TMDL Implementation Plan

City of Wilsonville, Oregon

Natural Resources Program

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List of Abbreviations

BMP	best management practice
C	Celsius
CIP	capital improvement project
City	City of Wilsonville
CD	Community Development
CWA	Clean Water Act
CWR	cold-water refugia
DEQ	Oregon Department of Environmental Quality
DMA	Designated Management Agency
I-5	Interstate 5
LA	load allocation
LID	low-impact development
OAR	Oregon Administrative Rules
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
PHS	Pacific Habitat Services
PW	Public Works
Plan	2014 TMDL Implementation Plan update
SMP	Wilsonville Stormwater Master Plan
SWMP	Stormwater Management Program document (2022)
TMDL	total maximum daily load
USEPA	U.S. Environmental Protection Agency
WCC	Wilsonville City Code
WLA	waste load allocation
WQMP	Water Quality Management Plan

Section 1

Introduction and Background

The Federal Clean Water Act (CWA) of 1977 authorized the U.S. Environmental Protection Agency (USEPA) to restore and maintain water quality in all water bodies within the U.S. In response to the CWA, the USEPA designated certain state agencies, (the Oregon Department of Environmental Quality [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 total maximum daily loads (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 USEPA's 303(d) list as an impaired water body, and the development of a TMDL follows.

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

Any agency or municipality that has legal authority over activities or areas that are sources of TMDL pollutants that impact water quality are known as Designated Management Agencies (DMAs). A DMA responsible for areas that discharge to a TMDL water body must develop a TMDL Implementation Plan that describes strategies to be undertaken to address LAs for nonpoint sources of TMDL pollutants. WLAs for point sources of pollutants are addressed through National Pollutant Discharge Elimination System (NPDES) permits (e.g., NPDES permits for Municipal Separate Storm Sewer System [MS4] discharges and NPDES permits for discharges from wastewater treatment plants).

This report represents an update to the 2022 Willamette River TMDL Implementation Plan developed for the City of Wilsonville (City) to address the Revised Willamette Basin Mercury TMDL (effective February 2021). This report outlines strategies to address LAs for temperature and references strategies to address WLAs for bacteria and mercury, as implemented through the City's NPDES MS4 permit.

1.1 Jurisdiction and Organization

Wilsonville is located about 20 miles south of Portland, Oregon. The city encompasses 4,975 acres and has a population of approximately 27,634 (as reported by Portland State University in 2023). The Interstate 5 (I-5) freeway corridor divides the City into distinct eastern and western zones. The I-5 corridor falls under the Oregon Department of Transportation's NPDES MS4 permit. The section running over the Willamette River, also known as the "Boone Bridge", is reflected in the coverage of the City's TMDL Implementation Plan, as it includes strategies for controlling pollution from nonpoint sources

Wilsonville is adjacent to a primary transportation route and has been undergoing rapid development over the last decade. Land use in the city is a combination of residential, commercial, and industrial. Industrial areas, both developed and undeveloped are located primarily along the I-5 corridor. Commercial areas are clustered around the I-5 and Wilsonville Road intersection and the I-5 and Elligsen

Road intersection. Residential land use is distributed throughout the city. Open space is found throughout the city and includes a number of parks, wetlands, and riparian areas.

General topography within Wilsonville consists of either low lying wetland areas (Coffee Lake Creek Basin) or steep sloped ravines (Boeckman Creek Basin). There are two primary soil types within the city, a silty loam derived from basalt in the upper basin areas and soil derived from glacial deposits located adjacent to the Willamette River. Soils in both areas have slow to moderate infiltration rates and are characterized as either hydrologic soil group B or C (*City of Wilsonville Stormwater Master Plan*, 2024) (SMP).

The City obtained its most recent NPDES MS4 permit from DEQ in 2021 for its municipal stormwater discharges to surface waters. Wilsonville is one of 12 co-permittees on the Clackamas County NPDES MS4 permit (number 101348). The City's Department of Community Development (CD) is responsible for coordinating and implementing the stormwater program and meeting regulatory requirements, including those outlined in this TMDL Implementation Plan. The Department of Public Works (PW) also implements stormwater program activities, primarily in conjunction with the City's NPDES MS4 permit. The PW and CD departments work cooperatively during the land development application process to ensure that City development code and policies are followed related to land use, transportation, and environmental regulations including water resource and riparian buffers. Figure 1-1 identifies the City's organizational structure.

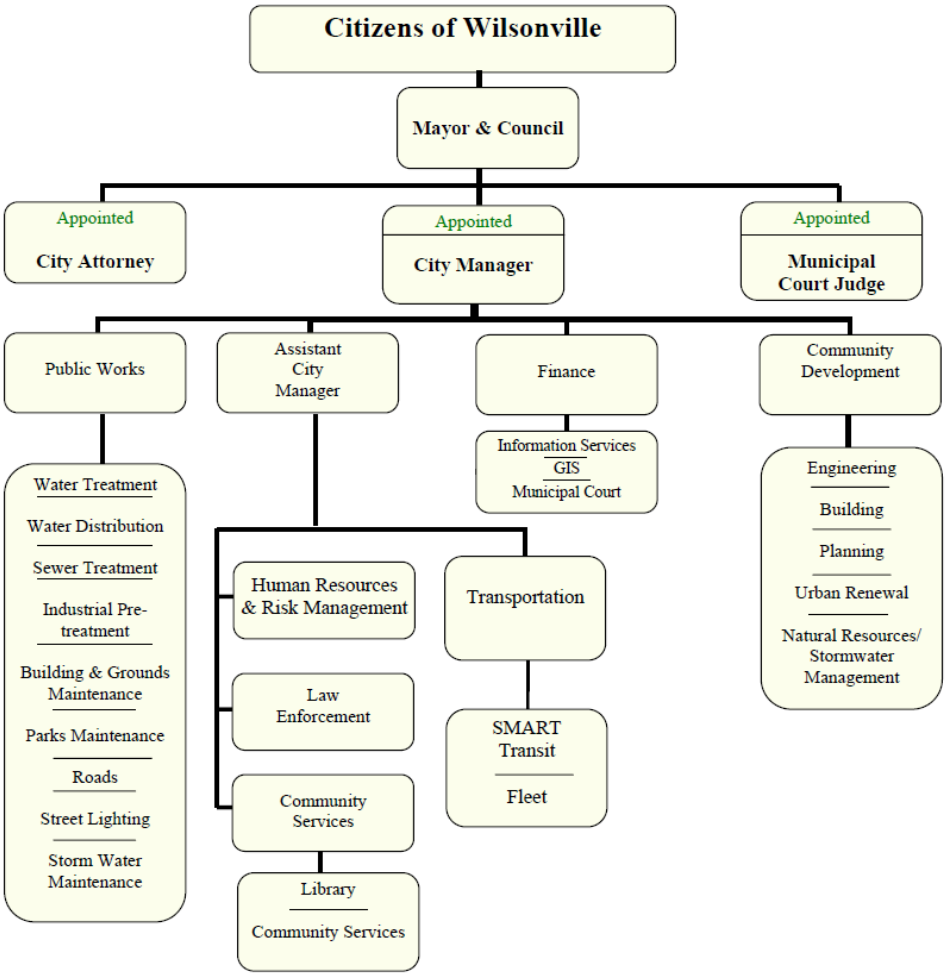

Figure 1-1. City of Wilsonville organizational structure

1.2 Wilsonville Watersheds and Drainage Patterns

Wilsonville is located in the Middle Willamette River watershed, and all areas discharge either directly or indirectly to the Willamette River between river mile (RM) 37 and 39.8. There are six major drainage basins in the city: Coffee Lake Creek/Seely Ditch, Boeckman Creek, Meridian Creek, Mill Creek, Charbonneau, and a sixth basin comprised of those areas draining directly to the Willamette River.

Together, Coffee Lake Creek/ Seely Ditch and Boeckman Creek drain about 71 percent of the total city area, and their watershed boundaries extend outside the city limits and the urban growth boundary (UGB). The Coffee Lake Creek watershed is the largest, covering 2,480 of the 5,126 acres in Wilsonville's UGB, or approximately 48 percent (*City of Wilsonville Stormwater Master Plan*, 2024).

Figure 1-2 shows the Wilsonville city limits and UGB as well as the major water bodies. Both city limits and UGB are shown because areas of potential annexation are included as part of the overall stormwater program (and NPDES MS4 permit implementation).

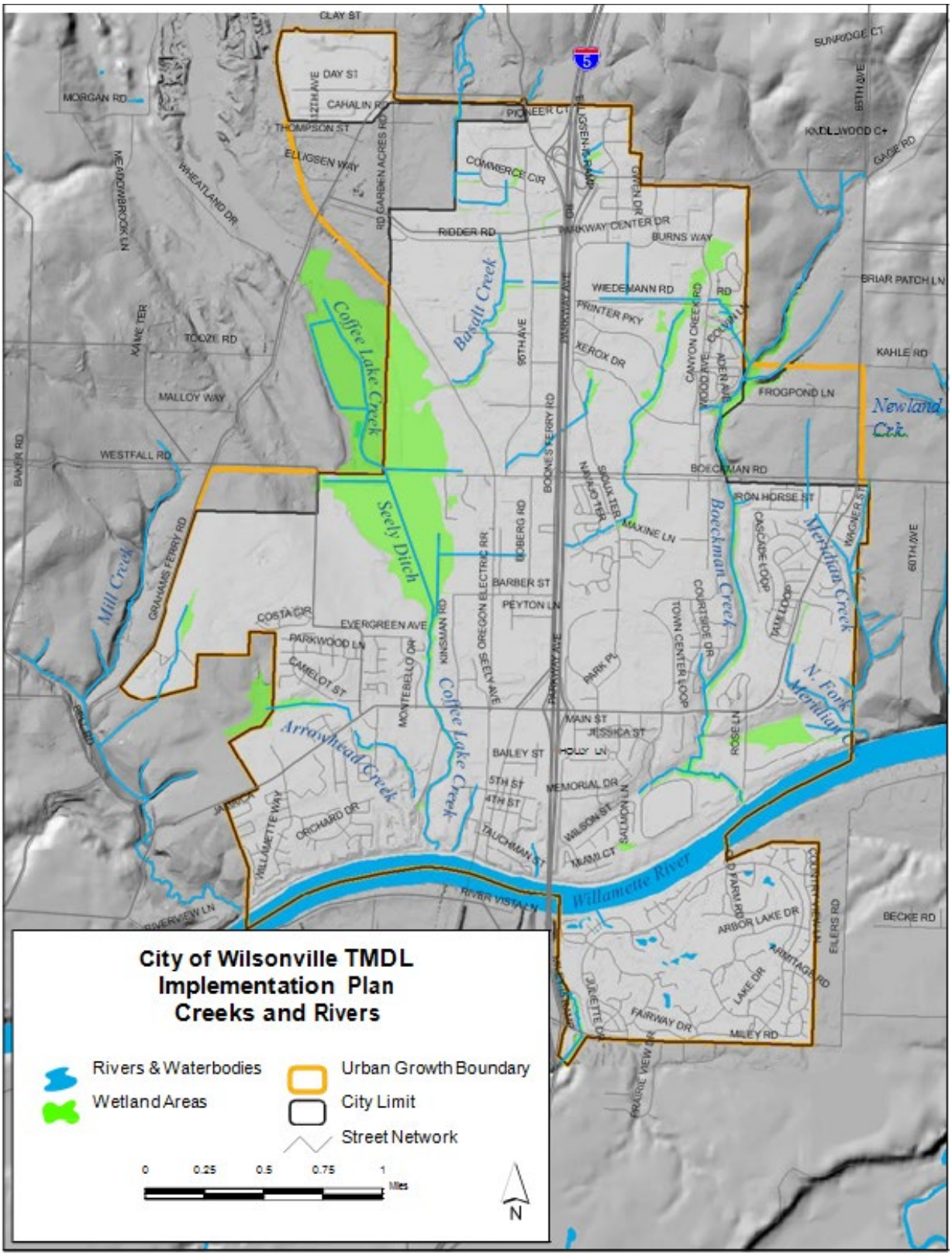

Figure 1-2. City limits and drainage patterns (2014)

1.3 TMDL Applicability and Coverage

On September 21, 2006, DEQ finalized a TMDL for the Willamette Basin. The TMDL addressed water quality impairment of the Middle Willamette River and its tributaries and included previously-approved TMDLs by reference. The Willamette Basin TMDL addressed bacteria, mercury, and temperature, and included WLAs and LAs specific to DMAs.

Table 1-1 summarizes the TMDL pollutants and associated LAs and WLAs applicable to Wilsonville.

Table 1-1. TMDL Summary for Wilsonville

TMDL	Year	Subbasin(s)	TMDL parameters	TMDL surrogate parameters	WLA[a]	LA[a]
Willamette River	2025	Middle Willamette	• Temperature (°C)	• Effective shade (surrogate for temperature)	• N/A	• 85-95% effective shade
Willamette River	2006	Middle Willamette	• Bacteria (*E.coli*)	• N/A	• 88% reduction (summer) • 75% reduction (fall, winter,spring)[b]	• 88% reduction (summer) • 75% reduction (fall, winter,spring)[b]
Willamette River	2019	Middle Willamette	• Mercury	• TSS	• 97% reduction	• 97% reduction

a. *WLAs are applicable to NPDES permitted point source discharges (including area covered by the City's NPDES MS4 permit); LAs are applicable to Non-permitted Urban Stormwater in accordance with EPA's Total Maximum Daily Load (TMDL) for Mercury in the Willamette Basin, Oregon - February 4, 2021.*

b. *The WLA/ LA for bacteria varies according to season and discharge location. A 75 percent annual reduction in bacteria load is applicable for urban area directly discharging to the Willamette River and a 75 percent reduction is applicable during the fall, winter, and spring seasons for urban area discharging to tributaries. An 88 percent reduction during the summer season is applicable for urban areas that discharge to tributaries. In accordance with the requirements of the WQMP (Chapter 13) of the 2006 Willamette Basin TMDL for bacteria, the City's stormwater management program (SWMP) document covers all point and non- point areas of bacteria discharge.*

1.3.1 Sources Covered

The City of Wilsonville implements their Phase I NPDES MS4 permit throughout their entire jurisdictional area; however, this TMDL Implementation Plan specifically covers nonpoint source areas of stormwater pollution. Stormwater pollution sources not covered by the NPDES MS4 permit are subject to DEQ defined LAs and associated management strategies.

This TMDL Implementation Plan (TMDL IP) is one of the city's mechanisms for addressing the discharge of bacteria and mercury to surface waters. To compliment the TMDL IP, and the associated management strategies that address LAs for bacteria and mercury (outlined in Section 2 and Appendix B) the city also administers an NPDES MS4 Phase 1 permit, employing best management practices (BMPS) outlined the city's Stormwater Management Plan (SWMP) Document and SWMP implementation activities are detailed in Appendix A.

The NPDES MS4 permit and SWMP are not required to address temperature because municipal stormwater runoff is not considered to be a significant contributor of heat or "thermal loading" to surface waters (pp 14-16 Willamette Basin TMDL, 2006). DMAs, including the City of Wilsonville, address temperature LAs exclusively in TMDL IPs.

1.3.2 2019 Revised Willamette Basin Mercury TMDL

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

Chapter 13 of the Final Revised Willamette Basin TMDL (November 2019) reflects the Water Quality Management Plan (WQMP). Per Section 13.3.1.11 and Table 13-11, DEQ refers to six minimum control measures to control mercury from unpermitted urban runoff from cities with populations of 5,000 or greater (e.g., City of Wilsonville). These six minimum control measures apply to cities with MS4 permits for areas outside of their MS4 permit coverage area, and to cities without MS4 permits (2019 Willamette Basin WQMP, Table 13-11, p 92-221). However, MS4 permit holders may choose to implement requirements under their permit throughout their jurisdiction for implementation consistency, and this approach would meet or exceed requirements in Table 13-11 (2019 Willamette Basin WQMP, p 94-221).

The City of Wilsonville implements its NPDES MS4 permit conditions jurisdiction-wide and therefore meets the six minimum measures. For reference Table 1-2 summarizes the six minimum measures for mercury (per Table 13-11 of the 2019 Willamette Basin WQMP), as related to the City's applicable 2021 NPDES MS4 permit schedule. Current SWMP management strategies applicable to the minimum stormwater control measures are outlined in Appendix A.

Table 1-2. Correlation between Six Minimum Stormwater Control Measures for Mercury and Phase I NPDES MS4 Permit Requirements

Minimum Stormwater Control Measure	Minimum Stormwater Control Measure Requirements Summary	Associated 2021 NPDES MS4 Permit Schedule
1. Pollution Prevention and Good Housekeeping for Municipal Operations	• Operate and maintain facilities to reduce the discharge of mercury-related pollutants. • Ensure DMA-owned and operated facilities with industrial activities have coverage under a 1200-Z permit and conduct operations and maintenance activities to protect water quality. • Maintain records.	Schedule A.3.f and Schedule A.3.g
2. Public Education and Outreach	• Conduct an ongoing education and outreach program to inform the public. • Track implementation of public education and outreach and assess progress including a qualitative evaluation of one activity.	Schedule A.3.a [a]
3. Public Involvement and Participation	• Implement a public involvement and participation program to provide the public with opportunities to participate in the development of control measures.	Schedule A.3.b
4. Illicit Discharge Detection and Elimination	• Implement and enforce a program to detect and eliminate illicit discharges. • Develop and maintain a current map of the conveyance system. • Prohibit non-stormwater discharges through enforcement of an ordinance or other legal mechanism.	Schedule A.3.c

Table 1-2. Correlation between Six Minimum Stormwater Control Measures for Mercury and Phase I NPDES MS4 Permit Requirements		
Minimum Stormwater Control Measure	**Minimum Stormwater Control Measure Requirements Summary**	**Associated 2021 NPDES MS4 Permit Schedule**
5. Construction Site Runoff Control	• Refer project sites to DEQ or agent to obtain 1200-C permit coverage. • Require construction site operators to complete and implement an Erosion and Sediment Control Plan for construction project sites that result in a minimum land disturbance of 0.5 acres or more. • Require erosion controls, sediment controls, and waste materials management for qualifying construction projects. • Develop, implement, and maintain escalating enforcement procedures.	Schedule A.3.d
6. Post Construction Site Runoff for New and Redevelopment	• Develop, implement, and enforce a program to reduce discharge of pollutants from new and redevelopment project sites. • Target natural or predevelopment hydrologic function to retain rainfall onsite and treat the remainder of the runoff.	Schedule A.3.e

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

1.4 TMDL Implementation Plan Update and Organization

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

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

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

(B) Provide a timeline for implementing management strategies and a schedule for completing measurable milestones;

(C) Provide for performance monitoring with a plan for periodic review and revision of the implementation plan;

(D) To the extent required by ORS 197.180 and OAR chapter 340, division 18, provide evidence of compliance with applicable statewide land use requirements; and

(E) Provide any other analyses or information specified in the WQMP.

In addition to the guidance document, various other documents were referenced in the preparation of this TMDL Implementation Plan. Chapter 14 of the Willamette Basin TMDL provides a Water Quality Management Plan (WQMP), which presents suggested management measures for jurisdictions discharging to the Willamette River, to comply with the TMDL requirements. Chapter 13 of the Final Revised Willamette Basin Mercury TMDL (November 2019) also includes a WQMP, which provides implementation guidelines for permitted and non-permitted entities, as well as management measures to address mercury for jurisdictions discharging to the Willamette River (see Table 1-2).

The City submitted a TMDL Implementation Plan (TMDL IP) for the Middle Willamette River and tributaries in March 2008. The TMDL IP 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 TMDL IP to DEQ in August 2014 and February 2019 that reflected progress and future goals for the next 5-year implementation timeframe. The City submitted a 2022 TMDL IP in August 2022, which reflected the required plan resubmittal 18 months from the effective date of the Willamette Basin TMDL update for mercury. The August 2022 TMDL IP was resubmitted in December 2023 in conjunction with the 5-year lookback survey and updated SWMP BMPs in Appendix A. This 2025 TMDL IP reflects minor adjustments to the August 2022 (including December 2023 update) TMDL IP to address DEQ review comments requesting additional clarifications.

This 2025 TMDL IP is organized as follows:

- Section 2 addresses the first three requirements (A,B, and C) for mercury and bacteria.
- Section 3 addresses the first three requirements (A, B, and C) specifically for temperature.
- Section 4 addresses the fourth requirement, (D), and reflects the evaluation of this Plan's conformance with the City's land use goals and comprehensive plan.
- Section 5 addresses additional items identified in the Water Quality Management Plan (WQMP) requirement (E) that the DMA must address. These items include the following:
  - Determine how best to 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.
  - Address cold-water refugia.

Section 2

Management Strategies for Bacteria and Mercury

Discharges to surface waters via the City's MS4 are point sources since they are covered by the City's 2021 NPDES MS4 permit and have associated wasteload allocations (WLAs). Requirements of the City's NPDES MS4 permit are addressed through implementation of a Stormwater Management Program document (SWMP). The SWMP outlines various management strategies in the form of best management practices (BMPs) that address specific permit requirements and specific TMDL parameters. BMPs include control techniques, system design and engineering methods, and other measures the City implements to reduce the discharge of pollutants in stormwater and protect water quality.

The City also has stormwater discharges that flow over land and enter receiving waters directly without first entering the City's MS4. While these discharges are typically considered to be non-point sources, with associated load allocations (LAs), they have been included and covered by BMPs outlined in the City's SWMP Document as regulated under the City's NPDES MS4 permit. However, given the presence of non-point areas with LAs, the strategies outlined in this section are meant to compliment SWMP BMPs and reduce bacteria and mercury discharges to surface waters.

The City implements its NPDES MS4 permit requirements across its entire jurisdiction and does not separate point source areas with WLAs and non-point sources areas with LAs. 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 reflect pollutant load generation from both point and nonpoint source areas, as well as implementation of stormwater controls (both structural and non- structural) as documented in the City's SWMP.

The management strategies discussed in this section apply to nonpoint source areas of bacteria and mercury, in addition to point source areas as covered under the City's NPDES MS4 permit. However, it should also be noted that management strategies to address temperature as outlined in Section 3 (i.e., riparian vegetation and buffers, ordinances protecting stream systems, etc.) will also support the additional removal of pollutants (i.e., bacteria and mercury) covered by the City's NPDES MS4 permit SWMP BMPs. Temperature is addressed in Sections 3 through 5 of this plan.

The purpose of this section is to provide an overview and reference of the additional management strategies, schedules, and monitoring activities that address bacteria and mercury.

2.1 Management Strategies to Address LAs

The City was issued a new NPDES MS4 permit from DEQ on October 1, 2021. An updated SWMP was submitted to DEQ by December 1, 2022, in conjunction with reissuance of its NPDES MS4 permit, and approved in the Spring of 2023. BMPs are listed and summarized in Appendix A as applicable to the City's 2022 SWMP. In conjunction with management strategies outlined in the City's SWMP, the City implements the following management strategies that are applicable to non-point areas of the City.

2.1.1 Enforcement of Riparian Buffers

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

Jurisdictions that comply with Titles 3 and/or 13 are utilizing strategies for addressing bacteria and mercury LAs. The City implements Title 3 and Title 13 requirements through Section 4.139 of the Wilsonville City Code (WCC). This section of the WCC describes the significant resources overlay zone (SROZ), established specifically by the City to encompass the outer boundary of a significant Goal 5 resource, lands protected under Title 3, riparian corridors, and significant wildlife habitat. The SROZ reflects a variable buffer width (i.e., a minimum 50-foot buffer for all streams, extending upwards to 300 feet for some riparian corridors), which encompasses the riparian corridor, riparian impact area, and the area of limited conflicting use (as defined by the City). Development within the SROZ is extremely limited. Provisions of the WCC allow for activities such as removal of invasive species, public improvements (only in conjunction with management strategies outlined in an approved master plan), and minor encroachments. Mitigation standards are provided that require an area of mitigation ranging from 1.5 to 5 times the original disturbance area.

2.1.2 Capital Improvement Projects

Since 2012, the City has completed a number of CIPs associated with pipe improvement/replacement, channel and outfall repair, and low impact development (LID). In 2021, the City initiated an update to their SMP and development of new water quality and retrofit-related CIPs; adoption of the updated SMP occurred in 2024.

The 2024 SMP includes 30 funded and 13 unfunded projects/ programs to address a variety of water quality and water quantity control objectives. Stormwater policies referenced encourage the use of LID for the treatment of stormwater runoff, riparian and wetland restoration and conservation, and habitat improvement for fish and wildlife. Capital improvement projects (CIPs) referenced in the 2024 SMP are prioritized and scheduled according to a proposed 5-year implementation window.

2.2 Timeline and Implementation Schedule

The City's SWMP includes measurable goals and tracking measures for each BMP. These represent the schedule for implementing the TMDL management strategies for bacteria and mercury (see Appendix A).

The table in Appendix B includes measurable goals and tracking measures in accordance with riparian protection efforts to help meet the LAs assigned for bacteria and mercury. These goals have the potential to change on an annual basis through adaptive management.

Implementation of CIPs per the 2024 SMP occurs in conjunction with the documented schedule that identifies projects as short-term (implementation in 0 to 5 years), mid-term (implementation in 6 to 10 years), and long-term (implementation in 11 to 20 years), and as funds are available. Per requirements of the NPDES MS4 permit, the City is required to develop TMDL pollutant load reduction benchmarks to show progress toward meeting TMDL WLAs. Given that the WLAs and LAs are the same for both bacteria and mercury, the pollutant load reduction benchmarks reflect pollutant load generation from both point and nonpoint source areas, as well as implementation of stormwater controls (both structural and non-structural) as documented in the City's SWMP. Implementation of CIPs per the SMP will be integrated into the future TMDL benchmark updates, in conjunction with the City's NPDES MS4 permit renewal application in 2026.

Finally, in conjunction with the updated 2024 SMP, the City will be conducting a financial study to review and update the stormwater fees and system development charges to support the new capital and operating requirements identified in the updated 2024 SMP.

2.3 Monitoring and Reporting

The City is required to monitor for program compliance. It does this by conducting two types of monitoring: implementation monitoring and environmental monitoring. Implementation monitoring relates to the tracking of BMP (management strategy) implementation and evaluating whether BMP measurable goals and tracking measures are met. Environmental monitoring relates to the analysis and evaluation of stormwater and in-stream pollutant concentrations.

2.3.1 Implementation Monitoring

With respect to implementation monitoring, the City submits NPDES MS4 and TMDL IP annual compliance reports December 1 of each year to summarize implementation activities for all BMPs in its SWMP as well as temperature management strategies outlined in Appendix B of this TMDL IP. Each BMP has a defined measurable goal and tracking measure. Appendix A lists the measurable goals and tracking measures for each BMP. Appendix B contains a description of management strategies, measurable goals and tracking measures for temperature management strategies, including those strategies that would apply to non-point areas of the City and address bacteria and mercury. In this way, implementation of the overall stormwater program and the goals for helping meet LAs for TMDL impairments are monitored simultaneously. Both implementation status tables (Appendices A and B of this document) are included in NPDES MS4 and TMDL IP annual reports.

Subsequent updates to this TMDL Implementation Plan may include updates to BMPs outlined in Appendix A and B, in accordance with updates to the SWMP and adaptive management activities. Updates to the TMDL IP are described further in Section 3.5.

2.3.2 Environmental Monitoring

The City conducts environmental monitoring in the form of sample collection and analysis at various in-stream and stormwater outfall sites throughout Wilsonville. Environmental monitoring activities are conducted in conjunction with the monitoring requirements listed in the NPDES MS4 permit. Separate from the NPDES MS4 requirements, the City is also conducting additional monitoring to inform water quality conditions at locations with historic data and/or locations with observed pollutant spikes or anomalies.

The City participates in the Comprehensive Clackamas County Stormwater Monitoring Plan (CCCSMP), a coordinated monitoring plan developed by 10 Clackamas co-permittees to comply with monitoring requirements under the 2021 NPDES MS4 permit. In conjunction with the 2023 Clackamas County NPDES MS4 permit modification and permit reissuance, the updated, effective CCCSMP is dated May 2023 with an implementation start of July 1, 2023.

Under the CCCSMP, Wilsonville is collecting water quality samples from two in-stream sites on Boeckman Creek and one stormwater outfall site. 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 CCCSMP, and the City conducted biological monitoring during the 2024/25 reporting year, which included biological sampling and physical condition monitoring at three instream sites. Data from environmental monitoring efforts are included in the NPDES MS4 annual reports.

Separate from the CCCSMP, the City began conducting independent instream temperature monitoring on Coffee Lake Creek and Boeckman Creek. The City is using remote loggers to collect continuous temperature data on Boeckman Creek and Coffee Lake Creek/Seely Ditch during the summer months.

Section 3

Management Strategies for Temperature

Because stormwater is not considered to be a source of water quality temperature exceedance, temperature is managed as a nonpoint source issue that needs to be addressed through this TMDL Implementation Plan as opposed to being addressed through the NPDES MS4 permit-required SWMP Document. The Willamette River TMDL requires Designated Management Agencies (DMAs), including the City of Wilsonville (City) to develop total maximum daily load (TMDL) Implementation Plans to address elevated temperature. These plans must describe how each DMA will conduct efforts to reduce temperature to meet water quality standards.

Elevated water temperature is a common problem in many tributaries to the Willamette River, resulting in TMDL load allocations (LAs) designed to protect and remedy impaired aquatic habitats. Water temperatures in excess of water quality standards make streams unsuitable for cold-water fish and other cold-water aquatic species. Excessively warm streams lead to a variety of ill effects on many salmon and trout species, ranging from decreased spawning success to death (Willamette River TMDL, 2006). Depending on the life-stage and species, water temperature of less than 18 degrees Celsius (C) is necessary for habitat. For spawning, water temperature of less than 11 degrees C is needed.

This section describes the City's TMDL Implementation Plan (TMDL IP) to address temperature. Section 3.1 provides a summary of the LAs and shade curves provided in the Willamette Basin TMDL document. Section 3.2 summarizes the existing shade conditions of stream channels in Wilsonville. Section 3.3 summarizes current management strategies to address the temperature LAs including results of the 2008 modeling effort to define a Functional Shade Area and Riparian Shade Zone (RSZ) specific for Wilsonville. Section 3.4 provides a summary of the City's proposed, future temperature management strategies to make progress toward meeting the TMDL LAs. Section 3.5 outlines the timeline and schedule for implementation, and Section 3.6 summarizes proposed monitoring and reporting.

3.1 TMDL LAs for Temperature

Several factors can contribute to elevated in-stream temperatures such as changes in channel morphology, climate, geographic location, riparian vegetation, dams, reservoirs, and point sources such as industrial wastewater discharges (Oregon Department of Environmental Quality [DEQ], 2006). DEQ has found that the largest contributor to elevated temperature in the Willamette watershed is the increased impact from solar radiation loads due to disturbances of riparian vegetation. In response to this finding, DEQ has defined effective shade targets as a surrogate measure for addressing temperature. Effective shade is determined through the use of shade curves developed specifically for particular geomorphic classifications. DEQ has developed 15 shade curves for the Middle Willamette Basin, five of which are deemed appropriate for Wilsonville (*TMDL Implementation Plan*, 2008). 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 generally more effective in reducing the temperature in narrower streams (less than 25 feet wide) than in wider streams because shadows from trees in the riparian zone will cover a larger percentage of the water surface. In Wilsonville, all tributary streams have an average summer width of

less than 25 feet, so it is anticipated that the City can achieve a high level of shade through the protection and restoration of streamside vegetation.

Using Figure 7.8 in Chapter 7 of the Middle Willamette Subbasin in the Willamette Basin TMDL, there are five potential geomorphic classifications and associated shade curves that can be applied in Wilsonville (geomorphic classifications Qff2, Qfc, Qalc, Qff1, and Qalf). Given Wilsonville's average stream width of approximately 25 feet, the average effective shade goal should range between 70 and 90 percent. This is interpreted to mean that historically prevalent riparian vegetation should block the majority (at least 70 percent) of solar radiation loading from the streams' water surfaces.

To meet the effective shade goals established by DEQ, as a surrogate for the temperature LA, the City will need to plant and/or retain potential vegetation capable of providing significant shade benefit to surface waters. These efforts, complimented by the other management strategies outlined in Section 3.3 of this TMDL IP, will aid the progress towards meeting effective shade targets.

3.2 Waterbody Overview

All tributary water bodies in Wilsonville discharge to the Willamette River. The largest tributary watersheds are the Coffee Lake Creek/ Seely Ditch and Boeckman Creek watersheds that collectively account for approximately 70 percent of the city area.

Short descriptions of each tributary and existing shade conditions follow.

3.2.1 Coffee Lake Creek/Seely Ditch

The Coffee Lake Creek/Seely Ditch Watershed contains the largest stream system within Wilsonville. In addition to Coffee Lake Creek and Seely Ditch, streams within this system include several unnamed tributary streams and Arrowhead Creek.

Coffee Lake Creek and Seely Ditch comprise the largest wetland complex within Wilsonville. Within the City of Wilsonville this stream can be characterized into three segments. The upstream reaches located north of the Barber Street bridge are characterized as Seely Ditch. Seely ditch is bordered by an extensive emergent and scrub-shrub wetland. Seely Ditch is a historically significant ditch that was dug around 1858 to drain the surrounding wetlands for farmland. Additional ditches were also dug throughout the wetland complex. Due to the width and depth of these ditches, no forested stream buffer is present or feasible in this area. The middle segment of the Coffee Lake Creek/Seely Ditch Watershed is located between Barber Street and Wilsonville Road. This middle section begins to take on the characteristic of a stream as opposed to a ditch and is surrounded by residential and industrial lands. This section of stream receives minimum shade from surrounding vegetation and the watershed is largely non-forested. The lower section of Coffee Lake Creek watershed is located south of Wilsonville Road, just upstream of its confluence with the Willamette River. This southernmost segment passes through a forested riparian corridor dominated by Douglas fir, Oregon ash, and western red cedar.

Three unnamed tributaries to Coffee Lake Creek and Seely Ditch are present in the northern portion of the City: the North Tributary (Basalt Creek), the Middle Tributary, and the South Tributary. Each tributary has been significantly channelized, impounded, and in some locations piped. A majority of the buffers are non-forested, with the exception of small remnant forest patches.

Arrowhead Creek is a tributary of Coffee Lake Creek in the southwestern portion of Wilsonville. Arrowhead Creek flows through relatively gently sloped lands, except for the central reach, which is contained within a steep ravine. The upstream portion of Arrowhead Creek has been ditched and channelized with little to no forest cover, because it is adjacent to commercial and residential areas including Inza R. Wood Middle School and residential neighborhoods. The middle portion of Arrowhead Creek is bordered by a forested wetland and the stream buffer is largely forested. The lowest portion of the stream, just upstream of its confluence with Seely Ditch and adjacent to an existing gravel quarry,

flows through a culvert for approximately 200 feet. Each end of the culvert is located within a forested canopy. South of the confluence with Arrowhead Creek, a historic concrete structure, located in the channel of Coffee Lake Creek, blocks fish passage to the upper reaches of the creek.

3.2.2 Boeckman Creek

Boeckman Creek flows south through the eastern third of Wilsonville. In the northern portion of the UGB, Boeckman Creek is less than 3 feet wide and shallow. Slopes bordering the creek in the far northern portion are relatively gentle until it reaches Boeckman Road, where the slopes quickly become very steep. This area is being redeveloped from an agricultural land use to a residential development beginning in 2018. There is an existing forested stream buffer that will remain intact as part of the Significant Resource Overlay Zone (see Section 3.2.2).

South of Boeckman Road, Boeckman Creek widens to approximately 10 feet with wetlands and a connected floodplain.

Along the central and southern reaches of Boeckman Creek, much of the stream buffers are forested and largely undisturbed, but dense stands of Himalayan blackberry and English ivy have invaded areas disturbed by adjacent development.

3.2.3 Meridian Creek

Meridian Creek and its tributaries are located along the extreme eastern edge of Wilsonville. Meridian Creek originates in agricultural fields north of Boeckman Road and flows south through a residential subdivision before flowing through a culvert under Wilsonville Road. North of Wilsonville Road, the creek buffer is largely non-forested. East of Wilsonville Road, the buffer is forested.

3.2.4 Unnamed Willamette River Tributaries

Three short unnamed tributaries to the Willamette River are also present within the Wilsonville UGB. One of these is south of the Willamette River in the Charbonneau District, and the other two are north of the Willamette River between Interstate 5 and Coffee Lake Creek. The buffers of these streams are largely forested.

3.2.5 Mill Creek

An unnamed tributary of Mill Creek is present in the southwestern portion of the Wilsonville UGB in the vicinity of the former Dammasch State Hospital. This stream flows through forested and non-forested riparian corridors with varying amounts of shade cover within the buffer.

3.2.6 Newland Creek

Two unnamed tributaries to Newland Creek are located east of the Wilsonville UGB and were evaluated in conjunction with Pacific Habitat Services (PHS) shade modeling effort (Section 3.2.2). These streams flow southeast outside of the Wilsonville UGB, toward Newland Creek. Much of the stream buffer is forested, but the uppermost reaches of these streams are bordered by agricultural fields.

3.3 Management Strategies to Address LAs

Since 2009, the City has been implementing activities targeted at temperature reduction. Efforts result from the shade modeling (Section 3.3.1) and include assessing riparian restoration and planting projects identified in the subsequent 2012 and 2024 SMPs. Other efforts include updates to the City's ordinances and comprehensive plan to comply with Title 13 requirements, incentives to the public to encourage planting riparian corridors on private property, updates to the City's design and construction

standards to promote infiltration of stormwater, and public education and outreach targeted at riparian planting and restoration.

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

3.3.1 Shade Modeling and Defining Riparian Shade Zone (RSZ)

In 2008, PHS developed a shade model and conducted an inventory of riparian vegetation along Wilsonville's streams. Results were documented in the City's 2008 *TMDL Implementation Plan*.

The shade model was developed to compare summer condition radiation loading with and without a vegetated buffer. Model results were used to establish a minimum and optimum vegetated buffer width for stream reaches, depending on orientation and slope. According to the PHS modeling effort, a minimum of 35 feet of vegetated buffer is needed (from the edge of bank), with an optimum range of 35 to 55 feet. There was a significant increase in effective shade when the opposite bank was vegetated (some of the daily solar radiation occurs when the sun is shining at low angles through the vegetation on the north bank), which supports establishment of a minimum 35-foot buffer along all stream segments.

Using geographic information system data and results of the shade model, PHS delineated a functional shade buffer along Wilsonville streams. The functional shade buffer was delineated as a variable-width buffer, reflecting a minimum width of 35 feet and a maximum width appropriate for the stream's orientation. The total functional shade buffer area for the city was calculated as approximately 236 acres.

A separate exercise was completed to identify constraints to planting. These include hard constraints (areas that cannot be planted) and soft constraints (areas where plant communities other than preferred system potential vegetation are needed). Constraint area was subtracted from the total functional shade buffer area to result in a plantable RSZ of 135 acres. Of the 135 acres, 12 were located on public property and 123 were located on private property.

As documented in the 2008 *TMDL Implementation Plan*, approximately 90 percent of the plantable RSZ area is located within the Significant Resource Overlay Zone (SROZ) as adopted by the City, and thus is protected according to land use planning regulations associated with Title 3. Additionally, about 70 percent of the RSZ within the city limits currently has moderate to significant shade.

Maps depicting the RSZ delineation and identification of public and private land ownership within the RSZ were developed as shown in Figure 3-1 of the 2008 *TMDL Implementation Plan*.

3.3.2 Enforcement of Riparian Buffers

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

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

Since preserving and restoring shade are important strategies for addressing the temperature TMDL, jurisdictions that comply with Titles 3 and/or 13 are already utilizing strategies for addressing temperature. The City implements Title 3 and Title 13 requirements through Section 4.139 of the Wilsonville City Code (WCC). This section of the WCC describes the SROZ, established specifically by the City to encompass the outer boundary of a significant Goal 5 resource, lands protected under Title 3, riparian corridors, and significant wildlife habitat. The SROZ reflects a variable buffer width (i.e., a minimum 50 foot buffer for all streams, extending upwards to 300 feet for some riparian corridors), which encompasses the riparian corridor, riparian impact area, and the area of limited conflicting use (as defined by the City).

Development within the SROZ is extremely limited. Provisions of the WCC allow for activities such as removal of invasive species, public improvements (only in conjunction with an approved master plan), and minor encroachments. Mitigation standards are provided that require an area of mitigation ranging from 1.5 to 5 times the original disturbance area.

Tree protection standards are also referenced in the WCC (Section 4.600). The removal of any native tree with a diameter of 6 inches or taller is allowed only with a City-issued permit. Any proposed tree cutting in the SROZ requires submittal of a significant resource impact report unless exempt from the requirements of the section (e.g., hazardous tree removal).

Continued enforcement of the WCC ensures that adequate riparian buffer and potential shade are preserved with new and redevelopment activities. The City will annually track any updates to the WCC and Comprehensive Plan related to riparian corridors and the SROZ.

3.3.3 Riparian Planting and Revegetation

As shown in the City's 2008 *TMDL Implementation Plan*, there are limited riparian areas in Wilsonville that are not already planted or vegetated or within an SROZ protected buffer area. The two largest riparian areas in the city are Coffee Lake Creek/Seely Ditch and Boeckman Creek. The two uppermost sections of Coffee Lake Creek/Seely Ditch within City limits are defined by a historically significant ditch unsuitable for riparian plantings. A portion of the southernmost section is constrained by a Bonneville Power Authority easement that doesn't allow for overstory trees due to the proximity of the wires. Boeckman Creek is almost entirely forested within City limits and protected within the SROZ.

The City will continue to assess riparian planting and revegetation opportunities in conjunction with the riparian planting and restoration CIPs identified in the City's 2024 SMP. Ongoing maintenance is required to ensure continued vegetative coverage.

Additionally, the City will continue to partner and provide financial contributions in conjunction with other organizations (e.g., Friends of Trees, Columbia Land Trust) in support of riparian planting projects. Efforts will be documented in annual reports.

The City's upcoming SMP update provides additional opportunity for stream assessment and the evaluation of public property planting and future capital project (see Appendix B).

3.3.4 Design Standards for New Development and Redevelopment

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

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

Installation of facilities that promote infiltration address these needs. The City developed its *Stormwater and Surface Water Design and Construction Standards* in September 2014 to address these requirements.

The City requires use of their *Stormwater and Surface Water Design and Construction Standards* for both public and private projects. They are available in hard copy and on the web to city staff and the public. The City provides trainings to staff and the engineering community on use of their Standards and the associated BMP Sizing Tool. The City periodically reviews and updates their Standards to clarify and correct information. By April 1, 2021, the City will prepare a user's manual for developers and engineers with standard details and site layout recommendations in conjunction with their Standards.

3.3.5 – Capital Improvement Projects

The City's 2024 SMP provides additional opportunity for stream assessment and the evaluation of public property planting and future capital projects (see Appendix B). The City's 2024 SMP includes 30 funded and ten unfunded projects/ programs to address a variety of water quality and water quantity control objectives. Stormwater policies referenced encourage use of low- impact development (LID) for the treatment of stormwater runoff, riparian and wetland restoration and conservation, and habitat improvement for fish and wildlife. Capital improvement projects (CIPs) referenced in the 2024 SMP are prioritized and scheduled according to a proposed 5-year implementation window.

3.3.6 Public Awareness and Education

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

As part of this plan, targeted public education efforts will focus on stewardship and enhancement of riparian buffers and vegetated corridors on private property. The City will continue to provide incentives in the form of training and planting materials upon request. Educational information will be promoted through City mailings, staff participation in public schools, and other regional programs. Staff training and conference attendance related to temperature management activities will continue to be supported.

3.4 Timeline and Implementation Schedule

This updated, 2025 TMDL Implementation Plan will become effective once DEQ approves following insufficiencies outlined in the 2023 submittal. The next five-year lookback TMDL program review will be due by December 1st, 2028. Section 3 (Load Allocation Management Strategies for Temperature) of this updated TMDL IP will need to be updated by November 9th, 2026 in accordance with the recent amendment to the Willamette Subbasins Temperature TMDL and Water Quality Management Plan.

In addition to the management strategies reported in Section 3.3, Appendix B summarizes measurable goals and tracking measures for each activity. The tracking measures reflect the timeframe and schedule for implementing the specific strategies.

3.5 Monitoring and Reporting

The City is required to monitor program compliance. It does this by conducting two types of monitoring: implementation monitoring and environmental monitoring. Implementation monitoring relates to the tracking of BMP (management strategy) implementation and evaluating whether BMP measurable goals and tracking measures are met. Environmental monitoring relates to the analysis and evaluation of stormwater and in-stream pollutant concentrations.

3.5.1 Implementation Monitoring

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

The progress report is submitted to DEQ annually and provides information related to implementation of identified management strategies, as described in Section 3.3. To consolidate reporting requirements, DEQ allows the TMDL IP annual progress report to be submitted with the NPDES MS4 annual report. Such annual reports are due December 1 of each year, reflecting implementation of activities over the previous fiscal year (July 1 to June 30). Appendix B is formatted in a manner that is consistent with how the TMDL IP progress reports will be submitted in the future and includes measurable goals and tracking measures for purposes of monitoring progress.

TMDL IPs typically have a 5-year implementation period from the date of approval by DEQ. Typically, every 5 years, the City is required to review the TMDL Implementation Plan to assess progress toward meeting goals and propose changes to the management strategies as appropriate. This TMDL IP update is due December 1, 2023. Future compliance dates and submittal schedules are required in accordance with Table 3-1 and will be based on review of existing data and activities relative to pollutant reduction goals. Existing strategies will be refined to reflect progress made over the last 15 years. New strategies will be identified to continue with work to address in-stream temperature.

Table 3-1. Wilsonville TMDL IP Compliance Dates

2019 TIP Implementation	2/1/19 - 12/31/23
2022 Mercury Update to the TIP	Due 9/3/22
2022 Updated TIP Implementation	9/3/22 - 12/31/23
TIP Five-year Review	Due 12/1/23
2024 TIP Update	Due 12/1/23
2024 TIP Implementation (anticipated)	1/1/24 – 12/31/28
2025 TIP Update (to address issues with 2023 submittal)	Due Summer 2025
2026 TIP Update (Section 3 - Temperature)	Due 11/9/26
Streamside Evaluation	Due 5/9/28
TIP Five-year Review	Due 12/1/28
Annual Reports	December 1 each year (except 2023)

3.5.2 Environmental Monitoring

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

In addition to instream monitoring conducted under the NPDES MS4 permit and CCCSMP, the City will conduct instream temperature monitoring in the Coffee Lake Creek and Boeckman Creek watersheds at select locations to build on historic data sets and identify any anomalies in the data. The City will compile and evaluate the data and submit with their TMDL annual reports.

Section 4

Evidence of Compliance with Applicable Land Use Requirements

Oregon Administrative Rules (OAR) 340-042-0080(3) (a) (D) defines one of the required elements of a total maximum daily load (TMDL) Implementation Plan to be evidence of compliance with applicable statewide land use requirements. Per the TMDL Implementation Plan Guidance Document, this consists of the following:

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

Wilsonville's comprehensive plan has been acknowledged by the Land Conservation and Development Commission (LCDC) to be compliant with Oregon Statewide Land Use Goals. The comprehensive plan is periodically reviewed by the City of Wilsonville (City) in coordination with LCDC and updated to ensure that it continues to comply with these goals. The comprehensive plan was revised in its entirety on October 16, 2000 and was last updated July 2013. An update in 2009 included incorporation of Ordinance 674 addressing Metro Title 13 (Nature in Neighborhood) compliance. In addition, other miscellaneous ordinances that refine master plans (i.e., the *City of Wilsonville Stormwater Master Plan*) and update land development code provisions have been completed. The periodic updates to the comprehensive plan allow for consistency with other planning documents and standards.

The comprehensive plan is organized into four sections: citizen involvement, urban growth management, public facilities and services, and land use and development. Within each section are specific goals, policies, and implementation measures that the City has developed to provide the framework for land use decisions within Wilsonville to comply with state land use planning goals. Several of these goals, policies, and implementation measures, specifically those contained in Section C (Public Facilities and Services) and Section D (Land Use and Development), are consistent with the intent of this TMDL Implementation Plan update.

Section C contains several implementation measures to maintain or improve the condition of natural features and fish and wildlife. Implementation measure 3.1.7.d states that "*major natural drainage ways shall be retained and improved as the backbone of the drainage system and designated as open space. The integrity of these drainage ways shall be maintained as development occurs….*" Implementation measure 3.1.7.p states that "*developers may be subject to retaining or improving native riparian vegetation in order to "decrease the amount of surface water run-off, to shade areas of surface water, to preserve areas of natural percolation, help stabilize landslide-prone areas, and reduce erosion*." Implementation measure 3.1.7.q also provides measures for prevention of channel erosion through the stabilizing of discharge points of culverts and storm drainage systems, using energy dissipaters if required. In addition, Implementation measures 3.1.11.i and 3.1.11.k provide measures for the protection of natural corridors such as river-connected wildlife habitat by limiting and restricting access to specified natural areas. These implementation measures are consistent with strategies in Section 3 of this plan.

Section 5

Additional Requirements

The fifth component of total maximum daily load (TMDL) Implementation Plans required by Oregon Administrative Rules 340-042-0025 is "any other analyses or information as specified in the Water Quality Management Plan (WQMP)." The WQMP for the *Willamette Basin TMDL* requires a fiscal analysis, a summary of legal authority, a summary of how the City will address public involvement, and how the City will address cold-water refugia (CWR) below river mile 50 of the Willamette River main stem. This section addresses these requirements.

5.1 Legal Authority

The City of Wilsonville (City) has existing ordinances that provide authority for implementation of portions of this TMDL Implementation Plan. The City currently operates under a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit that has ordinances for illicit discharges, erosion control, and post-construction site runoff, as necessary to implement the best management practices outlined within it, and also to implement the management strategies described in Section 2 to address bacteria and mercury.

The City also has ordinances to implement natural resource protection efforts. The current land development code, as described in Section 3.3, and comprehensive plan, as described in Section 4, pertain to the City's authority to implement management strategies proposed to address the temperature TMDL (Section 3).

5.2 Funding

The City's stormwater utility rate funds public works, operation and maintenance, and administrative activities to comply with conditions specified in its NPDES MS4 permit. Funds from the stormwater utility rate are also used to design and construct capital improvement projects identified in the City of Wilsonville's 2024 SMP. Additionally, funds from the stormwater utility are used to provide planting materials and other incentives for private property owners to conduct planting activities.

Annually, the City contributes a minimum of $5,000 to Friends of Trees to support their planting and habitat enhancement activities on public property. The City also contributes $10,000 annually to the Columbia Land Trust who administers the Backyard Habitat Certification Program. This program compliments the work of Friends of Trees as it is designed to enhance local native habitats on private property.

To assess the percentage of programmatic funds applicable to protecting and enhancing riparian buffers throughout the City, the ratio of SROZ protected land to total city limit acreage was applied to the total Stormwater Program expenditure for the 2024-25 NPDES MS4 Phase 1 permit reporting year (funds associated with administering the City's NPDES MS4 permit and SWMP, and maintenance of public infrastructure). The city has come to the conclusion that roughly 20% percent of the total Stormwater Program expenditure is applicable to implementing management strategies on non-point source areas of the City based on the following metrics:

- Total acreage with Wilsonville city limits: 4,966.4 acres (7.76 sq mi)
- Total acreage within SROZ: 990.91 acres

- Percent of land covered by the city's SROZ ordinance: 19.95%, or ~20%

Please see Table 4 below for the percentage allocation for employing this TMDL IP, based on programmatic costs from the 2024-25 NPDES MS4 permit reporting year.

Table 5-1. Stormwater Program Expenditures – Reporting Year 2024-25		
	Management Activities	Maintenance Activities
Wages and benefits	$304,999	$371,272
Materials and services	$91,745	$602,568
Total: $1,370,584.00		
Total for TMDL IP: $274,116.80 (20% of total Stormwater Program Expenditure)		

5.3 CWR

CWR can be described as patches of water within a stream that are 1 or 2 degrees cooler than the surrounding ambient stream temperature, resulting from the cool inflow 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). Alteration to river channel structure including removal or lack of large woody debris and modifications to deep pools and overhanging bank areas can reduce the presence of CWR. McIntosh et. al. (1998), in its study of CWR in the Klamath Basin using forward-looking infrared technology, concluded that areas of CWR appeared to be at a junction where tributaries meet.

According to the 2022 Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study, the designated beneficial use in Oregon's water quality standards for the lower 50-mile reach of the Willamette River is "salmon and steelhead migration corridor." Oregon designated the migration corridor use for large lower mainstem river reaches where the primary and most sensitive aquatic life use is for adult salmon and steelhead migration during the summer, and where lesser or no use for salmonid rearing occurs in the months of July and August. Per DEQ's associated WQMP, the temperature TMDL Implementation Plan designates that jurisdictions in areas below river mile 50 of the Willamette River main stem "shall look at identifying existing cold water refugia and provide options for protecting or enhancing such areas."

In 2017, the City participated in a study with the United States Geological Survey (USGS) and other jurisdictions including the City of Lake Oswego to evaluate water temperature in tributaries and the mainstem Willamette River. Water temperature readings were collected using continuous temperature sensors and point measurements along a 5-km reach of the Willamette River (the Wilsonville Reach) where Wilsonville tributaries including Coffee Lake Creek and Boeckmann Creek discharge. Findings showed that tributaries along the Wilsonville Reach were consistently 1-10 degrees C cooler than the main channel of the Willamette River, except for short periods where Coffee Lake Creek was warmer. Findings confirm that the junctions where Wilsonville's tributaries meet the Willamette River are consistent with the definition of CWR. The City's work to address elevated temperatures in tributaries to the Willamette River is coupled with restoration activities and stormwater design standards that require infiltration of new surface flows. Public incentive programs for planting trees on private property is making progress towards meeting temperature criteria that apply to migration corridors, i.e., a 7-day

average of maximum temperature at 20°C (68.0 degrees Fahrenheit). The narrative criterion states that these water bodies must have sufficiently distributed CWR that allow salmon and steelhead migration without significant adverse effects from a rolling weekly average of daily maximum water temperatures up to 20°C.

5.4 Public Involvement

The City addresses public involvement for management strategies described in Section 2 in conjunction with its NPDES MS4 permit requirements.

Public involvement will be provided for this TMDL Implementation Plan update (and associated management strategies highlighted in Section 2.1 and 3.3) through use of the City's website. The plan will be posted on the City's website, available for public review, for a minimum of 7 days. Comments will be received, logged, and considered by City staff.

Section 6

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Appendix A: SWMP Implementation Activities

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

Table A-1. Wilsonville SWMP Implementation Activities

Best Management Practice (BMP) Number		Addresses bacteria?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2022 SWMP)	Annual tracking measures (2022 SWMP)
Number	Name					
Public Education and Outreach (Schedule A.3.a)[a]						
PEO-1	Public Education Participation	●	●	Community Development Department, Natural Resources Program	• Utilize the City's newsletters, social media, and website to promote public awareness of stormwater quality issues and encourage public reporting of illicit discharges. • Publish two (2) articles per year in the Wilsonville Business Newsletter targeting stormwater issues associated with the business community (e.g., trash enclosure maintenance, outside storage of waste materials, outdoor washing, etc.). • Publish three (3) articles per year educating the public on stormwater issues (e.g., car washing, dog poop disposal, yard and garden products, etc.). • Distribute door hangers as necessary in neighborhoods where non-stormwater/illicit discharges have been identified. • Engage the City's Diversity, Equity, and Inclusivity (DEI) Committee to identify additional language translations needs of the public, if necessary. • Annually distribute newsletters to local business that include targeted stormwater messaging. • Financially support regional public education campaigns and programs. Utilize available outreach materials and distribute at a local scale.	1. Track the number of stormwater-related educational articles or materials published per year. 2. Track the number of door hangers distributed annually.
PEO-2	Staff Training	●	●	Community Development Department, Public Works Department, and Parks and Recreation Department	• Conduct municipal staff training in accordance with frequencies outlined in the Municipal Staff MS4 Training Strategy. • Attend scheduled Clackamas County co-permittee meetings and coordinate regarding regional water quality efforts.	1. Track the number of municipal staff training activities provided by the City. 2. Track staff participation in training activities. 3. Track any cost share or jointly funded projects conducted annually.
Public Involvement and Participation (Schedule A.3.b) [b]						
PI-1	Public Involvement and Participation	○	○	Community Development Department, Natural Resources Program	• Maintain a publicly accessible website with the SWMP, Monitoring Plan, annual reports, program contact information, educational/reference materials, and reporting requirements for illicit discharges. • Provide a 30-day public comment period, and consider comments received for updates to the Monitoring Plan, the SWMP, and other strategy documents as required. • Maintain the MS4 Document Library on the City website.	1. Track the number of comments/questions received from the public on documents submitted for 30-day public review. 2. Track updates to the publicly accessible website annually and revise content and links as needed.
PI-2	Public Stewardship Opportunities	●	●	Community Development Department, Natural Resources Program, Public Works Department, and Parks and Recreation Department	• Continue organizing public outreach programs such as Adopt-a-Road and WERK Day. • Continue participation in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Continue to support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.	1. Estimate volunteer and public participation in City-sponsored stewardship events. 2. Track the number of trees provided through the Tree Coupon program. 3. Track the number of collaboration projects where City employees are regularly engaging with school-based activities.
Illicit Discharge Detention and Elimination (Schedule A.3.c) [c]						
ILL-1	Illicit Discharge Detection and Elimination	●	●	Community Development Department, Natural Resources Program and Public Works Department	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge in conjunction with time frames outlined in the City's MS4 NPDES Permit. • By December 1, 2023, review and update the City's IDDE SOP to clarify enforcement procedures and response timeframes in conjunction with the NPDES MS4 permit.	1. Track the enforcement activities (i.e., number, type of discharge, general location, etc.) related to any illicit discharge investigation conducted.

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

Table A-1. Wilsonville SWMP Implementation Activities

Best Management Practice (BMP) Number		Addresses bacteria?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2022 SWMP)	Annual tracking measures (2022 SWMP)
Number	Name					
ILL-2	Spill Prevention, Training, and Response	●	●	Community Development Department, Natural Resources Program and Public Works Department	• City staff to respond to non-hazardous materials spills. • Ensure all appropriate parties, including State and National Emergency Response Systems as necessary, are notified of spills. • Train City staff to the OSHA First Responder Operations level. • Continue to use the "Citizen Complaint or Request Form" form to facilitate public reporting of spills, illicit discharges, and dumping. • Include the phone number and website for reporting illicit discharges in a minimum of one published article each year.	1. Track number of City employees attending OSHA spill-response training and/or refresher courses. 2. Track the number of citizen-reported concerns received each year and any follow-up actions resulting from the requests. 3. Track the type/source of pollutant discharges associated with each reported spill.
ILL-3	MS4 Mapping	○	○	Community Development Department, Engineering Division and Public Works Department, Information Systems and Geographic Information Systems Division	• Continually maintain the online GIS mapping for public viewing. • Add municipal structural stormwater controls in accordance with facility category naming to the available map online within 1 year of receiving the as-builts. • As necessary, create a tracking system for repeat illicit discharges over time and integrate into the MS4 mapping.	1. Annually, track the number of new public and private water quality facilities added to Wilsonville Maps associated with new development. 2. Annually, track the number of new outfalls added to the Wilsonville Maps associated with new development. 3. Track the number of repeat illicit discharges integrated into the MS4 mapping. 4. As applicable, track any capital improvements needed or implemented to eliminate recurring or chronic illicit discharges.
ILL-4	Dry Weather Field Screening	●	●	Community Development Department, Natural Resources Program	• Inspect all high priority field screening locations annually for illicit discharges in accordance with the dry weather field screening procedures as outlined in the IDDE SOP. • By December 1, 2023, review and update high priority locations and criteria, as necessary, based on outcomes from inspections and other public reporting. Update locations on mapping and in the IDDE SOP. • Notify the Public Works Director of all positively identified illicit connections and take necessary actions to eliminate them. • As necessary, update existing outfall mapping and priority dry weather field screening locations in accordance with field observations.	1. Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. 2. Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. 3. Indicate the outcome and resolution of any dry weather investigation activities conducted.
Construction Site Runoff Control (Schedule A.3.d) [d]						
EC-1	Erosion Control and Construction Site Management	●	●	Community Development Department, Engineering Division	• Require all new and redevelopment disturbing over 500 ft2 to obtain an Erosion and Sediment Control Permit. • Require a copy of all 1200-C permit applications for development resulting in land disturbance of greater than or equal to five acres. • Assess new and redevelopment applications for erosion control compliance during plan review. Require erosion and sediment control plans not in compliance to be amended prior to approval in conjunction with provisions outlined in the Clackamas County Erosion Prevention and Sediment Control Manual (2020), City Standards, and applicable permits.	1. Report any updates or modifications to the Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (2020). 2. Track the number of erosion and sediment control plans approved. 3. Track the number of 1200-C permits issued.
EC-2	Erosion Control Inspections and Enforcement	●	●	Community Development Department, Engineering Division	• Conduct a minimum of three (3) erosion control inspections on all construction sites issued an Erosion and Sediment Control Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the WC Section 8.318. • Require all disturbed areas to be permanently stabilized or revegetated prior to final inspections by the Engineering or Building Divisions. • By December 1, 2023, review and, if necessary, update enforcement response procedures and escalating enforcement specific to erosion and sediment control in WC and Public Works Standards.	1. Track the number of erosion control inspections conducted each year. 2. Report the number of notices of non-compliance and stop work orders issued, and describe the measures used to resolve the issue. 3. Track the number and type of enforcement actions taken by the City and/or DEQ.

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

Table A-1. Wilsonville SWMP Implementation Activities

Best Management Practice (BMP) Number		Addresses bacteria?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2022 SWMP)	Annual tracking measures (2022 SWMP)
Number	Name					
Post-Construction Site Runoff for New Development and Redevelopment (Schedule A.3.e) [e]						
PC-1	Stormwater Planning and Development Review	●	●	Community Development Department and Public Works Department	• Continue to require all new and redevelopment projects that add or replace 5,000 ft² or more of impervious surface to implement the City's Stormwater and Surface Water Design and Construction Standards (Section 3 of the Public Works Standards). Review plans for compliance with stormwater requirements. • By December 1, 2023, if deemed necessary with current implementation of the City's stormwater design standards, review and document updates to the City's LID Guidebook and Public Works Standards to refine preferred LID/GI approaches and strategies for development within the ROW. • By December 1, 2024, as necessary, update Section 3 of the Public Works Standards to include reference to either the Numeric Stormwater Retention Requirement (NSSR) or Alternative Site Performance Standards.	1. Track number of development applications reviewed for compliance with the City's stormwater requirements. 2. Track new and redeveloped impervious surface in conjunction with annual reporting requirements. 3. Track the number, type, and ownership of structural water quality and quantity facilities installed.
Pollution Prevention and Good Housekeeping for Municipal Operations (Schedule A.3.f) [f]						
OM-1	Municipal Stormwater Pollution Prevention	●	●	Community Development Department, Natural Resources Program; Public Works Department; Parks and Recreation Department; and SMART Transit	• Implement BMPs outlined in the City's SWPPS on an ongoing basis. • By December 1, 2024, review and update the SWPPS for consistency with current use, practices, and new facility installations (i.e., pending Public Works facility). • Ensure litter control language is included in new event contracts and facility rental agreements. • Attend applicable conferences and trainings, as appropriate.	1. Report any updates or modifications to the City's SWPPS. 2. Report any capital improvements to municipal facilities that treat, store, or transport municipal waste.
OM-2	Routine Road Maintenance	●	●	Public Works Department, Roads and Stormwater Division	• Sweep all curbed City streets monthly. • Schedule and conduct street maintenance activities during dry weather conditions. • Continue to sponsor the Adopt-a-Road program, Bulky Waste Day, and Fall Leaf Collection Day. • Implement the Winter Weather Response Plan as documented.	1. Track length and frequency of roadway swept annually. 2. Track volume of debris removed annually. 3. Track the number of winter weather events annually, including material storage quantities and locations, type and quantity (e.g., pounds per mile) of material used on City roads, and any other actions taken to protect waters of the state for areas where that data is available or becomes available during the permit term.
OM-3	Pest Management	●	●	Community Development Department, Natural Resources Program; Public Works Department; and Parks and Recreation Department	• Follow the current IPM principles for public landscape maintenance. • Require all staff and hired contractors applying chemicals within the City comply with federal, state, and local requirements. • Publish annual IPM activity report on City website.	1. Track amount of pesticides and fertilizers applied to public property and general areas of application. 2. Estimate number and area of sites where the planting of native vegetation was incorporated into the maintenance activities.
OM-4	Conveyance System Cleaning	●	●	Public Works Department, Roads and Stormwater Division	• Conduct CCTV inspection of approximately 15% of the public stormwater conveyance system annually; inspect other public conveyance systems as required. • Maintain and repair public conveyance system as needed based on inspections. • Refine the internal inspection guidelines to help facilitate ongoing inspection efforts.	1. Track maintenance activities related to the conveyance system each year. 2. Estimate the length of the public stormwater conveyance system inspected via CCTV annually.
OM-5	Catch Basin Cleaning	●	●	Public Works Department, Utilities Division	• Clean all high-priority public catch basins annually and the remaining public catch basins over a four-year period. • Inspect catch basins for maintenance and repair needs during catch basin cleaning activities. • Schedule catch basin repair activities as needed, based on inspections. • Refine the internal inspection guidelines to help facilitate ongoing inspection efforts. • Update tracking database during each maintenance cycle.	1. Track percent of total catch basins cleaned each year. 2. Track number of catch basin repair activities conducted each year. 3. Estimate volume of debris removed annually.

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

Table A-1. Wilsonville SWMP Implementation Activities

Best Management Practice (BMP) Number		Addresses bacteria?	Addresses mercury and TSS (DO)?	Responsible City Department	Measurable Goals (2022 SWMP)	Annual tracking measures (2022 SWMP)
Number	Name					
OM-6	Public Structural Facility Operation and Maintenance	●	●	Community Development Department, Natural Resources Program; Public Works Department; and Parks and Recreation Department	• Inspect public structural controls annually and maintain and/or repair as needed. • Maintain GIS database for public water quality structural controls. • In conjunction with updates to post-construction standards, by December 1, 2024, update the City's internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) being used in the City.	1. Track number of public stormwater structural controls inspected. 2. Track number of public stormwater structural controls maintained.
OM-7	Private Structural Facility Operation and Maintenance	●	●	Community Development Department, Natural Resources Program	• Promote maintenance of private structural facilities through the tracking of O&M Plans and Stormwater Maintenance and Access Easement agreements. • Maintain GIS database for private structural facilities.	1. Track agreements on file for private structural control facilities. 2. Track number of private annual inspection and maintenance reports received annually. 3. Track the number of private structural facilities inspected by City staff annually.
OM-8	Develop Planning Documents in Support of Water Quality	●	●	Community Development Department, Natural resources Program	• By December 1, 2023, complete public outreach related to the updated 2023 Stormwater Master Plan. • By December 1, 2023, document and submit a summary of outcomes the City's 2015 Retrofit Strategy and 2015 Hydromodification Assessment, in accordance with the 2023 Stormwater Master Plan. • Implement water quality, flood control, and natural resource CIPs in accordance with the effective Stormwater Master Plan.	1. Track the status of the City's Stormwater Master Planning efforts. 2. Track the number of CIP/retrofit projects implemented each year and discuss the added benefit (water quality, hydromodification, habitat restoration, etc.) of each. 3. Map the location and drainage area of water quality CIPs/retrofits as they are constructed.
Industrial and Commercial Facilities (Schedule A.3.g)[g]						
IND-1	Industrial and Commercial Inspection Program	●	●	Community Development Department, Natural Resources Program; and Public Works Department	• By December 1, 2023, update the Industrial/Commercial Facility Inspection Program SOP with updated facility prioritization, inspection and documentation procedures. • Obtain completed Environmental Surveys from new businesses (i.e., non-residential sewer users) annually, to identify whether the business is a potential high pollutant source facility. • Update facility information by sending the Environmental Survey or obtaining additional data related to onsite activities for all businesses once over the permit term, to confirm accuracy of the high pollutant source facility inventory. • As applicable, identify facilities needing NPDES 1200Z permits and notify the facility and DEQ within 30 days. • Annually conduct windshield surveys of potential high pollutant source facilities. • Annually conduct formal business site inspections on up to five potential high pollutant source facilities.	1. Track the number of facilities inspected annually. 2. Track the number of existing and potential new 1200Z permitted facilities identified annually. 3. Track any enforcement actions associated with inspections.

a. *Activities associated with Public Education and Outreach (Schedule A.3.a) address the Minimum Control Measure #2 (Public Education and Outreach) for mercury.*
b. *Activities associated with Public Involvement and Participation (Schedule A.3.b) address the Minimum Control Measure #3 (Public Involvement and Participation) for mercury.*
c. *Activities associated with Illicit Discharge Detention and Elimination (Schedule A.3.c) address the Minimum Control Measure #4 (Illicit Discharge Detection and Elimination) for mercury.*
d. *Activities associated with Construction Site Runoff Control (Schedule A.3.d) address the Minimum Control Measure #5 (Construction Site Runoff Control) for mercury.*
e. *Activities associated with Post-Construction Site Runoff for New Development and Redevelopment (Schedule A.3.e) address the Minimum Control Measure #6 (Post Construction Site Runoff for New and Redevelopment) for mercury.*
f. *Activities associated with Pollution Prevention and Good Housekeeping for Municipal Operations (Schedule A.3.f) address the Minimum Control Measure #1 (Pollution Prevention and Good Housekeeping for Municipal Operations) for mercury.*
g. *Activities associated with Industrial and Commercial Facilities (Schedule A.3.g) address the Minimum Control Measure #1 (Pollution Prevention and Good Housekeeping for Municipal Operations) for mercury.*

Appendix B: Temperature Management Strategies

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

Table B-1. Management Strategies to Address LAs for Non-Point Areas

TMDL IP Activity	Implementation Strategy	Applicable TMDL Parameter			Measurable Goal(s) *Methods to meet strategies*	Implementation Tracking/Performance Measure *Demonstration of implementation*	Timeline	Milestones *Intermediate indicators of progress*	City Department	Status (to be populated with each annual report)
		Bacteria (E. coli)	Mercury	Temperature						
Riparian Area Management	Enforce riparian buffers to protect existing vegetation and minimize impacts to surface waters due to development.	●	●	●	Continue to implement Wilsonville Municipal Code (WMC), Chapter 4 – Planning and Land Development, related to the following: • Section 4.139 - Implementation of the Significant Resource Overlay Zone (SROZ). The SROZ reflects compliance with Title 3 and Title 13 requirements. • Section 4.600 – Limitations on tree removal and tree cutting in the SROZ.	• Annually track WMC and Comprehensive Plan updates related to Title 3/ 13 compliance.	Ongoing	N/A – WMC is currently consistent with Title 3/13 compliance.	Community Development	
	Evaluate opportunities for targeted planting efforts to improve shade conditions throughout Wilsonville waterbodies	○	○	●	Conduct a desktop GIS evaluation and inspect/ ground truth sites identified as public planting opportunity areas shown in Appendix D.	• Document planting progress and overall site feasibility based on the desktop GIS evaluation and inspection/ ground truthing efforts.	Ongoing	• By June 30, 2024, compile mapping information per Appendix D and updated aerial imagery. • By April 1, 2025, ground truth public planting sites identified per Appendix D. • By November 1, 2025, prepare a maintenance and planting schedule for applicable public planting sites based on ground truthing exercise.	Community Development	
		○	○	●	Continue participation in opportunistic planting efforts with local and state agencies and organizations.	• As applicable, document planting and vegetation enhancement efforts on public property and private property.	Ongoing	N/A – Implementation is ongoing and opportunistic.	Community Development	
		○	○	○	Continue partnerships and financial contributions to Friends of Trees and Columbia Land Trust.. Partnership may include in-kind staff participation on governing boards, technical/ permitting support for sponsored projects within the City, or financial contributions.	• Annually contribute a minimum of $5,000 to Friends of Trees. • Annually contribute a minimum of $10,000 to Columbia Land Trust • **Annually obtain status reports from Friends of Trees to identify planting locations over the reporting year.**	Ongoing	Annually report on financial contributions to Friends of Trees and Columbia Land Trust.	Community Development	

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Table B-1. Management Strategies to Address LAs for Non-Point Areas

TMDL IP Activity	Implementation Strategy	Applicable TMDL Parameter			Measurable Goal(s) *Methods to meet strategies*	Implementation Tracking/Performance Measure *Demonstration of implementation*	Timeline	Milestones *Intermediate indicators of progress*	City Department	Status (to be populated with each annual report)
		Bacteria (E. coli)	Mercury	Temperature						
		○	○	●	Assess riparian planting and restoration capital project needs in accordance with DEQ's March 2020 cold water refugia (CWR) study and efforts associated with the City's Stormwater Master Plan (SMP) update.	• Review results of DEQ's CWR study (March 2020) and identify potential CWR opportunity areas relevant to the City. • Assess feasibility of planting activities at CWR opportunity areas using GIS mapping and/or field investigation efforts. • Conduct stream assessment to assess vegetative cover conditions along specific stream reaches and identify restoration-related capital project needs as part of the SMP update. • As applicable, incorporate planting and restoration project needs into the City's stormwater capital improvement program. • Annually document completion of riparian planting and restoration capital projects per the City's SMP update.	• Ongoing	• By June 30, 2027, ground truth any CWR opportunity areas, previously identified by the City. • By June 30, 2028, evaluate the continued applicability of unconstructed riparian planting and restoration CIPs per the City's 2024 SMP. • By May 9, 2028, summarize results from the stream assessment effort. • Please note that capital project implementation is subject to prioritization schedules outlined in the 2024 SMP.	• Community Development	
Design Standards for New and Redevelopment	Implement design standards that promote infiltration for public and private development projects.	●	●	●	Promote the use of infiltration for stormwater management through updated stormwater design standards, facility details, sizing tools, and the City's 2024 SMP.	• As applicable, document changes or updates to the City's stormwater design standards. • As applicable, incorporate water quality project needs into the City's stormwater capital improvement program.	• Ongoing	• By April 1, 2028, update the user manual for developers and engineers with most recent standard details for recommended stormwater treatment facilities.	• Community Development	

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Table B-1. Management Strategies to Address LAs for Non-Point Areas

TMDL IP Activity	Implementation Strategy	Applicable TMDL Parameter			Measurable Goal(s) *Methods to meet strategies*	Implementation Tracking/Performance Measure *Demonstration of implementation*	Timeline	Milestones *Intermediate indicators of progress*	City Department	Status (to be populated with each annual report)
		Bacteria (E. coli)	Mercury	Temperature						
Public Awareness and Education	Continue to provide information regarding water quality-related issued and shade preservation efforts to the public.	●	●	●	Using the City newsletter, annually distribute a minimum of one article related to non-point source issues and management approaches.	• Annually track the number and content of non-point source – related articles distributed to City residents by the City.Annually document shade planting incentives (materials, trainings, etc.) provided to citizens.	• Ongoing	Annually report on article publications related to bacteria, mercury, and/or temperature management.	Community Development	
		●	●	●	Promote regional programs targeted at improving habitat on private property. Continually distribute information regarding regional programs in City outlets.	Annually document the methods of information distribution conducted by the City.	• Ongoing	N/A – Implementation is ongoing.	Community Development	
		●	●	●	Participate in student education and outreach activities in local schools, providing instruction on the importance of maintaining riparian buffers for shade and temperature management.	As applicable, document participation and activities conducted with local schools.	• Ongoing	N/A – Implementation is ongoing.	Community Development	
		●	●	●	Support staff training opportunities related to water quality, TMDL compliance, and temperature management through conference attendance and other education activities.	Annually provide up to 8-hours of staff training activities.	• Ongoing	Annually report, on staff trainings and conference attendance.	- Community Development Public Works	
Environmental Monitoring	Monitor surface water temperature to document status and evaluate trends with respect to water quality standards.	○	○	●	In conjunction with NPDES MS4 requirements, conduct sampling for temperature at required instream monitoring locations.	As applicable, annually report any modification to existing temperature monitoring activities.	• Ongoing	N/A – Implementation is ongoing.	Community Development	
		○	○	●	Conduct ongoing temperature monitoring in the Coffee Lake Creek and Boeckman Creek watersheds over this 5-year TMDL implementation period to build on historic datasets and identify anomalies.	Annually summarize this supplemental monitoring in tabular and narrative format.	• Ongoing	N/A – Implementation is ongoing. Please note that CCCSMP updates are subject to issuance of the City's NPDES MS4 permit. This effort is not currently reflected in the 2023 CCCSMP.	• Community Development	

Appendix C: Metro Title 3 and Title 13 Summary

Appendix C

Metro Title 3 and Title 13 Summary

C.1 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. Title 3 implements 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.

See Figure C-1 for Title 3 vegetated buffer widths for protected water features. To implement Title 3, many cities have adopted Table 3.07-3, along with a portion of the Title 3 model ordinance into their city code. Several exemptions are allowed for various reasons and are outlined specifically in Title 3 (Metro 1998).

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

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

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

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%	• 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]	• 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]	• 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%	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	15 feet
Secondary Protected Water Features[2]	≥ 25%[5]	• Edge of bankfull flow or 2-year storm level; • Delineated edge of Title 3 wetland	50 feet

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

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

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

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

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

Figure C-1. Title 3 (Table 3.07-3) - required width of vegetated corridor

C.2 Title 13

The Title 13 model ordinance was also created by Metro in 2006. However, it was created to provide clear objective standards and a discretionary review process for implementation of Oregon Statewide Land Use Goal 5. Goal 5 is focused on the protection of natural resources and open space. The purpose of Title 13 is to provide guidelines in order for local jurisdictions to:

1. Conserve, protect, and restore a continuous ecologically viable streamside corridor that is integrated with upland wildlife habitat, and
2. Control and prevent water pollution in order to protect public health and improve the region's water quality.

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

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

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

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

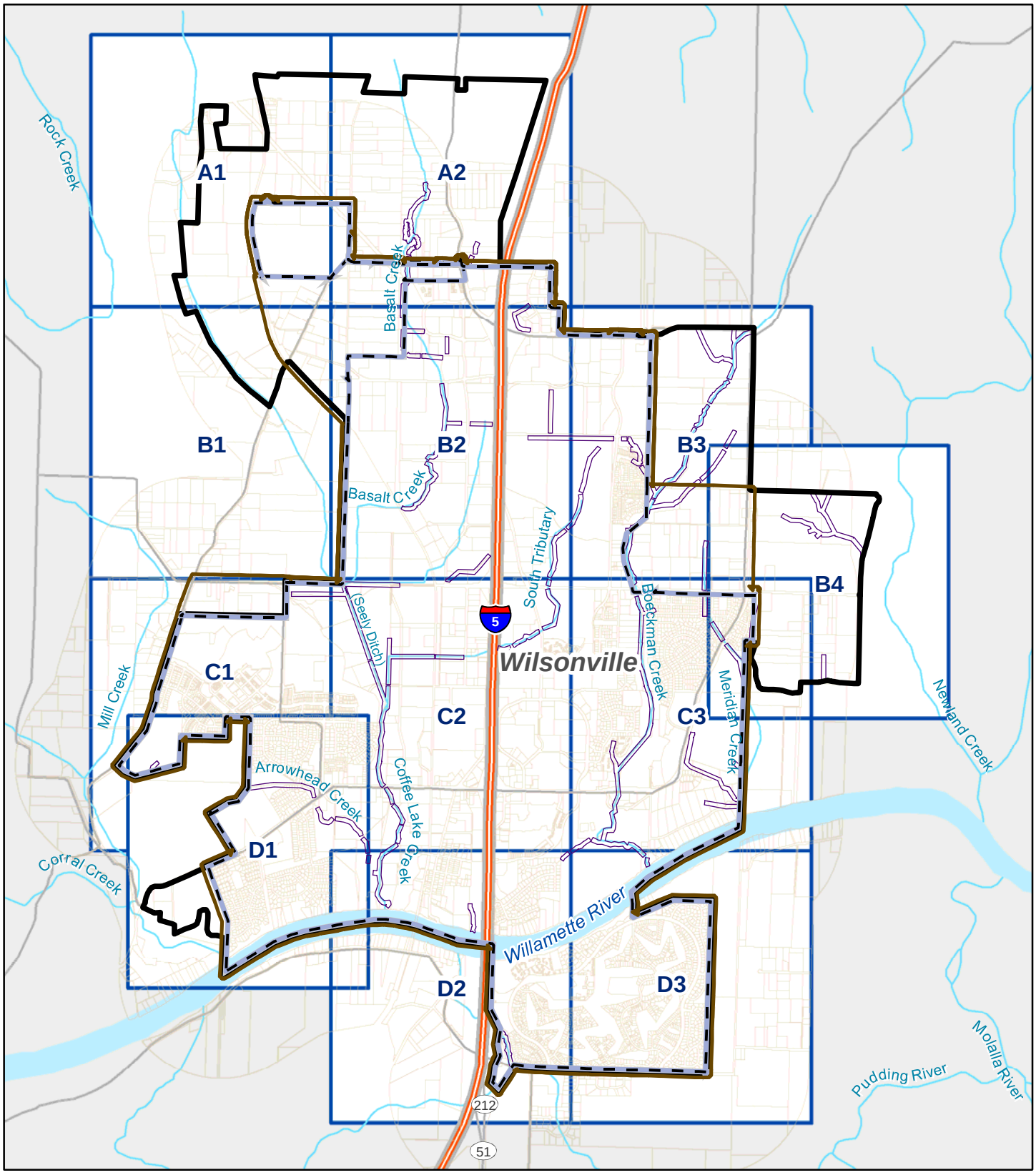
Several exemptions are allowed for various reasons and are outlined specifically in the title. In essence, Title 13 promotes vegetative buffers around water bodies for protection of wildlife habitat through the preservation and improvement of designated habitat conservation areas. Title 13 and its corresponding model ordinance describe specific design and construction practices to minimize impacts on wildlife corridors and fish passage. Performance and implementation objectives and measurable targets are outlined in the title, specifically related to design and construction practices that would be employed.

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

C.3 Title 3 and Title 13 Comparison

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

Appendix D: Shade Opportunity Mapping (2008)



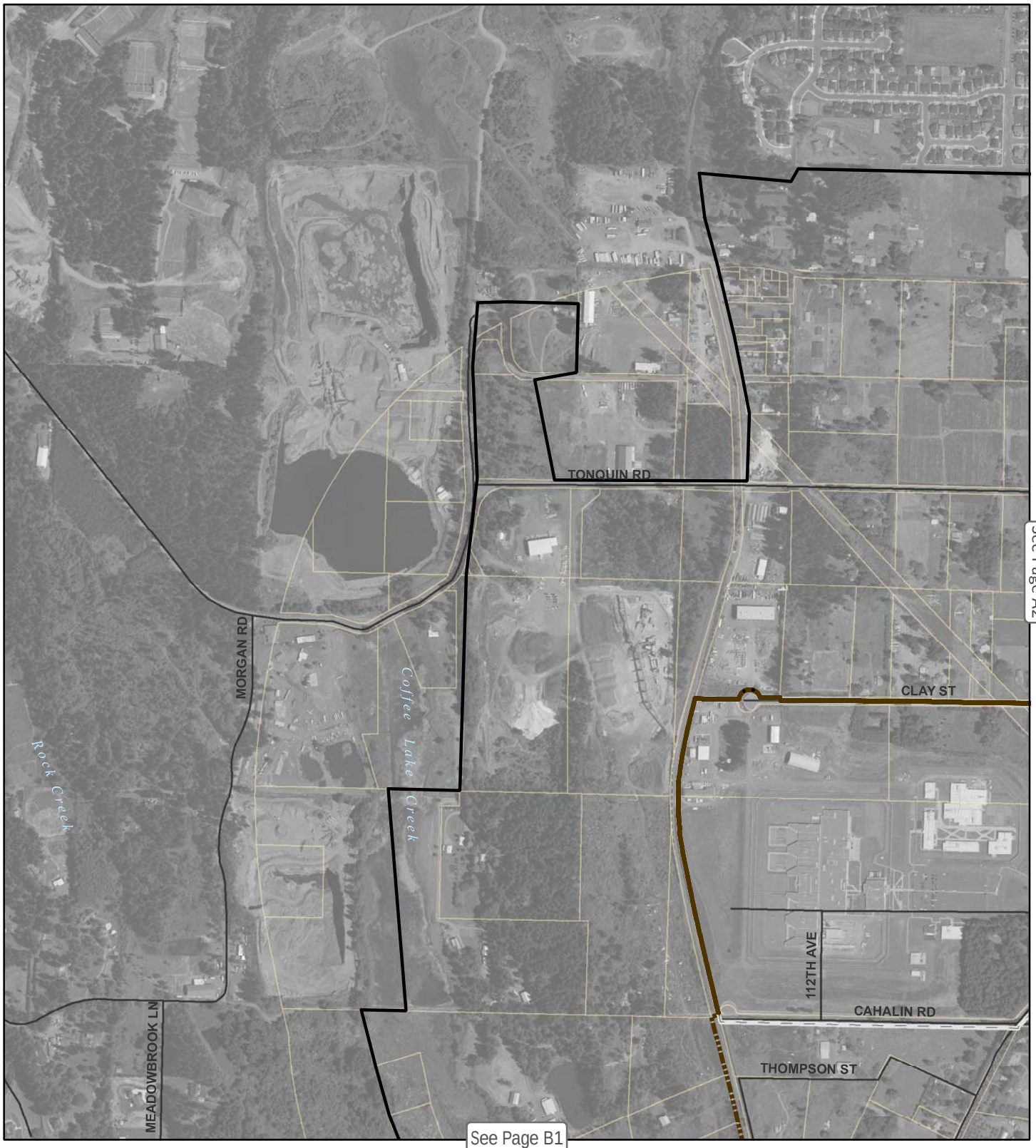
City of Wilsonville
Temperature TMDL Implementation Plan
Figure 3-1. Riparian Shade Index Map

0 0.25 0.5 1 Miles

N

Study Area
TMDL Policy Extents
Stream/River
Tax Lots
UGB Boundary
City Limits

Produced by GeoDataScape, Inc. :K:\Projects\WilsonvilleTMDL\MapDocs\Wilsonville_TMDL_Index_fig3.mxd, March 20, 2008



City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

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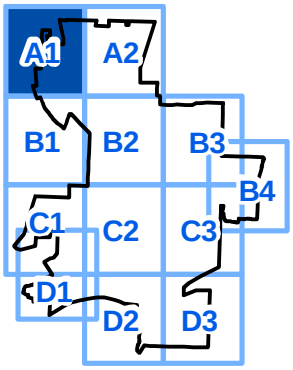
Riparian Shade on Public Lands
Riparian Shade on Private Lands
Hard Constraints
Soft Constraints

Study Area
Tax Lots
UGB Boundary
City Limits
Streams

N

0 250 500 1,000 Feet



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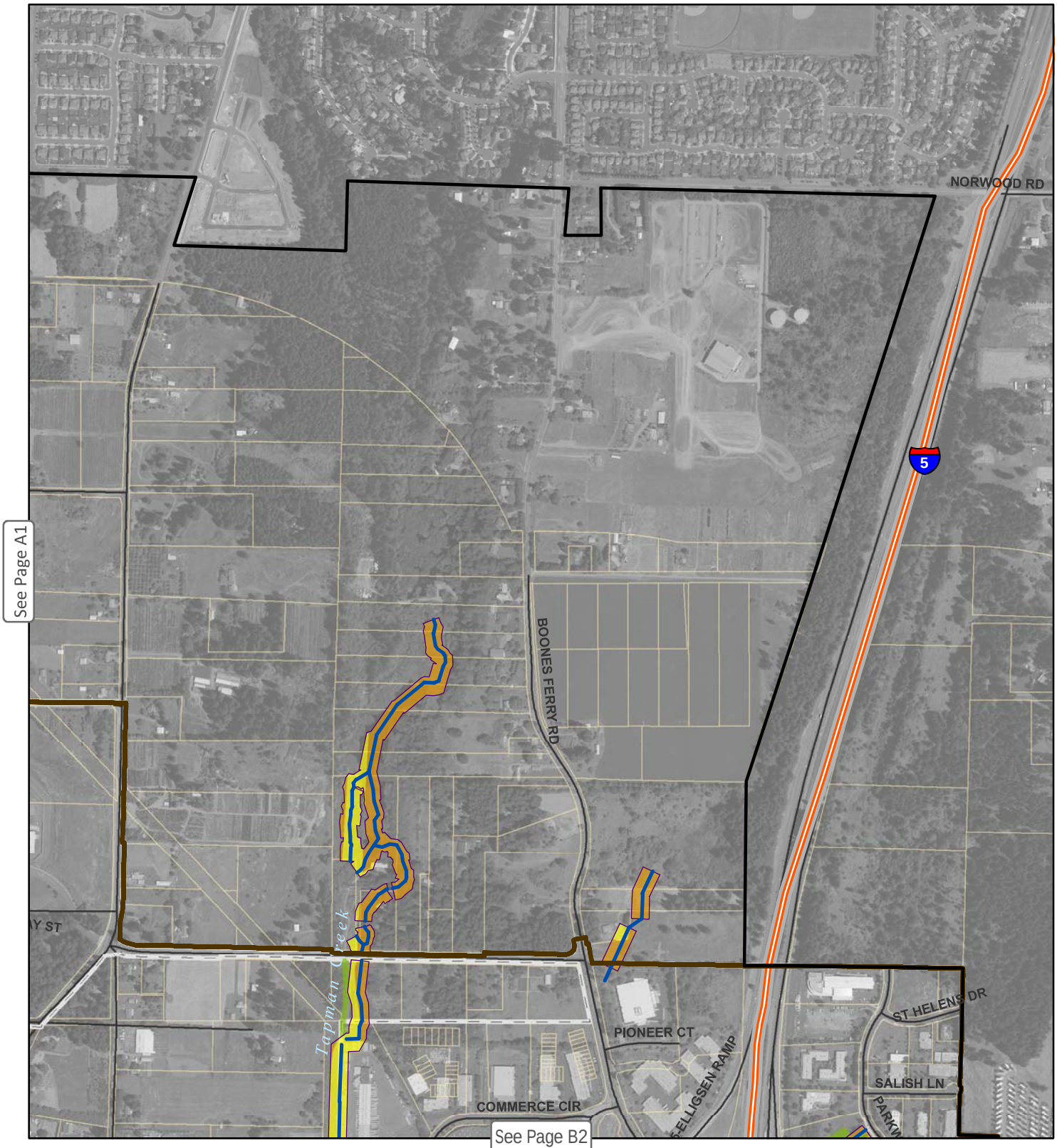


City of Wilsonville

Temperature TMDL Implementation Plan

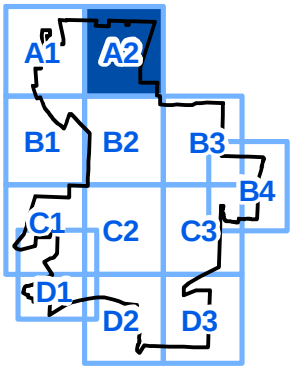
Figure 3-1. Riparian Shade

Page A2

- Riparian Shade on Public Lands
- Riparian Shade on Private Lands
- Hard Constraints
- Soft Constraints
- Study Area
- Tax Lots
- UGB Boundary
- City Limits
- Streams

N

0 250 500 1,000 Feet



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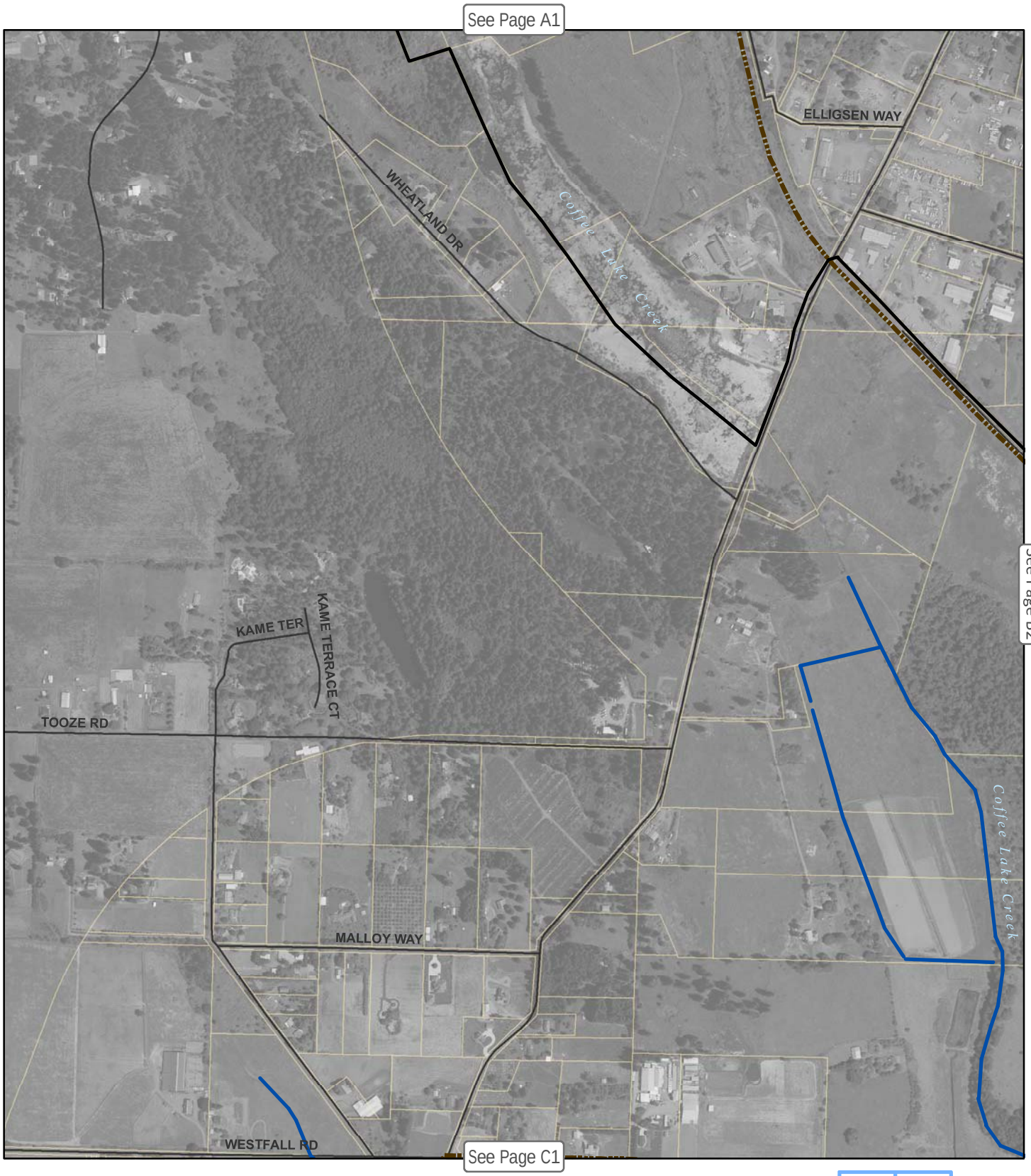


City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

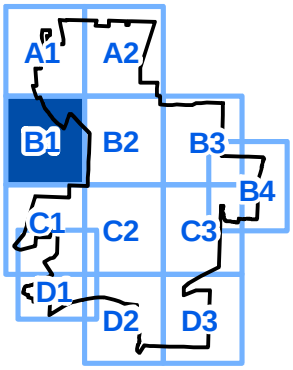
Page B1

Riparian Shade on Public Lands
Riparian Shade on Private Lands
Hard Constraints
Soft Constraints

Study Area
Tax Lots
UGB Boundary
City Limits
Streams

N

0 250 500 1,000 Feet



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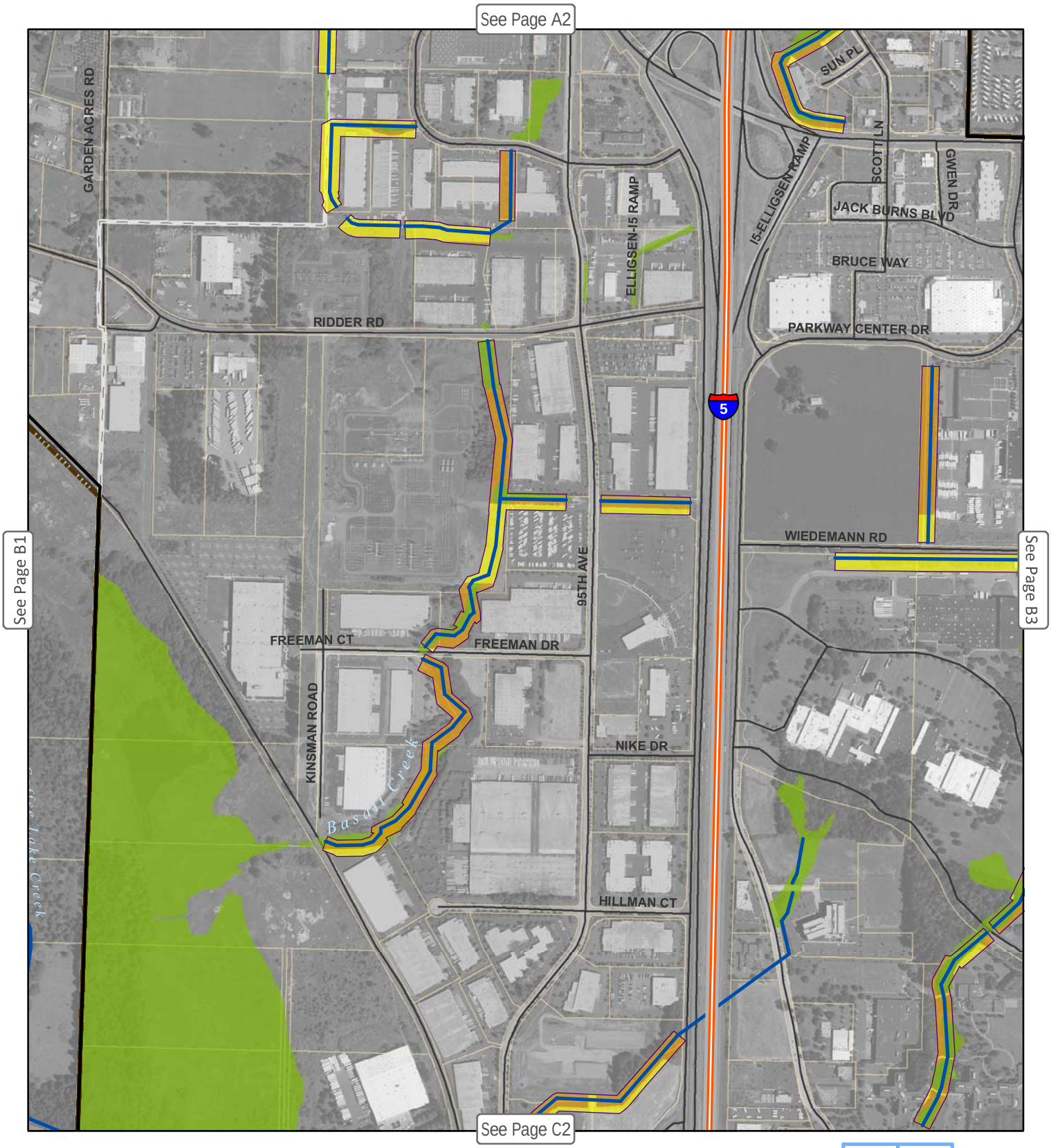


City of Wilsonville

Temperature TMDL Implementation Plan

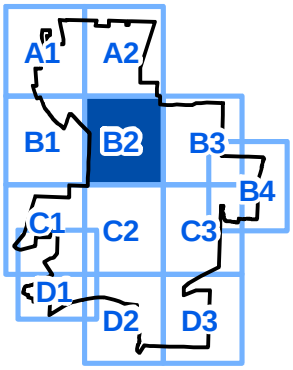
Figure 3-1. Riparian Shade

Page B2

- Riparian Shade on Public Lands
- Riparian Shade on Private Lands
- Hard Constraints
- Soft Constraints
- Study Area
- Tax Lots
- UGB Boundary
- City Limits
- Streams

N

0 250 500 1,000 Feet



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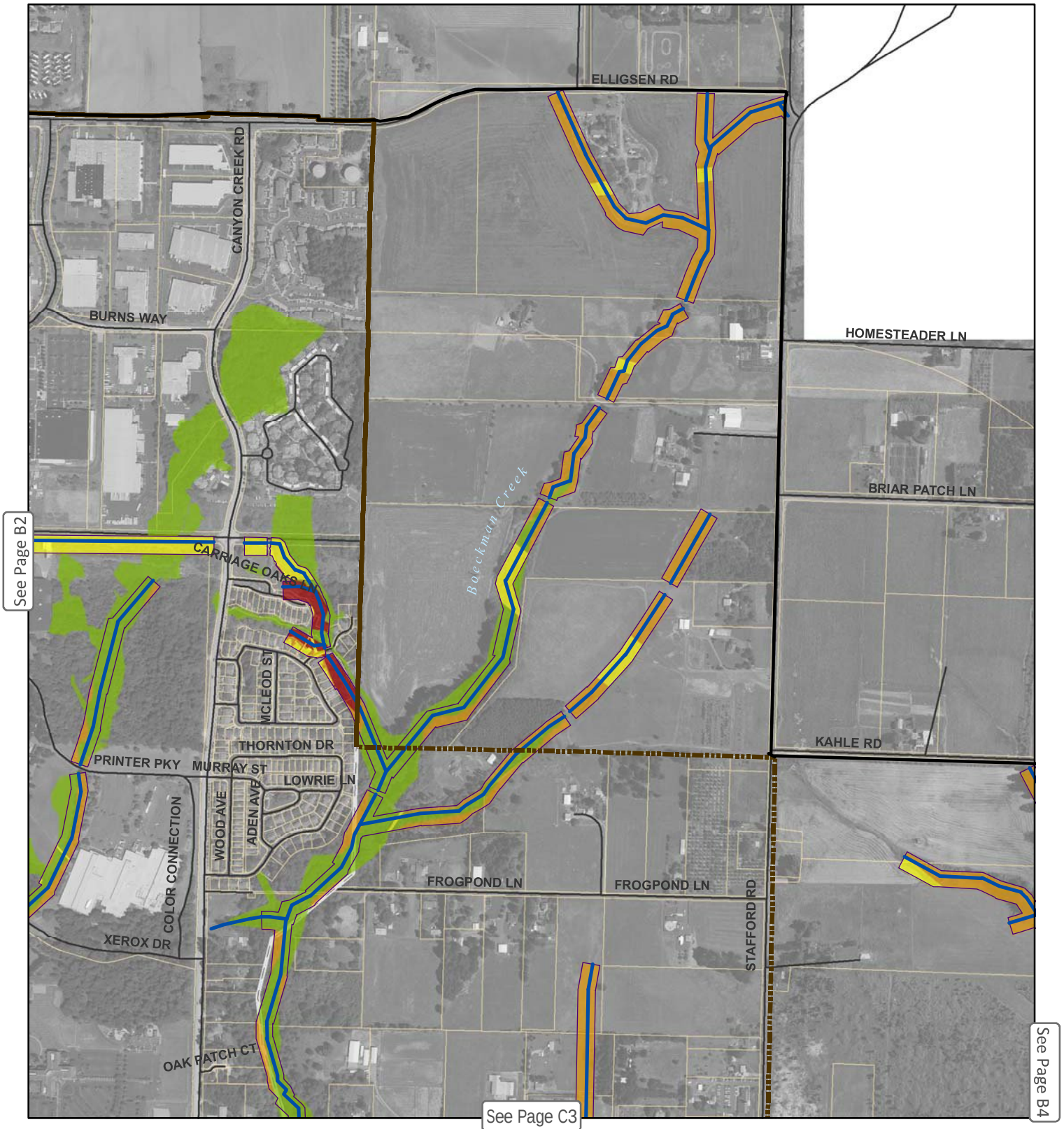


City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

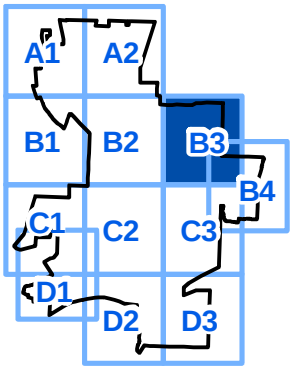
Page B3

Riparian Shade on Public Lands
Riparian Shade on Private Lands
Hard Constraints
Soft Constraints

Study Area
Tax Lots
UGB Boundary
City Limits
Streams

N

0 250 500 1,000 Feet



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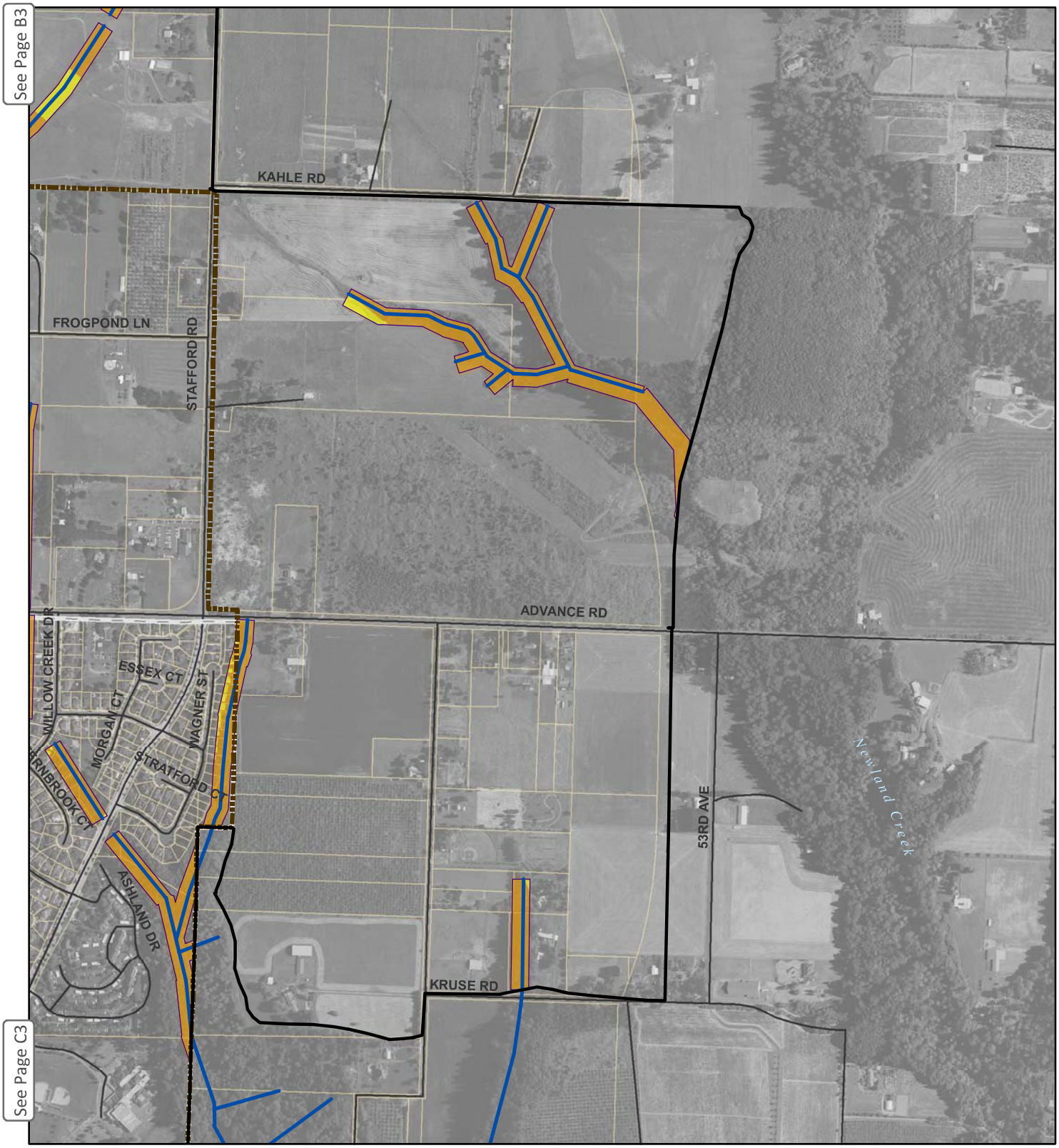

City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

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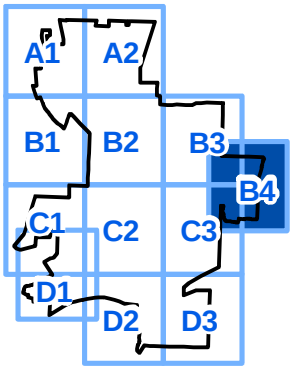
- Riparian Shade on Public Lands
- Riparian Shade on Private Lands
- Hard Constraints
- Soft Constraints
- Study Area
- Tax Lots
- UGB Boundary
- City Limits
- Streams

N

0 250 500 1,000 Feet



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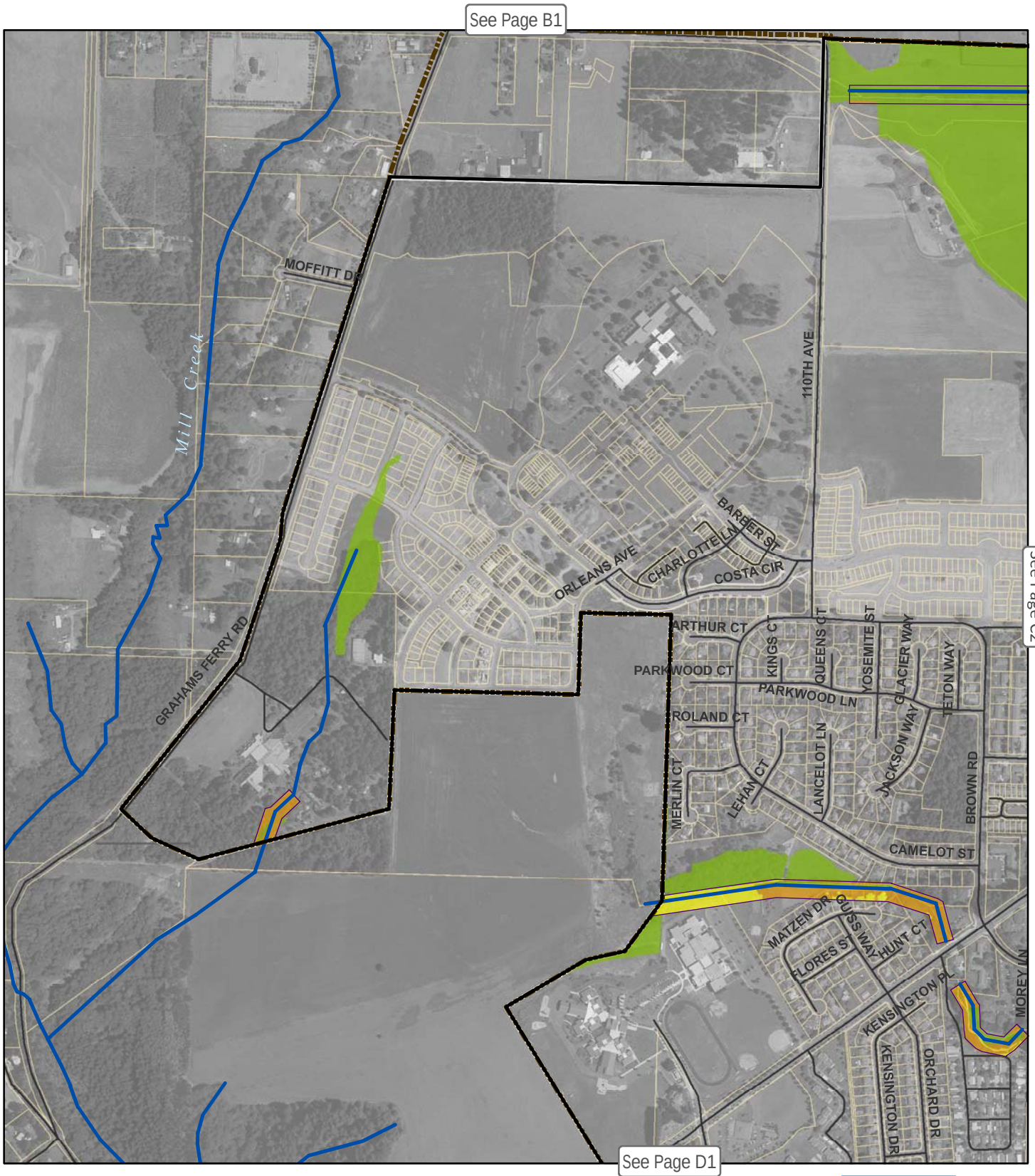


City of Wilsonville

Temperature TMDL Implementation Plan

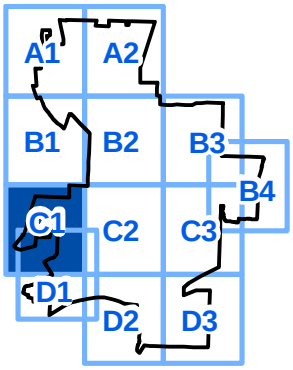
Figure 3-1. Riparian Shade

Page C1

N

0 250 500 1,000 Feet

- Riparian Shade on Public Lands
- Riparian Shade on Private Lands
- Hard Constraints
- Soft Constraints
- Study Area
- Tax Lots
- UGB Boundary
- City Limits
- Streams



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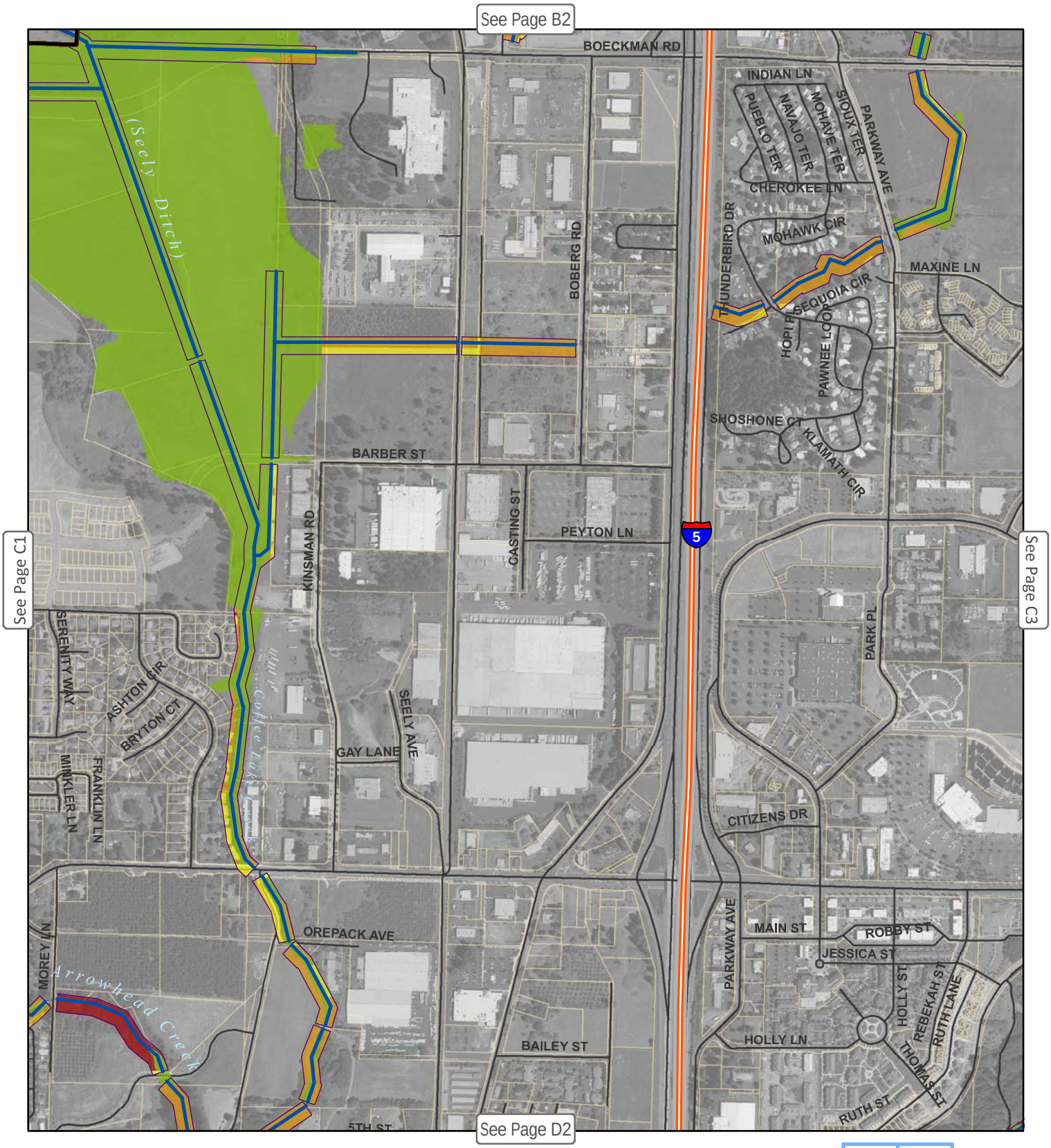

City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

Page C2

Riparian Shade on Public Lands
Riparian Shade on Private Lands
Hard Constraints
Soft Constraints

Study Area
Tax Lots
UGB Boundary
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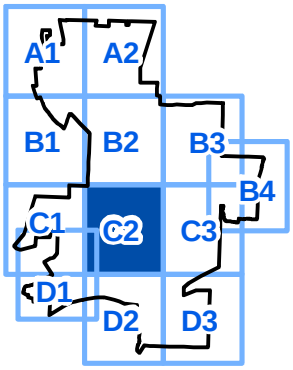
N

0 250 500 1,000 Feet



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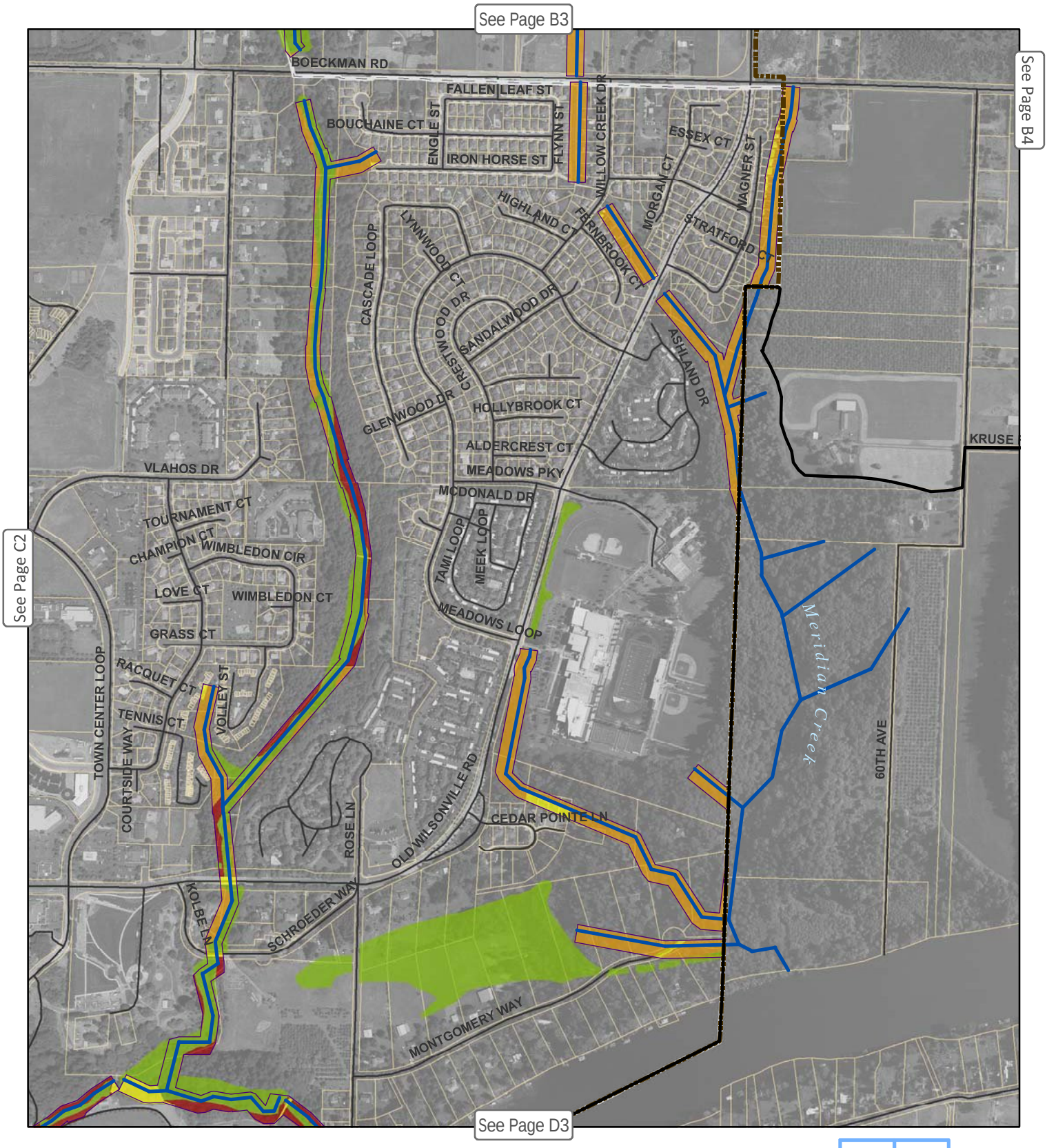

City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

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- Riparian Shade on Public Lands
- Riparian Shade on Private Lands
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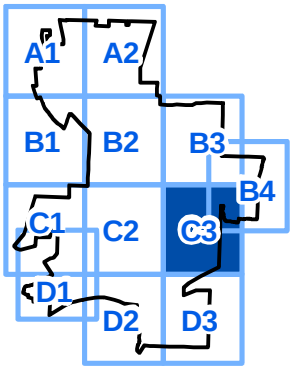
0 250 500 1,000 Feet



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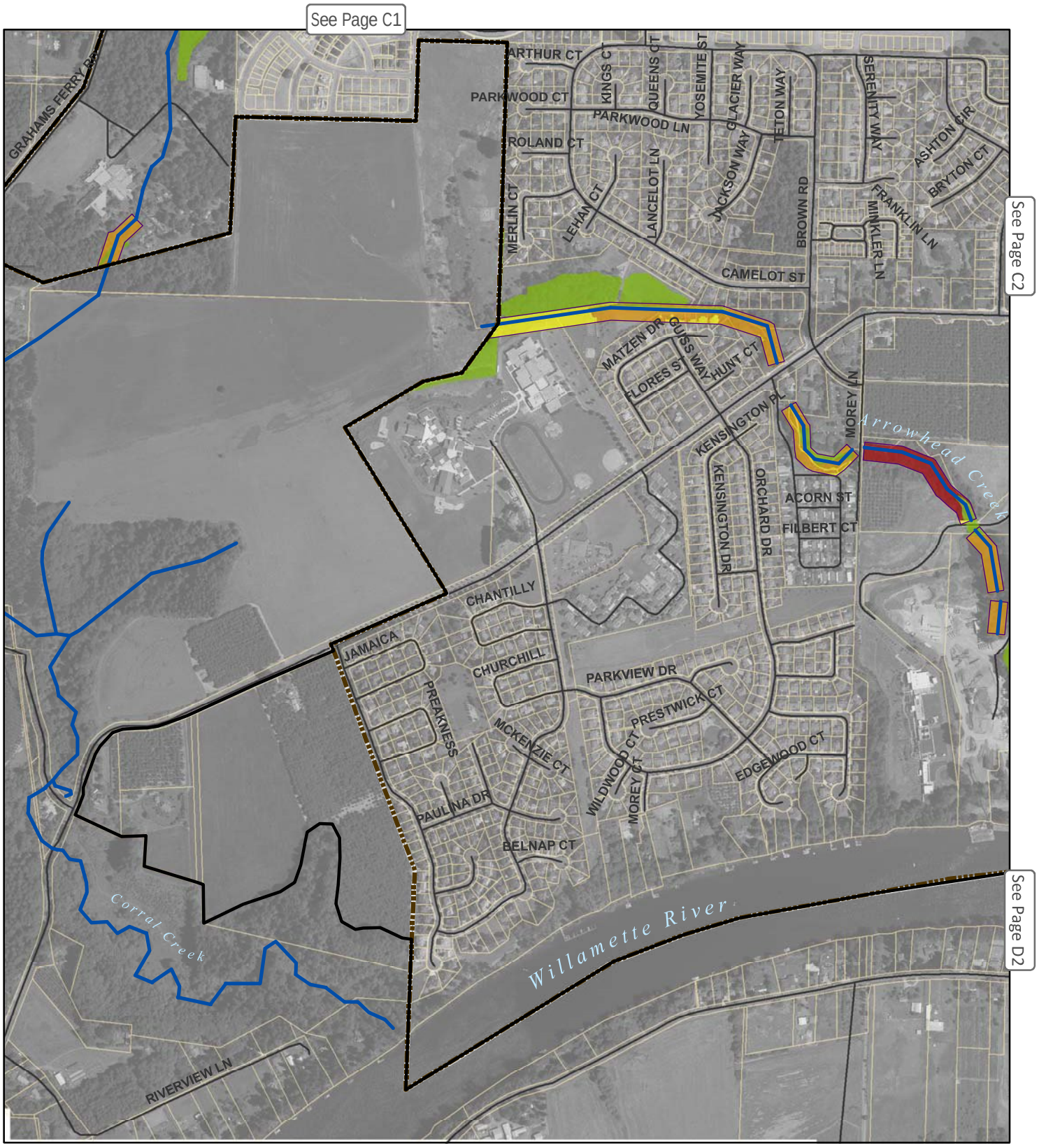

City of Wilsonville

Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

Page D1

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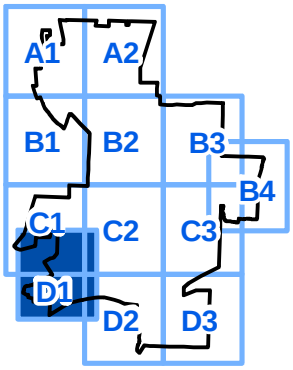

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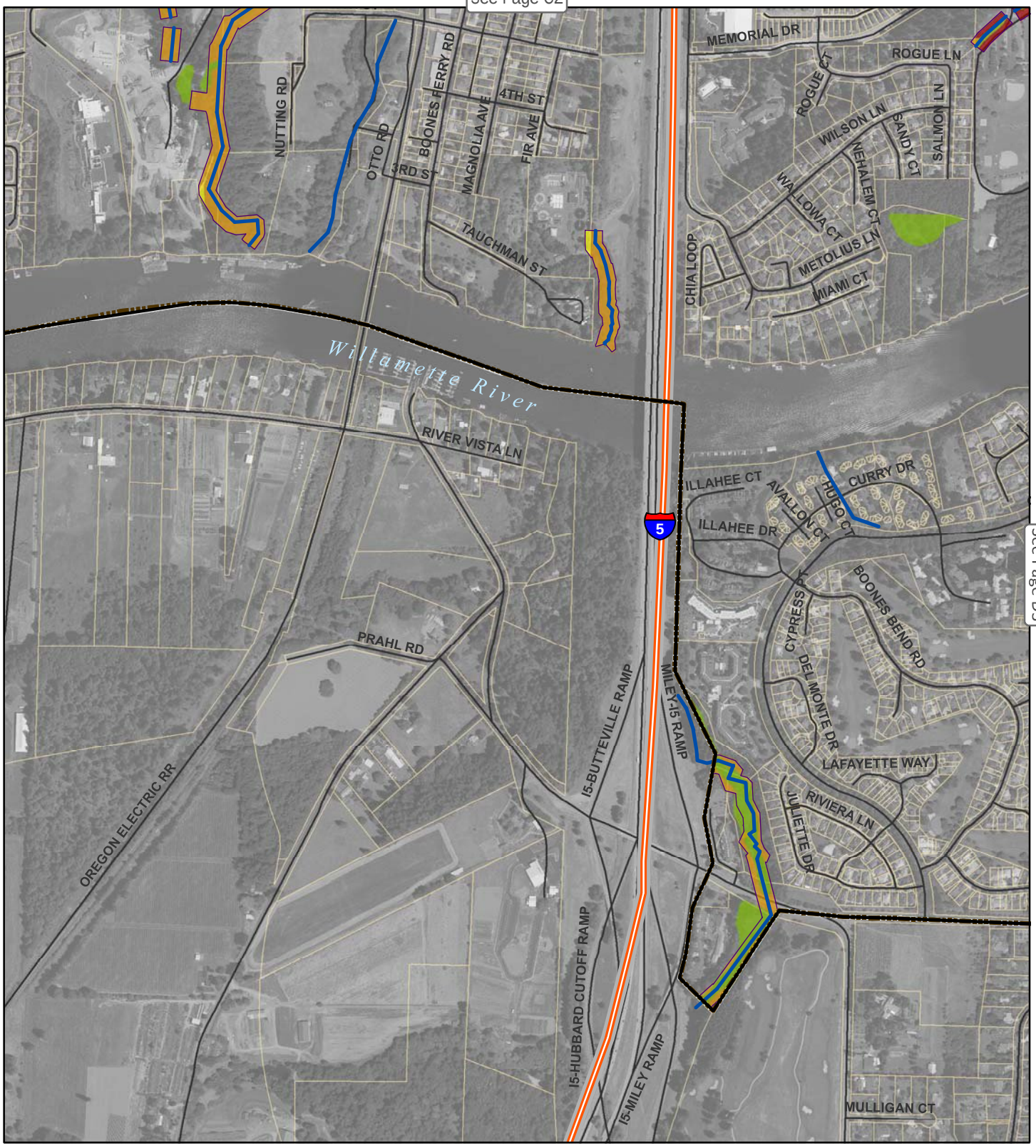
See Page C2



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Temperature TMDL Implementation Plan

Figure 3-1. Riparian Shade

Page D2

N

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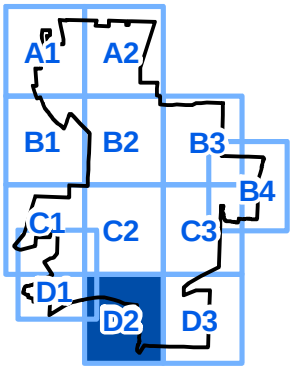

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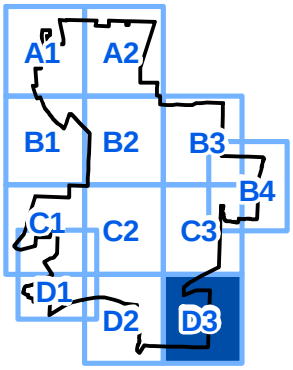

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