Natural Areas Management Plan

City of Wilsonville

Prepared by Ash Creek Forest Management, LLC

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EXECUTIVE SUMMARY

The Natural Areas Management Plan (NAMP or Plan) is a comprehensive framework for the City of Wilsonville (City) to use to manage ecosystems and steward its city-owned natural areas and is designed to help the City achieve its vision of a more ecologically resilient future. This Plan highlights 14 city-owned and managed natural areas and uses information gathered from those natural areas to inform recommended management strategies based on proven best practices and integrated pest management (IPM) practices.

The NAMP summarizes past and current management work that the City implements in its natural areas and highlights the community engagement and volunteer opportunities that the City provides for the public to engage in natural area management. The Plan also highlights a number of existing natural resource management plans and documentation that have been adopted by the City or other management entities in the region (e.g. Metro and Clackamas County). The NAMP is intended to work in conjunction with and not supersede these existing plans.

Using existing data and on-the-ground habitat assessments, 14 city-owned natural areas were classified by their natural resource function/value (low, moderate, and high) and current habitat conditions (poor, fair, and good). The NAMP also delineates habitat types throughout these city-owned natural areas. Habitat types include upland mixed conifer/deciduous forest, riparian mixed conifer/deciduous forest, riparian deciduous forest, scrub/shrub wetland, upland meadow, riparian meadow, and oak woodland/savanna. Using the information gathered in these assessments and delineations, the NAMP identifies and outlines six general, over-arching objectives related to current and future issues facing the City's natural areas:

1. Enhance ecological processes and native vegetation communities
2. Control invasive and noxious weeds
3. Improve resilience against climate change
4. Reduce wildfire risk
5. Proactively manage for emerging pests/diseases
6. Provide the public with safe and accessible opportunities to recreate, learn, and be stewards of natural areas

Using IPM practices and habitat assessments, the Plan outlines management strategies that can be applied to city-owned natural areas to help achieve these six objectives. Recommended management strategies are separated into *General* and *Habitat-Specific* strategies. The Plan also outlines generalized cost estimates (per acre per year) that the City can expect for different management strategies for varying habitat qualities. The Plan recommends that the City continues to review and assess its city-owned natural areas and adapt its management strategies as needs and trends change.

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INTRODUCTION

The Natural Areas Management Plan (NAMP or Plan) is a comprehensive framework for the City of Wilsonville (City) to use to manage ecosystems and steward its city-owned natural areas. This Plan is designed to help the City achieve its vision of a more ecologically resilient future and over-arching goal of improving the health and resilience of ecosystems in its natural areas.

The guiding objectives in the development of this Plan are:

- To promote long-term maintenance, enhancement, and community appreciation of city-owned natural areas
- To recognize that natural spaces are a valuable resource for community resilience, public engagement/education, and stewarding healthy habitats
- To engage with the public and facilitate an inclusive and transparent planning process
- To develop and recommend strategies that are based on data, best management practices, and integrated pest management (IPM)
- To address emerging risks to city-owned natural areas
- To recommend opportunities for community engagement in management of city-owned natural areas

The NAMP outlines general, over-arching objectives and strategies for the City to use in developing specific management plans for its city-owned natural areas. This Plan highlights 14 city-owned and managed natural areas (Appendices C & D) and uses information gathered from those natural areas to inform recommended management strategies based on proven best practices and integrated pest management (IPM) practices. For the purposes of this Plan, a natural area is an area that:

- Retains "*relatively intact historical vegetation communities and habitats*" (The Intertwine Alliance, 2012)
- Contains significant contiguous natural habitat (greater than 0.5 acres) (AECOM, 2022)
- Contains valuable habitat for (or has the potential to support) a large diversity of native plants and animals (Oregon Administrative Rules Database, 2019)
- Contains valuable areas for recreation, and promotes community appreciation of natural features (Oregon Administrative Rules Database, 2019)
- Contains degraded habitat but has the potential for restoration

To achieve the overall goal of creating more resilient natural areas, this Plan highlights a suite of actions and strategies aimed at reducing risk of catastrophic wildfire, enhancing habitat for native fish, wildlife and plant species; managing non-native invasive pests; and improving public access to natural areas. It also outlines potential opportunities for the City to incorporate public engagement into its natural area management. The NAMP is intended to work in conjunction with other existing plans and documentation that the City and/or other management entities in the region (e.g. Metro, Clackamas County) have adopted related to natural resources and not to supersede any existing plans.

BACKGROUND

Wilsonville is located approximately 24 miles south of the Oregon and Washington border in Clackamas and Washington counties and encompasses approximately 7.8 square miles. The City of Wilsonville sits on the ancestral lands of the Confederated Tribe of Siletz Indians and the Confederated Tribes of Grand Ronde (Wallamut and Kalapuya Tribes).

The City owns approximately 199 acres of natural areas (Table 1), which are managed by the Wilsonville Parks and Recreation Department (WPRD) and the Natural Resource Program (NRP). These natural areas contain a variety of habitats ranging from wetlands, streams, meadows/prairie, and riparian and upland mixed conifer/deciduous forests.

Benefits and Importance of Natural Areas

Natural areas are critically important to preserving and enhancing ecosystem resilience and health in urban landscapes and have important benefits to human health and well-being. Natural areas are a space to preserve and enhance healthy habitats for native plants and wildlife as well as support ecosystem services such as biodiversity, pollination, flood control, clean water, and clean air. By restoring and enhancing healthy ecosystems, resilience and tolerance to disturbances, due to threats like invasive species, climate change, and wildfire, are increased. Natural areas also offer important opportunities for public recreation, public engagement, and education about the value of natural resources, as well as providing shade and cooling within the natural area and in surrounding communities.

Habitat restoration is the act of returning an ecosystem to its historic natural state or to a desired future condition. The goal of habitat restoration is to create high quality habitat that will support a diversity of plants and animals and to reestablish and maintain ecosystem services. In some cases, the goal of habitat restoration is to return an ecosystem to historic conditions, but in the face of issues such as climate change, the goal may be to establish new conditions that will better align with a future environment and to increase the resilience of ecosystems to these changes (e.g., shifts in hydrology, drought, pests, and wildfire). In the Pacific Northwest, some of the most common habitat restoration strategies include removing invasive plants (e.g., Himalayan blackberry, English ivy, and reed canary grass) and reestablishing native plant and climate-adaptive vegetation communities that provide fish and wildlife habitat and other ecosystem services.

Planning Issues and Concerns

Current and future issues facing Wilsonville's natural areas inform the recommendations and management strategies outlined in this Plan. The following issues and concerns were identified as high priority objectives through habitat assessments and discussions with City staff and members of the public.

Wildfire

Historically, the Willamette Valley, including areas of Wilsonville, were managed by Indigenous peoples using prescribed fire. Fire suppression practices of the past 150 years have caused significantly higher fuel loading in natural areas (IPRE, 2024). Today, throughout much of the City, residential and urban properties are directly adjacent to the city-owned natural areas (Wildland Urban Interfaces or WUI), many of which are heavily forested areas. Because of proximity and fuel loads, fires can spread and threaten natural areas and residential/urban areas (IPRE, 2024). Urban and residential areas themselves come with a higher probability of ignition than wildlands due to human activities. Additional compounding factors that increase fire risk and severity in natural areas include drought, extreme heat events, and large populations of invasive weeds that can act as ladder fuels, such as Himalayan blackberry and Scotch broom. Throughout the process of developing this Plan, wildfire was highlighted as one of the highest priorities for many community members, since many residential areas in Wilsonville are in close proximity to natural areas.

In 2019, the City adopted a Hazard Mitigation Plan (University of Oregon et al., 2019), which is part of the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan and details the City's goals of minimizing potential harm from wildfires to people, structures, and natural resources. The Clackamas County Community Wildfire Protection Plan (CWPP) (IPRE, 2024) also acts as a guiding framework for the City to manage and assess wildfire risk. The NAMP is intended to complement the strategies for wildfire and hazard mitigation that are outlined in the above plans.

Invasive Species

An invasive species is a plant, animal, insect, or disease that did not historically occur in an area (or was introduced) and can cause harm to ecosystems, economies, or human health. Many invasive species have traits that facilitate rapid growth and reproduction, and they often lack natural enemies. Invasive species are able to spread quickly and often out-compete native species, reducing biodiversity, and disrupting ecosystem services such as clean water, suitable habitat for fish and wildlife, and pollination. Invasive species can spread through human activity (e.g., shipping and transportation, moving firewood, via equipment/boots). In Wilsonville and the broader Pacific Northwest, notable invasive plant species include Himalayan blackberry, English ivy, English holly, reed canary grass, among many others. A number of invasive plant species in the region, including garlic mustard, lesser celandine, and false brome, are considered Early Detection Rapid Response (EDRR) weeds and are not yet widespread but warrant proactive treatment to prevent further spread and potential harm to native ecosystem.

Mediterranean oak borer (MOB) and emerald ash borer (EAB) are invasive pest insects that pose a major threat to the City's trees. MOB was first detected in Oregon in Troutdale in 2018, and then in 2022 MOB infestations were confirmed in Wilsonville. MOB infests oak species, including the Oregon white oak (*Quercus garryana*), and carries a fungus that impedes water flow through trees, causing a wilting disease and eventually killing the trees (ODF, 2024). While EAB has not been detected in Wilsonville as of mid-2025, it has been detected nearby in Marion, Multnomah, Clackamas, and Yamhill Counties, so it poses a significant threat to the Oregon ash population in Wilsonville. Both Clackamas and Washington counties have established a quarantine of all ash species (*Fraxinus spp.*) to limit the spread of this devastating forest pest.

The City is already involved in significant work to control invasive species, including many invasive plant species, and pests, such as MOB, and EAB. See the section “Past and Ongoing Restoration Efforts in Wilsonville” for more details on pest management efforts in city-owned natural areas.

Climate Change

Global climate change is causing extreme weather events, high temperatures, and precipitation changes with cascading effects on ecosystems and ecological processes. When unable to adapt to climate extremes, native plant communities see large population declines and loss of habitat functionality. The warming climate can cause invasive plants and other pests to expand their range and take advantage of weakened native habitats. Additionally, increased frequency and severity of extreme weather events due to climate change can cause more severe disturbances such as more extreme flooding, drought, and wildfire. These threats in turn negatively impact ecosystem services, or the benefits that are naturally provided by intact habitats, such as pollination, air and water quality, and biodiversity.

The City is currently developing a Climate Action Plan (CAP) that will “address the current and future impacts of climate change within the city limits and the region at large,” including strategies to address rising temperatures, wildfire and flooding risk, and greenhouse gas emissions (City of Wilsonville, 2025). The NAMP will support and implement climate-informed strategies from the CAP that in turn will help mitigate climate impacts on the City's natural areas. See the section “Management Objectives and Strategies” for examples of climate-informed strategies.

Recreation

Recreation is central to natural areas management. Natural areas provide a valuable resource for the public to connect and engage with nature, but at the same time, the impacts of recreational use can stress these ecosystems and create unique considerations for management. Unmanaged and off-trail recreational use raises numerous issues in natural areas, including damage to vegetation, soil compaction, erosion, and associated impacts to water quality and overall ecosystem health. Habitat fragmentation and recreational use has been shown to stress birds and other wildlife and reduce the suitability of natural areas to provide healthy habitat (Hennings, 2017). Recreation is also a common vector for the introduction and spread of invasive weeds and pests via footwear and clothing, vehicles, and the movement of firewood. Natural area managers must account for safe public recreation and access that also minimize ecological damage, while allowing the public to appreciate and engage with the natural area.

Past and Ongoing Natural Area Management in Wilsonville

WPRD and the NRP have actively managed city-owned natural areas in Wilsonville for many years. In 2001, the City adopted the Significant Resource Overlay Zones, and in 2018, the City published an updated Comprehensive Plan which work towards achieving Goal 5 of *Oregon Statewide Planning Goals and Guidelines* (Oregon DLCD, 2019). The SROZ ordinance

established standards for development that will protect the quality and integrity of important natural resources, including streams, wetlands, wildlife habitat, and visual/aesthetic quality (City of Wilsonville, 2018).

In 2018, the City developed and adopted an Integrated Pest Management (IPM) Plan which identifies pests of concern and outlines strategies for managing pests and invasive species (City of Wilsonville, 2018). The IPM plan identifies practices that consider pest biology and life cycles, technology and equipment, and environmental conditions. IPM practices reduce reliance on pesticides, reduce economic cost, and minimize risk to natural resources, wildlife (including pollinator health), people, and the environment. IPM practices also are shown to minimize wildfire risk by reducing overgrown brush in forest understories and enhancing native vegetation, which can create more fire-resistant plant communities.

Examples of natural area management that the City has implemented to control invasive species, restore stream health, and reduce wildfire risk in city-owned natural areas include:

- Boeckman Creek and Boeckman Road Improvements:
    - Management of invasive species such as Himalayan blackberry and reed canary grass
    - Installation of trail systems to create designated public recreation access
    - Future plans for removal of a flood control structure that aims to restore historic stream flow and enhance stream health
    - Construction of wildlife passages in the redesign of Boeckman Road and restoration of surrounding Coffee Lake Creek wetlands
- Memorial Park and Murase Plaza:
    - Management of invasive species such as English holly, Himalayan blackberry, lesser celandine, and English ivy through grazing with goats, manual removal, and chemical treatments
    - Installation of native plants
    - Removal of culverts and restoration of stream reaches and riparian habitats
- Park at Merryfield:
    - Fuel reduction through brush and ladder fuel removal
    - Collaboration with Metro to reduce wildfire risk in Park at Merryfield and also the adjacent Graham Oaks Nature Park
- Arrowhead Park:
    - Removal of Himalayan blackberry and installation of native plants
- Coffee Lake Creek Wetlands:
    - Wetland mitigation areas for construction of Boeckman Road (Metro, 2019)
    - Metro wetland restoration project, including modification of drainage flows to reestablish meandering slough
    - Installation of native wetland vegetation
    - Monitoring of wildlife use and movement through the area
- Villebois:
    - Villebois Master Plan (Costa Pacific Communities, 2019) outlined plans for a trail and park system in the Villebois neighborhood that connects the natural areas surrounding Villebois, including city-owned Coffee Lake Creek Wetlands,

Edelweiss Park, Oulanka Park, Tivoli Park, sections of the Ice Age Tonquin Regional Trail, and other natural spaces including Graham Oaks Nature Park and other areas that are owned and managed by Homeowners' Associations (HOAs).

- Restoration efforts to date have included:
  - Installation of native vegetation to enhance natural habitat features and improve forage and habitat for wildlife
  - Improvements to stormwater detention and rainwater capture systems

Since MOB was detected in Wilsonville, the City has partnered with Oregon Department of Forestry (ODF), Oregon Department of Agriculture (ODA), and Metro to develop strategies for removing infested Oregon white oaks trees and preventing further spread. With funding from its Climate Resiliency Fund, the City has partnered with local arborist companies like Barlett Tree Experts to remove infested trees and to proactively treat healthy trees with insecticides and fungicides that will reduce risk of future infestation.

The City has a long history of utilizing partnerships and community efforts to steward its natural areas. Since 2002, the City has partnered with Friends of Trees to restore and enhance natural areas within the City. Volunteers have helped to plant native forest and riparian vegetation and create healthy pollinator habitats in natural areas throughout the City, including Memorial Park, Arrowhead Creek Park, Tranquil Park, and Boeckman Creek Corridor. For the last six years, the City has also participated in the Neighborhood Trees program that provides and installs low-cost yard and street trees for homeowners with the goal of enhancing urban tree canopies. The City also organizes volunteer workdays like the annual WERK (Wilsonville Environmental Resource Keepers) Day, where volunteers rebuild and enhance trails, plant native plants, and remove invasive species like Himalayan blackberry, English ivy, and English holly at Memorial Park. This event typically attracts more than 200 volunteers each year. The City also partners with many other organizations to implement projects, provide resources to communities, and engage the community in stewardship. These include the Center for Research in Environmental Sciences & Technologies (CREST), which is currently closed, the Backyard Habitat Certification Program, the Xerces Society, the NW Center for Alternatives to Pesticides, EcoBiz, and Northwest Youth Corps.

Related Management Plans and Reports

The City and other organizations, such as Metro, have developed a number of plans that are relevant to natural area management. These plans and reports have been reviewed and integrated into the NAMP:

- Graham Oaks Nature Park Site Conservation Plan (Metro, in preparation)
- Climate Action Plan (City of Wilsonville, 2025)
- Graham Oaks Nature Park Oak Habitat Conservation Plan (Alacia et al., 2022)
- Urban Forest Management Plan (City of Wilsonville, 2021)
- Wilsonville Comprehensive Plan (City of Wilsonville, 2020)
- Hazard Mitigation Plan (University of Oregon et al., 2019)
- Coffee Lake Creek Wetlands Site Conservation Plan (Metro, 2019)

- Clackamas County Community Wildfire Protection Plan (IPRE, 2024)
- Parks and Nature Systems Plan (Metro, 2019)
- Integrated Pest Management Plan (City of Wilsonville, 2018)
- Villebois Village Master Plan (Costa Pacific Communities, 2019)
- Regional Conservation Strategy (Intertwine Alliance, 2012)
- Willamette River TMDL Implementation Plan (City of Wilsonville, 2009)
- Surveys of Fish Species and Habitat in Wilsonville Streams (Wilsonville 2006)
- Wildlife and Habitat Assessment (City of Wilsonville, 2001)

COMMUNITY ENGAGEMENT

Community Engagement Objectives and Strategies

The City's natural areas are an invaluable resource to the surrounding landscapes and the residents and visitors that utilize them. The City is committed to a planning process that is transparent and inclusive.

During the development of NAMP, community engagement objectives included:

- Identify community groups, members of the community, and other organizations and government agencies that are indirectly or directly connected to the City's natural areas
- Identify public concerns regarding natural area management
- Provide opportunities for interested community members, groups, and agencies to learn about the NAMP, provide feedback, and ask questions
- Outline recommendations for future outreach for maintaining/creating:
    - Ongoing engagement with interested community members and organizations
    - Community volunteer opportunities to restore and steward City natural areas

To accomplish the City's planning objectives, the following public engagement strategies were implemented during development of the NAMP:

- Created a project webpage on Let's Talk Wilsonville (LTW) that provides project overview and information, frequently asked questions, comment submission portal, and contact information for City and ACFM staff
- Published a public questionnaire to gather information on priority concerns and natural area usage from Wilsonville residents.
- Published press releases in Boones ferry Messenger with project updates and public meeting announcements
- Posted meeting announcements to the City's social media
- Hosted an open house at Wilsonville City Hall
- Tabled at the 2024 and 2025 Earth Day Celebrations

Public Questionnaire Outcomes

In April and May 2025, the City ran an online questionnaire for Wilsonville residents to voice their opinions and concerns about management of the City's natural areas. The survey was comprised of questions regarding personal connection to natural areas, priority ranking of issues facing natural areas, and vision for the future. Out of the questionnaire's 16 respondents, the most common concern was wildfire risk in natural areas and the implications for surrounding properties. The next most frequent concerns were invasive species and unmanaged recreation. Additional issues noted by respondents included graffiti and vandalism and the use of pesticides and fertilizers. Respondents identified more recreation trails and development of habitat beneficial to pollinators as their highest priorities for future natural area activities.

NATURAL AREAS and HABITAT TYPES

A primary objective of the natural area management planning process was to create a catalog of natural areas in Wilsonville, described in detail below. The scope of the NAMP catalog, however, only includes natural areas that are owned and managed by the City of Wilsonville. The NAMP recommends that the City align and work in tandem with neighboring natural area managers, where possible, because consistent management across all natural areas will improve ecosystem resilience throughout the City.

These local land managing entities include Metro, Tualatin Valley Water District, and private landowners. Many of these natural areas have existing management plans and/or are actively managed by the entities that own them. For example, one of the largest natural areas in the surrounding Wilsonville area is Graham Oaks, a 245-acre site owned and managed by Metro. The City has collaborated on managing parts of this natural area with Metro, but Graham Oaks is not included in the NAMP because the City is not the primary managing entity. Metro is currently developing a site conservation plan for Graham Oaks Nature Park (Graham Oaks Park Site Conservation Plan; Metro, in preparation), and the NAMP is intended to work in tandem and align with this site conservation plan and other existing management plans to create cohesive natural area management throughout the City.

Methods

To create the catalog of city-owned natural areas (Table 1), all city-owned tax lots were identified and then classified as a natural area based on the following criteria:

- Retains "*relatively intact historical vegetation communities and habitats*" (The Intertwine Alliance, 2012)
- Contains significant contiguous natural habitat (greater than 0.5 acres) (AECOM, 2022)
- Contains valuable habitat for (or has the potential to support) a large diversity of native plants and animals (OARD, 2019)
- Contains valuable areas for recreation, and promotes community appreciation of natural features (OARD, 2019)
- Contains degraded habitat but has the potential for restoration.

Tax lots that did not meet the criteria for natural areas included narrow right-of-way zones, parcels that are primarily comprised of parking lots or other infrastructure, and urban parks with less than 0.5 acres of natural habitat. Where parcels contain sports fields, playgrounds, and other hard-scaped infrastructure, the acreage shown in Table 1 only includes natural habitat.

During evaluation, two additional factors were used in prioritizing the City's natural areas and developing management recommendations: natural resource function/value and baseline habitat conditions, discussed in the next section. Because of the high variability of natural area size and condition in Wilsonville, it was important to determine where restoration and management efforts should be focused. Restoration practitioners generally prioritize natural areas that are more intact and healthier, because those areas are often easier, quicker, and more cost effective to

restore than highly degraded habitats or highly urbanized parks. This does not mean the City should not invest in restoring highly degraded natural areas or urbanized parks, but these areas are a lower priority in the catalog, because they are generally more expensive and difficult to restore and show lower return on investment in habitat functionality.

Natural resource function and value

Natural resource function and value of the city-owned tax lots was assessed using a points-based scoring system (Appendix A) that was adapted from the Portland Parks & Recreation (PPR) Natural Area Management Plan (Portland Parks & Recreation, 2015). Data for this scoring system were collected using information from GIS, natural resource inventories, and discussions with WPRD and NRP staff. The primary data sources were the City of Wilsonville and the Oregon Department of Fish and Wildlife. Natural resource function and value scores of 22-33 (of 33 points possible) were considered High; scores of 11-21 were considered Medium; and scores of less than 11 were considered Low (Table 1). Of all city-owned tax lots, 14 parcels scored High or Medium for natural resource function and value, met the criteria of a natural area, and were selected for baseline habitat surveys (Appendix A). There were eight parcels that scored Medium but did not meet the size requirements to be considered a natural area.

Baseline habitat conditions

To further assess ecological function, condition, and management needs of city-owned natural areas, assessments were conducted to determine baseline habitat conditions (Table 1). These habitat assessments informed the management strategies recommended and outlined in this Plan. Habitat assessments were conducted in each of the high and medium priority areas during the summer of 2024. At each natural area, surveyors used transects and quadrats at random locations to collect data on non-native vegetation cover, native vegetation cover, plant species richness, and native tree stem count (Appendix B). To develop an overall baseline habitat condition score for all city-owned natural areas, the parameters outlined above were averaged for each area and given a score of Poor, Fair, or Good (Appendix C). Overall, 21% of the surveyed natural areas scored Good; 29% scored Poor; and 50% scored Fair for existing habitat conditions (Table 2). Natural areas that scored Poor generally had high invasive species cover and low native vegetation cover. Natural Areas that scored Good had high cover and richness of native vegetation and low cover of invasive species. Natural Areas that scored Fair had varied levels of native and invasive cover.

Table 1. Natural Area Catalog. Summary of natural resource function/value, baseline habitat condition score, and habitat types for 14 natural areas in Wilsonville.

Natural Area	Acres	Natural Resource Function/Value	Baseline Habitat Condition
Memorial Park	62.4	High	Fair
Boeckman Creek Corridor	37.9	High	Fair
Arrowhead Creek Park	6.5	High	Fair
Coffee Lake Creek Wetlands	11.9	High	Poor
Murase Plaza	12.9	High	Poor
Boones Ferry Park	14.2	Medium	Fair
Kinsman Road	12.4	Medium	Poor
Edelweiss Park	10.8	Medium	Good
Park at Merryfield Park	8.2	Medium	Good
Canyon Creek Park	7.1	Medium	Good
Tivoli Park	6.9	Medium	Fair
Tranquil Park	4.5	Medium	Fair
Oulanka Park	1.8	Medium	Poor
Willow Creek Park	1.38	Medium	Fair

Habitat Delineations

To help the City prioritize and develop management plans for each city-owned natural area, habitat types were delineated (Table 2, Appendix D). Habitat delineations help guide decision making when planning and strategizing restoration priorities. Understanding historic and current habitat structures can clarify the treatment strategies that will be most effective in various habitat types. Habitat delineations utilized here include a variety of information sources, including vegetation information from botanical surveys, satellite imagery, and WEB Soil Survey data (USDA, 2019).

Table 2. Habitat types in city-owned natural areas with approximate acreage and dominant characteristics

Habitat Type	Approx. Acreage	Dominant Characteristics
Upland Mixed Conifer/Deciduous	66	Low-elevation mesic forested habitat comprised of conifers such as Douglas-fir, Western hemlock, and Western red cedar as well as hardwoods such as bigleaf maple
Riparian Mixed Conifer/Deciduous	58	Low-elevation riparian forests consisting of conifers such as Douglas-fir and Western red cedar as well as hardwoods such as Oregon ash, bigleaf maple, and red alder
Riparian Deciduous	8	Riparian forests with hardwood canopy including bigleaf maple, Oregon ash, and red alder as dominant species
Scrub/Shrub Wetland	19	Wetland habitat in streams and valley bottoms with woody vegetation less than 20 ft tall, such as willows and other broadleaf shrubs
Upland Meadow	10	Dry grassland habitat lacking dense canopy or shrubs, dominated by grasses and wildflowers
Riparian Meadow	17	Wet/moist grassland habitat lacking dense canopy or shrubs, dominated by grasses, sedges, rushes, and wildflowers
Oak Woodland/Savanna	3	Low-elevation forested habitat consisting of varying densities of Oregon white oak canopy with shrub and grassland understory

MANAGEMENT OBJECTIVES and STRATEGIES

To achieve the overarching goal of creating more ecologically resilient ecosystems, the following management objectives have been identified for management of the city-owned natural areas:

1. Enhance ecological processes and native vegetation communities
2. Control invasive and noxious weeds
3. Improve resilience against climate change
4. Reduce wildfire risk
5. Proactively manage for emerging pests/diseases
6. Provide the public with safe and accessible opportunities to recreate, learn, and be stewards of natural areas

The management strategies in this Plan are organized into general and habitat-specific strategies that the City can utilize to achieve the management objectives outlined above.

General Strategies

Table 3. General management strategies

Management Objective	Strategies
1. Enhance ecological processes and native vegetation communities	• Improve plant diversity in city-owned natural areas by planting a variety of site-adapted native trees, shrubs, and herbaceous plants • Install native plant species quickly after removal of invasives to suppress weed reestablishment; continue maintenance and removal of invasives to improve planting survival and vigor • Increase plant survival by selecting native plant species with appropriate light, moisture, and soil requirements per planting area • Enhance native pollinator habitat by selecting pollinator-friendly plant species and seed mixes, especially in open-forest and meadow ecosystems • Plant eroded and bare streambanks with native riparian species to decrease erosion risk, increase stream shade, and improve habitat for aquatic species • Retain and promote beaver activity in places where increased beaver activity will not damage or interfere with infrastructure or private property

2. Control invasive and noxious weeds	• Manage and remove invasive species using multiple strategies for treatment to maximize effectiveness and impact
	• Time invasive species treatments to maximize efficacy per target species and habitat type
	• Refer to the City's 2018 IPM Plan for detailed treatment specifications
	  o Himalayan blackberry – cut/masticate large brambles, manage small resprouts with manual removal or targeted spot sprays
	  o English ivy – spray large swaths, air gap ivy that is growing up trees, utilize volunteer labor and hand pull, especially in areas with high native density

	○ Weedy trees (e.g., English holly, English hawthorn, cherry laurel, bird cherry) – girdle, or cut-stump and treat with herbicides to prevent resprouting • Install boot brushes at entrances/parking areas to reduce the spread of invasive weed species • Work with property owners, HOAs, etc. to encourage management of invasive species on properties adjacent to city-owned natural areas • Collaborate with Oregon Department of Agriculture, Clackamas SWCD and Marion County SWCD to coordinate rapid response to EDRR species that are found on city-owned property
3. Improve ecosystem resilience against climate change	• Utilize strategies outlined for Objectives 1 and 2 to improve overall ecosystem health, manage invasive species, and increase plant diversity • Use climate-smart restoration strategies ○ Select plant species that are adaptive to extreme environmental stressors (e.g., drought, heat) ○ Select plant species that are sourced from local ecoregions that reflect potential future conditions • Enhance wetland and floodplain habitats to reduce water temperatures, improve water filtration, increase water storage, and improve habitat for aquatic wildlife species • Promote and retain beaver activity to improve ecological complexity, increase habitat niches for other species, improve water storage, and reduce fire risk; only in places where increased beaver activity will not interfere with infrastructure or private property.
4. Reduce wildfire risk	• Utilize the Clackamas Community Wildfire Protection Plan and the City of Wilsonville Hazard Management Plan to guide wildfire mitigation and response strategies in city-owned natural areas • Manage dense vegetation in city-owned natural areas to reduce wildfire risk to natural areas and adjacent residential communities ○ Thin trees in overstocked forested areas ○ Remove accumulations of dead woody material in balance with the benefits they provide as dead, downed wood and habitat snags. Generally, small/fine woody materials poses a higher fire risk and lower habitat value than larger diameter wood. ○ Remove ladder fuels (e.g., low tree branches, dense understory vegetation) from understory that could carry fire to canopy/crowns ▪ Using IPM strategies, target invasive species such as Himalayan blackberry, scotch broom, and weedy trees species, which are highly flammable and often grow in dense stands • Plant native species that are fire resistant (e.g., Oregon grape, snowberry, Oregon white oak, other deciduous trees) ○ Characteristics include low sap/resin content, moist or waxy leaves, open branching patterns, doesn't retain high amounts of dead material (Detweiler et al., 2023) • Plant a diversity of plant species and structures and increase plant spacing to improve resilience to wildfire • When applicable, collaborate with local organizations, such as Tualatin Valley Fire & Rescue (TVF&R) to further assess fire risk in natural areas, especially in neighborhoods directly adjacent to natural areas (e.g., Boeckman Creek and Park at Merryfield)

	• Partner with local organizations to develop community engagement/organization/resources around wildfire management (e.g., Firewise USA) • Promote and/or provide opportunities to learn about defensible space for homeowners who live adjacent to natural areas

5. Proactively manage for emerging pests/diseases	• Continue existing work to proactively treat and manage for MOB
	• Develop a proactive management strategy for EAB similar to other local jurisdictions
	  o Regularly monitor Oregon ash populations throughout the City so that any EAB infestations are detected
	  o Refrain from including Oregon ash in planting lists, and use substitutes such as black cottonwood and alder species in riparian plantings

6. Provide the public with safe and accessible opportunities to recreate, learn, and be stewards of natural areas	• Install and/or update interpretive and educational signage in parks and natural areas to promote greater learning, care, and appreciation for natural areas • Establish and/or carefully design maintain trails through natural areas to encourage recreation in designated areas while addressing impacts such as erosion, removing social trails, and re-routing trails out of sensitive areas. • Work with Homeowners' Associations that contain greenspaces and in neighborhoods that are adjacent to natural areas to enhance and maintain ecosystem health • Continue working with organizations like Friends of Trees to facilitate volunteer activities (e.g., invasive species removal, native plantings, pollinator meadows) • Connect with local organizations such as the Intertwine Alliance and the Blueprint Foundation to develop opportunities for under-served and minority communities/youth to recreate, learn, and steward in natural areas (e.g., Connecting Canopies program)

Habitat-Specific Strategies

Table 4. Habitat-specific management strategies

Habitat Type	Strategies

Upland Mixed Conifer/Deciduous	• Treat and remove invasive species, monitor for new introductions of invasive weeds
	  o Common invasive species: Himalayan blackberry, English Ivy, English hawthorn, English holly, bird cherry, cherry laurel, Canada thistle, bull thistle
	  o EDRR species: garlic mustard, lesser celandine
	• Improve diversity of native plant communities by installing conifer and deciduous tree species where appropriate, understory shrub species, and seeding native herbaceous species.
	• Monitor for new introductions of invasive weeds and pest species such as EAB (where Oregon ash is present) and MOB
	• Preserve snags and nurse logs where possible
	• Thin canopy density where necessary to reduce wildfire risk, increase habitat complexity, and promote forest succession

Riparian Mixed Conifer/Deciduous; Riparian Deciduous	• Utilize same strategies outlined above for Upland Mixed Conifer/Deciduous • EDRR species: knotweed spp., garlic mustard, lesser celandine, false brome, and drooping sedge • Plant a diversity of native riparian species with varying morphologies to enhance riparian vegetation complexity and diversity • Improve riparian complexity with preservation of beaver dams and log jams or installation of beaver dam analogs (BDAs), post-assisted log structures (PALS), and large woody debris placement

Scrub/Shrub Wetland	• Treat and remove invasive species using IPM strategies
	  o Common invasive species to target: reed canary grass, Canada thistle, bull thistle, vetch spp., velvet grass, tansy ragwort, teasel, oxeye daisy
	  o EDRR species: knotweed spp., garlic mustard, purple loosestrife, yellow flag iris, and ludwigia
	• Monitor for new introductions of invasive weeds and pest species such as EAB (if Oregon ash is present)
	• Plant diverse wetland shrub and low-stature trees, including willows, spirea, black twinberry, ninebark, black hawthorn
	• Improve wetland complexity with preservation of beaver dams and log jams or installation of beaver dam analogs (BDAs), post-assisted log structures (PALS), and large woody debris placement

Upland and Riparian Meadow	• Treat and remove invasive species using IPM strategies
	  o Common invasive species to target: Canada thistle, bull thistle, reed canary grass, vetch, velvet grass, tansy ragwort, teasel, oxeye daisy
	  o EDRR species: garlic mustard, lesser celandine
	• Monitor for new introductions of noxious weeds
	• Manage woody species encroachment with chemical or mechanical methods
	• Seed diverse mixes of native grasses and forbs

Oak Woodland/Savanna	• Treat and remove invasive species using IPM strategies
	  o Common invasive species to target: Canada thistle, bull thistle, vetch, velvet grass, tansy ragwort, teasel, oxeye daisy, reed canary grass, English hawthorn
	• Monitor for new introductions of invasive weeds and pest species such as MOB
	• Selectively thin Oregon white oak stands when appropriate
	  o Typical stand densities range from 1-10 trees per acre in oak savannas and 10-40 trees per acre in oak woodlands (Grand, 2024)
	• Plant Oregon white oak and seed native understory and grassland species
	• Manage encroachment of conifers such as Douglas fir with chemical or mechanical methods
	• Partner with indigenous groups and/or tribes to conduct prescribed burns to replicate natural fire regimes

Cost Estimates and Potential Funding Sources

Management of city-owned natural areas will vary in cost depending on current habitat quality, management needs, and duration of management. Approximate costs (per acre per year) are outlined in Appendix E. These costs are based on 2025 industry-standards for contracted restoration work in the Portland Metro Area and should be reviewed periodically and adjusted for inflation.

There are numerous funding sources that the City should consider to fund and/or supplement internal/general funds for natural area management work and community engagement in natural area management. Potential funding sources and grants include:

- OWEB Small Grants (OWEB, n.d.)
    - Supports on-the-ground restoration projects (up to $20,000) for a wide range of natural area and watershed restoration projects, including stream, river, wetland, and upland habitat improvements
- Natural and Working Lands Fund (OWEB, n.d.)
    - Restoration and Technical Assistance grants to plan and implement a wide range of natural climate solutions on Natural and Working Lands
    - Eligible applicants are Soil and Water Conservation Districts, tribes, non-profits, so the City would need to partner with an eligible applicant to implement projects under this fund.
- Land and Water Conservation Fund (OPRD, n.d.)
    - Supports acquisition of land or developing facilities within public outdoor recreation areas
- Access and Habitat Program (ODFW, n.d.)
    - Supports projects that improve fish and wildlife habitat, including, but not limited to wetland restoration and noxious weed control
- Private Forest Accord Grant Program (ODFW, 2024)
    - Supports projects impacting fish and aquatic wildlife species and habitats
- Nature in Neighborhoods (Metro, n.d.)
    - Supports local parks and nature projects in the greater Portland Metro Area, focusing on water and air quality, fish and wildlife habitat restoration, and increasing access to nature for all residents
        - Capital Grants: for publicly owned capital projects that advance racial equity, address climate change, and involve meaningful community engagement.
        - Community Choice Grants: a participatory budgeting process where community members can propose and vote for parks and nature projects
        - Community Stewardship and Restoration Grants: supporting partnerships that improve water quality and habitat and connect people with nature, particularly targeting underserved communities and emphasizing environmental justice.
- Urban and Community Forestry (UCF) Subaward Program (ODF, n.d.)

    - Promotes investments in community and urban forestry, including tree planting and maintenance, supporting urban communities and green infrastructure development.
- Oregon Invasive Species Council Grants (OISC, n.d.)
    - Provides funding specifically for projects related to invasive species education and outreach
- Oregon Wildlife Foundation Grants (OWF, 2025)
    - Awards small grants for projects aligning with their mission of fish and wildlife conservation and public enjoyment of natural resources. Eligible projects include habitat restoration or protection, invasive species removal, and natural resource education
- Arbor Day Foundation Grants (Arbor Day Foundation, 2025)
    - Provides funding for plant material in tree planting projects (typically 5,000-10,000 trees)

In addition to the potential funding sources listed above, Wilsonville Parks & Recreation also offers several grants for community organizations and individuals that are intended to support opportunities for natural area enhancement, community education and engagement. These grants include:

- Community Opportunity Grant (City of Wilsonville, n.d.)
    - Provides funding (up to $25,000 per year in total) for a range of local projects, often focusing on education, diversity, arts, and community involvement
- Wilsonville-Metro Community Enhancement Grant Program (CEP) (City of Wilsonville, n.d.)
    - In partnership with Metro, provides funding for projects improving the City's appearance, environmental quality, recycling efforts, or recreational areas within city limits.

CONCLUSION

Natural areas are an invaluable resource for ecosystem function and human health and well-being. To achieve the City's vision of a more ecologically resilient future, this Plan creates an over-arching framework for management and stewardship of city-owned natural areas and emphasizes the importance of community engagement in natural area management.

Management of natural areas requires consideration of current and emerging issues including, but not limited to, wildfire, invasive pests, climate change, and recreation. Natural area management should be an ever-evolving process, and management objectives and strategies should be adapted as new threats/issues and community priorities emerge. Additionally, as new techniques and best practices are developed, management strategies should be adapted to best serve the ecosystems and communities. The City should plan to review ongoing management activities every 4-5 years to ensure that objectives and recommended strategies remain appropriate and relevant to the overall goal of creating and maintaining healthy and resilient ecosystems in city-owned natural areas.

REFERENCES

AECOM. 2022. “Lake Oswego Natural Areas Habitat Management Plan.” City of Lake Oswego, Lake Oswego, OR.

Alaica, S., Roberts, T., Esterson, A. 2022. “Graham Oaks Conservation Plan.” Unpublished report for Metro, Portland. Institute of Applied Ecology. Corvallis, Oregon.

Arbor Day Foundation. 2025. Reforestation Request for Domestic Proposals. URL: https://www.arborday.org/toolkit/reforestation-domestic-proposal?utm_term=adestra&utm_campaign=reforestation-rfp&utm_content=&utm_medium=email&utm_source=email1

City of Wilsonville, 2001. “Natural Resource Inventory and Goal 5/Title 3/Endangered Species Act Compliance and Protection Plan: Inventory Update 1999-2000.” City of Wilsonville, Wilsonville, OR.

City of Wilsonville. 2018. “Wilsonville Comprehensive Plan.” City of Wilsonville. Wilsonville, OR.

City of Wilsonville. 2018 “Integrated Pest Management Plan.” City of Wilsonville. Wilsonville, OR.

City of Wilsonville. 2021. “Urban Forest Management Plan.” City of Wilsonville, Wilsonville, OR.

City of Wilsonville. 2025. “Climate Action Plan.” [Unpublished draft.] City of Wilsonville. Wilsonville, OR.

City of Wilsonville. n.d. Grant Programs. URL: https://www.wilsonvilleoregon.gov/parksrec/page/grant-programs

Costa Pacific Communities. 2013. “Villebois Village Master Plan.” City of Wilsonville. Wilsonville, OR.

Detweiler, A. J., Fitzgerald, S., Cowan, A., Bell, N., and Stokely T. 2023. “Fire-resistant plants for home landscapes.” Oregon State University Extension Service. Corvallis, OR.

Institute for Policy Research and Engagement (IPRE). 2024. Clackamas County Community Wildfire Protection Plan. University of Oregon. Eugene, OR.

Grand, L. 2024. “Fire adapted oak habitats in the South Willamette Valley.” Oregon State University Extension Service. Oregon State University. Corvallis, OR.

Hennings, L. 2017. “Hiking, mountain biking and equestrian use in natural areas: A recreation ecology literature review.” Oregon Metro. Portland, OR.

Koloszar, James A., Ward, D. L., and Pribyl, A. L. 2006. “Surveys of fish species and habitat in Wilsonville streams.” City of Wilsonville. Wilsonville, OR.

Metro. 2019. “Coffee Lake Creek Wetlands Site Conservation Plan.” Oregon Metro. Portland, OR.

Metro. In preparation. “Graham Oaks Nature Park Site Conservation Plan.” Oregon Metro. Portland, OR.

Metro. n.d. Nature in Neighborhood Grants. URL: https://www.oregonmetro.gov/tools-partners/grants-and-resources/nature-grants

OARD. 2019. 736-045-0006. URL: secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3432

ODFW. 2016. Oregon Compass. URL: compass.dfw.state.or.us/visualize/#x=-119.35&y=44.19&z=7&logo=true&dls%5B%5D=true&dls%5B%5D=0.5&dls%5B%5D=549&basemap=ESRI+Satellite&tab=data&print=false

ODFW. 2024. Private Forest Accord Grant Program. URL: https://www.dfw.state.or.us/habitat/PFA/grant_program.html

ODFW. n.d. A&H Grants. URL: https://dfw.state.or.us/lands/AH/grants/index.asp

ODF. 2024. “Mediterranean Oak Borer.” Oregon Department of Forestry. Salem, OR.

ODF. n.d. Urban and Community Forestry Subaward Programs. URL: https://www.oregon.gov/odf/forestbenefits/pages/ucf-subaward-programs.aspx

Oregon DLCD. 2019. “Oregon Statewide Planning Goals and Guidelines.” Oregon DLCD. Salem, OR.

Oregon DLCD. n.d. Community Green Infrastructure Grant Program. URL: https://www.oregon.gov/lcd/cgi/pages/default.aspx

OISC. n.d. Grant for Invasive Species Education & Outreach. URL: https://www.oregoninvasivespeciescouncil.org/grants

OPRD. n.d. Land and Water Conservation Fund. URL: https://www.oregon.gov/oprd/gra/pages/gra-lwcf.aspx

OWEB. n.d. Grant Programs. URL: https://www.oregon.gov/oweb/grants/Pages/grant-programs.aspx

OWF. 2025. Grantmaking. URL: https://myowf.org/grants

Portland Parks & Recreation. 2015. “Natural Areas Restoration Plan.” Portland Parks & Recreation, Portland, OR.

The Intertwine Alliance. 2012. “Regional Conservation Strategy for the Greater Portland-Vancouver Region.” A. Sihler, editor. The Intertwine Alliance, Portland, OR.

USDA. 2019. “Web Soil Survey.” URL: websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

University of Oregon, Institute for Policy Research and Engagement, and Oregon Partnership for Disaster Resilience. 2019. “City of Wilsonville Addendum to the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan.” Clackamas County. Oregon City. OR.

APPENDICES

Appendix A. Natural Resource Function and Value

Table A-1. Scoring system for Natural Resource Function and Value of City-owned natural areas in Wilsonville. Adapted from Portland Parks & Recreation (2015).

Natural Resource Function/Value Scoring System:

3 points

- Presence of fish bearing stream
- Overlap with Significant Resource Overlay Zones (SROZ) (City of Wilsonville, 2001)
- Overlap with ODFW Strategy Habitats
- Terrestrial Species of Concern Ranking 1 or 2 (ODFW, 2016)
- Aquatic Species of Concern Ranking 1 or 2 (ODFW, 2016)
- Terrestrial Crucial Habitat Ranking 1 or 2 (ODFW, 2016)
- Aquatic Crucial Habitat Ranking of 1 or 2 (ODFW, 2016)
- Existing or past capital projects or restoration activities

2 points

- Presence of non-fish bearing stream
- Terrestrial Species of Concern Ranking 3 or 4 (ODFW, 2016)
- Aquatic Species of Concern Ranking 3 or 4 (ODFW, 2016)
- Terrestrial Crucial Habitat Ranking of 3 or 4 (ODFW, 2016)
- Aquatic Crucial Habitat Ranking of 3 or 4 (ODFW, 2016)
- Overlap with Conservation Opportunity Area (ODFW, 2016)
- Overlap with Priority Wildlife Conservation Areas (PWCA) (ODFW, 2016)

1 point

- Terrestrial Species of Concern Ranking 5 or 6 (ODFW, 2016)
- Aquatic Species of Concern Ranking 5 or 6 (ODFW, 2016)
- Terrestrial Crucial Habitat Ranking of 5 or 6 (ODFW, 2016)
- Aquatic Crucial Habitat Ranking of 5 or 6 (ODFW, 2016)
- Active volunteer or stewardship activities

Appendix B. Habitat Assessment Survey Protocols

Establishing Survey Transects Plots:

- Fifty meter transects were used to establish plots at each natural area; the number of transects mapped at each natural area was dependent on the acreage of the site to ensure that data is representative of the scale of the park.
- Random points were placed on maps prior to arriving on site to establish the beginning points of each transect and a random number generator was used to determine the cardinal direction in which the transect extended.
- To survey the tree and shrub community, two 10x10 meter macroplots plot(s) were established at random locations on the transect. Parameters for random number generator were as follows:
    - Transect direction: 0 = North, 1 = West, 2 = South, 3 = East
        - From the starting point extend the transect in the direction determined above
    - Plot location on transect (m): 0 = 0 meters, 1 = 10 meters, 2 = 20 meters, 3 = 30 meters, 4 = 40 meters
    - Plot location (side of transect): 0 = left, 1 = right
- To survey the herbaceous plant community, 1x1-meter subplots were established the upper left and lower right corners of the established macroplots.

Data Collection:

- Macroplots were surveyed to assess botanical and ecological attributes including stem counts of native and non-native trees and shrubs, tree and shrub species richness, and dominant tree and shrub species. Bare ground was estimated as a percentage of the total plot. Canopy cover was evaluated using photo monitoring and digital analysis in each macroplot. Observational information about dominant tree and shrubs species within the plot and in the surrounding areas was also recorded to determine habitat type.
- Subplots were surveyed to assess the herbaceous coverage and richness. Percent cover was estimated by functional group including native and non-native graminoids, forbs, shrubs, and bare substrate. Additionally, surveyors recorded herbaceous species richness and estimated overall percentage cover of noxious weed species. Lastly, dominant herbaceous species were noted to determine habitat type.
- General habitat conditions (soil moisture, compaction, riparian or upland habitat) were also noted by surveyors to determine habitat type and assess suitable future management of natural areas. Notable disturbances such as off trail recreation and major erosion were recorded.

Data Analysis:

- To determine the baseline habitat condition of each natural area relative to the rest of the natural areas, metrics from macroplots and herbaceous subplots were averaged by park and then assigned scores based on quartile analysis.
- Metrics used included native tree and shrub stem count, native species cover, non-native species cover, and species richness.

- Points for each parameter were based on where metrics fell into quartiles of the data set, from lowest quartile at 0 to highest quartile at 3.
- Scores for parameters for each natural area were averaged to give an overall score per area (0-3). Scores between 0 and 1 were considered Poor; scores between 1 and 2 were considered Fair, and scores between 2 and 3 were considered Good.

Appendix C. Baseline Habitat Conditions

Table C-1: Vegetation data for each City-owned natural area, averaged across all survey plots at each site

Natural Area	Native Tree Stem Count	Tree and Shrub Richness	Canopy Cover	Native Herbaceous Cover	Native Shrub Cover	Herbaceous Richness	Non-Native Tree Stem Count	Non-Native Herbaceous Cover	Non-Native Shrub Cover	Noxious Weed Cover
Memorial Park	6.90	5.13	60.33	14.50	9.58	4.60	6.37	36.65	14.55	35.57
Boeckman Creek	9.98	3.88	65.90	19.72	9.11	2.69	5.58	13.89	22.06	33.06
Kinsman Road	0.75	2.00	3.13	11.91	0.00	5.06	4.00	66.19	6.31	12.41
Boones Ferry Park	5.13	4.31	70.00	4.06	2.53	4.88	0.94	62.41	3.92	14.75
Coffee Lake Wetlands	2.67	1.50	2.33	0.00	5.83	1.00	0.00	74.58	0.21	74.58
Murase Plaza	3.00	6.00	25.33	7.33	1.25	3.33	2.83	25.83	39.58	55.67
Edelweiss Park	27.67	7.17	75.00	7.58	24.58	4.33	2.33	23.67	0.42	14.25
Tivoli Park	3.50	6.75	2.50	11.25	8.50	6.75	2.00	63.38	3.00	3.88
Willow Creek	9.25	5.25	66.00	10.25	4.00	3.25	11.25	29.00	27.13	57.38
Oulanka Park	2.25	2.50	0.00	9.63	0.00	3.00	0.00	69.13	0.00	54.75
Park at Merryfield	8.00	5.50	84.00	57.13	5.75	6.00	14.75	8.50	8.25	9.25
Tranquil Park	7.50	7.25	89.00	3.75	10.50	3.25	11.75	5.88	61.25	73.25
Canyon Creek Park	10.50	8.00	42.50	10.00	19.13	5.25	2.00	19.13	5.00	20.63
Arrowhead Park	5.00	4.00	77.50	6.38	47.88	4.25	6.75	31.00	0.63	28.50

Table C-2: Baseline habitat condition scores and ratings for each City-owned natural area in Wilsonville

Natural Area	Score	Rating
Canyon Creek Park	2.75	Good
Edelweiss Park	2.5	Good
Park at Merryfield Park	2.125	Good
Memorial Park	1.75	Fair
Boeckman Creek	1.75	Fair
Tivoli Park	1.75	Fair
Willow Creek	1.75	Fair
Tranquil Park	1.75	Fair
Arrowhead Park	1.375	Fair
Boones Ferry Park	1	Fair
Kinsman Road	0.875	Poor
Murase Plaza	0.75	Poor
Coffee Lake Wetlands	0.5	Poor
Oulanka Park	0.5	Poor

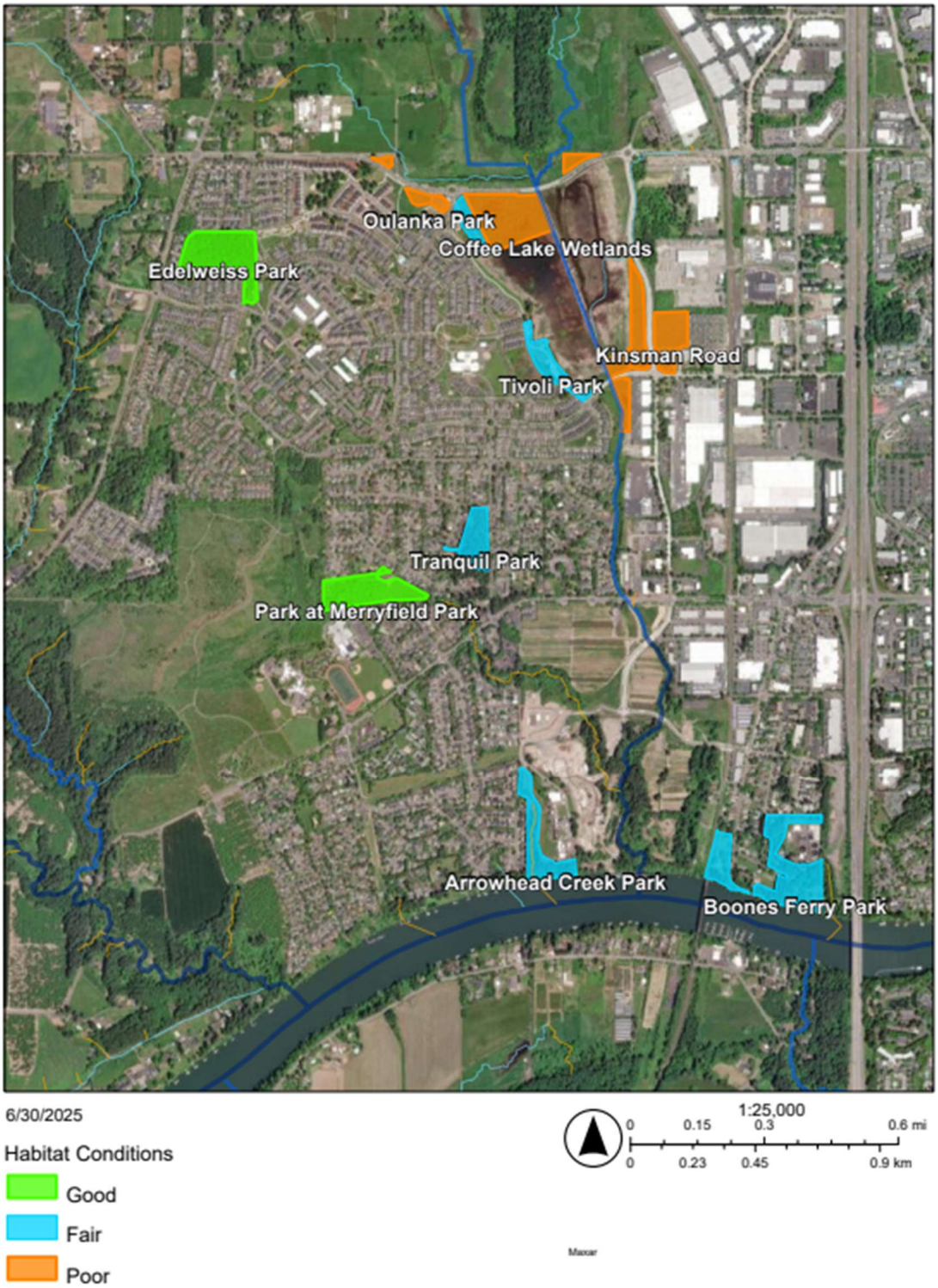

Figure C-1: Habitat conditions of City-owned natural areas west of the I-5 corridor in Wilsonville

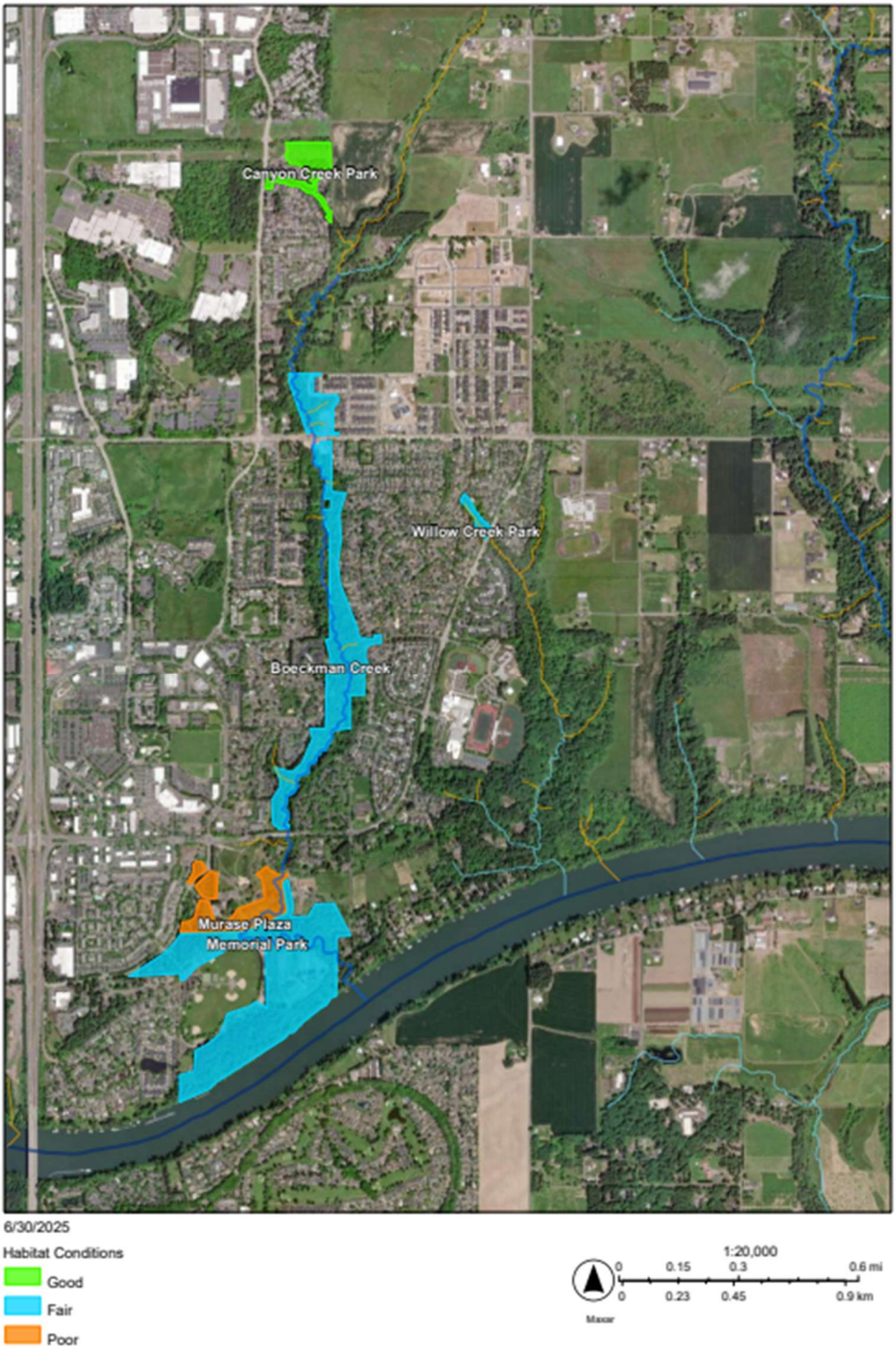

Figure C-2: Habitat conditions of City-owned natural areas east of the I-5 corridor in Wilsonville

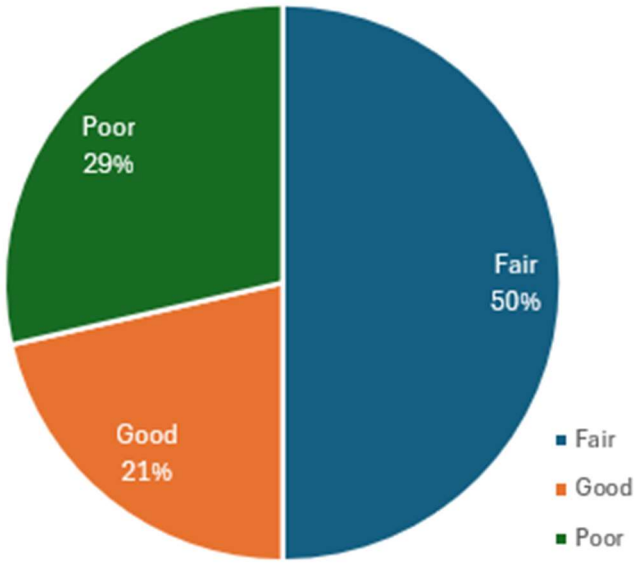

Figure C-3: Distribution of habitat conditions across City-owned natural areas in Wilsonville

Appendix D. Habitat Delineations

Figure D-1. Habitat delineations for City-owned natural areas west of the I-5 corridor in Wilsonville

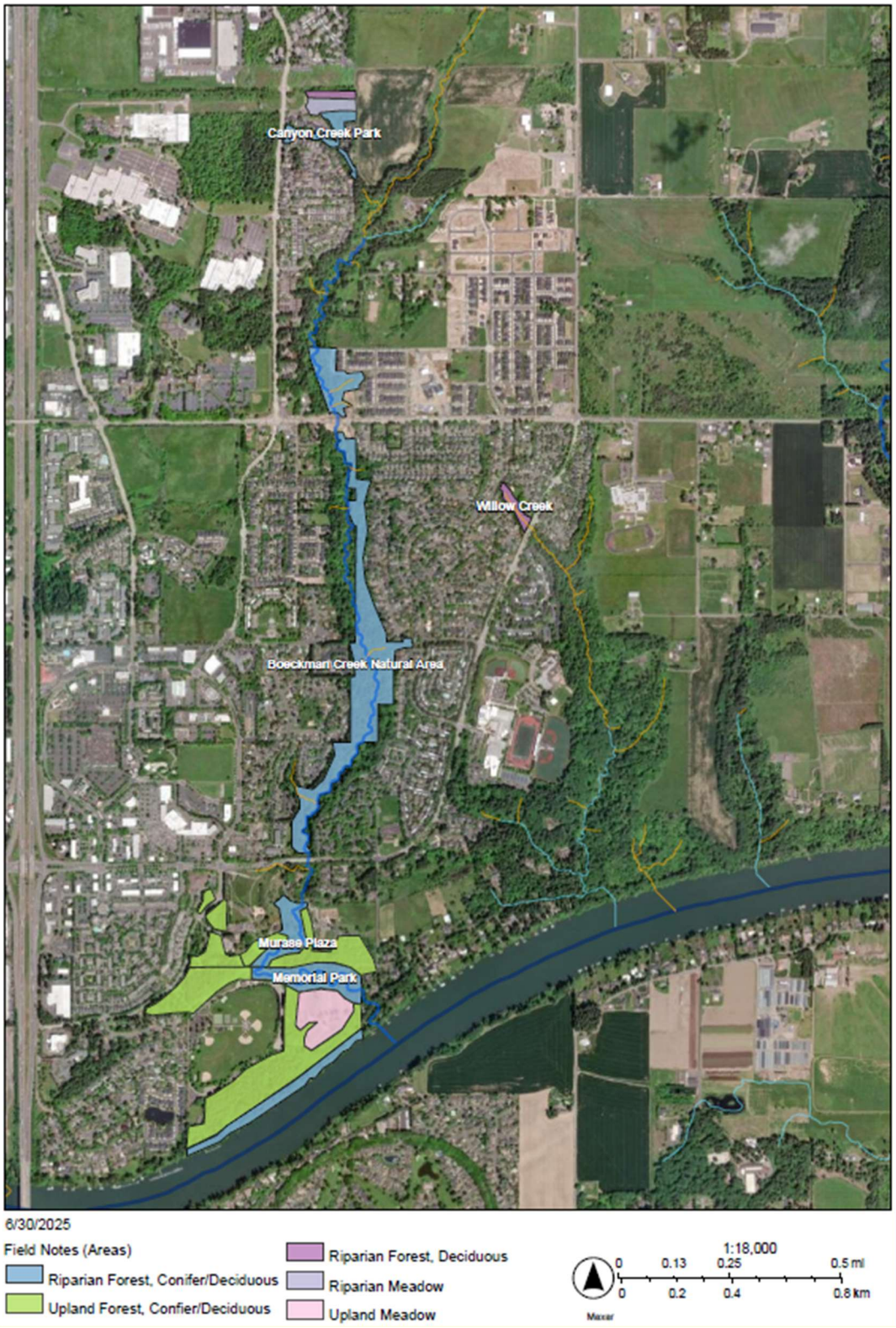

Figure D-2. Habitat delineations for City-owned natural areas east of the I-5 corridor in Wilsonville

Figure D-3: Arrowhead Creek Park habitat types

Figure D-4: Boones Ferry Park habitat types

Figure D-5: Tranquil Park habitat types

Figure D-6: Park at Merryfield habitat types

Figure D-7: Edelweiss Park habitat types

Figure D-8: Oulanka Park habitat types

Figure D-9: Coffee Lake Creek Park habitat types

Figure D-10: Tivoli Park habitat types

Figure D-11: Kinsman Road habitat types

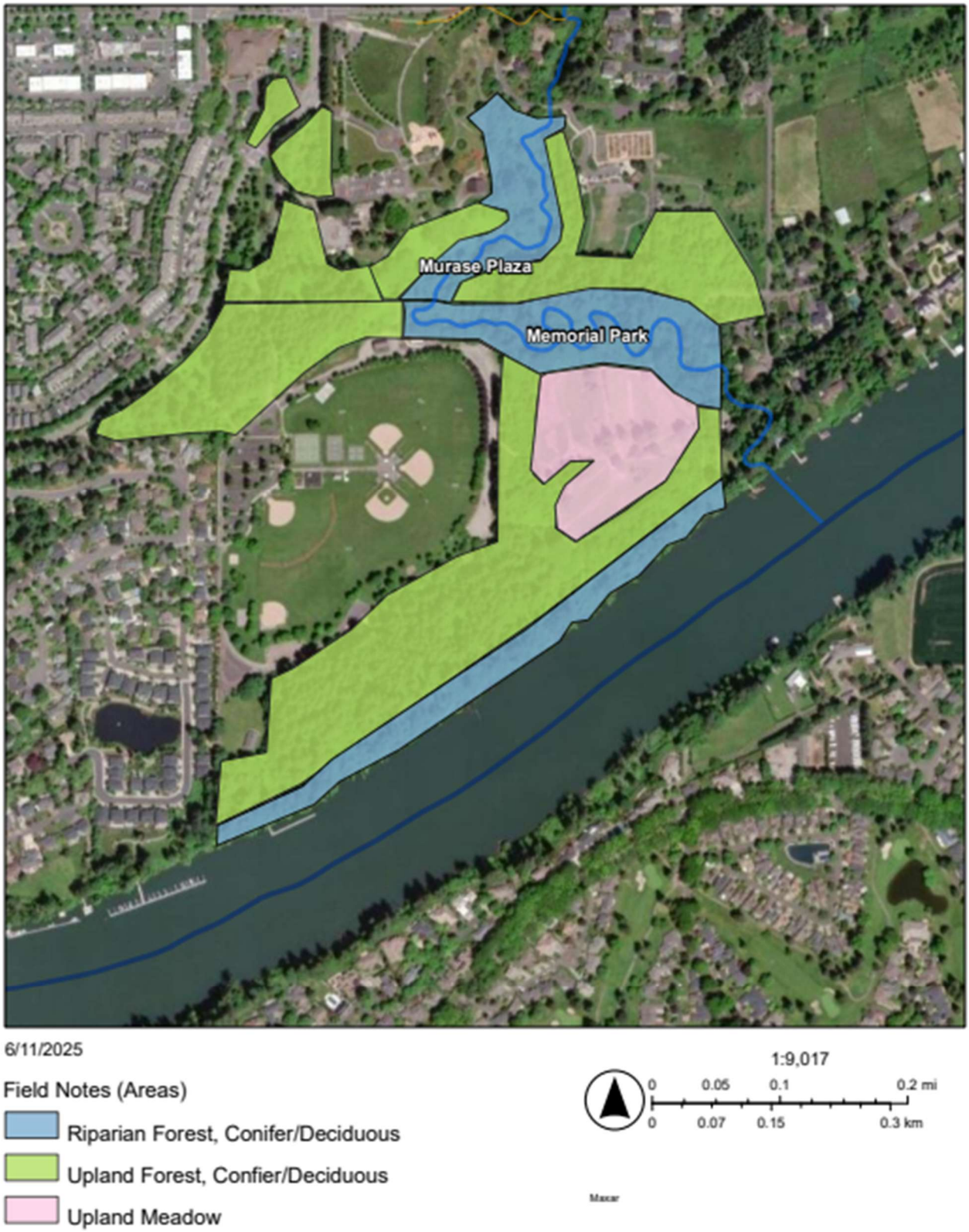

Figure D-12: Murase Plaza and Memorial Park habitat types

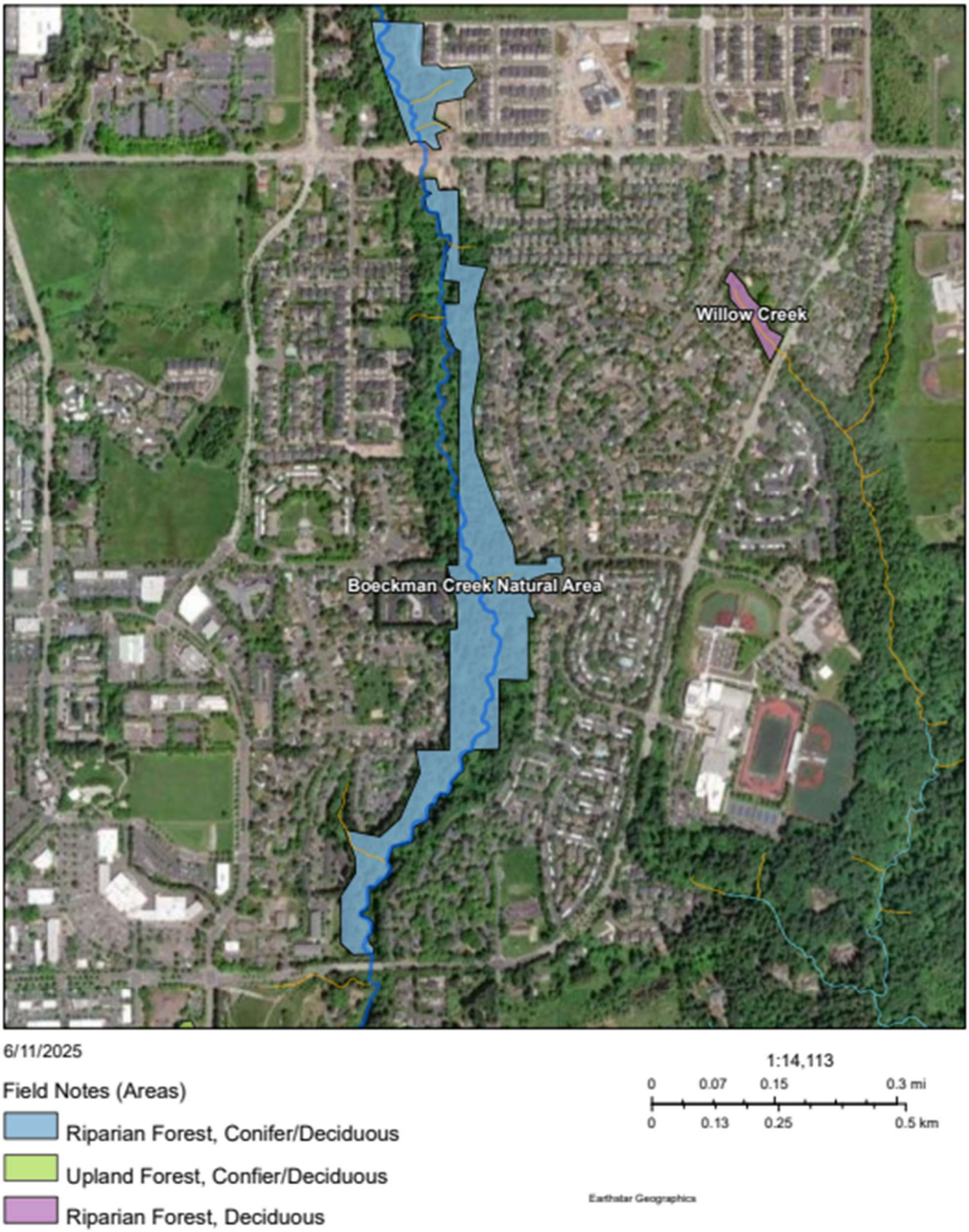

Figure D-13: Boeckman Creek and Willow Creek Park habitat types

Figure D-14. Canyon Creek Park habitat types

Appendix E. Cost Estimates

The costs shown below are ranges of expected costs for site preparation, ladder fuel reduction, planting, and maintenance. Costs are shown in units per acre per year (ac/yr) and vary depending on habitat quality (i.e. good, fair, and poor). These costs are based on 2025 rates. For subsequent years, apply a 3% increase to account for inflation. If true inflation rate is known, make appropriate adjustments if rate is above or below 3%. Project management and mobilization costs are built into the rates.

Site Preparation				
The rates below represent 3 site preparation visits per year. IPM principles should be followed. Use combinations of mechanical, manual, and chemical methods to treat invasive species and prepare the site for planting.				
Habitat Quality	**Unit**	**Cost**		**Description**
Good	ac/yr	$0.00	$3,820.00	Expect zero to one years of site preparation. High quality sites with little to no invasive species cover may not need site preparation prior to planting.
Fair	ac/yr	$6,588.50	$9,278.50	Expect one to two years of site preparation before planting.
Poor	ac/yr	$10,081.00	$12,771.00	Expect two to three years of site preparation before planting.

Ladder and Wildfire Fuels Removal				
The ranges of costs below show the expected cost per acre per year for varying levels (intensities) of ladder and wildfire fuel reduction. Sites should be assessed to determine what ladder fuels are present and what other wildfire fuel risks are present (e.g. overstocked/dense forests). Thinning of trees larger than 10" will likely require working with certified arborists to safely and efficiently remove trees.				
Intensity	**Unit**	**Cost**		**Description**
Low	ac/yr	$4,622.50	$7,415.00	Removal of ladder fuels such as invasive brambles and brush in understory; sparse removal of small weedy trees.
Moderate	ac/yr	$7,415.00	$11,195.00	Sparse thinning of trees (< 8" DBH) in dense forested areas; removal of ladder fuels such as low tree branches and invasive brambles and brush in understory.
High	ac/yr	$13,725.00	$25,625.00	Major thinning of trees (< 8" DBH) in overstocked/dense forested areas ; removal of ladder fuels such as low tree branches and invasive brambles and brush in understory.

Bareroot or Live Stake Planting				
The rates below include ranges of estimates for plant purchase and installation. Narrower spacing results in higher quantities of plants per acre and is generally used to plant sites that were heavily site prepped, while wider spacing is utilized primarily for interplanting sites with larger amounts of native vegetation.				
Habitat Quality	**Unit**	**Cost**		**Description**
Good	ac/yr	$1,964.30	$2,773.28	Stewardship planting and interplanting to enhance existing native vegetation; approximately 10'x10' to 6'x10' spacing.
Fair	ac/yr	$5,072.82	$7,535.28	Row or cluster planting; 5'x5' to 4'x4' spacing.
Poor	ac/yr	$7,535.28	$12,693.90	Row or cluster planting; 4'x4' to 3'x3' spacing.

Maintenance				
The rates below represent 3 maintenance visits across one year. Maintenance should follow IPM principles and combine chemical, manual, and mechanical strategies for managing invasives after planting. Maintenance strategies may include ring-cuts or ring-sprays to reduce vegetation growth around plantings and spot sprays or manual labor to treat smaller patches of resprouting invasives. For maintenance, Habitat Quality refers to the quality of the site prior to site preparation. Sites that start out in fair or poor quality with high invasive cover will likely require more maintenance after site preparation and planting due to higher potential for invasive resprouts from the seedbank, than a high quality site that had low invasive cover to start.				
Habitat Quality	**Unit**	**Cost**		**Description**
Good	ac/yr	$2,110.00	$3,820.00	Expect at least one year of maintenance after planting.
Fair	ac/yr	$5,362.50	$7,282.50	Expect one to two years of maintenance after planting.
Poor	ac/yr	$11,122.50	$14,830.00	Expect two to three years of maintenance after planting.