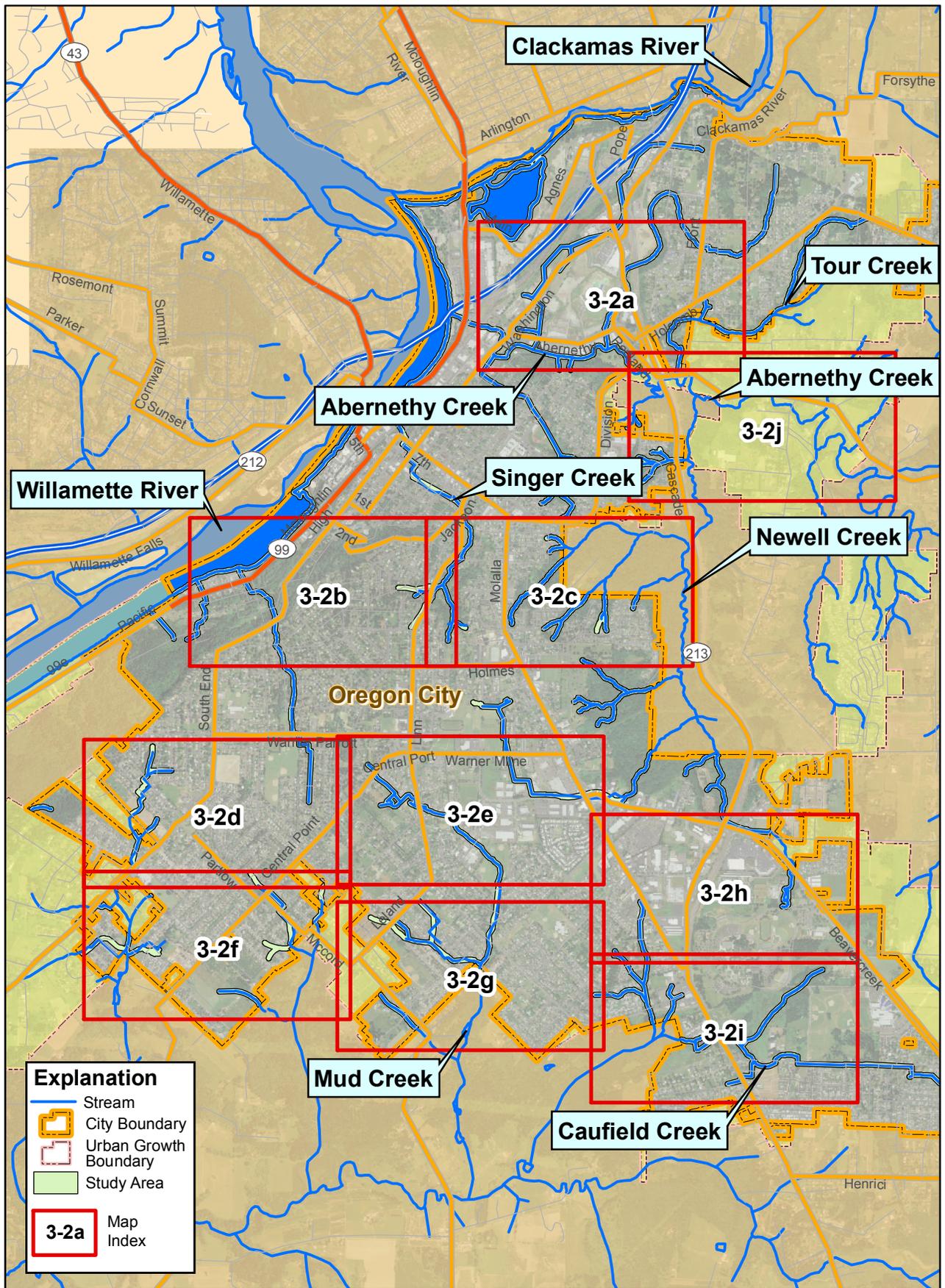
TITLE 3 AND TITLE 13 COMPARISON

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

Planting Opportunity Areas (2008)

Page left intentionally blank.



Explanation

- Stream
- City Boundary
- Urban Growth Boundary
- Study Area
- 3-2a** Map Index

0 0.5 1 Miles
1:40,000

OREGON CITY SHADE OPPORTUNITIES - MAP INDEX

CITY OF OREGON CITY, OREGON
TEMPERATURE TMDL IMPLEMENTATION PLAN

FIGURE 3-2



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation		Taxlots	
	Stream		Private
	Potential Cold Water Refugia		Public
	City Boundary	Shade Opportunity	
	Urban Growth Boundary		High Priority
	Study Area		Medium Priority
			Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

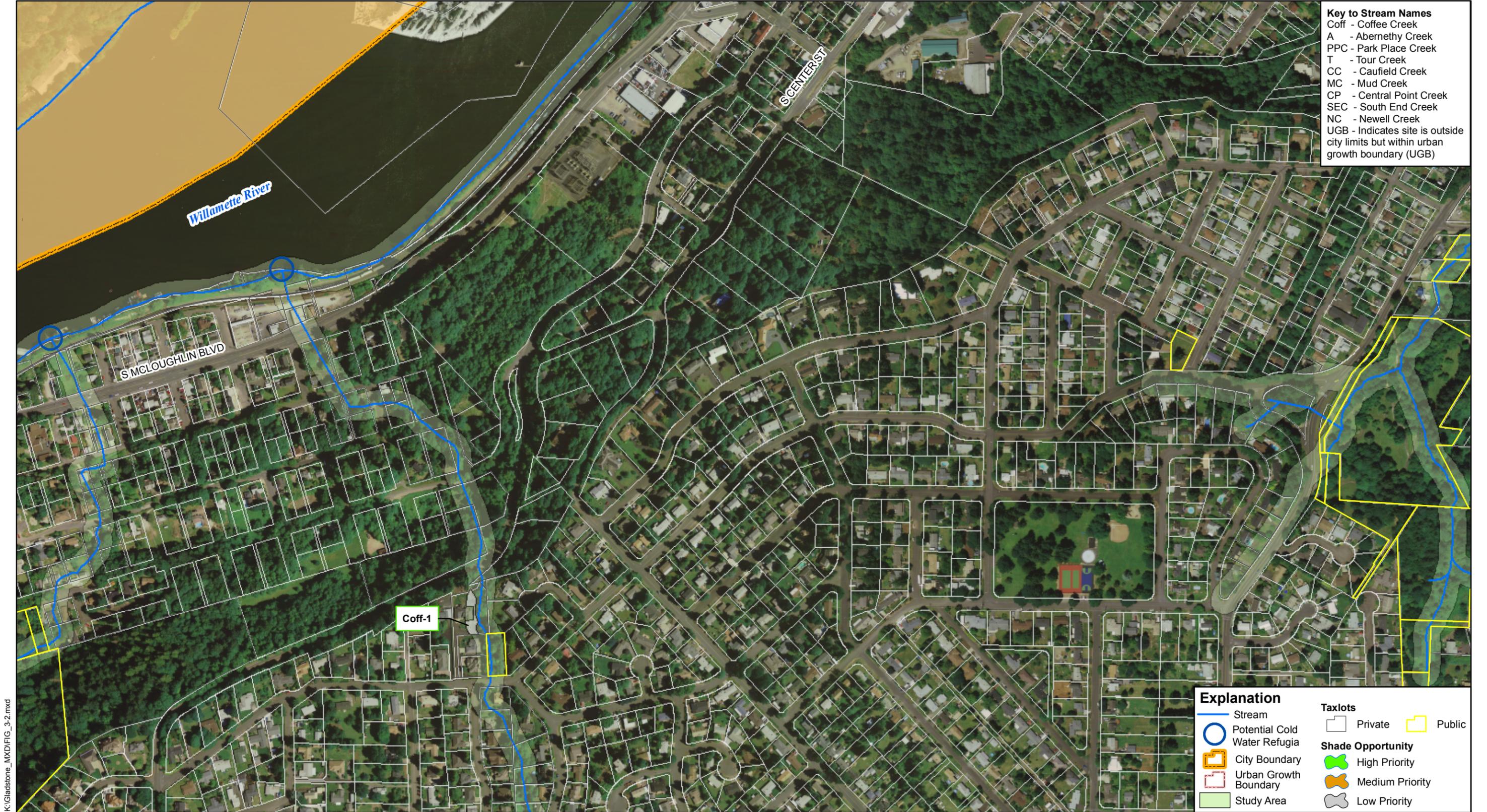
0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2a
 Map 1 of 10



Key to Stream Names

- Coff - Coffee Creek
- A - Abernethy Creek
- PPC - Park Place Creek
- T - Tour Creek
- CC - Caufield Creek
- MC - Mud Creek
- CP - Central Point Creek
- SEC - South End Creek
- NC - Newell Creek
- UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation		Taxlots	
	Stream		Private
	Potential Cold Water Refugia		Public
	City Boundary	Shade Opportunity	
	Urban Growth Boundary		High Priority
	Study Area		Medium Priority
			Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

0 250 500 750 1,000 Feet

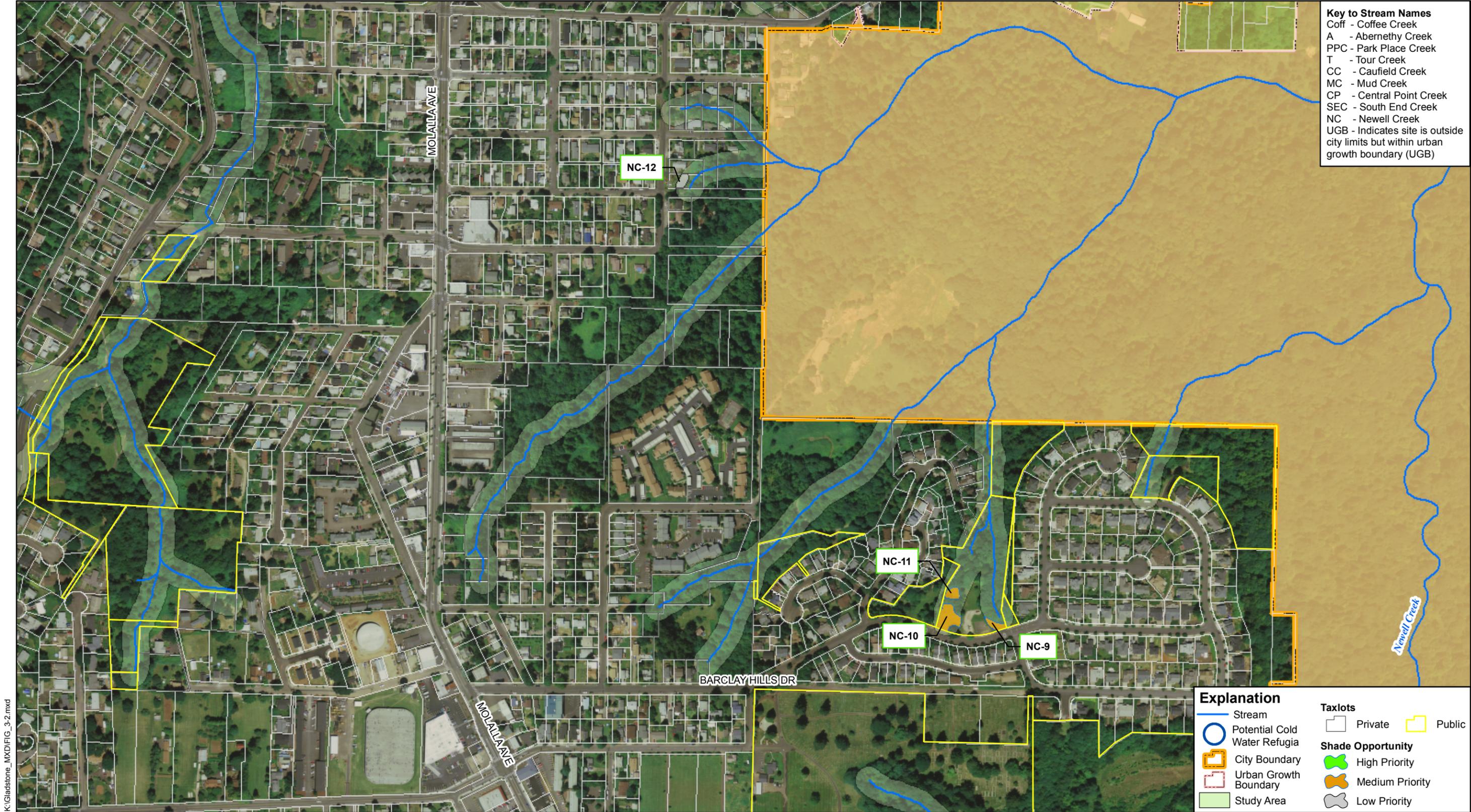


1:4,800

URS
Print Date: March 18, 2008

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

FIGURE 3-2b
Map 2 of 10



- Key to Stream Names**
- Coff - Coffee Creek
 - A - Abernethy Creek
 - PPC - Park Place Creek
 - T - Tour Creek
 - CC - Caufield Creek
 - MC - Mud Creek
 - CP - Central Point Creek
 - SEC - South End Creek
 - NC - Newell Creek
 - UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

- Explanation**
- Stream
 - Potential Cold Water Refugia
 - City Boundary
 - Urban Growth Boundary
 - Study Area
- Taxlots**
- Private
 - Public
- Shade Opportunity**
- High Priority
 - Medium Priority
 - Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

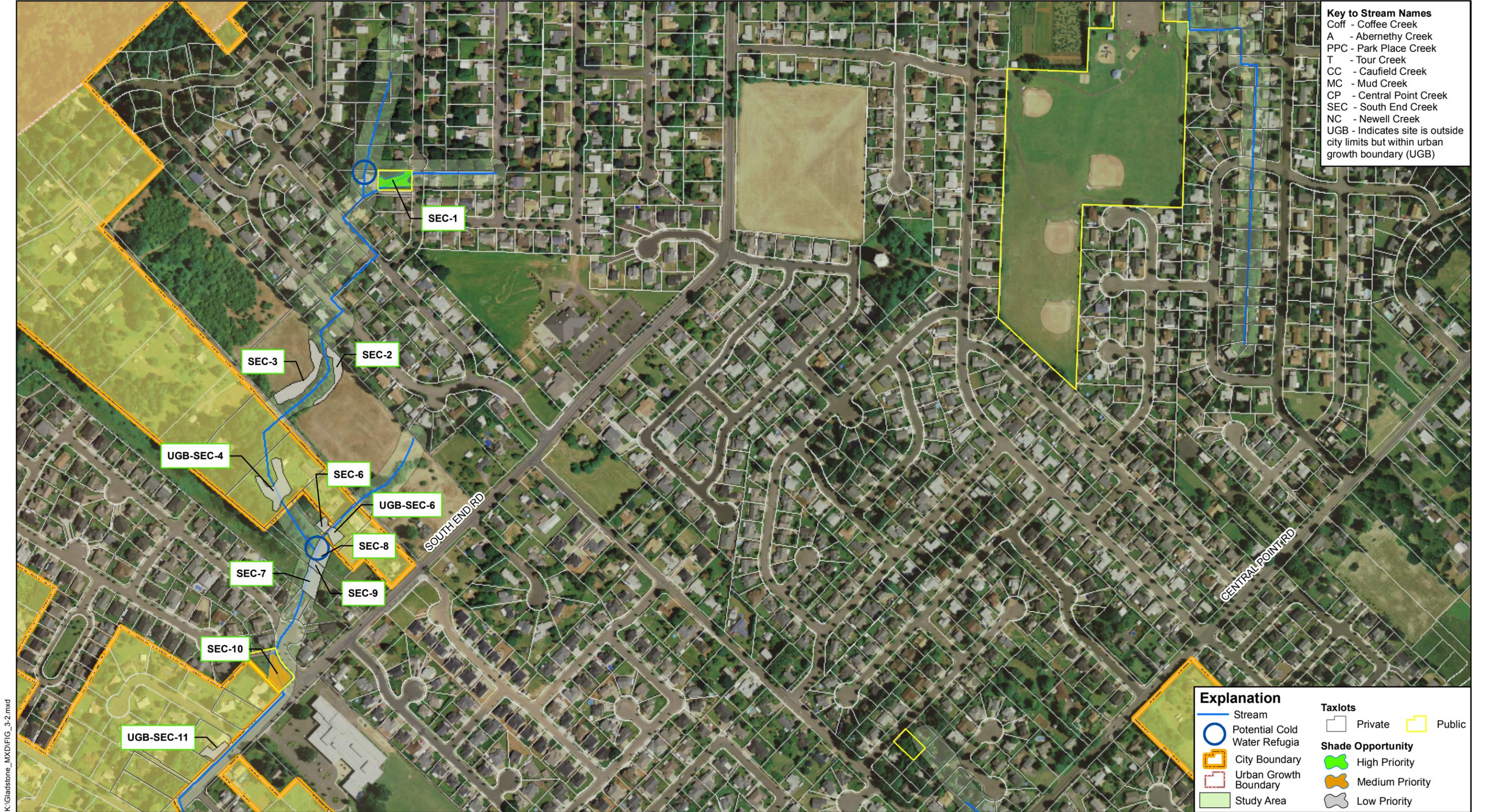
0 250 500 750 1,000 Feet



URS
Print Date: March 18, 2008

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

FIGURE 3-2c
Map 3 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

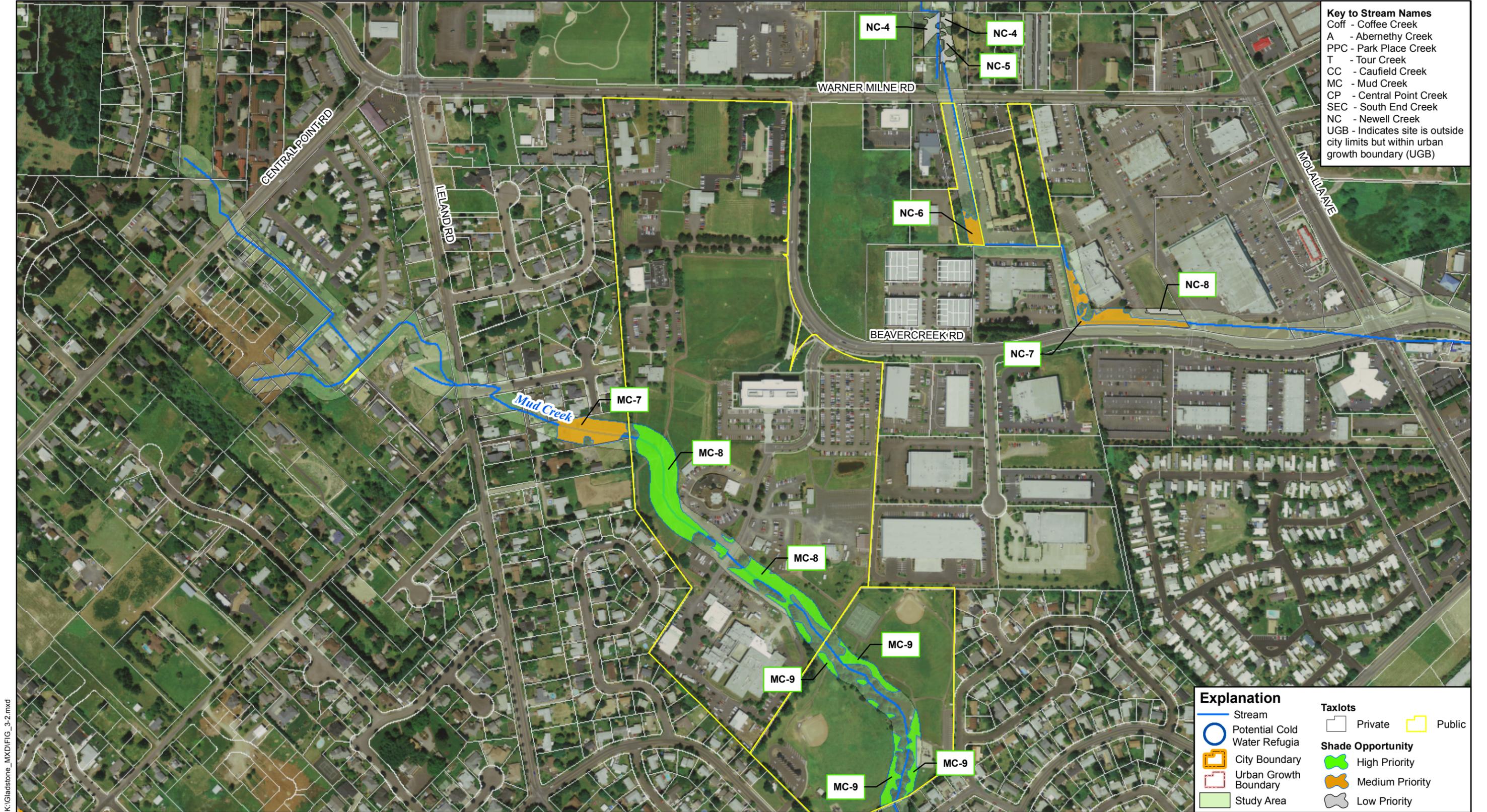
0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2d
 Map 4 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2e
 Map 5 of 10

K:\Gladstone_MXD\FIG_3-2.mxd



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2f
 Map 6 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2g
 Map 7 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caulfield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2h
 Map 8 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caufield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

Stream	Private Taxlots	Public Taxlots
Potential Cold Water Refugia	Shade Opportunity	
City Boundary	High Priority	Medium Priority
Urban Growth Boundary	Low Priority	
Study Area		

K:\Gladstone_MXD\FIG_3-2.mxd

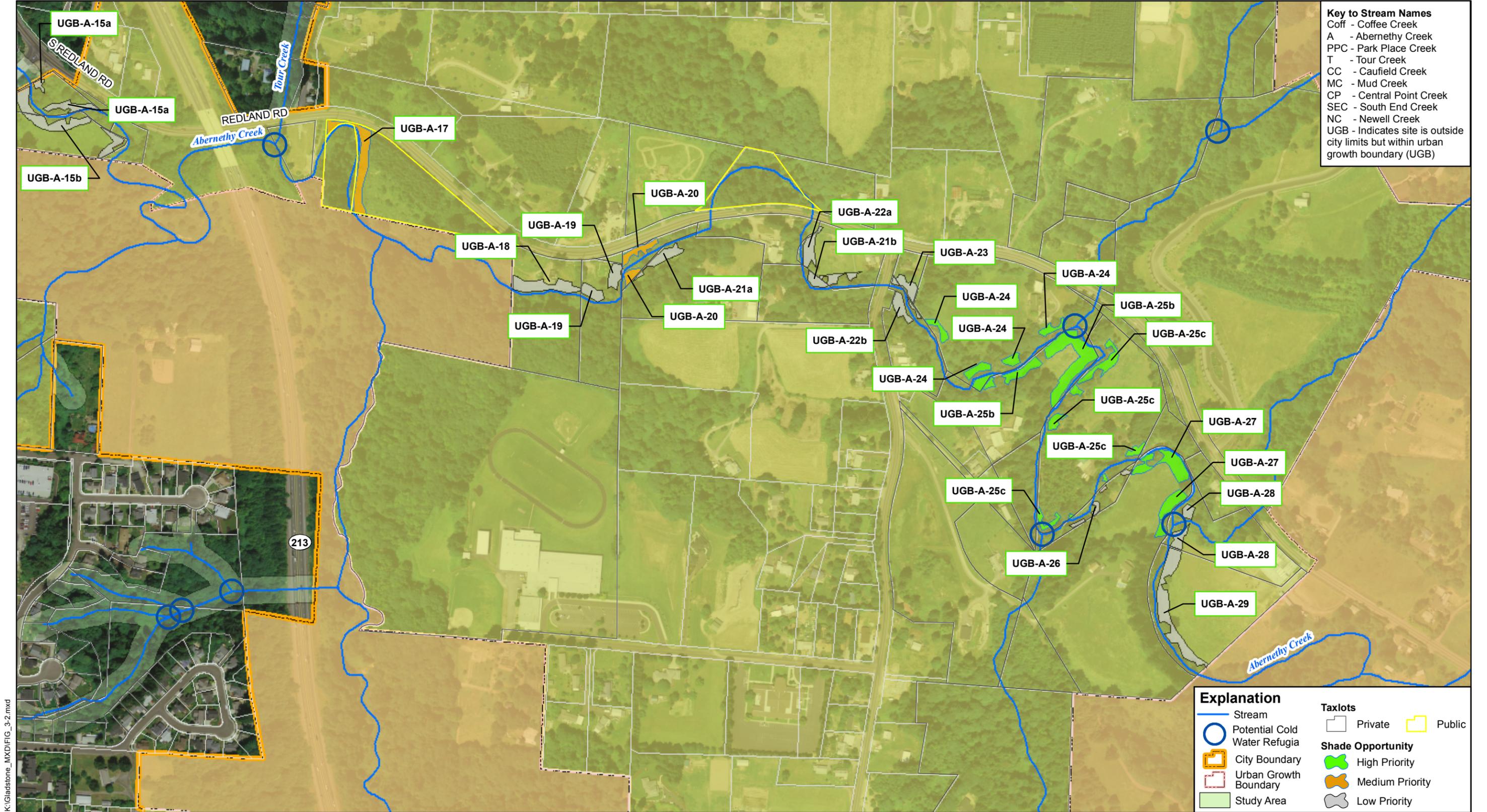
0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2i
 Map 9 of 10



Key to Stream Names
 Coff - Coffee Creek
 A - Abernethy Creek
 PPC - Park Place Creek
 T - Tour Creek
 CC - Caulfield Creek
 MC - Mud Creek
 CP - Central Point Creek
 SEC - South End Creek
 NC - Newell Creek
 UGB - Indicates site is outside city limits but within urban growth boundary (UGB)

Explanation

- Stream
- Potential Cold Water Refugia
- City Boundary
- Urban Growth Boundary
- Study Area

Taxlots

- Private
- Public

Shade Opportunity

- High Priority
- Medium Priority
- Low Priority

K:\Gladstone_MXD\FIG_3-2.mxd

0 250 500 750 1,000 Feet



URS
 Print Date: March 18, 2008

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

FIGURE 3-2j
 Map 10 of 10