EXHIBIT A

AECOM

Natural Areas Habitat Management Plan

City of Lake Oswego

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Delivering a better world

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Executive Summary

This Natural Areas Habitat Management Plan (Plan) focuses on improved ecological resiliency for 27 of the City of Lake Oswego's (City) natural areas. It also provides a framework for the management of other natural lands in the City. This Plan seeks to achieve an overarching management goal for Lake Oswego's natural areas:

Enhance and restore Lake Oswego's natural areas to provide safe and healthy ecosystems.

For the purposes of this plan, "healthy" natural area ecosystems are defined as:

> *Natural areas that can support a wide diversity of native plants and animals and can adapt to change to maintain functionality amidst increased recreation, encroachment by invasive species, changes to natural water flows, and threats posed by wildfire and climate change.*

This Plan summarizes the management of the City's natural areas to date by Lake Oswego Parks and Recreation (LOPR), which collaborates with restoration contractors to enhance park properties. To date, LOPR has focused on the treatment and removal of ivy (*Hedera helix, H. hibernica*) and other prioritized invasive species, and the installation of native plants in disturbed habitat areas. This Plan also summarizes the City's partnerships with local volunteer groups and watershed councils, which are instrumental to the continued care of the City's natural areas.

This Plan was developed by mapping and classifying seven general habitat types that are commonly observed within each of the City's natural areas. The seven habitat types include: mixed-conifer deciduous forest, deciduous forest, Oregon white oak woodland, conifer forest, shrubland, upland grassland, and wetland. Habitats were classified based on a unique condition ranking system for purposes of managing lands based on their ecological status (degraded, moderate, or good quality). The Plan then lists eight Management Objectives to support the overarching management goal:

Objective 1. Enhance Natural Area Health and Resilience by Supporting Natural Ecological Processes
Objective 2. Noxious Weed Control
Objective 3. Minimize Habitat Fragmentation
Objective 4. Improve Climate Resilience
Objective 5. Reduce Wildlife Hazards
Objective 6. Enhance Hydrologic Function and Resource Protection Districts
Objective 7. Selective Tree Removal to Improve Safe and Healthy Ecosystems
Objective 8. Adaptively Manage Ongoing Public Engagement Opportunities that Benefit Habitat Protection and Enhancement

These objectives were developed based on habitat conditions and observed factors that constrain healthy ecosystems (e.g., invasive species, dispersed, informal trails, and increased drought stress from increasing summer temperatures). Success criteria were developed for each objective to provide a means of determining whether objectives are achieved and to inform an adaptive management approach.

This Plan includes management prescriptions, or strategies, that can be applied to help achieve these eight objectives. The prescriptions have been grouped into three categories*: General (*apply to all parks and habitat types), *Habitat-specific* (apply to specific habitat types across all parks based on existing condition), and *Park-specific (a*pply to individual parks). The Plan is intended to be a living document that is periodically updated. To that end, it concludes with recommendations for adaptive management, a systematic approach for improving natural resource management based on periodic monitoring and a review of trends to inform ongoing management approaches. Data review and resulting plan updates are recommended every 6 years (every three biennial planning cycles).

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Acronyms and Abbreviations

City	City of Lake Oswego
CSRT	Climate Smart Restoration Tool
dbh	diameter at breast height
HEP	Habitat Enhancement Program
LDC	Lake Oswego Community Development Code
LO	Lake Oswego
LOC	Lake Oswego Code
LOPR	Lake Oswego Parks and Recreation
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OPWG	Oak Prairie Work Group
Plan	Natural Areas Habitat Management Plan
RC	Resource Conservation (District)
RP	Resource Protection (District)
RLIS	Regional Land Information System
SWCD	Soil and Water Conservation District
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service

1. Introduction

The purpose of this Natural Areas Habitat Management Plan (Plan) is to provide a framework for consistent management of natural areas parklands by the City of Lake Oswego (City). This Plan is focused on developing habitat- and area-specific natural area management objectives and strategies tailored to the existing habitat conditions observed within the City's various natural areas.

The City's Parks and Recreation Department (Lake Oswego Parks and Recreation [LOPR]) manages over 460 acres of land to maintain and enhance the natural character and beauty of Lake Oswego. As stated in its mission, *LOPR provides excellence in building community, enriching lives, and caring for our urban and natural environment*. Protecting and conserving natural area parks is an important aspect of this mission due to their role in providing important habitat for plants and animals, watershed and stormwater management, and spaces for the community to connect with nature. While restoration practices are meant to return urban parks to their natural state, ongoing maintenance is acknowledged and expected in all of these habitats.

This Plan was developed with an overarching management goal for Lake Oswego's natural areas:

> *Enhance and restore Lake Oswego's natural areas to provide safe and healthy ecosystems.*

For the purposes of this plan, "healthy" natural area ecosystems are defined as:

> *Natural areas that can support a wide diversity of native plants and animals and can adapt to change to maintain functionality amidst increased recreation, encroachment by invasive species, changes to natural water flows, and threats posed by wildfire and climate change*

This Plan focuses on ecological restoration, enhancement, and improved ecological resiliency for 27 of the City's natural areas and sets the framework for other natural lands in the City. Improved ecological resiliency can be achieved via a suite of actions aimed at improving climate resiliency, supporting native vegetation (generally), supporting Oregon Conservation Strategy species and habitats, improving native species diversity, and reducing fire hazard. This Plan was developed by identifying and mapping habitat types within each of the City's natural areas, ranking the condition of habitats within each natural area, creating management objectives based on habitat conditions, addressing specific threats (e.g., invasive species, climate change), and recommending management actions accordingly. The Plan is adaptable and will be updated every 6 years, as necessary, based on monitoring data and recommendations for adaptive management.

Anticipated benefits of the Plan include:

- Developing healthy ecosystems;
- Providing the City with a framework for planning and prioritizing restoration activities;
- Providing a framework that can be applied to other smaller or future natural area sites;
- Ensuring transparency in how natural areas are managed;
- Providing background information to help support land use approvals for necessary enhancement activities, particularly for natural resources identified by the City's Sensitive Lands Map; and
- Streamlining project development for habitat enhancement grant applications.

2. Background

The City encompasses 11.2 square miles in Clackamas (primarily) and Multnomah Counties and is located about 8 miles south of the City of Portland. Current management of the City's natural areas is conducted by LOPR, which performs tasks such as noxious weed removal, native plant establishment, trash removal, and maintenance of physical structures (i.e., fences, signs, restrooms, trails, picnic

facilities, and interpretive features). Responsibilities of LOPR natural areas staff include natural areas management and maintenance, oversight of enhancement and restoration efforts, and management of contractors hired to conduct ecological enhancement activities. Staff also manage trail maintenance, outreach and education with the public, and coordination with volunteers. LOPR works in coordination with the Planning, Fire, and Engineering Departments on specific aspects of this restoration work as well.

The City partners with local volunteer groups for maintenance of natural areas:

- Friends of Hallinan Heights Woods, Friends of Iron Mountain Park, Friends of Lily Bay Natural Area, Friends of Luscher Farms, Friends of the Walugas, Friends of Southwood Park, Friends of Springbrook Park, Friends of Woodmont
- Parks, Recreation and Natural Resource Advisory Board, as well as the Natural Areas Work Group (a sub-committee)
- Clackamas Soil & Water Conservation District
- Backyard Habitat Certification Program (Portland Audubon and Columbia Land Trust)
- SOLVE and many other local service groups
- Oswego Lake Watershed Council, Tualatin River Watershed Council, Tryon Creek Watershed Council (non-city land)

The recommendations of this Plan are consistent with the City Charter (*Chapter X. Section 43. Limitations of Development)* which states that “the City of Lake Oswego shall be allowed to maintain (or allow any person to maintain) a Native Preserve for the purposes of ecological restoration that provides a safe and healthy natural area that is accessible for public enjoyment, provides a healthy habitat for wildlife, eliminates invasive species, restores native species, and mitigates fire hazards.”

2.1 Overview of Lake Oswego Natural Areas

Lake Oswego’s natural areas are located within Oregon’s “Interior (Willamette) Valley” vegetation zone, described as a mosaic of oak woodlands, coniferous forests, grasslands, shrub communities, and riparian forests, which are enclosed by the Cascade Range to the east and the Coastal Ranges to the west (Franklin and Dyrness 1988). The locations of natural area parks range from hill tops (such as Cook’s Butte) to low-lying shoreline areas along Oswego Lake or the Tualatin River (Lily Bay and River Run, respectively). Most of the natural area lands are forested or in the process of becoming forested; very few areas remain in a maintained grassland state (e.g., Stevens Meadows). General habitat types observed within the natural areas are consistent throughout the City, with characteristics generally associated with elevation, topography, and water presence. Natural areas on slopes tend to consist of primarily conifer or mixed conifer and deciduous forest. Natural areas along streams or rivers contain deciduous, riparian forest habitat. Natural areas located on low-gradient (relatively flat) terraces generally contain deciduous upland or wetland habitats. Further detail is provided in Appendix A. Table 1 lists the 27 Lake Oswego natural areas evaluated for this Plan and Figure 1 provides their locations within the City.

Table 1. Lake Oswego Natural Areas Assessed by this Plan

Name	Size (acres)
Bryant Woods Park	19.7
Canal Acres	27.3
Cooks Butte City Park	43
Cornell Natural Area	3.2
East Waluga Park*	17.7
Freepons Park*	5.9
George Rogers Park*	26
Glenmorrie Park*	2.3
Glenmorrie Greenway	3.9
Hallinan Woods	5.7
Iron Mountain*	51
Kelly Creek	3.7
Lamont Springs Natural Area	0.5
Lily Bay	1.8
Luscher Farm Natural Areas	19
Pennington	2.4
Rassekh**	2.1
River Run	10.8
Roehr Natural Area*	7.9
Sierra Vista	1.3
South Shore Natural Area	9.2
Southwood Park	2.5
Springbrook Park	52
Stevens Meadows	27.8
Sunny Slope	12
West Waluga Park*	22.8
Woodmont Natural Park	6.8
TOTAL	**388.3*** **

Notes:

*Hybrid park

**Hybrid park In planning stage (only stream corridor is managed as a natural area)

***These are the acres assessed by this plan; not the total acres of areas managed by the City as Natural Areas Parks (approximately 460 acres).

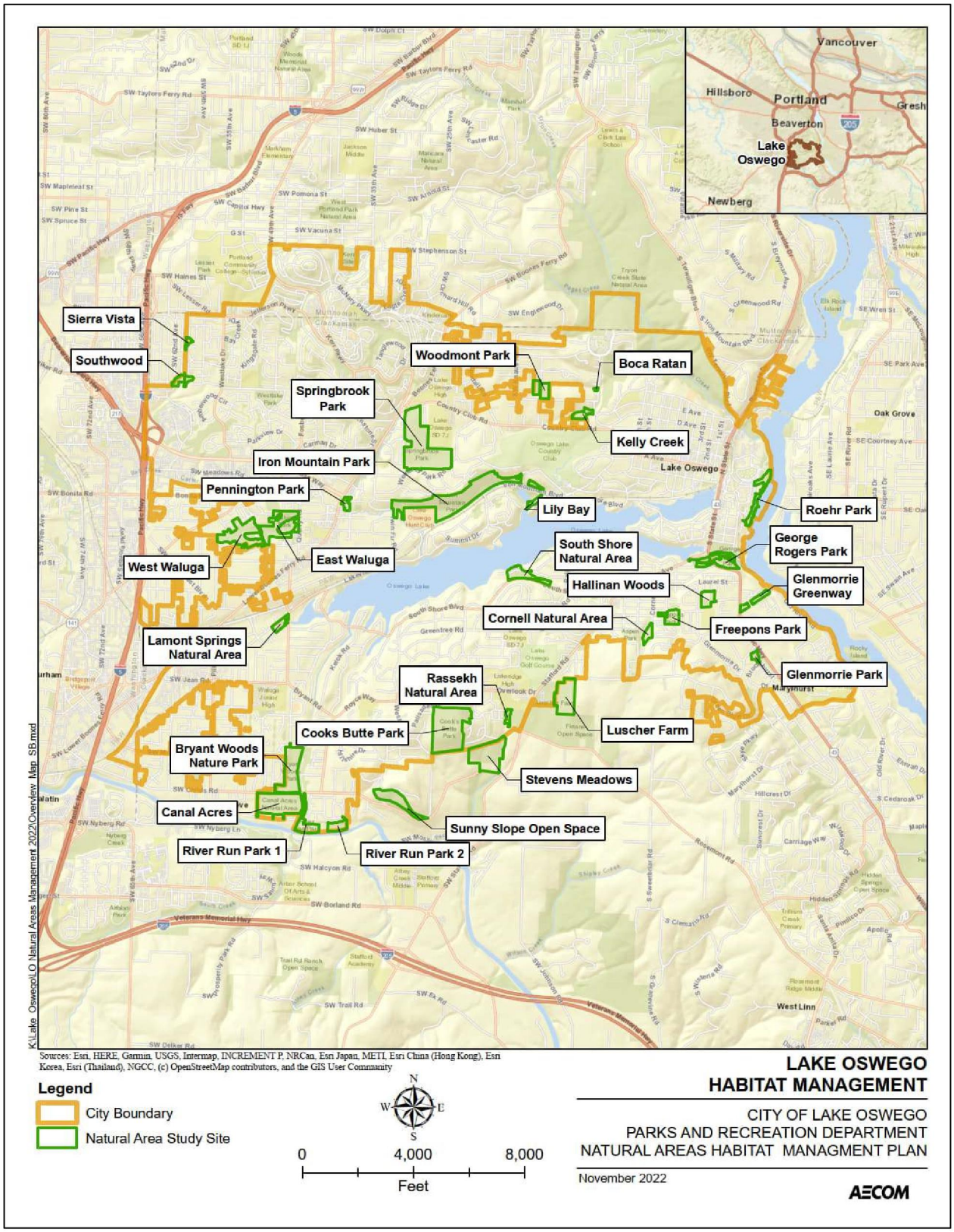


Figure 1. Lake Oswego Natural Area Study Sites Considered in this Plan

2.2 Summary of Natural Areas Management Efforts to Date

Healthy ecosystems support the health, wellness, and safety of Lake Oswego residents. The City has recognized this and has a long history of protecting and planning for projects that enhance parks and natural areas. In 2011, the City Council directed LOPR to prioritize ivy (*Hedera helix, H. hibernica*) removal from natural area parks. LOPR was asked to redirect $70,000 of general funding to support ivy removal annually, which became the Invasive Removal Program. This funding was used to hire restoration contractors to treat and remove ivy and other prioritized invasive species. While developing the LOPR 2025 Master Plan, the City's natural areas were evaluated and ranked on the basis of condition and resource values. The Master Plan established the initial framework to guide City staff, contractors, and volunteer restoration priorities.

In 2014 the City developed an updated Sensitive Lands Ordinance in coordination with Metro. Sensitive Lands regulated by the City include wetlands, streams, riparian areas, and upland forest stands. Updates to the Sensitive Lands Ordinance reduced regulations on private landowners with the promise that the City would increase restoration efforts and protections on City-owned land. The City Council directed $250,000 in annual funding to support and expand ongoing restoration efforts. This funding created the Habitat Enhancement Program (HEP). The HEP continued invasive removal efforts, added native species planting projects, and provided for ongoing maintenance. Currently, HEP funds are used in the following ways:

- City restoration
- Grant funding for local watershed councils to support restoration work on private land
- Use as matching funds for restoration grant applications (leveraged to gain grant funding)
- Purchase of plants for volunteer work parties.

To date, Invasive Removal Program and HEP funds have been used to enhance 31 public natural areas, including more than 370 of the 460 acres of natural area parks managed by the City. Funding has also supported all three local watershed councils with annual support for various watershed restoration projects on private lands. It should be noted that natural areas management efforts are iterative and often require multiple site visits over several years to control noxious weeds and establish native plant communities.

LOPR has also been instrumental in developing master plans and restoration/maintenance plans for several of the natural area park properties (e.g., *Iron Mountain Park Master Plan* [2017]; *George Rogers Park Master Plan* [2002]; *Cooks Butte Park Management Plan* [2008]; and *Woodmont Natural Park Master Plan* [2017]).

In 2021, Lake Oswego voters passed Citizen's Initiative 3-568 to amend the City Charter to include additional protections of natural areas within the City. This initiative was a grassroots effort to protect natural areas.

2.3 Related Plans

Some of the related plans that have been reviewed are listed below. Applicable elements of these plans have been incorporated into this Plan.

- Lake Oswego Sensitive Lands regulations
- *Lake Oswego Open Space Plan* (City of Lake Oswego 2001)
- *Lake Oswego Urban & Community Forestry Plan* (City of Lake Oswego 2007)
- *Lake Oswego's State of the Urban Forest Report* (City of Lake Oswego 2009)
- *City of Lake Oswego Comprehensive Plan* 2013, Healthy Ecosystems Chapter (2015) (Ordinance 2687)
- *City of Lake Oswego Parks Plan 2025* (City of Lake Oswego 2012a)
- *Mountain Park Homeowners Association Natural Areas Assessment* (Pacific Habitat Services 2012)

- *City of Lake Oswego Addendum to the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan* (University of Oregon 2019)
- *Sustainability and Climate Action Plan for Lake Oswego* (City of Lake Oswego 2020a)
- *City of Lake Oswego Stormwater Management Manual* (City of Lake Oswego 2020b)
- *Integrated Pest Management Practices* (City of Lake Oswego 2022)

2.4 Available Data

Plant communities were classified and their boundaries were delineated using a combination of brief field visits, input from the City's restoration contractors, input from City staff, high-resolution aerial imagery, high-resolution topographic imagery, and a variety of spatial data (mapping data that can be visualized and queried). Available spatial data that was particularly helpful in the remote delineation of plant communities is summarized in Table 2.

Table 2. Data Sources Used to Help Identify Plant Community Boundaries

Plant Community	Layer (Source)
Oregon White Oak Woodland	OakPoints (OPWG)
Upland Conifer Forest Deciduous Forest Mixed Conifer-Deciduous Forest	condec (Conifer-Deciduous; RLIS), aerial imagery (Google Earth, ArcGIS Online) LO_RP_3_2019 (City of LO, Resource Protection [RP] Districts)
Upland Grassland Shrubland	condec (gaps in this layer do not have a forest canopy; RLIS) Land_Cover (Regional Conservation Strategy, RCS) aerial imagery (Google Earth, ArcGIS Online)
Wetland	LO_RP_3_2019 (City of LOLO) Land_Cover (RCS) Hydric Soils (USDA/RLIS) stream_route (RLIS) National Wetland Inventory (USFWS) Draft Local Wetland Inventory (Fishman 1992)

Notes: City and Contractor expertise were used to verify and refine GIS layers listed above. For Iron Mountain Park, an existing habitat assessment (ESA 2017) was also referenced.

Acronyms: LO = Lake Oswego; OPWG = Oak Prairie Work Group (a project of The Intertwine Alliance); RCS = Regional Conservation Strategy; RLIS = Regional Land Information System (Metro); RP = Resource Protection; USDA = US Department of Agriculture; USFWS = US Fish and Wildlife Service.

3. Generalized Plant Communities in Lake Oswego Natural Areas

This Plan addresses management of seven generalized plant communities that characterize the variety of unique habitats within the City's natural areas: mixed conifer-deciduous forest, deciduous forest, Oregon white oak woodland, upland conifer forest, shrubland, upland grassland, and wetland. It should be noted that riparian habitat occurs within many of the plant communities described below, particularly deciduous forest. However, because riparian areas require specific delineation methods described in Lake Oswego Community Development Code (LDC) section 50.05.010, they were not field delineated for purposes of this Plan. Although these habitats are not separately inventoried, they are generally indicated on the habitat maps (Attachment B) by the City's Resource Protection (RP) overlay zones. Due to their ecological importance, several management strategies for riparian areas are described in this Plan.

The RP Overlay Zone includes an estimated stream or wetland and associated riparian buffer area, which can have a variable width dependent on slope gradient. Most park forest stands that are not zoned RP

are zoned as Resource Conservation (RC) zones. Forest management policies within RP and RC districts are unique and must comply with the standards described in LDC 50.05.010 (Sensitive Lands Overlay Districts).

Approximate plant community boundaries and habitat condition rankings were determined using a combination of available geospatial data review (per Section 2.4 above), limited site visits, input from the City's restoration contractors, input by LOPR staff, and literature review. Field assessment was conducted at a limited number of the larger natural areas to field test the initial habitat boundary delineations and to determine the dominant canopy and understory species present, collect notes on vegetation age and structure, and assess noxious weed cover. Initial inventory and ranking were improved upon by incorporating input provided by the City's natural area restoration contractors, who are very familiar with existing conditions and past restoration efforts. The resulting habitat inventory and classification is included as Appendix B to this plan. While the inventory and ranking provide an important context for planning and future management of the City's natural area parks, it should be noted that the inventory was largely delineated remotely and is, therefore, imprecise; none of the habitat polygon boundaries were field surveyed.

The following documents were used as references for the habitat types that were mapped in the City and are described below:

- *Portland Plant List* (City of Portland 2016)
- *Classification of Native Vegetation of Oregon* (Kagan et al. 2004)
- *Native Freshwater Wetland Plant Associations of Northwestern Oregon* (Christy 2004)
- *City of Lake Oswego Native and Invasive Plants* (City of Lake Oswego 2012b)
- *Oregon Conservation Strategy*

3.1 Plant Community Summaries

The following subsections provide an overview of each general plant community that commonly occurs throughout the City's natural area parks. More detail on each plant community and a list of key native plant species associated with each community is provided in Appendix C.

3.1.1 Mixed Conifer-Deciduous Forest

This forest community is a common cover type within multiple natural areas and dominates several of the City's larger natural areas. Total area within Lake Oswego's natural areas is 109.6acres. The dominant species in the canopy include Douglas-fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*). Additional common canopy species include western red cedar (*Thuja plicata*), red alder (*Alnus rubra*), and Pacific madrone (*Arbutus menziesii).* Most of the overstory trees are young to mature, with diameters ranging from 8 inches to a maximum of 24 inches diameter at breast height (dbh). Canopy cover typically ranges from 80 to 100 percent, with variable canopy heights. This community is often found within many of the areas mapped as RP overlay zones. Common native understory trees and shrubs include Scouler's willow (*Salix scouleriana*), vine maple (*Acer circinatum*), Indian plum (*Oemleria cerasiformis)*, Oregon grape (*Mahonia aquifolium*), salal (*Gaultheria shallon*), beaked hazelnut (*Corylus cornuta* var. *californica)*, red elderberry (*Sambucus racemosa* ssp. *pubens*), trailing blackberry (*Rubus ursinus*), and snowberry (*Symphoricarpos albus*). Common native herbaceous species include sword fern (*Polystichum munitum*), fringecup (*Tellima grandiflora*), and large-leaved avens (*Geum macrophyllum*).

3.1.2 Deciduous Forest

In Lake Oswego, deciduous forests are the second most common habitat type, totaling 82.9 acres within the City's natural areas. In deciduous forest stands, very few mature conifers are present in the overstory. Bigleaf maple is typically the dominant species, with red alder occasionally abundant, particularly along draws and ravines. Black cottonwood (*Populus trichocarpa*) is also seen within this habitat type. Some stands contain conifer saplings (e.g., western red cedar), indicating that they will become mixed conifer-deciduous forest over time. The shrub layer is typically dominated by red-osier dogwood (*Cornus*

sericea), beaked hazelnut, Indian plum, and Pacific ninebark (*Physocarpus capitatus*). This plant association is often found in riparian areas along streams and rivers.

3.1.3 Oregon White Oak Woodland

This habitat is dominated by Oregon white oak (*Quercus garryana*) and is generally less common than the coniferous forested habitat types in Lake Oswego. According to the Oregon Conservation Strategy, oak woodland habitat is characterized by a tree canopy that obscures 30 to 70 percent of the sky and an understory that is relatively open with shrubs, grasses, and wildflowers. Areas mapped as Oregon Oak Woodland in Appendix B include areas that contain relatively dense oak trees but do not necessary meet the definition of oak woodland habitat per the Conservation Strategy. For example, the understory may be crowded rather than open. However, they identify areas with the potential to become oak woodland with ongoing management.

Historically, oak woodlands were most common on flat to moderately rolling terrain, usually in drier landscapes. Although historically a common element of the Willamette Valley, today less than 5 percent of oak woodland habitat remains.[1] In Lake Oswego, this habitat type occurs on approximately 19.5 acres of natural areas; however, many of these oak stands are overcrowded by large conifers and other species and do not currently have an open understory as is characteristic of this habitat type. Because of its uniqueness and regional loss, this habitat type is an important component of the City's biodiversity and would benefit from specific management actions. Oak woodlands are an Oregon Department of Fish and Wildlife (ODFW) Conservation Strategy Habitat and support species that have a high degree of fidelity to oak trees. Shrub species associated with this habitat include western serviceberry (*Amelanchier alnifolia*), Oregon grape, and buckbrush (*Ceanothus cuneatus*). Herbaceous plants include grasses (*Bromus carinatus, Elymus* spp., *Festuca* spp.) and sedges (*Carex* spp.). Historical burning by indigenous communities was a major factor in maintaining oak woodlands in this area, as frequent low-intensity fires hinder conifers such as Douglas-fir. Within the City, it is common for oak woodlands to contain Oregon ash (*Fraxinus latifolia)* as a subdominant species.

Modern fire suppression practices have resulted in this habitat type being overrun by native conifers and invasive species. Loss of oaks, particularly large-diameter, open-structured trees valuable to wildlife, is of particular concern because oak trees have a slow growth rate, which slows restoration success. In addition, reproduction and recruitment of younger trees are poor in many areas.

3.1.4 Conifer Forest

In Lake Oswego's natural areas, conifer forest stands encompass approximately 52.3 acres and contain Douglas-fir as dominant and western hemlock (*Tsuga heterophylla*) as a subdominant species emerging below the forest canopy. In more mature forests, this habitat may include additional conifer species, including grand fir (*Abies grandis*) and western red cedar. Occasional bigleaf maple and/or red alder may be present as minor understory stand components, but these species are typically not included in the forest canopy. The shrub understory varies in diversity, with native areas dominated by sparse-to moderate-density native shrubs (similar to those found in the mixed conifer-deciduous forest habitat).

3.1.5 Shrubland

In Lake Oswego, the upland shrubland habitat type occurs primarily in former agricultural land such as old orchards. This habitat type represents a relatively small portion of Lake Oswego's natural areas, with 8.6 acres mapped within the natural areas. Wetland shrubland habitat often occurs in areas that have experienced frequent or recent disturbance (such as regular flooding or recent fire) that would preclude tall overstory tree species. Native shrub species often include willows, red-osier dogwood, hardhack (*Spirea douglasii* spp. *douglasii*), and/or Pacific ninebark. Shrubland habitat is considered transitional, meaning that over time and without repeated or continued disturbance, it will convert to a tree-dominated habitat type. For this reason, young tree saplings can also be present within this habitat type.

[1] https://oregonconservationstrategy.org/strategy-habitat/oak-woodlands/

3.1.6 Upland Grassland

Historically, the Willamette Valley contained upland grassland habitat, also known as prairies, which often occurred near oak woodlands where fire was also used to maintain the open character of that habitat type. Grasslands were historically dominated by native perennial bunchgrass species such as Lemmon's and California needlegrass (*Acnatherum lemmonii* and *A. occidentalis* ssp. *californica*), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus* ssp. *glaucus),* and fescues *(Festuca* spp.) (City of Portland 2016). Forbs are also present, including many wildflowers such as camas (*Camassia quamash*), yarrow (*Achillea millefolium),* clovers (*Trifolium* spp.) and clarkias (*Clarkia amoena* and *C. rhomboidei*) (City of Portland 2016). Camas is a native tuberous lily that was a staple in the diet of local indigenous communities. As such, it is widely regarded as a culturally important native plant and is often associated with relic or restored wet prairie habitats. Several native plant species became adapted to growing only in (endemic to) these prairie habitats. As prairies have largely been converted to agriculture or development, these endemic species are becoming imperiled, and many have been placed on the Oregon Endangered Species list (e.g., White Rock larkspur [*Delphinium leucophaeum*], peacock larkspur [*Delphinium pavonaeceum*], Nelson's checker-mallow [*Sidalcea nelsoniana*], Kincaid's lupine [*Lupinus oreganus*] and Willamette daisy [*Erigeron decumbens*]).[2]

The City's grasslands (approximately 38.3 acres) can be managed to encourage the development of native prairie habitat. This opportunity could be considered if regional partnerships or grant funding opportunities supporting native prairie habitat restoration are available. The largest areas of upland grassland habitat can be found at Luscher Farm and Stevens Meadow natural areas. Other options for habitat improvements include transitioning upland grassland habitat that consists of fallow lawn areas to native shrub or forest habitat through restoration.

3.1.7 Wetland

Wetlands are characterized by plants that have adapted to growing in areas that, under normal circumstances, are seasonally inundated or saturated within a foot of the soil surface for at least two consecutive weeks during the growing season. Probable wetlands (not officially "delineated" but likely based on data review) are the dominant cover type in some of Lake Oswego's natural area parks, including West Waluga and Canal Acres. A variety of wetland forms exist within the City's natural areas: forested wetlands, shrub wetlands, and herbaceous marsh totaling approximately 58.9 acres. Although these different wetland forms are structurally different, they are all managed under similar federal, state, and local regulatory protections, face similar threats, and would be managed in a similar manner; thus, all wetland forms are grouped for purposes of this management plan. Wetland prairies, if present now or in the future, would be managed differently from these wetland forms (i.e., more like grasslands), with threats and recommendations that are very similar to those for upland grassland prairies.

Forested wetlands in Lake Oswego are generally dominated by Oregon ash in the overstory, with a variety of shrubs common in the understory. In some areas, black cottonwood and red alder co-dominate the forest canopy, particularly near surface waters. Shrub-dominated wetlands and shrub understory species within forested wetlands typically include red-osier dogwood, hardhack, Pacific ninebark, and willows. Common native wetland herbs and forbs include slough sedge (*Carex obnupta),* small-fruited bulrush (*Scirpus microcarpus*), rushes (*Juncus* spp.), water parsley (*Oenanthe sarmentosa*), and large-leaved avens. Wetlands are often correlated with areas mapped as RP zones in the City's Sensitive Lands Atlas.

3.2 Limiting Factors

Each of the natural area habitats in the City have unique attributes, including specific ecological factors that limit the habitats from becoming fully healthy native ecosystems (such as reed canarygrass [*Phalaris arundinacea*] in wetlands). However, there are some common limiting factors that are ubiquitous throughout all of Lake Oswego's natural areas. These are described in the sections that follow. Limiting factors inform the objectives of this plan, as described in Section 4 of this report.

[2] https://agsci-labs.oregonstate.edu/willamettevalleyprairies/threatened-and-endangered-plants-of-willamette-valley-prairies/

3.2.1 Invasive Species

According to the Lake Oswego Master Plant List (Lake Oswego Code [LOC] Section 50.11.004), invasive plants "tend to dominate plant communities, crowding out other native plants. They generally have low value to wildlife, and some are considered harmful to humans." Target species for removal, listed in the Clackamas Soil and Water Conservation District (SWCD) WeedWise program (CSWCD 2021), represent a culmination of expertise on current site conditions, and consider local and regional invasive species lists, such as those prepared by the Oregon Department of Agriculture (ODA).

3.2.2 Off-Leash Dogs

Off-leash dogs are a threat to the City's natural areas (LOC 34.12.620) and are allowed only in areas specifically designated as off-leash dog parks (at Hazelia Field, Pilkington Park, West Waluga Park, and McNary Park). Pets can spread invasive species, cause physical damage to native plants, and aggravate wildlife.

3.2.3 Informal Trails

The City plans for trails to be located and maintained in specific areas that balance human access and recreation with habitat protection objectives. Park users often stray from main trails to find shortcuts or explore interior areas of parks. These informal trails attract followers, which can exacerbate habitat degradation by introducing humans, pets, litter, soil erosion, and noxious weeds into sensitive areas that are intended to be managed for conservation. When used heavily, these trails break up otherwise cohesive blocks of habitat that are used by wildlife for forage and cover—a process known as habitat fragmentation.

3.2.4 Forest Pests

The presence of forest pests such as invasive or harmful insect and fungi species are monitored and effectively managed if necessary. Of recent concern is the introduction of the emerald ash borer beetle (*Agrilus planipennis*) because of the significant management costs and ecological harm this pest poses. This beetle is a wood-boring pest of ash trees (*Fraxinus* spp.) and is considered the most destructive forest pest in North America (Oregon Department of Forestry 2021). It presents a significant concern for Lake Oswego where Oregon ash is abundant such as within forested wetland habitats and within Oregon white oak woodland. This beetle is native to parts of Asia but was first detected in North America in 2002 near Detroit, Michigan and Windsor, Ontario (Oregon Department of Forestry 2021). In June 2022, the emerald ash borer was detected in Oregon which is the first confirmation of this invasive pest on the West Coast. The Oregon Department of Forestry and ODA have prepared an *Emerald Ash Borer Readiness and Response Plan* for Oregon (Oregon Department of Forestry and ODA 2021) to be used as a guide for response to this species.

3.2.5 Encroachment

The City is undergoing restoration and fuel reduction work along park borders and encountering years' worth of encroachment from private lands owners. Dumping of debris, building of fire pits and permanent structures, and ornamental landscaping on encroached land creates fire hazards and stalls restoration efforts. The City is working with these private landowners to display survey markers and reestablish borders for current and future tenants.

3.3 Conditions Ranking

Forest habitats were ranked based on a schema that evaluates three ecological attributes that are relatively simple to measure: stand age, diversity of native species, and noxious weed cover.[3] This ranking system borrows from the Clean Water Services system for ranking vegetated corridors (vegetated buffers of water quality sensitive areas) but was adapted to natural areas based on AECOM's experience in evaluating habitats throughout the City as part of on-call Sensitive Lands reviews conducted between

[3] "Noxious" weeds include those listed in Clackamas SWCD WeedWise

2016 and 2022. These base attributes are intended to be representative of conditions that infer overall habitat quality for wildlife and ecological resiliency against factors such as climate change, noxious weed infestation, and increased recreational use. These are not a strict grading criteria for plant populations with characteristically slow growth rates (e.g., Oregon white oak).

Ecological condition was ranked "**High**" where a plant community meets the following metrics:

- **Age (Forested):** Majority of trees ≥50 years old or average tree dbh ≥20 inches for Douglas-fir or bigleaf maple or >12 inches for Oregon ash trees within the stand.
- **Diversity (Forest):** ≥4 native tree species (in forested areas), ≥6 native shrub species, and ≥2 native groundcovers (e.g., ferns)
- **Diversity (Shrub):** ≥6 native shrub species, and ≥4 native groundcovers (graminoid or forb)
- **Diversity (Herbaceous):** ≥8 native groundcovers (e.g., graminoids, ferns, wildflowers) with total cover of >50% and with each of the 8 species having at least 2% cover
- **Noxious Weed Cover:** <25%

Each species counted toward the diversity goal should provide a minimum of 2% of total cover within the habitat polygon being assessed.

Ecological condition was ranked "**Moderate**" where a plant community meets the following metrics:

- **Age (Forested):** Majority of trees ≥~25 years old and <~50 years old; average tree dbh 10-20 inches
- **Diversity (Forest/Shrub):** ≥2 native tree species (in forested areas), ≥4 native shrub species, and ≥2 native groundcovers (e.g., ferns)
- **Diversity (Herbaceous):** ≥4 native groundcovers (e.g., graminoids, ferns, wildflowers) with total cover of >25% and with each of the 4 species having at least 2% cover
- **Noxious Weed Cover:** <40%

Ecological condition was ranked "**Low**" where a plant community meets the following metrics:

- **Age (Forested):** Majority of trees <~25 years old; average tree dbh <10 inches
- **Diversity (Forest/Shrub):** ≤2 native tree species (in forested areas; to be considered a tree, dbh must be ≥6 inches), <4 native shrub species, and <2 native groundcovers (e.g., ferns)
- **Diversity (Herbaceous):** <4 native groundcovers (e.g., graminoids, ferns, wildflowers)
- **Noxious Weed Cover:** >40%

For each attribute assessed, a habitat is given a score of 1 for low, 2 for moderate, and 3 for high. Based on these scoring criteria, forest habitats would receive one condition score that is based on the average of their age, diversity, and noxious weed cover scores. For example:

Forest habitat X: Age (2), Diversity (3), Noxious Weed Cover (1) = condition score of 2 ((2+3+1)/3).

Because herbaceous and shrub habitats are not ranked for age, their scores are based on the average of their diversity and noxious weed cover scores. The resulting condition rank is based on the following average scores:

- 0 to 1.4 — Low
- 1.5 to 2.2— Moderate
- 2.3 to 3 — High

As such, the condition rank for "forest habitat X" in the example above would be moderate, based on the combination of moderate age, high diversity, and abundant noxious weed cover.

4. Management Goal, Objectives, and Prescriptions

Diverse and healthy ecosystems provide many benefits to the City, including improved air and water quality, habitat for wildlife, shade/temperature regulation, soil health, nutrient cycling, pest management, recreation, and mental health benefits for City residents.

The following sections describe the City's *overall management goal* and *eight objectives* developed to achieve that goal. This section also summarizes management prescriptions recommended to achieve the goal and objectives.

4.1 Management Goal and Objectives

The following objectives are designed to achieve one overarching goal for this plan:

This Plan was developed with an overarching management goal for Lake Oswego's natural areas:

> *Enhance and restore Lake Oswego's natural areas to provide safe and healthy ecosystems.*
>
> For the purposes of this plan, "healthy" natural area ecosystems are defined as: *Natural areas that can support a wide diversity of native plants and animals and adapt to change to maintain functionality amidst the increase of recreation, encroachment by invasive species, changes to natural water flows, and threats posed by wildfire and climate change.*

4.1.1 Objective 1. Enhance Natural Area Health and Resilience by Supporting Natural Ecological Processes

To protect the long-term health of Lake Oswego's natural areas and improve their resilience to land use pressures such as recreation, stormwater management, climate change, and recreational uses, the City should employ a variety of management actions that minimize habitat degradation, mitigate prior disturbance, and fortify against future ecological threats. The City has 12 years of experience conducting restoration activities. This experience will inform future projects in conjunction with adjustments made for changing conditions, new techniques or methodologies, and new collaborations and partnerships.

Success Criteria: Within 10 years, at least 25% of plant associations (by area) noted as being in low or moderate rank will be elevated to moderate or high rank, respectively. Photo monitoring will be conducted on a yearly basis to visually demonstrate changes to habitats in restoration.

4.1.2 Objective 2 Noxious Weed Control

Invasive species (many of which are also considered noxious weeds) threaten natural resources through competition, habitat degradation, reduction of genetic diversity, and introduction of diseases. The ODA (2020) definition of a noxious weed is "a terrestrial, aquatic, or marine plant designated by the Oregon State Weed Board under Oregon Revised Statute 569.615 as among those representing the greatest public menace and as a top priority for action by weed control programs." As mentioned in Section 2.2 of this report, the City has dramatically reduced noxious weed cover in several of the City's natural areas since 2011. Recommended actions in this Plan focus on continuing efforts that target invasive species identified by the Clackamas SWCD WeedWise program (CSWCD 2021). This target list was developed to focus efforts on species with the greatest potential to adversely affect the health, resiliency, and functionality of native ecosystems. Removal of weeds follows the integrated pest management guidelines outlined within the department's IPM policies.

Following the removal of target noxious weeds, native plant species will be planted to reoccupy the open soil. Continued removal of noxious weeds will allow for the native plants to grow and become the dominant plant species within the supported habitat. Native plants will be chosen to fit the habitat being restored, and planned succession will be taken into consideration. By reducing the noxious weed load and reintroducing and supporting native plant species, target noxious weed cover can be reduced in an ecologically resilient manner.

Target invasive species presence in each of the natural areas can change over time, particularly after removal efforts have begun and when new species are introduced, so this objective must be closely monitored and linked to the restoration practices described in Objectives 1 and 6.

Success Criteria: A sample of parks having target invasive species (Clackamas SWCD WeedWise Program) will be monitored every 5 years and shown to have decreasing target invasive cover of at least 5% (e.g., from 20% to 15% cover). Monitoring locations should be randomly selected and should include all the plant associations described in Section 3 above. For natural area parks with <10% cover by target invasive species, ongoing treatment should be considered at the discretion of LOPR staff. If stable and not expanding, further treatment may be unnecessary, but monitoring should continue to detect increases in target invasive plant populations. As most natural areas with robust target invasive plant infestations have already received intensive, preliminary herbicide treatments, this standard assumes gradual ongoing reductions of target weeds over time and intentionally avoids further dramatic reductions that would require substantial amounts of herbicide use (although such intensive herbicide applications may still be warranted at sites where needed to reduce robust infestation). For ease of management, a portion of applicable natural areas should be monitored each year, rather than once every five years.

4.1.3 Objective 3. Minimize Habitat Fragmentation and Protect Sensitive Areas

Lake Oswego's natural areas provide valuable habitat refuges for wildlife while at the same time offering recreation and public access opportunities, which provide many physical and mental health benefits to City residents. Balancing recreation and resource protection goals can be challenging, particularly in smaller natural area parks where there is inadequate space to provide buffers for sensitive habitats. This Plan recommends actions that identify and prioritize highly sensitive habitat areas and develop habitat protection strategies to minimize habitat fragmentation and recreational use conflicts in the City's more sensitive habitat areas.

Lake Oswego's natural areas are already fragmented by decades of development. Fragmented habitats are less likely to support sensitive species and are more susceptible to ecological degradation such as the spread of invasive species along informal trails. However, within the existing natural areas there are opportunities to restore cohesive habitat blocks via native plant establishment and by addressing issues of invasive species and erosion. There are also opportunities to minimize future habitat fragmentation by limiting the potential for new informal or social trails through patches of sensitive habitat. Efforts by LOPR in support of this objective are already underway, including providing signage to identify areas where public access and recreation are approved. However, specific efforts to create natural barriers around highly sensitive habitat areas can help further this objective by reducing unwanted social trail establishment. For example, plantings of native shrubs with thorns or natural woody debris barriers may aid in directing pedestrian traffic around highly sensitive habitat areas.

This Plan defines a highly sensitive habitat area as one that is in relatively good condition and meets any of the following criteria:

- Contains unique habitat communities such as wetland or camas prairie (see "Other Unique Features" noted in Appendix A);
- Has been recently restored (thus more susceptible to damage while plants establish); and/or
- Contains sensitive plant or wildlife species per the Rare, Threatened, and Endangered Species of Oregon[4] (ORBIC 2019).

Efforts to minimize habitat fragmentation can create cohesive blocks of habitat that enhance wildlife habitat conditions within natural areas. Protection of these habitat areas may also support efforts to enhance wildlife corridors (existing or planned) between natural area parks. These efforts should be

[4] At this time, Iron Mountain is the only of the City's natural areas are known to contain rare species (White Rock larkspur*)* and is actively managed for this species*;* however, should additional rare species become identified, a management plan should be developed to identify appropriate protective buffers around populations of these species, which would be managed as highly sensitive habitat areas.

consistent with regional plans for connectivity, such as Metro's Title 13 Resource Inventory (Metro 2005), and in collaboration with adjoining property owners and conservation partners such as local watershed councils. HEP funding, which is administered to conservation partners by LOPR, is often used to for this purpose. Additionally, as funding for future conservation opportunities becomes available, those that enhance wildlife corridors should receive priority over similar opportunities that do not.

Success Criteria: Using the habitat classification mapping developed for this plan, priority sensitive areas will be identified by LOPR and flagged for restricted access within 2 years. Within 5 years, sensitive areas that are under threat of fragmentation due to uncontrolled access will have access restrictions put in place, including possible trail closures, signage, and/or barriers made of natural materials.

4.1.4 Objective 4. Improve Climate Resilience

According to the *Fourth National Climate Assessment*, the Northwest has warmed 2˚F since 1900 and is projected to continue to warm during all seasons under all future climate scenarios (May et al. 2018). Warmer winters result in reduced snowpack, which correlates to drought, water scarcity, and large wildfires (May et al. 2018; Barbero et. al. 2015).

Climate change impacts, including increases in temperature and changes in normal precipitation patterns, have the potential to exacerbate existing threats on natural ecosystems. Lake Oswego's natural areas may experience increased tree mortality from heat, drought, and invasive species infestations. Natural parks may no longer be able to support certain native plant and animal species, as thermal thresholds for some species are expected to be surpassed. Changes in climate would also affect shifts in the timing of migration, life cycles, and flowering, which are important for ecological processes such as reproduction and nutrient cycling.

Climate change presents unprecedented challenges for natural resource managers but taking proactive steps to ensure that Lake Oswego's natural areas are more resilient to the impacts of climate change will make the challenges more manageable. This will require management that prepares the natural areas for a changing climate rather than relying on historical norms and practices. Some examples of this type of management, also termed "climate-smart restoration" are increasing the diversity of native tree species in forested areas and ensuring mixed ages and different structures within a given forested area. These practices protect the overall ecological function of a natural area by avoiding a complete loss of forest canopy during a heat event or drought that may result in die-off of certain species or age class. Additionally, plant species selection (e.g., selecting more heat and drought tolerant native species), seed sourcing (e.g., selecting native seeds from local populations in areas where the climate is hotter and drier), and assisted migration (e.g., purposefully selecting species whose range occurs outside the area but is anticipated to be suitable for future climate conditions and whose addition to the ecosystem would be either neutral or beneficial to overall functioning) can help a restoration project be successful given projected future climate conditions. Guidance resources specific to climate-smart restoration in Oregon are in development.[5] Climate-smart restoration practices should be adaptive and consistently reevaluated as new research and developments are introduced.

Success Criteria: All new restoration projects will incorporate a review of climate-smart forestry/restoration practices (Oregon Department of Forestry 2021; CSRT, in development) and incorporate these practices into design and construction. A summary of these efforts will be included in the *Natural Areas Management Plan Effectiveness Monitoring Report* (see Section 6).

4.1.5 Objective 5. Reduce Wildfire Hazards

The natural areas that make Lake Oswego a beautiful and desirable place to live and work inherently come with the risk of wildfire by supplying a potential fuel source. Fire hazards are present when there is fuel (e.g., wood) combined with conditions related to local topography and seasonal weather, particularly relative humidity, heat, and wind. The City will continue efforts to remove ladder fuels and other woody weed species that pose a threat to canopy fires. Lake Oswego's Fire Department website provides

[5] Climate Smart Restoration Tool (CSRT), in development, US Forest Service, Conservation Biology Institute, and Oregon State University https://consbio.org/projects/climate-smart-restoration-tool/

instructions for maintaining defensible space and fire-resistant plants along the interface between human developments and forested areas. The City's Addendum to its Multi-Jurisdictional Hazard Mitigation Plan (University of Oregon 2019) lists wildfire hazards for neighborhoods bordering specific natural areas, including Iron Mountain Bluff, Springbrook Park, and [East] Waluga Park. In general, this objective is met by existing policies related to reducing fuels along the periphery of natural areas, in coordination with the Fire Department, where they are adjacent to human developments and removal of hazard trees. The City refers to the *Clackamas Community Wildfire Protection Plan* (Clackamas County 2017) for coordination and fire hazard reduction management strategy.

Success Criteria: The City will coordinate with regional partners to remove fire hazards observed within park boundaries and reduce woody debris piles within natural area peripheries. This may include thinning fuels in natural areas containing dense undergrowth, especially where such density slows natural forest development or where it would benefit oak release. Fire hazard reduction efforts will be documented in a Natural Areas Management Plan Effectiveness Monitoring Report once every 6 years.

4.1.6 Objective 6. Enhance Hydrologic Function and RP Districts

Lake Oswego's rivers, streams, and wetlands provide many ecological functions valued by society for their ability to sustain fish and wildlife, improve water quality, and control flows for both flood hazard reduction and summer base flow support. Waters and associated riparian areas are ODFW Conservation Strategy Habitats, as they are ecologically important and sensitive to degradation from human land use pressures. For example, increased runoff from surrounding development introduces sediments and pollutants that contribute to water quality issues. When water flow is impeded by barriers such as roads and culverts, channelization (detachment from natural floodplain) occurs. This restricts the natural ability of streams to meander over time. Changes in runoff patterns resulting from impervious developments and invasive plant species have altered the frequency and duration of flows into and through streams, often resulting in erosion, channelization, and/or blockage of flow.

A variety of stream enhancement measures may be implemented based on the hydrologic conditions of each stream. As such, LOPR should look for grant opportunities or partners to fund stream assessments, particularly in areas with known flooding concerns and/or known fish passage barriers, such as those mapped by the ODFW on Tryon Creek and Oswego Creek (ODFW 2022a). With grant funding, streams should be assessed by a professional stream ecologist and/or water resource engineer to determine the stream mechanics and conditions resulting in poor performance. Then the specialist can recommend a suite of management measures to enhance stream form, flows, and water quality (e.g., temperature and dissolved oxygen) where impaired. Common enhancement strategies include grade controls, fish passage barrier removal, streamside plantings, bank stabilization measures, control of noxious weeds, and treatment/storage of incoming surface flows. In headwater locations, enhancement efforts typically focus on hydrologic cycling for water retention, improving water quality, and slowing water flow. This objective also supports Objective 4 (climate resilience). The role of LOPR in this objective should be limited to grant development, support, and coordination with ongoing natural areas management activities (e.g., riparian planting and target invasive species control).

Success Criteria: The City will seek grant funding to hire contractors to plan and implement river, stream, riparian, and/or wetland restoration projects each biennium. Priority will be for perennial streams, large wetlands, and fish passage barrier removal opportunities. Fish passage projects should focus on streams the drain directly to the Willamette or Tualatin Rivers. Grant efforts will be documented and summarized in a Natural Areas Management Plan Effectiveness Monitoring Report once every 6 years.

4.1.7 Objective 7. Selective Tree Removal to Improve Safe and Healthy Ecosystems

Forest stand health can be weakened by disease, drought, infestation, or overcrowding of saplings. Furthermore, trees along public trails and roadways have the potential to become hazard trees if they are weakened and prone to falling. Several habitats in Lake Oswego are weakened by competition with non-native trees, including English hawthorn (*Crataegus monogyna*), English holly (*Ilex aquifolium*), English Laurel (*Prunus laurocerasus*), and eastern cherry tree (*Prunus* spp.) species. To promote healthy growth

of native trees, areas containing overcrowding or hazard trees should be identified and treated or removed/thinned. This will support oak release projects, keep tree-falling hazards minimal along formal trails and roads, and prevent the spread of pests, such as emerald ash borer. Removal of trees should focus on locations where such removal would benefit the overall health of the forest habitat or remove a falling hazard adjacent to public trails, neighboring developments, or roadways. Some trees should be left as snags to improve habitat conditions if they are free from disease or pests.

Success Criteria: During the development of management plans or restoration project proposals, LOPR will review natural areas to determine whether selective tree removal should be incorporated into the plans for improved forest health and safety. In addition, LOPR will review publicly available hazard tree inventory data, including ongoing citizen-led tree inventory data, and plan for selective removals in natural areas where such actions would improve forest health and/or pedestrian safety. These efforts should be documented in a Natural Areas Management Plan Effectiveness Monitoring Report once every 6 years.

4.1.8 Objective 8. Adaptively Manage Ongoing Public Engagement Opportunities that Benefit Habitat Protection and Enhancement

Lake Oswego is actively engaged with a volunteer community encompassing many different groups and organizations. Volunteer work parties have focused on removal of target invasive species, native planting projects, demonstration gardens, and citizen science monitoring projects (via the Watershed councils). Continued public involvement in stewardship activities is crucial for maintaining and enhancing Lake Oswego's natural areas. As participating volunteers come and go, the City is routinely engaged in trying to maintain current levels of volunteer participation in natural areas management activities. LOPR will continue its current level of outreach opportunities while seeking out funding and other opportunities for expanded volunteer recruitment, training, and appreciation events for completed projects. At park entrances and throughout our natural areas, signage detailing educational materials, promoting stewardship, indicating sensitive lands, and prohibiting destructive activities will be maintained and added as necessary. These forms of passive information help educate recreators and amplify restoration impacts.

Success Criteria: LOPR staff currently provide an annual presentation of their volunteer and outreach efforts to the Parks Board. However, every 6 years the general trends of volunteerism will be evaluated to identify what is working and to identify opportunities for successful citizen engagement. The results of this evaluation will include recommendations that will be summarized in a Natural Areas Management Plan Effectiveness Monitoring Report once every 6 years.

4.2 Management Prescriptions

Management prescriptions are strategies that could be applied to help achieve the objectives outlined in Section 4.1. The management prescriptions are grouped into three categories:

- *General — apply* to all parks and habitat types.
- *Habitat-specific — apply* to specific habitat types across all parks based on existing condition.
- *Park-specific — apply* to all habitat types within a park.

Repetition of management prescriptions in the three categories is intentional to allow LOPR staff to quickly and comprehensively access recommendations based on the needs of the upcoming project. Management strategies that are higher priority are shown in bold in Table 3. High priority strategies were determined by considering the funding/feasibility of the project, as well as its impact on ecosystem health.

4.2.1 General Prescriptions

Table 3. Summary of General Management Strategies by Objectives

Objective	Management Strategies
1. Enhance Natural Area Health and Resilience by Supporting Natural Ecological Processes	• **Increase diversity of native species in all strata (tree, shrub, groundcover) to create a wider array of drought tolerance and susceptibility to pests or viral pathogens that can affect one or more native species.** • Support native pollinating insects by incorporating native pollinator support seed mixes (native wildflower species attractive to bees) within restoration projects. • Staff should attend training on emerald ash borer beetle so they can be quick to recognize arrival and learn management techniques. • Plant using successional planting list to increase vegetation diversity and increase habitat resiliency. • Consider soil restoration, decomposition, and nutrient cycling in restoration efforts. Where appropriate, inoculate soils or bare root plant materials with mycorrhizae as part of restoration efforts.
2. Reduce Target Noxious Weed Species	• **Continue target invasive treatment that focuses on target species (Clackamas SWCD WeedWise Program), as appropriate given annual variability and site-specific priorities in infested areas, using broad-spectrum herbicide application (for initial treatment), followed by spot spraying and/or mechanical and hand removal.** • Utilize Integrated Pest Management guidelines to optimize noxious weed removal and limit use of herbicides. • During various park management activities, identify/map small populations of target invasive species with potential to rapidly expand and prioritize for treatment (e.g., a small patch of shining geranium (*Geranium lucidum*) along the edge of a forested area that could quickly spread). • Continue to partner with agencies that outreach to private property owners on target invasive species management and resources. • Replant treated areas with native trees, shrubs, and other plants as appropriate for each habitat type and park location.
3. Minimize Habitat Fragmentation and Protect Sensitive Areas	• **Identify locations of sensitive areas (e.g., recent restoration areas, areas of high biological diversity) which may need additional protection through restricted access through use of signs, fencing, logs, woody debris, barbed plantings, or other measures.** • Work with local and regional partners to strategically enhance wildlife corridors and linkages, including within and between parks where appropriate. Metro Title 13 Inventories identify habitat linkages between parks and offer a good identifier for future conservation opportunity areas, as funding allows. For example, the Springbrook Creek riparian corridor provides habitat linkage between Springbrook, Pennington Park, and Iron Mountain Natural Areas. • Work with local and regional partners to support regional trail development by confirming that the alignment of proposed trails does not overlap with sensitive areas. Trails through wetlands should seek funding to develop elevated boardwalks that separate foot traffic from sensitive habitat and surface flow conditions. • Work with Transportation Department to evaluate the potential for planned upgrades to culverts or other road crossings for wildlife crossing support. For example, larger culverts can be fitted with an internal bench to provide wildlife with a way to cross under busy streets without the risk of vehicle collision. Similarly, small rodent bridges can be constructed between poles over street traffic. These efforts would require grants or other outside funding support but could provide opportunities to improve habitat corridors within and between natural areas and other habitat areas.

Objective	Management Strategies
4. Improve Climate Resilience	• **Ensure restoration projects include a high diversity of plant species and morphological diversity for enhanced ability to adapt to climate change.** • Plant successional plant species to increase vegetation diversity. • Protect and expand high-quality habitat through invasive species removal, and restoration. • Implement climate-smart restoration practices such as incorporating native species more capable of withstanding drought and heat in planting efforts (e.g., Oregon white oak, Oregon grape, and bigleaf maple[6]) and considering spacing of new plants and trees for water availability. • Consider incorporating species whose range may be projected to expand to the area because of climate change that would be considered a neutral or ecologically beneficial addition to the native ecosystem.
5. Reduce Wildfire Hazards	• **Continue to implement fuel reduction efforts on City-owned forested areas within 50 feet of natural area property lines, factoring in site-specific conditions such as slope, health of trees, invasive species, and areas that interface with dense residential development.** • **Include species that are heat and fire resistant for restoration efforts.** • When leaving woody debris on-site to promote soil health/nutrients, debris material should be scattered (not piled) and left in direct contact with soil. Remove or modify brush piles or unlimbed fallen trees along natural area margins. • Removal of woody weed species and ladder fuels. • Continue LOPR's role in supporting Fire Department efforts in promoting programs through outreach and communication.

6. Enhance Hydrologic Function and RP Districts	• **Work with partner agencies and City departments to apply for grant funding and support the planning and implementation of projects that maintain or enhance natural flow conditions and riparian structural integrity. These may include projects that:**
	  • Filter and disperse incoming runoff from impervious areas
	  • Provide grade controls in channelized, erosional streams
	  • Remove barriers that restrict stream flows and natural channel migration zones (e.g., invasive species, debris, poorly designed culverts, or channelized stream segments)
	  • Allow for natural meandering of creeks and reconnection with floodplain terraces for improved flood hazard reduction
	  • Capture and treat stormwater runoff prior to it entering streams
	  • Remove invasive vegetation on streambanks and replace with native shrubs and trees
	  • Maintain and build headwater canopy and vegetation for hydrologic cycling and water retention.
	  • Add woody material or alluvial (rounded) gravels to streams that lack aquatic habitat complexity and have the potential to provide habitat for resident fish populations
	• Work with the Engineering Department to evaluate the potential for upgrades to culverts or other undercrossings for enhanced hydrologic functioning.
	• Apply for a grant to have hydrologists and aquatic ecologists review streams and wetlands in the City's natural areas to identify aquatic resource areas that may become costly restorations if not enhanced at relatively low cost now. This would help with prioritizing ongoing aquatic resource restoration efforts.

[6] Oregon State University Extension, https://extension.oregonstate.edu/collection/trees-shrubs-drought-tolerance#high

Objective	Management Strategies
7. Selective Tree Removal to Improve Safe and Healthy Ecosystems	• **Manage hazard trees in a way that will enhance and improve the health of the natural areas through ecologically sound maintenance practices. This may include the creation of snags with cavities for birds.** • Identify areas with overly dense native or non-native sapling growth and thin where such efforts would result in a healthier, safer native forest stand. • Remove high priority hazard trees in areas that interface with foot traffic, auto traffic, or structures. Use available data, including citizen-led tree inventories to identify hazard trees with signs of infestations, rot, poor soil anchoring, or other indications of potential tree fall. • Remove and properly dispose of Oregon Ash trees that have been identified to house emerald ash borers to prevent the spread of pests via hatching. • When removing hazard trees, leave materials on-site to promote natural ecological processes (e.g., decomposition) while avoiding brush piles or other fire hazards. Do not place debris within fire management edge areas.
8. Adaptively Manage Ongoing Public Engagement Opportunities that Benefit Habitat Protection and Enhancement	• **Use new or existing avenues for public outreach to encourage local understanding and tolerance of the implementation of new or different management or maintenance activities (such as trail closures, seasonal restrictions, and/or prescribed fire).** • Continue to engage with local school and volunteer groups for outreach materials, interpretive signs, volunteer work events, and other environmental education opportunities, but evaluate trends and monitor which engagement efforts are most productive; update as necessary. • Work with volunteers to install, maintain, and monitor wildlife enhancement features (e.g., osprey [*Pandion haliaetus*] nest platform, bat boxes, native pollinator features). Wildlife cameras (secured) can be placed to record use, which can be shared with public to build interest.

4.2.2 Habitat-Specific Prescriptions

Table 4 provides habitat management prescriptions tailored to the characteristics and condition of each plant association.

Table 4. Summary of Management Strategies by Habitat Type

Name	Condition	Management Strategies
Mixed Conifer-Deciduous Forest and Upland Conifer Forest	High	• Preserve or create snags with nesting cavities. • Maintain designated trails with clear signage to direct river access and at approved points, and limit for off-trail usage using woody debris or barbed plantings (e.g., rose [*rosa* spp.]). • Monitor for invasive species and tree pathogens and remove infected vegetation from park. • Install raptor perches in riparian stands along the Tualatin and/or Willamette Rivers.
	Moderate	• Enhance diversity in existing stands by planting additional native trees and shrubs. • Treat and/or remove invasive species. • Provide dense native tree and shrub plantings along riparian areas for bank stabilization, water shading, habitat, and flood water energy dissipation.
	Low	• Enhance diversity in existing stands by planting additional native trees and shrubs. • Treat and/or remove invasive species and implement restoration plantings in treated areas to prevent regrowth or infestation of different invasive species.

Name	Condition	Management Strategies
		• Perform thinning in overcrowded stands, particularly along trails. • Install boot brushes at park entrances.
Deciduous Forest	High	• Monitor trails for invasive species to avoid spread. • Preserve or create snags with nesting cavities. • Install raptor perches in riparian stands along the Tualatin and/or Willamette Rivers. • Discourage off-trail foot traffic using woody debris or barbed plantings (e.g., rose). • Maintain designated trails with clear signage to direct river access and at approved points and limit for off-trail usage. • Monitor for tree pathogens and effectively manage infected vegetation within park.
	Moderate	• Enhance diversity in existing deciduous stands by planting additional native trees and shrubs. • Treat and/or remove invasive species. • Provide dense native tree and shrub plantings along riparian areas for bank stabilization, water shading, habitat, and flood water energy dissipation.
	Low	• Enhance diversity in existing deciduous stands by planting additional native trees and shrubs. • Treat and/or remove invasive species and implement restoration plantings in treated areas to prevent regrowth or infestation of different invasive species. • Perform thinning in overcrowded stands, particularly along trails. • Install boot brushes at park entrances.
Wetlands	High	• Manage portions of high-quality wetland areas as conservation sites and discourage recreational and off-leash pet access in these areas. • Minimize points of access into high-quality wetland areas using barbed shrubs (e.g., roses) or woody debris. • Plant native trees and shrubs in buffer areas (~100 feet) surrounding wetland boundaries.
	Moderate	• Target removal of reed canarygrass and other wetland invasive species. In areas of dense reed canarygrass, an herbicide approved for use in aquatic environments is recommended for initial control efforts. • Plant native shrubs in areas dominated by reed canarygrass to shade and displace the species. • Remove Himalayan blackberry (*Rubus bifrons*) along wetland borders and replace with native riparian shrubs and trees. • Provide elevated trails through some wetlands for education and recreation purposes (may require wetland permit).
	Low	• Target removal of reed canarygrass and other wetland invasive species. • Plant native shrubs in areas dominated by reed canarygrass to shade and displace the species.
Oregon White Oak Woodland	All	• Identify areas for oak woodland restoration, including intact stands threatened by crowding from conifers. • Remove invasive species competing with healthy, mature oaks to support oak release, canopy openings, and regeneration of oak saplings. • In specific areas, obtain tree removal permits and remove conifers competing with oaks to promote oak release. • Retain large-diameter standing dead trees (i.e., snags) to support cavity-nesting birds and bats where there is no hazard to public safety.

Name	Condition	Management Strategies
		• Per Oregon Conservation Strategy (ODFW 2022b), use multiple tools, including prescribed fire, mowing, and selective harvest, to maintain open canopy. Ensure tools are site-appropriate and implemented to minimize impacts to native species. • Re-establish native grasses, herbaceous plants, and shrubs. • Monitor, protect, and enhance habitats for rare, threatened, and endangered species.
Upland Grassland	All	• Maintain and/or restore grassland (prairie) habitat with high diversity of native grasses and forbs (non-grass-like herbaceous plants). Limit cover of native trees and shrubs (<10 % cover) and promote cover of native forbs (>10% cover per ODFW 2022b). • Identify and implement appropriate management strategies following restoration to maintain native prairie, such as, but not limited to, prescribed burning. • Work in collaboration with partner organizations such as Metro and ODFW for prairie restoration funding and best practices. • Direct recreational uses away from highly sensitive areas with endemic native plant species and possibility of sensitive wildlife. • Per the Oregon Conservation Strategy (ODFW 2022b), minimize disturbance during the grassland bird breeding/ground nesting season (April 1-July 15). • Continue to install nest boxes adjacent to restored sites for western bluebird (*Sialia mexicana*). • Include a high percentage of native wildflower species known to support pollinators • Monitor, protect, and enhance habitats for rare, threatened, and endangered species.
Shrubland	Upland	• Remove invasive species and species associated with former agricultural uses, such as orchard trees. • Restore using native upland shrub species and trees to preserve a diversity of habitat forms and support natural succession.
	Wetland	• Protect and restore wetland shrubland areas to provide wetland buffers by removing invasive species and replanting using native shrub species associated with wetlands.

4.2.3 Natural Area-Specific Prescriptions

Table 5 summarizes priority management strategies by natural area based upon a review of current threats and opportunities. This list is not comprehensive. It is intended to synthesize data gathered during development of this report to identify readily available enhancement opportunities. Many of these strategies may already be in progress. Natural areas not mentioned in Table 5 are those that require further, site-specific assessment to identify priority management strategies.

Table 5. Summary of Priority Management Strategies by Natural Area

Name	Primary Management Strategies
Bryant Woods Park	• Target removal of invasive species (English hawthorn, reed canarygrass, Himalayan blackberry, ivy). • Discourage and restore social (informal) trails.
Canal Acres	• Target removal of knotweed (*Fallopia* spp.).
Cooks Butte City Park	• Target removal of shining geranium. • Perform stream grade control/enhancement.
East Waluga Park	• Target removal of ivy. • Identify, close, and restore social trails along steep slopes. • Control reed canarygrass in wetland.

Name	Primary Management Strategies
Freepons Park	• Protect and expand existing camas patch.
George Rogers Park	• Target removal of English ivy and knotweed. • Protect existing paved pathways from erosion.
Glenmorrie Park	• Protect existing oaks and encourage recruitment of young oak seedlings through a variety of management actions, including thinning competing trees, reducing target invasive species, and planting oak seedlings.
Hallinan Woods	• Perform thinning as needed to improve health and reduce wildfire risk.
Iron Mountain	• Target removal of ivy, English holly, Himalayan blackberry, and old man's beard (*Clematis vitalba*). • Perform trail maintenance on established trails. • Repair and restore erosion areas. • Identify opportunities within and adjacent to existing Oregon white oaks for habitat improvements including removal of conifers and other competing species, such as target invasive species.
Lamont Springs Natural Area	• Target removal of geraniums.
Luscher Farm Natural Areas	• Expand and continue Oregon white oak planting and restoration. • Implement native grassland/prairie restoration. • Develop a plan for trail layout to preserve blocks of native habitat with easy access for ongoing vegetation maintenance (e.g., mowing).
Pennington	• Seek grants to hire specialists to perform stream restoration incorporating hydrologic enhancement/floodplain connectivity. • Target removal of knotweed.
Rassekh	• Site is being designed for a variety of improvements, including natural area. Work with consultant to incorporate elements of this Plan.
River Run	• Target removal of ivy, English hawthorn, and Scotch broom (*Cytisus scoparius*). • Improve diversity of riparian trees and shrubs in shoreline areas along river. • Close and restore seasonal social trail. • Monitor success of native plantings in wetland and wetland buffer treatment area.
Roehr Natural Area	• Restore riparian corridor; diversify species to address issue of aging cottonwoods. Work with Planning Department to ensure enhancements are consistent with Willamette Greenway ordinance.
Sierra Vista	• Protect existing oaks and encourage recruitment of young oak seedlings through a variety of management actions. Consider potential for thinning competing trees, reducing target invasive species, and planting oak seedlings.
South Shore Natural Area	• Target removal of ivy and garlic mustard (*Alliaria petiolata*). • Close and restore social trail.
Southwood Park	• Close and restore social trail(s).
Springbrook Park	• Consider a boardwalk trail through the wetland area would allow ongoing environmental education while removing foot traffic impacts from the sensitive headwater wetland area.

Name	Primary Management Strategies
	• Seek opportunities to partner with private and public landowners to maintain and enhance the Springbrook stream corridor as a viable wildlife migration corridor connecting Springbrook and Pennington/Iron Mountain Natural Areas. • Perform restoration and fuel reduction along park borders. • Conduct trail maintenance and reduce use of, and access to, habitat-fragmenting social trails. • Repair erosion areas. • Install additional and diverse tree plantings to support succession and drought resiliency. • Target removal of English holly, Himalayan blackberry, meadow bindweed (*Convolvulus arvensis*), old man's beard, ivy, and garlic mustard
Stevens Meadows	• Implement upland grassland restoration. • Manage portions of the meadow for wildlife conservation via signage or other soft barriers with goal of reducing human/pet conflicts during breeding season for sensitive wildlife (April 15-July 15 per Oregon Conservation Strategy).
West Waluga Park	• Protect and expand existing camas patch. • Control reed canarygrass and English hawthorn in wetland areas. • Manage areas of dense oak per Oregon Conservation Strategy; protect existing oaks and encourage recruitment of young oak seedlings through a variety of management actions including thinning competing trees, reducing target invasive species, and planting oak seedlings.
Woodmont Natural Park	• Plant herbaceous pollinator species within the field grass. • Remove noxious weeds within the front shrub beds. • Target removal of Scotch broom, English hawthorn, and Himalayan blackberry.

5. Coordination with Urban Forestry Planning Policies

Habitat management involves both operations and policy. To support the successful implementation of this plan, the City should review its Comprehensive Plan (Healthy Ecosystems Chapter), Development Code, and Tree Code, and recommend any updates as needed to support the habitat management objectives presented in this plan.

The City's development code allows resource enhancement projects, which may include tree removal from sensitive lands, including RP and RC districts, to enhance and restore natural resource functions and values. Resource enhancement may be approved through a ministerial process (no public notice or comment). A verification tree permit is required to confirm the correct trees approved for removal by the resource enhancement project are to be removed before the project begins. However, this existing permit process may not address changes in habitat functions and values over time due to climate change or other factors. These changes, for example, may necessitate removal of target invasive tree species; native saplings or young trees in areas where tree density is limiting growth or creating tree falling hazards; or conifers in areas targeted for oak release, per the management strategy for oak woodlands, an ODFW Conservation Strategy Habitat (ODFW 2022b).

Typically, observance of City Code requires that applications for tree removal be filed with the City Planning Department and approved prior to removal. The applicable code regulating tree removal depends on whether the tree is in an RP or RC overlay district, and if not, whether the tree removal meets

other criteria including standards for management of large, forested tracts. The typical process involves filing an application identifying all trees for removal and procedures that include flagging trees and may require a site visit by Planning Department staff.

As part of this general management plan, upon approval, LOPR will seek a programmatic permit for tree removals. The goal of the programmatic permit will be to avoid the need to obtain individual project permits that expire. The programmatic permit would apply where tree removals are consistent with the management actions described in this Plan; specifically, where tree removal is part of an overall habitat management strategy intended to benefit the ecological condition or safety of a natural area.

In addition to recommending process improvements for habitat management tree removal, this plan contains information that may support an update to the *Urban & Community Forestry Plan*, which is intended to be updated periodically to identify policy changes that are informed by periodic State of the Urban Forest Reports, including the pending 2022 report. The State of the Urban Forest Reports are based on the status and trends of trees and forests throughout the City of Lake Oswego, including those on public and private lands. The condition assessment and management strategies for forest habitats within Lake Oswego's natural area parks, as described in this plan, may provide information beneficial to the development of a subsequent *Urban & Community Forestry Plan* update.

6. Monitoring and Adaptive Management

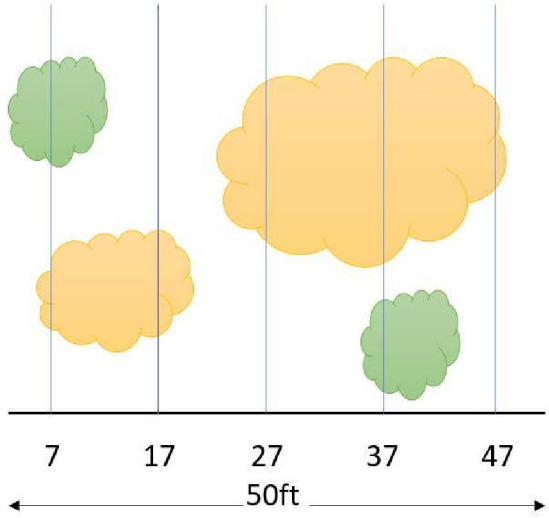
Adaptive management is a systematic approach for improving natural resource management. It requires that management actions be assessed over time for effectiveness and that improvements be made in the management strategy as a result of the effectiveness assessment data. In order to assess the effectiveness, periodic monitoring is required.

Monitoring a randomly selected subset of managed natural areas provides important information to inform adaptive management while remaining within budget and effort constraints. The City should plan on monitoring 10% of areas treated (randomly selected polygons within different habitat types) every 4 years to determine if success criteria are being met. This monitoring data should inform management strategies and may identify the need for corrective actions, which will inform the biennial budget. Monitoring could be split into annual monitoring (2.5% each year) or every other year (5% every 2 years). To avoid placing all monitoring effort on limited LOPR staff, monitoring may be incorporated in future restoration grants and contractor scopes of work. Monitoring efforts may increase overall natural areas management program costs. However, monitoring data may save much more over time by identifying inefficient or ineffective strategies that can be altered for improved success. The budget for monitoring related to Objective 6 in Section 4.1 above (Enhance Hydrologic Features) should be included in grant application budgets and associated monitoring should be conducted in the early part of the growing season (March-April) when wetland and stream hydrology indicators are most likely to be present.

Monitoring should include photo-monitoring and sample data collected along transects at established locations. Vegetation monitoring should be performed in late summer or early fall when foliar cover is most robust. To evaluate plant cover and native plant establishment success, appropriate monitoring methods for woody plants include stem counts and line-intercept monitoring. Stem counts involve marking off a rectangular sample area (e.g., 20 feet by 50 feet) and counting live woody stems (or plants for individual plants with multiple stems) within the sample area. The species of each plant should be noted as shown in the following example:

Cornus sericea: IIII
Amelanchier alnifolia: III
Corylus cornuta: II
Acer circinatum: I
Total: 10 live shrubs per 1,000 square feet (10 foot-on-center spacing)

The results of one or more stem count plots collected within a habitat area can be compared to the initial planting density to determine survival estimates.



Line intercept monitoring is done by establishing a baseline using a measuring tape. This could be, for example, a 50-foot-long measuring tape placed along the southern boundary of a habitat area being monitored (per example at right). Then, at a randomly selected number between 1 and 10, a sample transect can be run out perpendicular to the baseline for 50 feet. Along this sample transect, the start and end point of each species encountered can be recorded in tenths of a foot (or meter). The sample transect is then repeated every 10 feet along the baseline transect, resulting in five, 50-foot-long sample transects. The data gathered from these transects are then quantified in a spreadsheet to summarize total cover, by species, as a percentage of total sample transect length. For example, if the sum of species x totaled 100 feet within the 250 feet of sampled transects, per graphic at right, that species would be estimated to provide 40% (100/250) aerial cover within the sampled habitat area. Aerial cover estimates are used to monitor growth of plants over time.

For herbaceous vegetation cover (noxious cover or native seed establishment monitoring), a 1-meter square vegetation sample quadrat (frame) can be used to document representative cover by species. Using the same sample design as shown above for line-intercept monitoring, the 1-meter quadrat can be placed at a randomly selected number between 1 and 10 along each sample transect, beginning close to the baseline. Then the quadrat can be placed every 20 feet along each sample transect. For example, if the first sample quadrat is placed at 5 feet, the second is placed at 25 feet, and the third is placed at 45 feet from the baseline. This results in three quadrat data collection points for each transect, or 15 in total for a sample design containing five sample transects. At each sample quadrat location, the total cover of each herbaceous species and bare ground should be recorded. For detailed descriptions of these methods please refer to *Measuring and Monitoring Plant Populations* (Elzinga et. al. 1998).

Monitoring results should be compared against the success criteria listed in Objectives 1 through 8 (Section 4.1.1- 4.1.8) or other site-specific criteria that are developed specifically for individual restoration projects. These data will inform the success of ongoing herbaceous vegetation management activities.

Every 6 years (every three budgetary planning cycles), the City should prepare a Natural Areas Management Plan Effectiveness Monitoring Report. The report should provide a brief summary of ongoing management activities related to the objectives and recommendations outlined in this plan. It should describe actions taken, effectiveness of prior treatments (based on data review or monitoring), and recommendations for adaptive management, which may include updates to this Plan.

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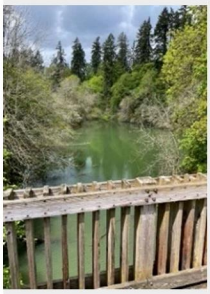
Appendix A

Natural Area Park Summaries

Appendix A: BASELINE CONDITION SUMMARY FOR LAKE OSWEGO NATURAL AREA PARKS

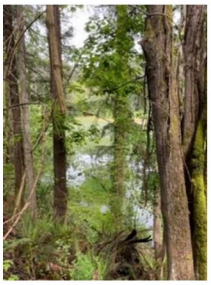
Name	Size (acres)	Description
Bryant Woods Park 	19.7	Natural area for wildlife viewing with soft surface trails located north of Canal Acres and adjacent to the Oswego Canal. Site has a seasonal wetland/meadow, upland forested area, and a natural spring with an associated creek. *Dominant Habitat Type(s):* Upland Mixed Conifer-Deciduous Forest *Threats:* Invasive species, social trails *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs, bulbs, and bare-root planting since 2011. The City received a Metro Nature in Neighborhood Grant in 2015. Annual trail maintenance. *Other Unique Features:* camas (*Camassia quamash)* patch & headwater canal to Oswego Lake runs through the park.
Canal Acres 	27.3	Natural area for wildlife viewing with a soft surface trail located north of Tualatin River and adjacent to the Bryant Woods Park. *Dominant Habitat Type(s):* Upland Mixed Conifer-Deciduous Forest; Wetland Deciduous Forest *Threats:* Invasive species including garlic mustard, social trails *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2011. Received a Metro Nature in Neighborhood Grant in 2015. Annual trail maintenance. *Other Unique Features:* Wet ash forest, Adjacent to Tualatin River Conservation Opportunity Area[1]
Cooks Butte City Park 	43	Cooks Butte is an extinct volcano rising 728 feet above the Stafford Basin. Mixed forest with spring native perennials. There is a soft surface trails system with varying topography. *Dominant Habitat Type(s):* Wetland Mixed Conifer-Deciduous Forest, Upland Deciduous Forest, Upland Conifer Forest *Threats:* Invasive species, Lake Oswego Fire Community at Risk[2][3], trail erosion *Prior Restoration/Management Actions*: Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2011. Trail renovation project completed in 2010. Annual park maintenance. *Other Unique Features:* Geologic features, two water towers located in the park.

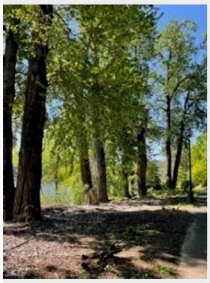
[1] Oregon Conservation Strategy
[2] High Priority Community at Risk, Lake Oswego Addendum to Clackamas County MJHMP
[3] Community at Risk, Lake Oswego Fire

Name	Size (acres)	Description
Cornell Natural Area 	3.2	Small, forested area with steep slopes known as the "Corridor of Trees." One of the oldest groves of Douglas-fir in the city. Restoration supported by Friends of Hallinan. *Dominant Habitat Type(s):* Upland Conifer Forest *Threats:* Invasive species, poor access *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plantings. *Other Unique Features:* none identified
East Waluga Park 	53	Hybrid park with a mix of active and natural passive areas, adjacent to West Waluga Park with soft surface trails. Restoration supported by Friends of the Walugas *Dominant Habitat Type(s):* Wetland Deciduous Forest and Upland Mixed Conifer-Deciduous Forest *Threats:* Invasive species, social trails, Lake Oswego Fire Community at Risk *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root planting since 2014. Annual park maintenance. *Other Unique Features:* Quarry Bike Skills Park in forested area
Freepons Park 	5.9	Small hybrid neighborhood park located close to Hallinan Woods and Cornell Natural Area; Natural Area includes soft surface trails connecting the neighbourhoods. Restoration supported by Friends of Hallinan. *Dominant Habitat Type(s):* Upland Deciduous Forest; Upland Conifer Forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2015. Annual park maintenance. *Other Unique Features:* Right-of-way connects to Cornell Natural Area; camas patch.
George Rogers Park 	26	Hybrid regional park that contains active recreation facilities, access to the Willamette River, a sandy beach, restrooms, a playground, a soft surface trail, and paved trails and bridges along the Willamette River and Oswego Creek. *Dominant Habitat Type(s):* Wetland Mixed Conifer-Deciduous Forest *Threats:* Invasive species including garlic mustard and Japanese knotweed *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native seed and bare-root plants since 2011. Upgraded pedestrian access in the lower portion of the park along the Willamette River (2005), *Other Unique Features:* A historic iron furnace landmark with interpretive signage; adjacent to Lower Willamette River Floodplain Conservation Opportunity Area.

Name	Size (acres)	Description
Glenmorrie Park 	2.3	Small hybrid park accessing Glenmorrie Neighborhood for pedestrians and bikers from Highway 43. Natural area vegetation is to the west of the developed park. *Dominant Habitat Type(s):* Upland Deciduous Forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and bare-root planting since 2019. *Other Unique Features:* Mature Oregon white oak in deciduous forest.
Glenmorrie Greenway 	3.9	Narrow strip of forest with one endpoint near the Willamette River. *Dominant Habitat Type(s):* Wetland Deciduous Forest *Threats:* invasive species, social trails *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2015. *Other Unique Features:* none identified
Hallinan Woods 	3.8	Natural woodland area containing a creek. Paved trail connects neighborhood to Hallinan Elementary School. Also includes soft surface trails. City purchased adjacent property in 2020. Restoration supported by the Friends of Hallinan with previous work done by Oswego Lake Watershed Council. *Dominant Habitat Type(s):* Wetland and Upland Mixed Conifer-Deciduous Forest *Threats:* crowding, Invasive species, wildfire *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2012. *Other Unique Features:* None identified

Name	Size (acres)	Description
Iron Mountain 	51	Located on a south-facing hillside, overlooking Iron Mountain Boulevard. Site of old iron mining operation. Contains a unique plant community, a variety of wildlife, and 1.5 miles of trails. Located within a quarter mile of Springbrook Park but separated by residential neighborhood. Restoration and site education supported by Friends of Iron Mountain Park. *Dominant Habitat Type(s):* Upland Conifer Forest, Riparian Forest, and Wetland *Threats:* Invasive species including garlic mustard, Lake Oswego Fire Community at Risk, and erosion. *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root planting since 2014. 2015 Capital Improvement Program project in lower area of park included relocation of stream and enhancement of stream and wetlands; removal of trees and re-grading on-site; installation of native trees, shrubs, groundcovers, seed mixes, bark mulch, logs, boulders, permanent and temporary irrigation; and construction of pathways, parking lot, play area, restroom, and picnic shelter. Project completed in 2021. *Other Unique Features:* Upper portion of the park contains mature conifer forest and a high density of Oregon white oak. Also, home to endangered white rock larkspur.
Kelly Creek 	3.7	This small natural area is adjacent to Tryon Creek State Park and contains stands of old (50+ years) Douglas-fir and younger deciduous trees (e.g., bigleaf maple). Nettle Creek flows through the park. *Dominant Habitat Type(s):* Upland and Wetland Mixed Conifer-Deciduous Forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root planting since 2014. *Other Unique Features:* No trail access.
Lamont Springs Natural Area 	0.5	Small, forested natural area just west of the West Bay of Lake Oswego Lake with a natural spring creek and soft surface trails. *Dominant Habitat Type(s):* Upland and Wetland Mixed Conifer-Deciduous Forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root planting since 2011. Annual park maintenance. *Other Unique Features:*

Name	Size (acres)	Description
Lily Bay 	1.8	Upland forested habitat adjacent to Lily Bay, a semi-enclosed bay of Lake Oswego on the north shore. This small natural area contains mature conifers and steep slopes. Restoration supported by the Friends of Lily Bay. *Dominant Habitat Type(s)*: Wetland and Upland Mixed Conifer-Deciduous Forest *Threats:* Invasive species *Prior Restoration/Management Actions*: Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2019. *Other Unique Features*: Connected to privately owned Lily Bay.
Luscher Farm Natural Areas 	19+	Luscher Farm Complex is a grouping of properties supporting a variety of agricultural activities, active recreation, and natural resource conservation. The suggested restoration areas are shown in the Luscher Area Master Plan. These sites are actively being enhanced and will add several acres of oak habitat and upland conifer forest. It also has the unique opportunity to provide native prairie habitat. Prairies were common in the Willamette Valley prior to European arrival but are relatively rare now, having largely been converted to agriculture. The site currently contains a paved path along active and former agricultural fields and is popular for walking, biking, and bird watching. Partnerships include the Friends of Luscher Farm and the Friends of Rogerson Clematis Garden *Dominant Habitat Type(s):* Upland grassland *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species since 2011, wetlands mitigation and the planting of 150 native Oregon white oak in 2018-2019. *Other Unique Features:* The historic farm house is surrounded by The Rogerson Clematis Garden. Interpretive signage along paved path describing history of the historic farm and Stafford Basin area.
Pennington 	2.4	Small natural area with native vegetation and Spring Brook Creek running through it. *Dominant Habitat Type(s):* Wetland Mixed Conifer-Deciduous Forest *Threats:* Invasive species including garlic mustard and seasonal flooding *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2011. *S*tream realigned and enhanced to improve flow and habitat. Annual park and trail maintenance. *Other Unique Features:* Adjacent to and providing some connectivity to Springbrook Park and Iron Mountain Park, though habitat connectivity is disrupted by residential streets.

Name	Size (acres)	Description
Rassekh 	2.1	Located close to Luscher Farm and contains a narrow stream corridor of Pecan Creek that leads to the Tualatin. Adjacent to the natural area is a project in the design phase for development of a multisport athletic field, restroom, parking area, skatepark, and playground. *Dominant Habitat Type(s):* Wetland Mixed Conifer-Deciduous Forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native seeds and bare-root plants since 2015. *Other Unique Features:* Active beaver dam.
River Run 	10.8	Natural area located adjacent to the Tualatin River and the Oswego Lake canal. The area provides nature and wildlife viewing. *Dominant Habitat Type(s):* Riparian; Upland Deciduous *Threats:* Invasive species *Prior Management Actions:* Habitat restoration activities including removal of invasive species and planting of native seeds and bare-root plants since 2015. City received a Metro Nature in Neighborhood Grant in 2015 to help restoration. Annual park maintenance. *Other Unique Features:* Adjacent to Tualatin River Conservation Opportunity Area
Roehr Natural Area 	7.9	Waterfront park that features a pathway along water, City-owned Water Sports Center, and an amphitheatre overlooking the Willamette River. *Dominant Habitat Type(s):* Riparian; Upland Deciduous Forest *Threats:* Aging black cottonwoods *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species since 2016. *Other Unique Features:* Adjacent to Lower Willamette River Floodplain Conservation Opportunity Area. Willamette Greenway Overlay.
Sierra Vista 	1.3	Small pocket of forest located in a residential neighborhood with a soft surface trail. *Dominant Habitat Type(s):* Upland deciduous forest *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2019. *Other Unique Features:* Connects two neighborhoods and has Oak Woodland potential.

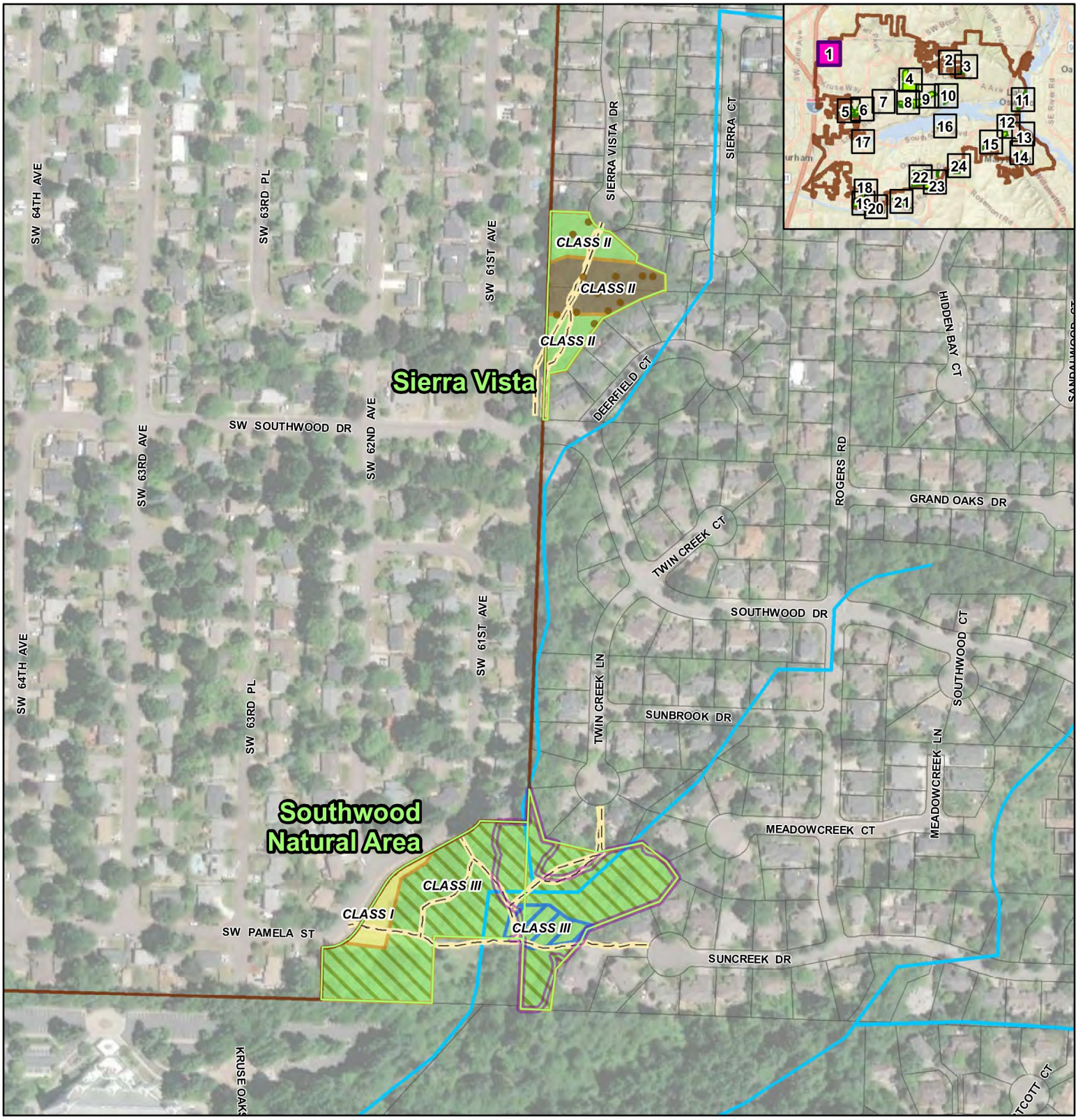
Name	Size (acres)	Description
South Shore Natural Area 	9.2	Steeply sloped, small, and narrow strip of natural habitat on the south shore of Lake Oswego. *Dominant Habitat Type(s):* Upland Mixed Conifer-Deciduous Forest *Threats:* Invasive species including garlic mustard; small social trail *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native seeds and bare-root plants since 2012. *Other Unique Features:* Extremely steep along the northern edge with netting to protect roadway from rockfall.
Southwood Park 	2.45	A mixed conifer-deciduous forest neighbourhood park and natural area with mixed-use trails. Ball Creek flows through the park with a riparian zone filled with dense native vegetation. Noxious weed cover throughout park is very low. Restoration is supported by Friends of Southwood Park. *Dominant Habitat Type(s):* Mixed Conifer-Deciduous Forest *Threats:* Invasive species, off-leash dogs, rogue trail building *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native seeds and bare-root plants since 2013. *Other Unique Features:* Unofficial work parties began in 1992.
Springbrook Park 	52	A tributary to Springbrook Creek flows through the park which feeds into Lake Oswego. The park was saved from development in 1969 with the help of local citizens and the Friends of Springbrook. The property was last logged in the 1950's. The park offers great hiking and wildlife-viewing opportunities and contains nearly 2 miles of trails. Restoration and trails maintenance are supported by the Friends of Springbrook Park. *Dominant Habitat Type(s):* Upland Deciduous Forest *Threats:* Invasive species, Lake Oswego Fire Community at Risk, trail erosion *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs, seeds, and bare-root plants since 2014. Annual park maintenance *Other Unique Features:* Nature Play Area
Stevens Meadows 	27.8	Open area adjacent to Cooks Butte City Park offering a short loop trail. Like Luscher Farm, this site has the unique opportunity to provide native prairie habitat. This would increase the diversity of natural area habitat types managed by the City and made available to the public. *Dominant Habitat Type(s):* Upland Grassland *Threats:* Invasive species including Canada thistle *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species since 2011. *Other Unique Features:* None identified

Name	Size (acres)	Description
Sunny Slope 	12	Located north of the Tualatin River, this park is close to other natural areas. This park features mixed-use soft surface trails through forested habitat. *Dominant Habitat Type(s):* Upland Mixed Conifer-Deciduous Forest *Threats:* Invasive species including garlic mustard *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2018. *Other Unique Features:* Through offsite lands containing forest habitat, this site provides a moderate wildlife corridor that connects with Bryant Woods Natural Area, Canal Acres, and River Run.
West Waluga Park 	22.8	Located adjacent to East Waluga Park, this park features a mixture of active and passive recreational opportunities, including nature trails. Restoration supported by Friends of the Walugas. *Dominant Habitat Type(s):* Wetland Deciduous Forest *Threats:* Lake Oswego Fire Community at Risk, invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species since 2021. *Other Unique Features:* Headwaters for Three Sisters Creek, which drains east through East Waluga Park to its confluence with Springbrook Creek; camas patch
Woodmont Natural Park 	6.8	Provides scenic overlooks, wildlife viewing, and interactive natural play areas featuring installations by a local artist. In 2021 the park opened after undergoing substantial enhancements and park improvements consistent with a master plan for the sites. Restoration supported by Friends of Woodmont. *Dominant Habitat Type(s):* Upland Grassland; Conifer Forest; Upland Shrubland *Threats:* Invasive species *Prior Restoration/Management Actions:* Habitat restoration activities including removal of invasive species and planting of native forbs and bare-root plants since 2018 in riparian area. Capital Improvement Program 2015, new native trees, shrubs, and perennials planted, with 0.5 mile of trail improvements completed 2021. Restored oak savannah and wetland habitats. *Other Unique Features:* Local nature-inspired artwork

Photo Credits: AECOM and City of Lake Oswego 2022

Appendix B

Habitat Inventory and Classification Map Set



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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest
- Upland Grassland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 1 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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December 2022

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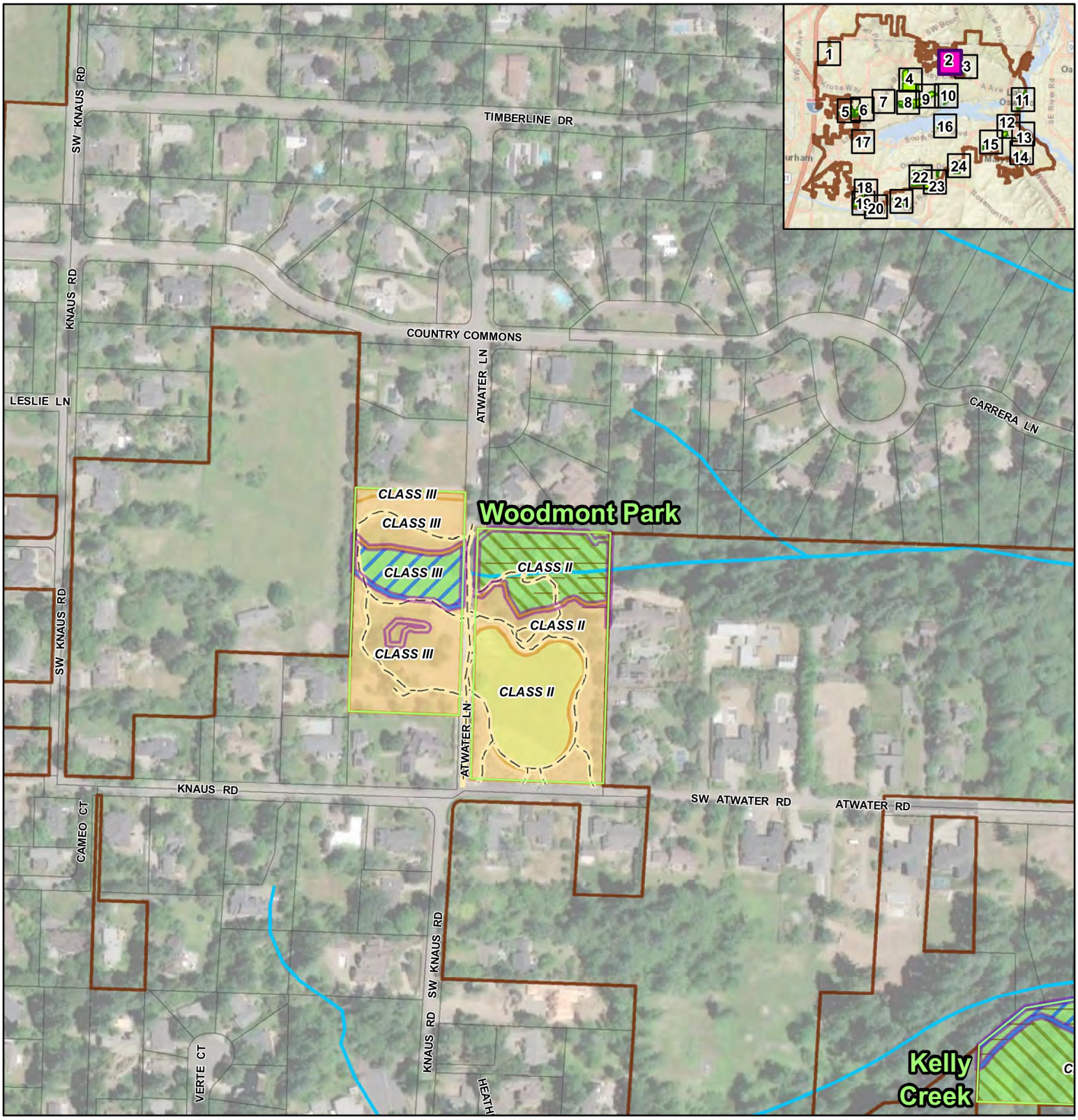

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Mixed Conifer-Deciduous Forest
- Shrubland
- Upland Grassland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 2 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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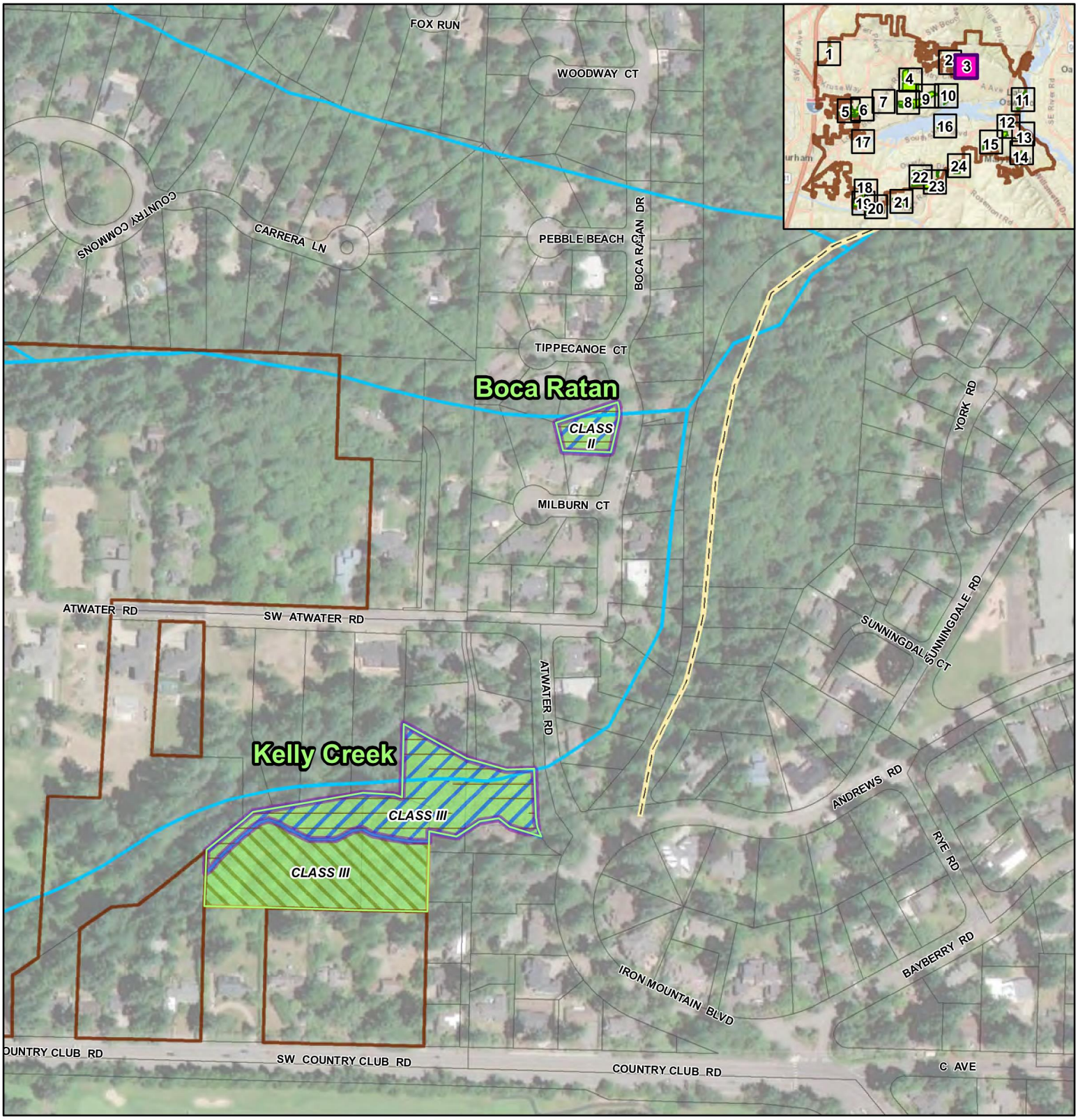

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 3 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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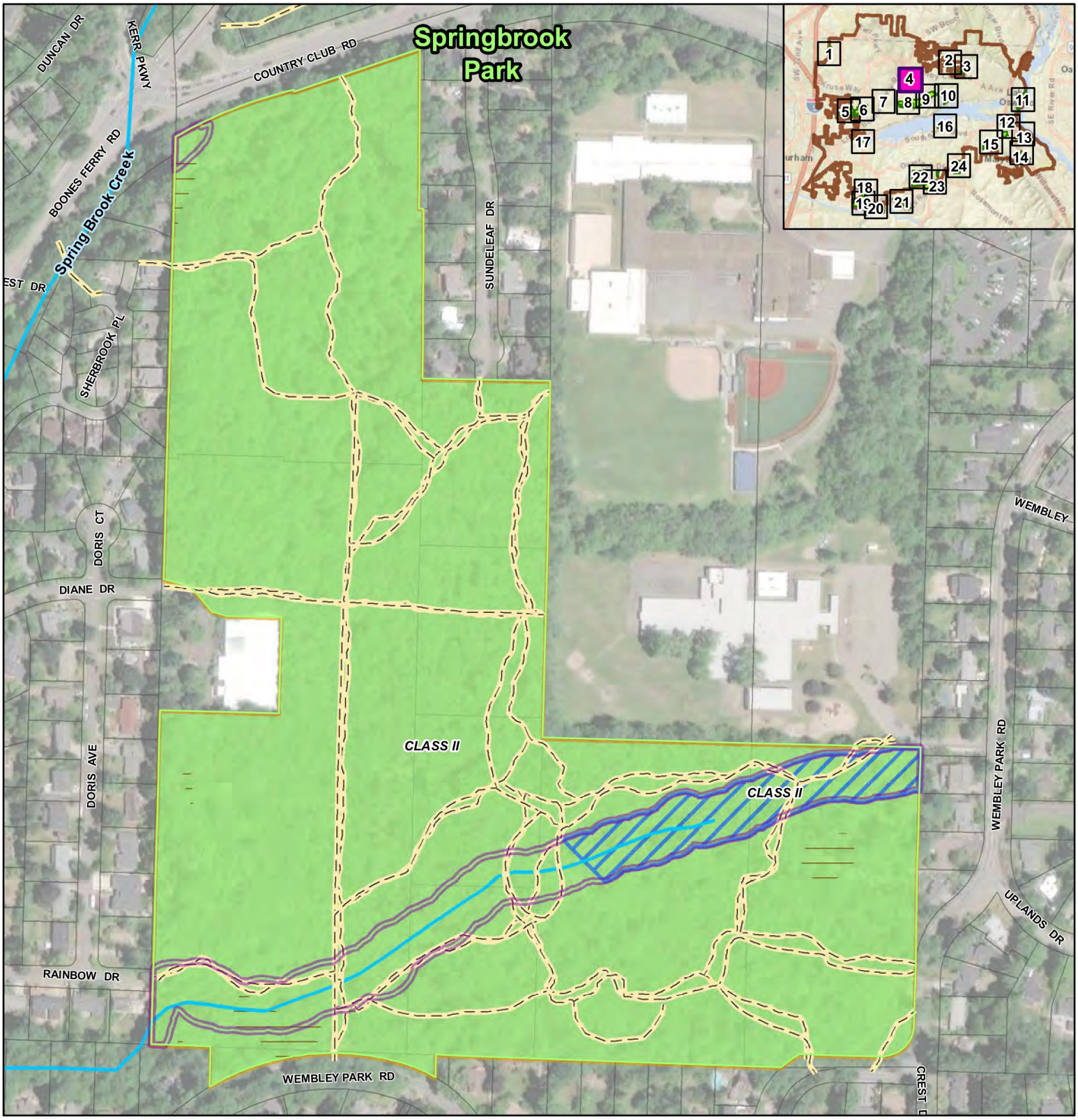

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Legend

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- Taxlot
- Steep Slope
- Waterway
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 4 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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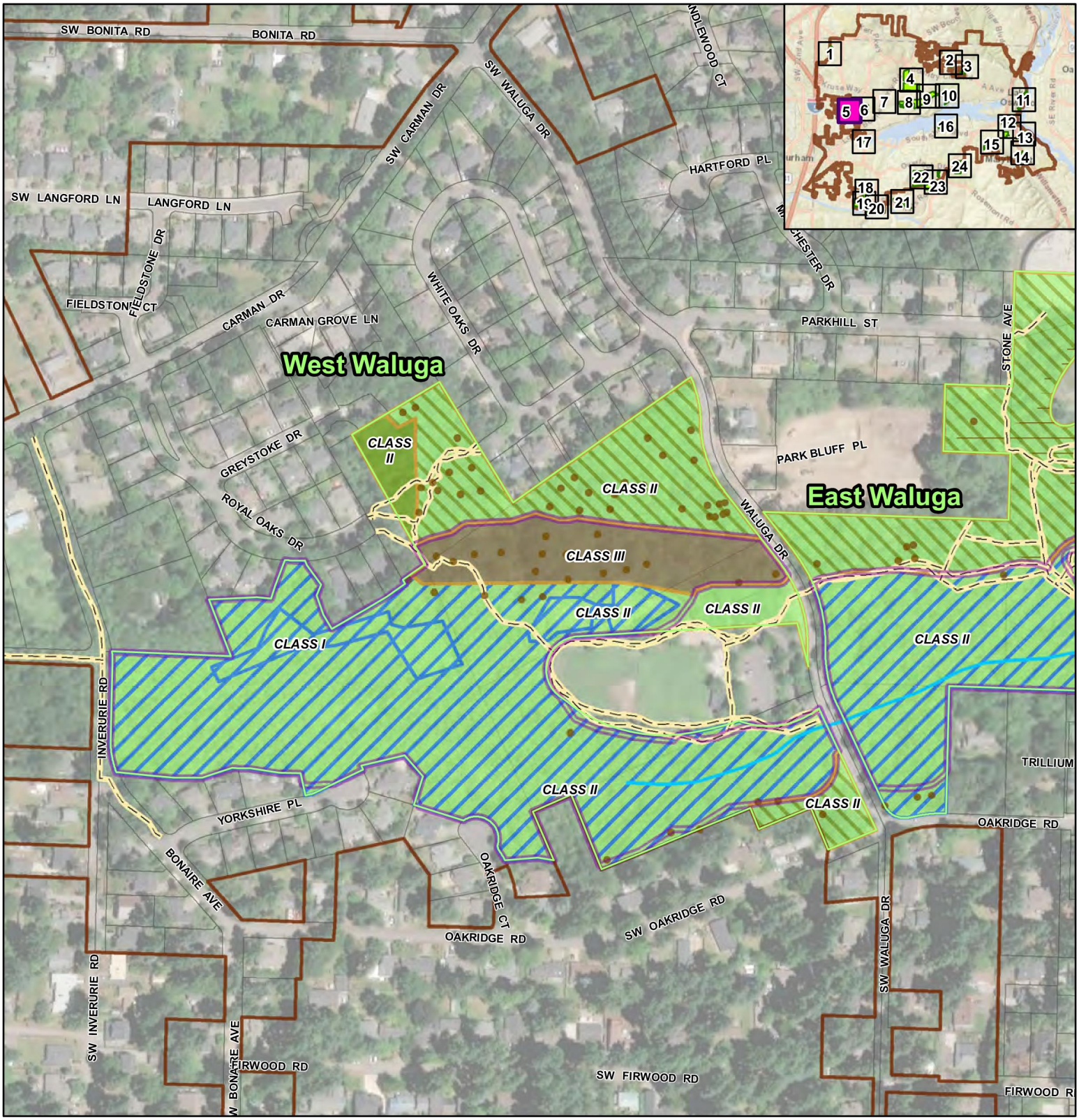

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 5 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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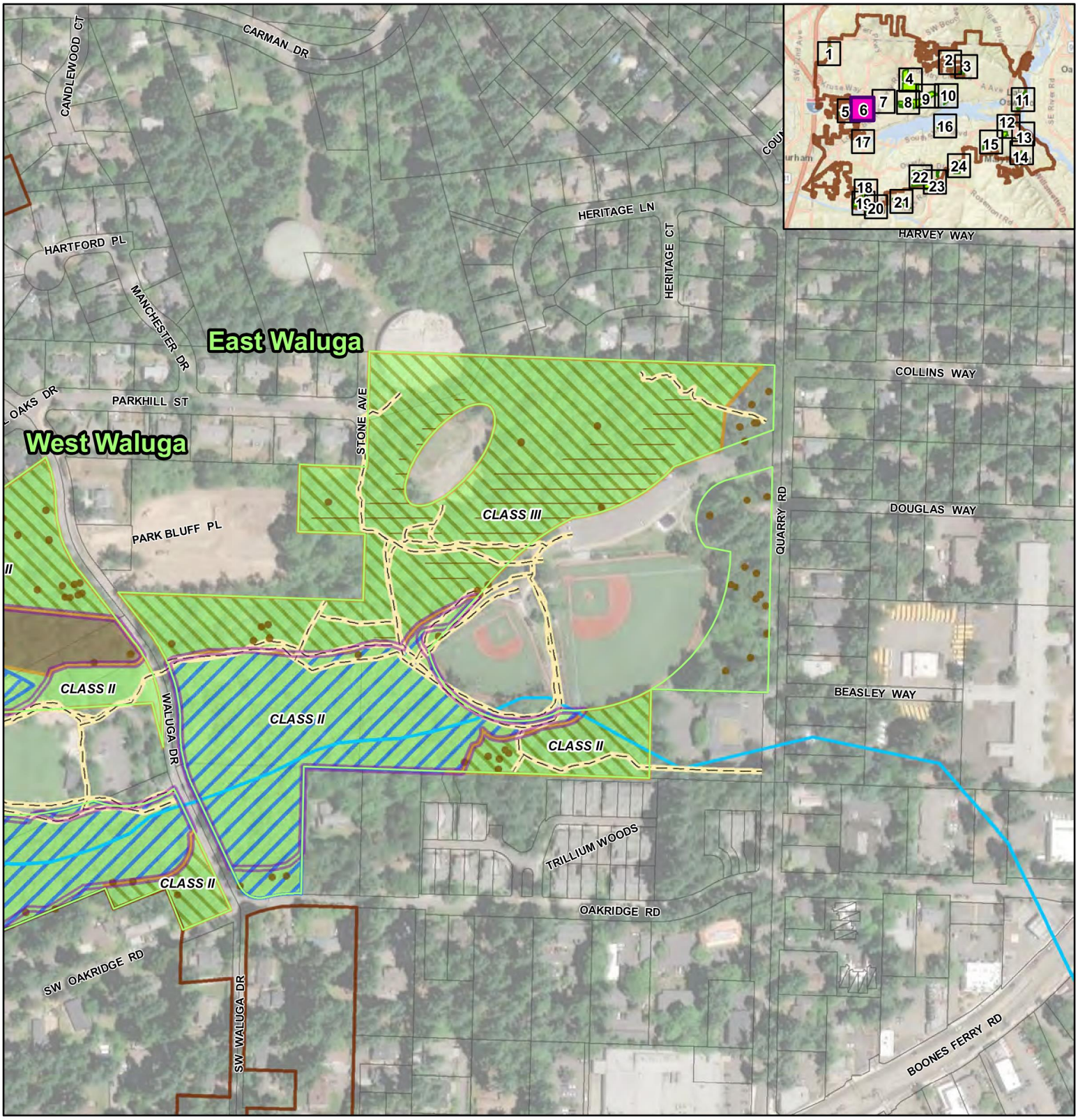

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 6 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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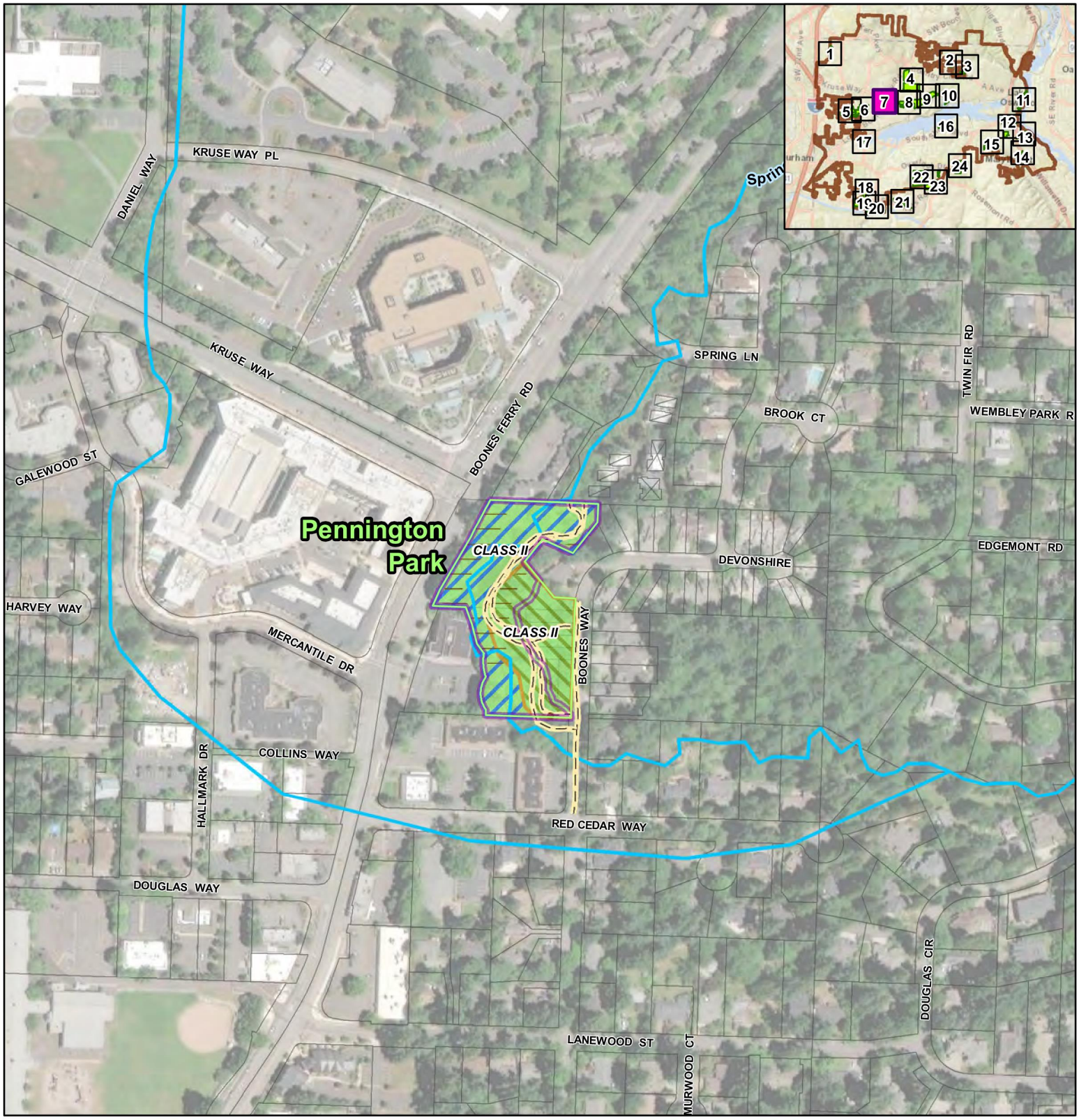

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 7 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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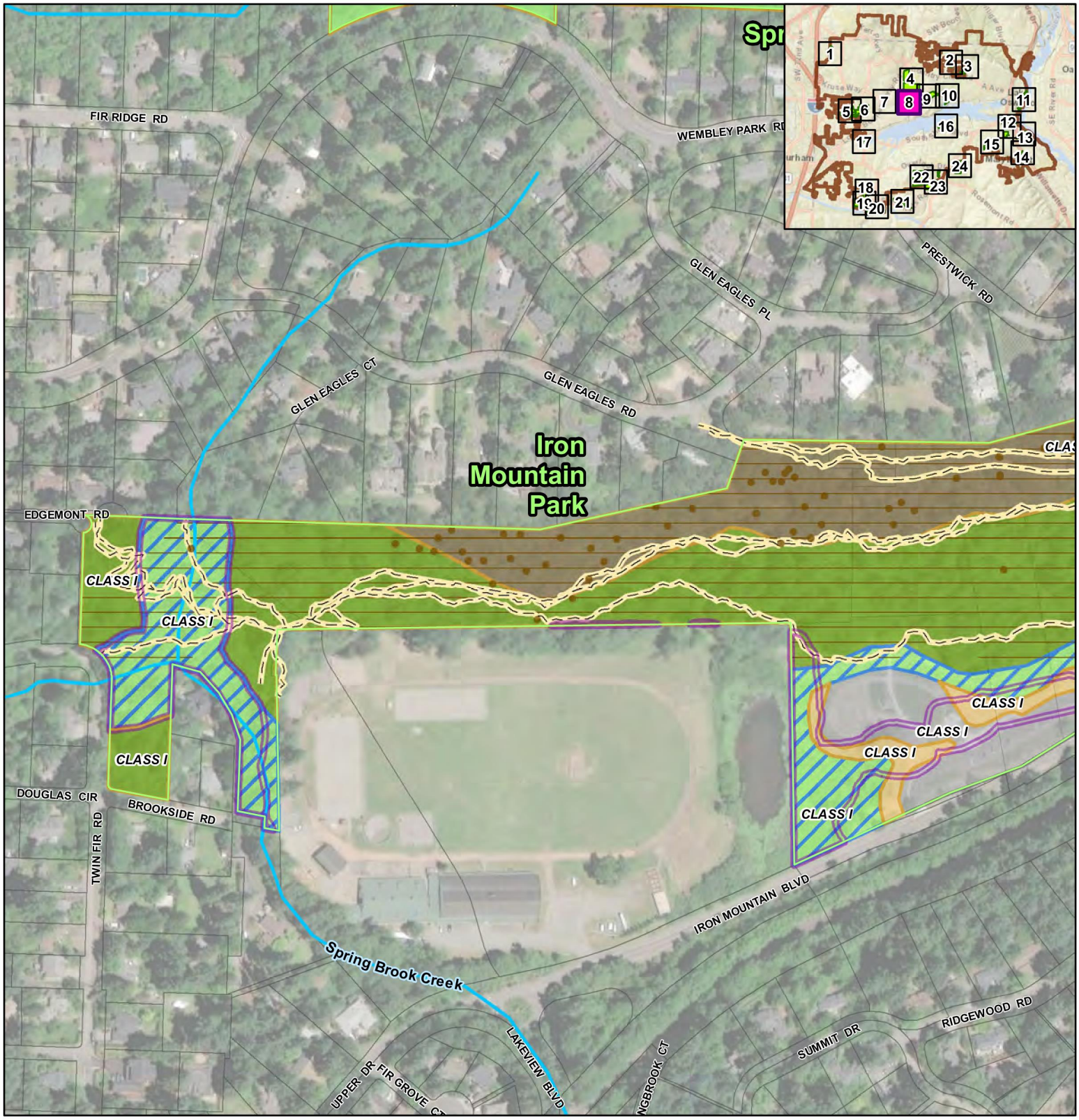

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Shrubland
- Developed

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 8 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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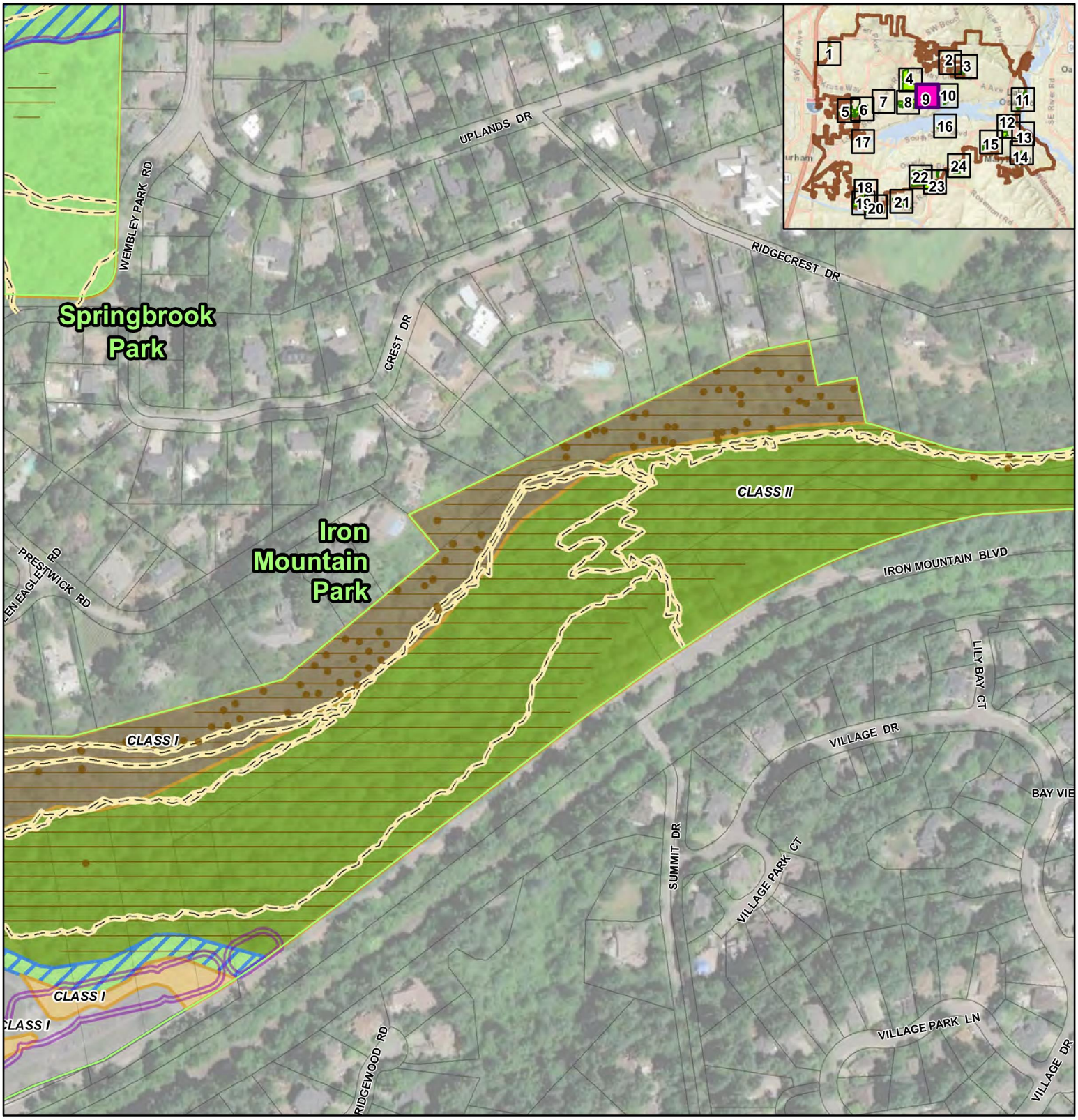

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Shrubland
- Developed

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 9 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Conifer Forest
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 10 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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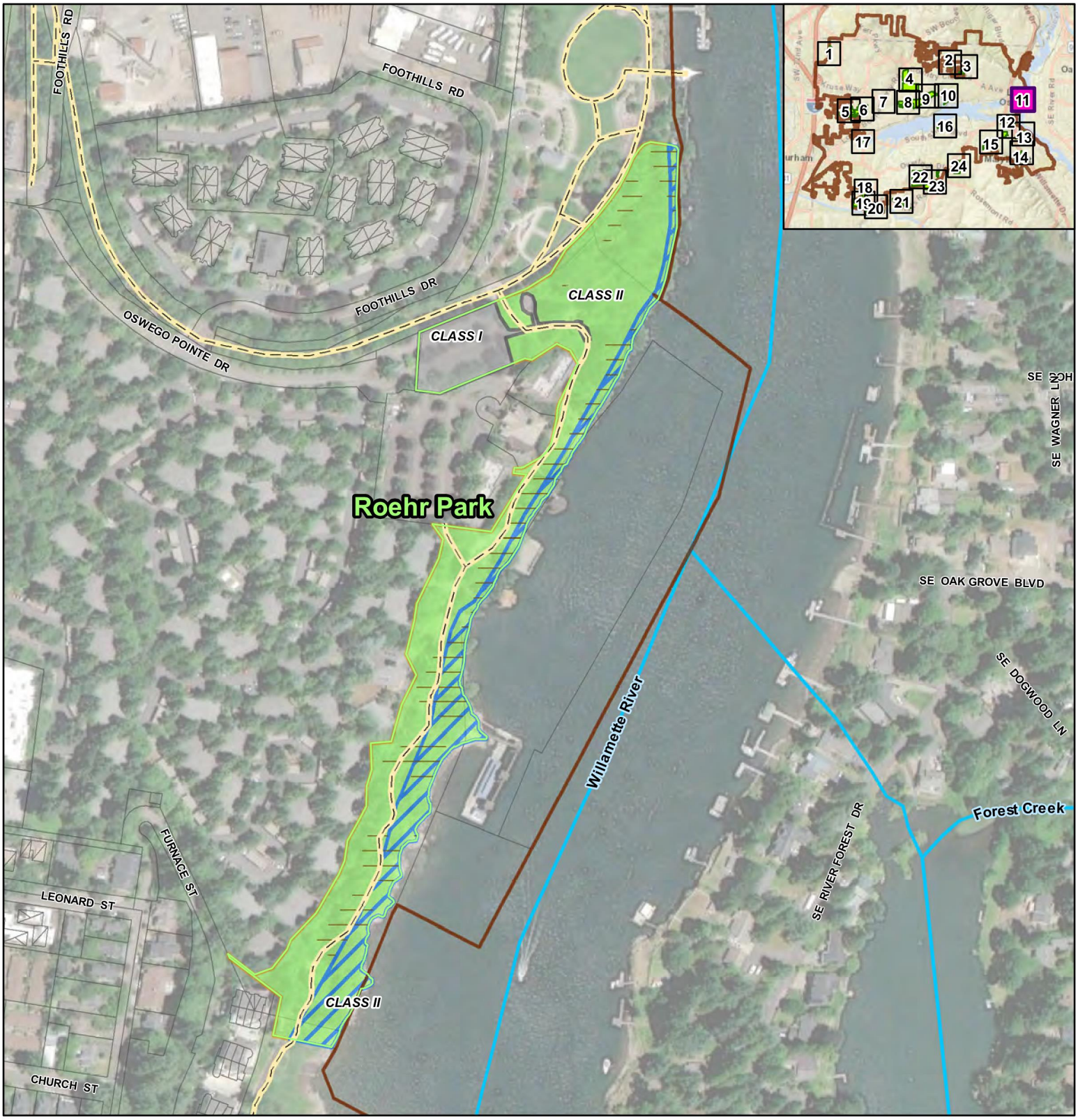

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Developed

Map 11 of 24

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

LAKE OSWEGO
NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 12 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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December 2022

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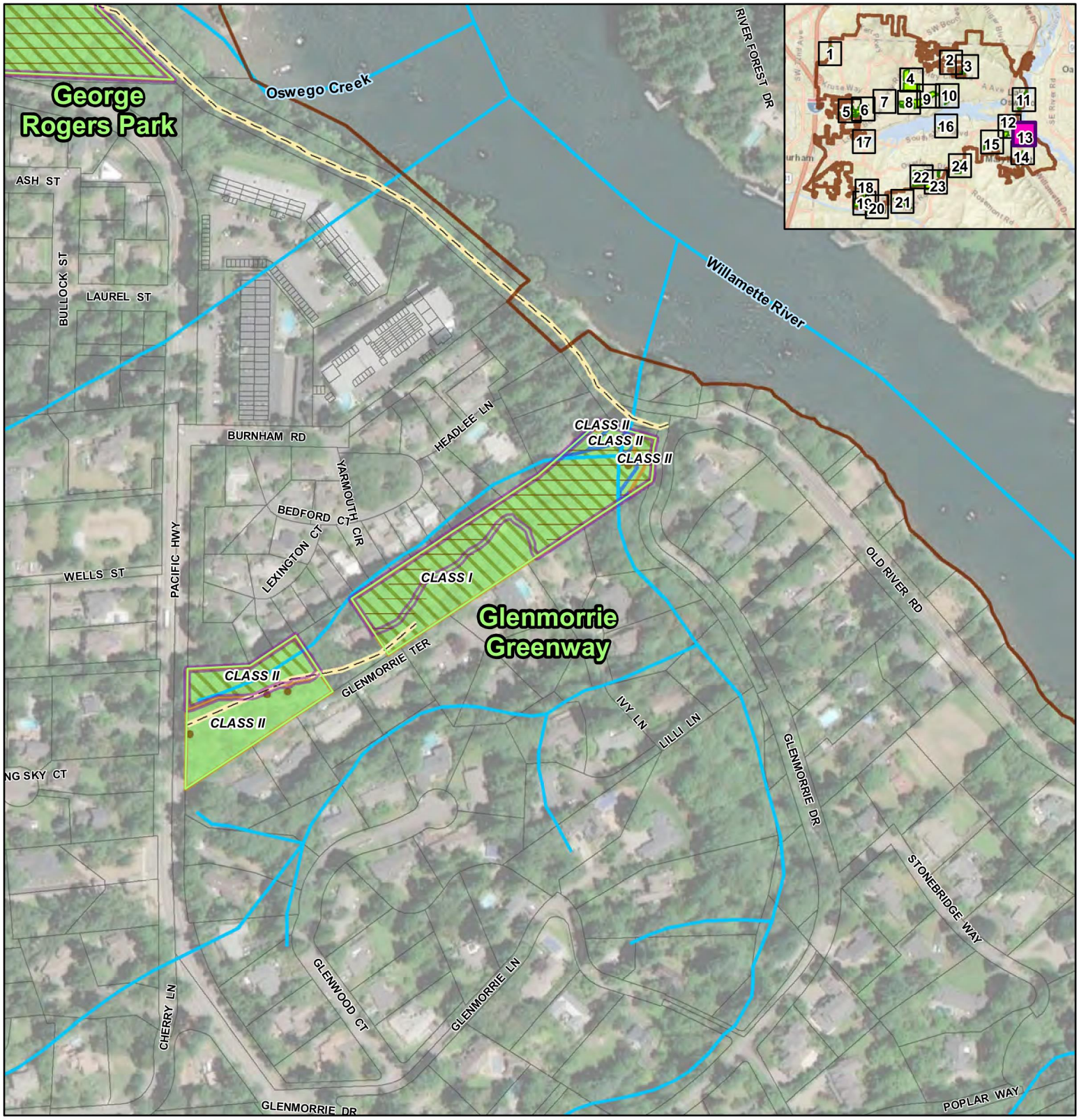

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 13 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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December 2022

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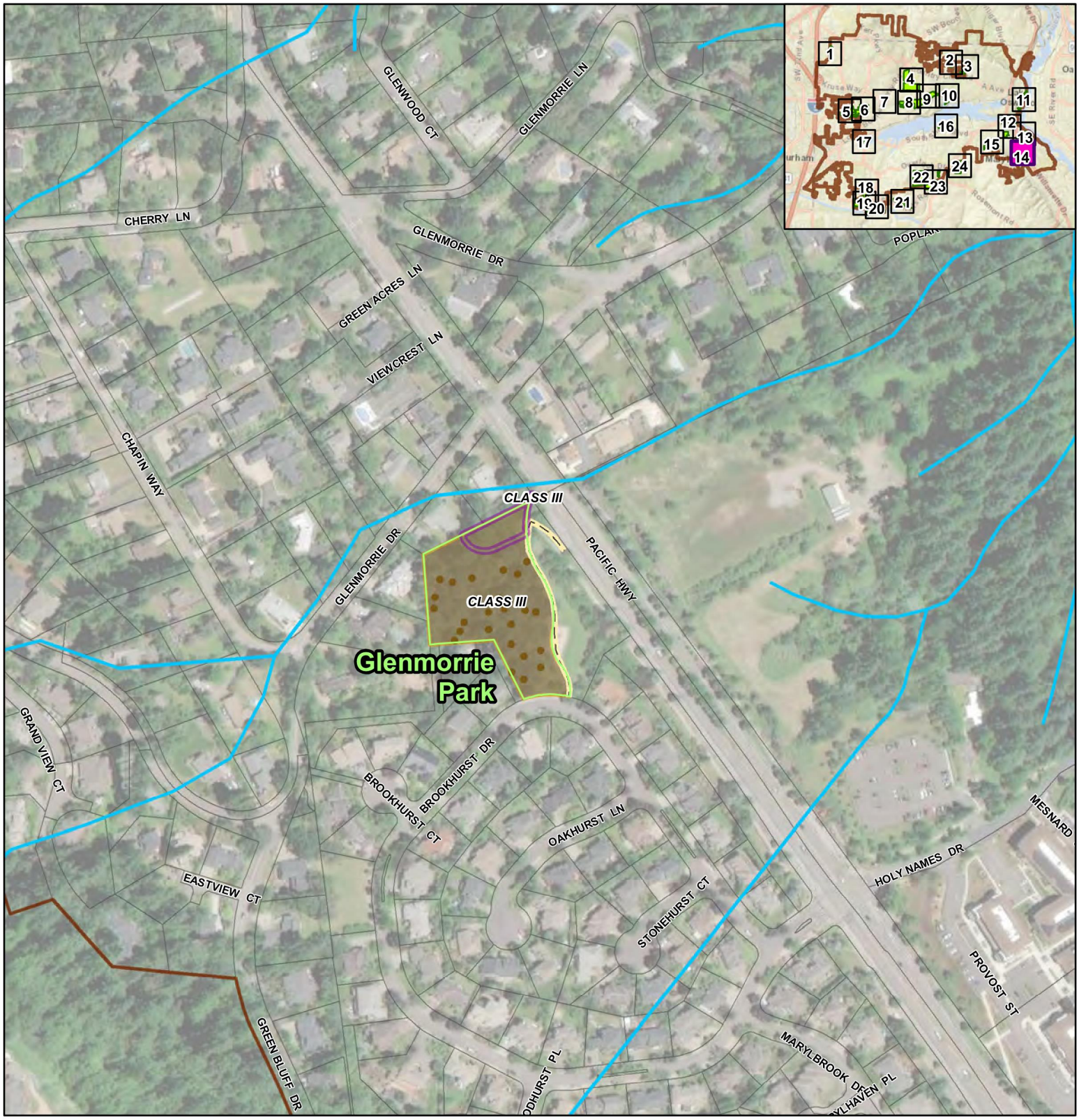

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Waterway
- Oak Tree
- RP District (Riparian/Wetland)

Habitat Type

- Oregon Oak Woodland

Map 14 of 24

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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December 2022

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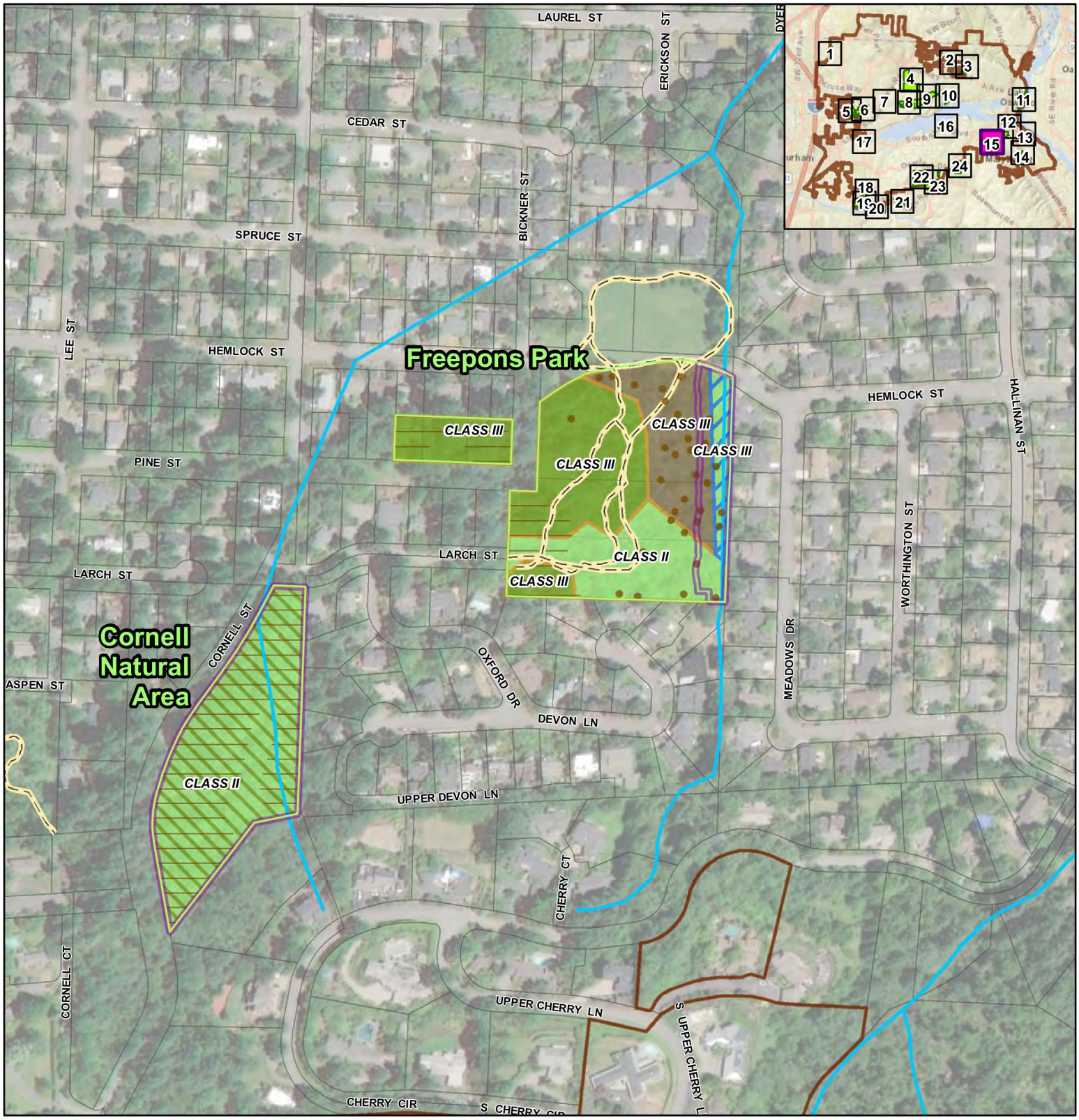

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 15 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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Feet

December 2022

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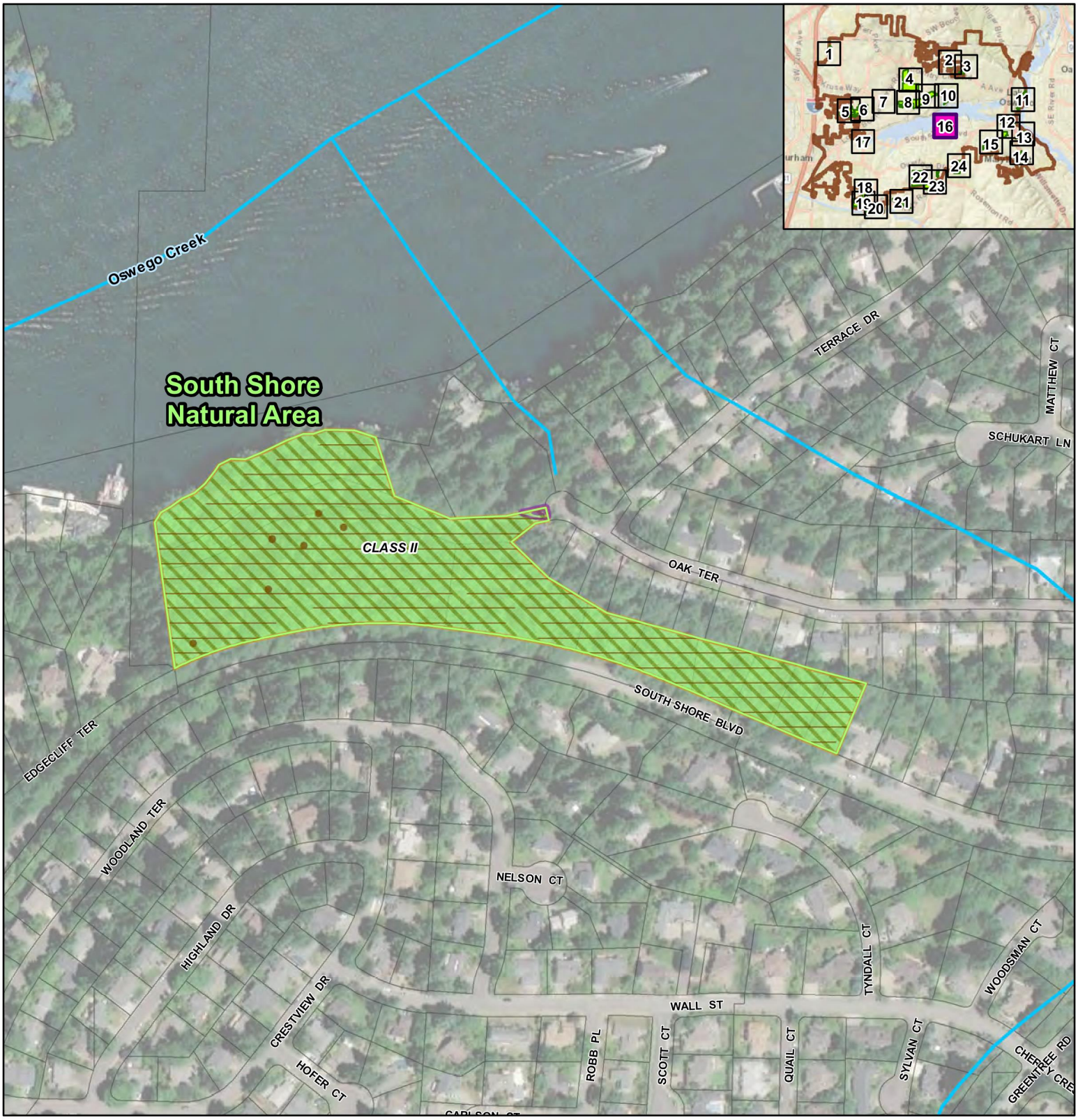

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- RP District (Riparian/Wetland)

Habitat Type

- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 16 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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December 2022

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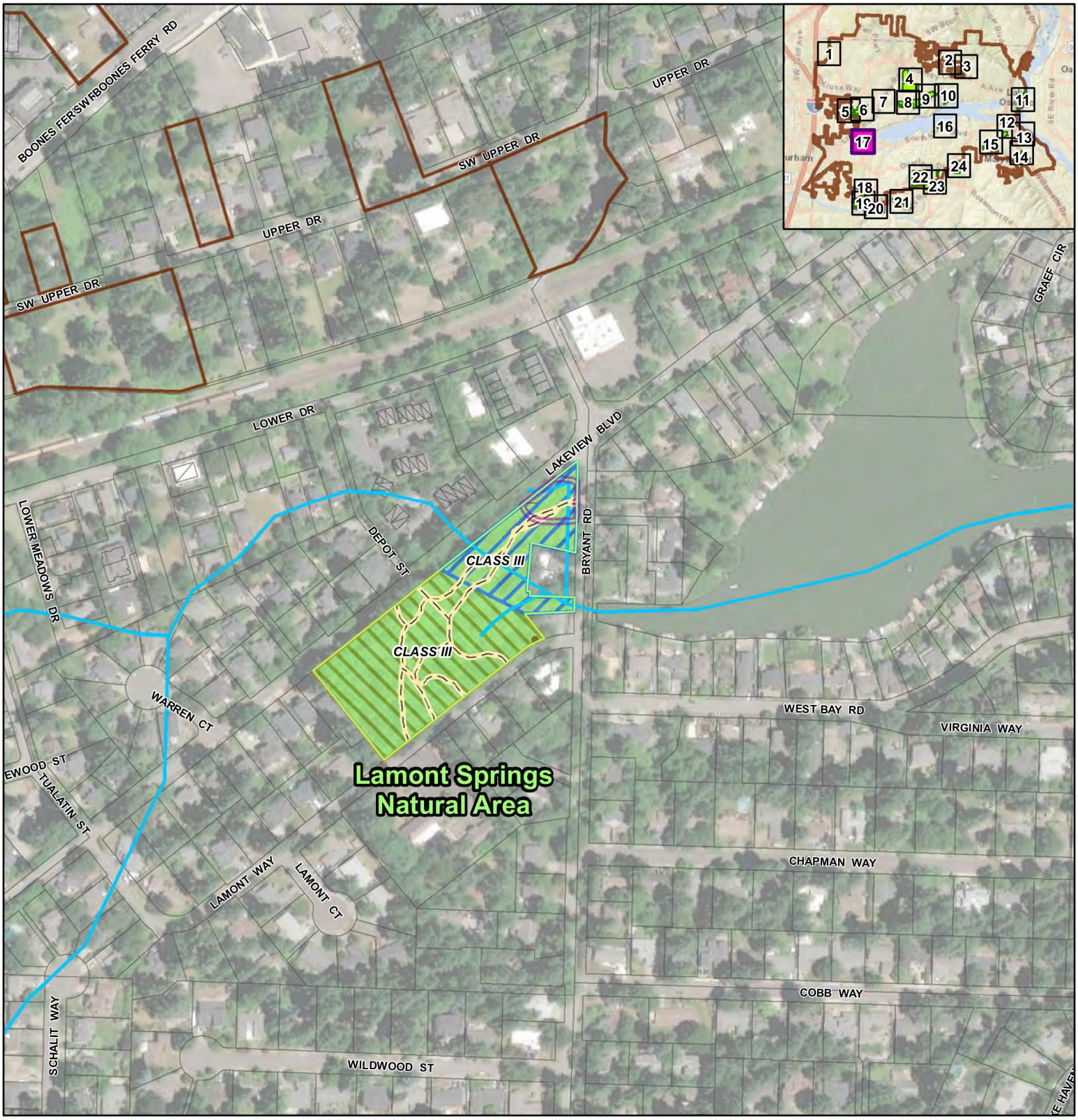

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 17 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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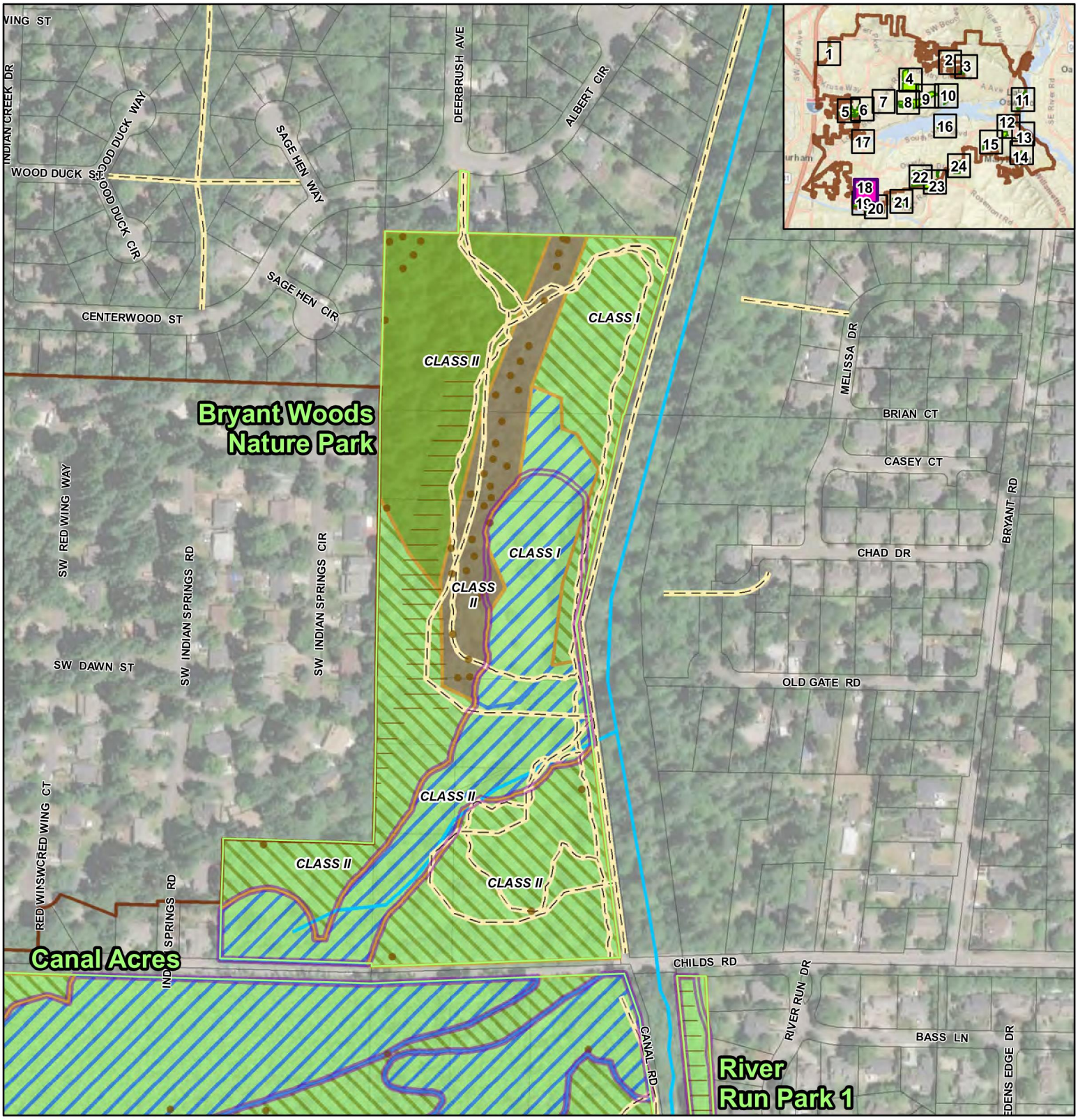
Feet

December 2022

AECOM



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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 18 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

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Feet

December 2022

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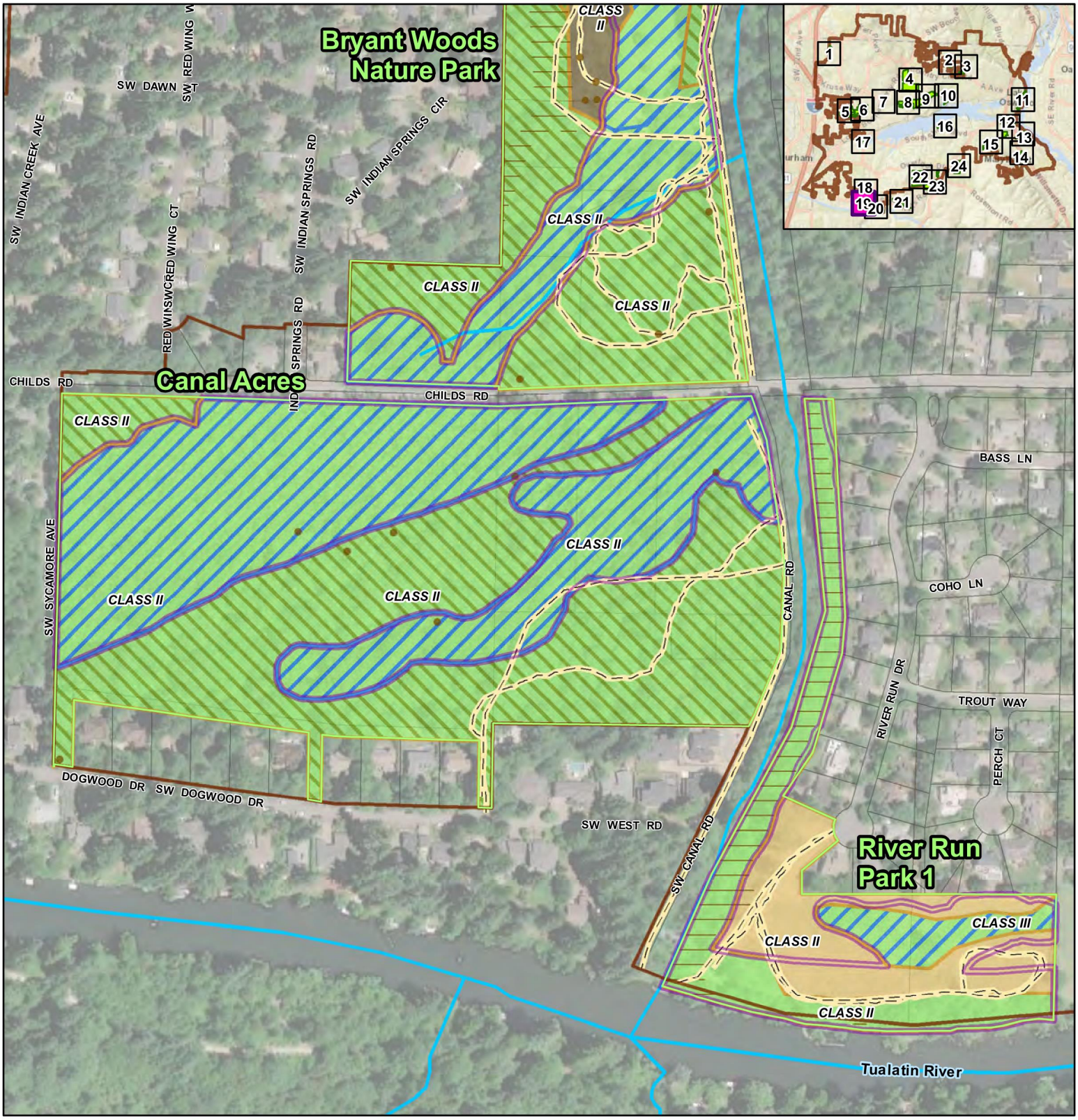

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Oregon Oak Woodland
- Mixed Conifer-Deciduous Forest
- Shrubland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 19 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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Feet

December 2022

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Deciduous Forest
- Mixed Conifer-Deciduous Forest
- Shrubland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 20 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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Feet

December 2022

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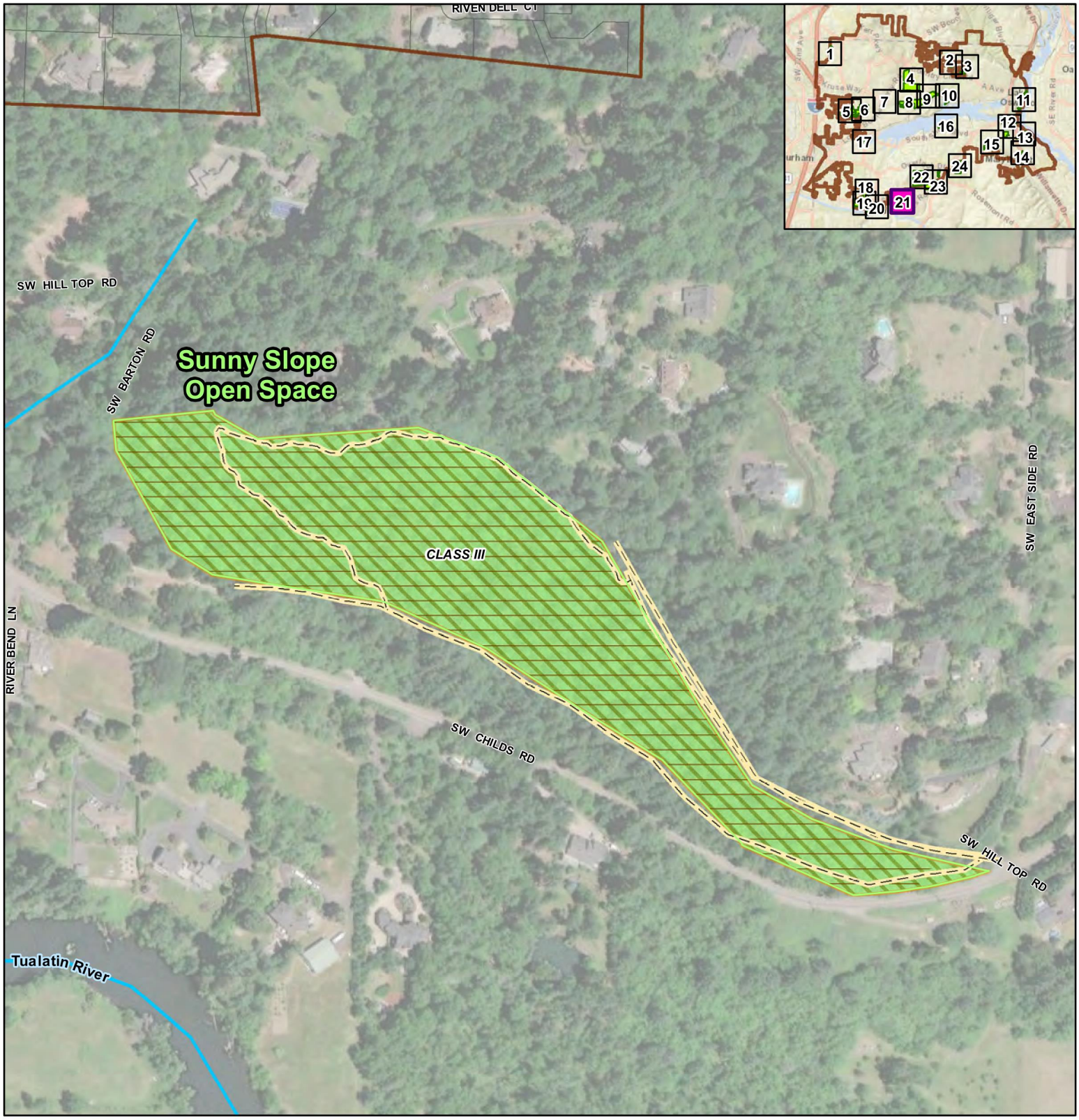

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Trail/Pathway

Habitat Type

- Mixed Conifer-Deciduous Forest

Map 21 of 24

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

LAKE OSWEGO
NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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December 2022

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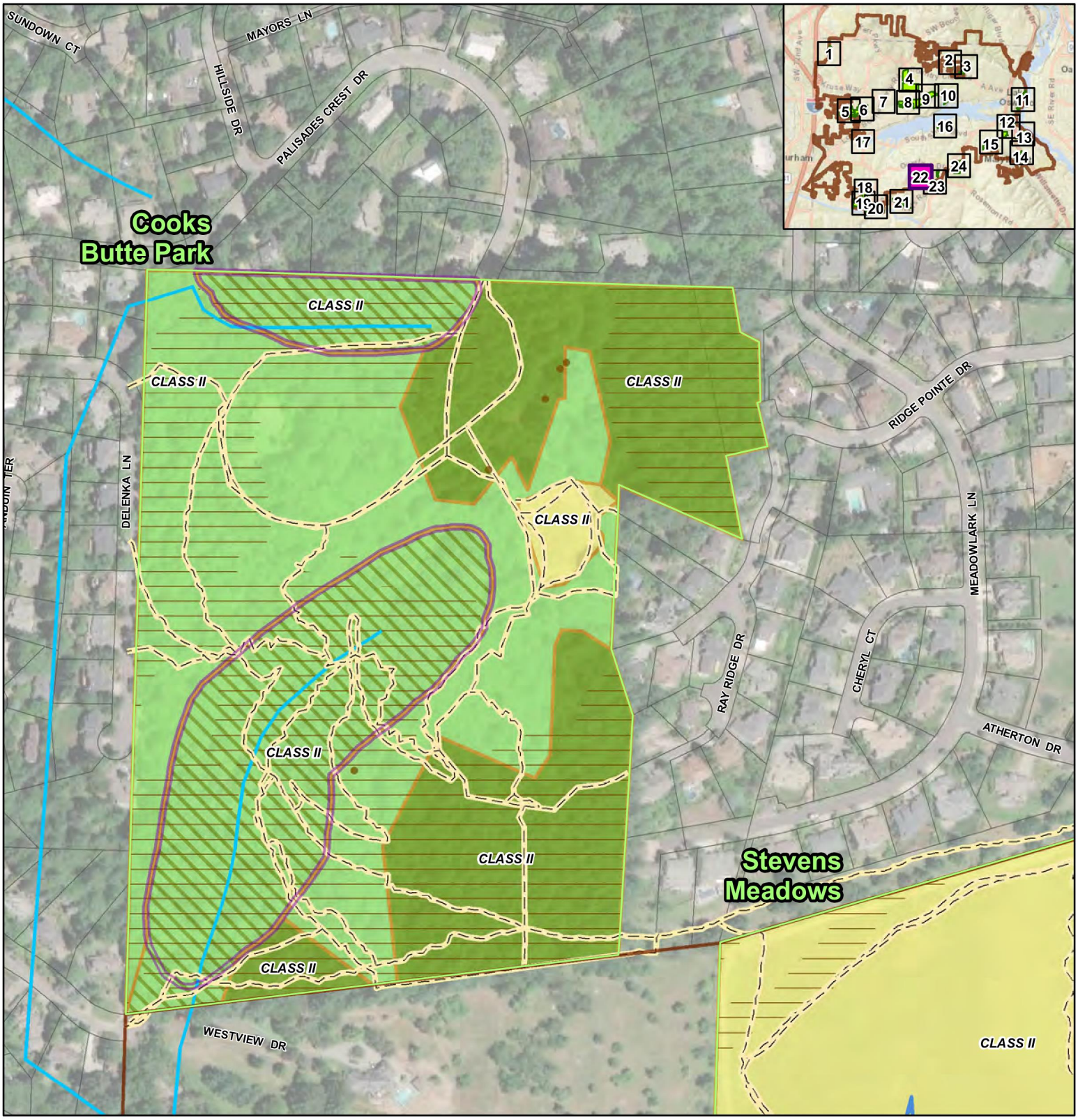

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Oak Tree
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Mixed Conifer-Deciduous Forest
- Upland Grassland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 22 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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December 2022

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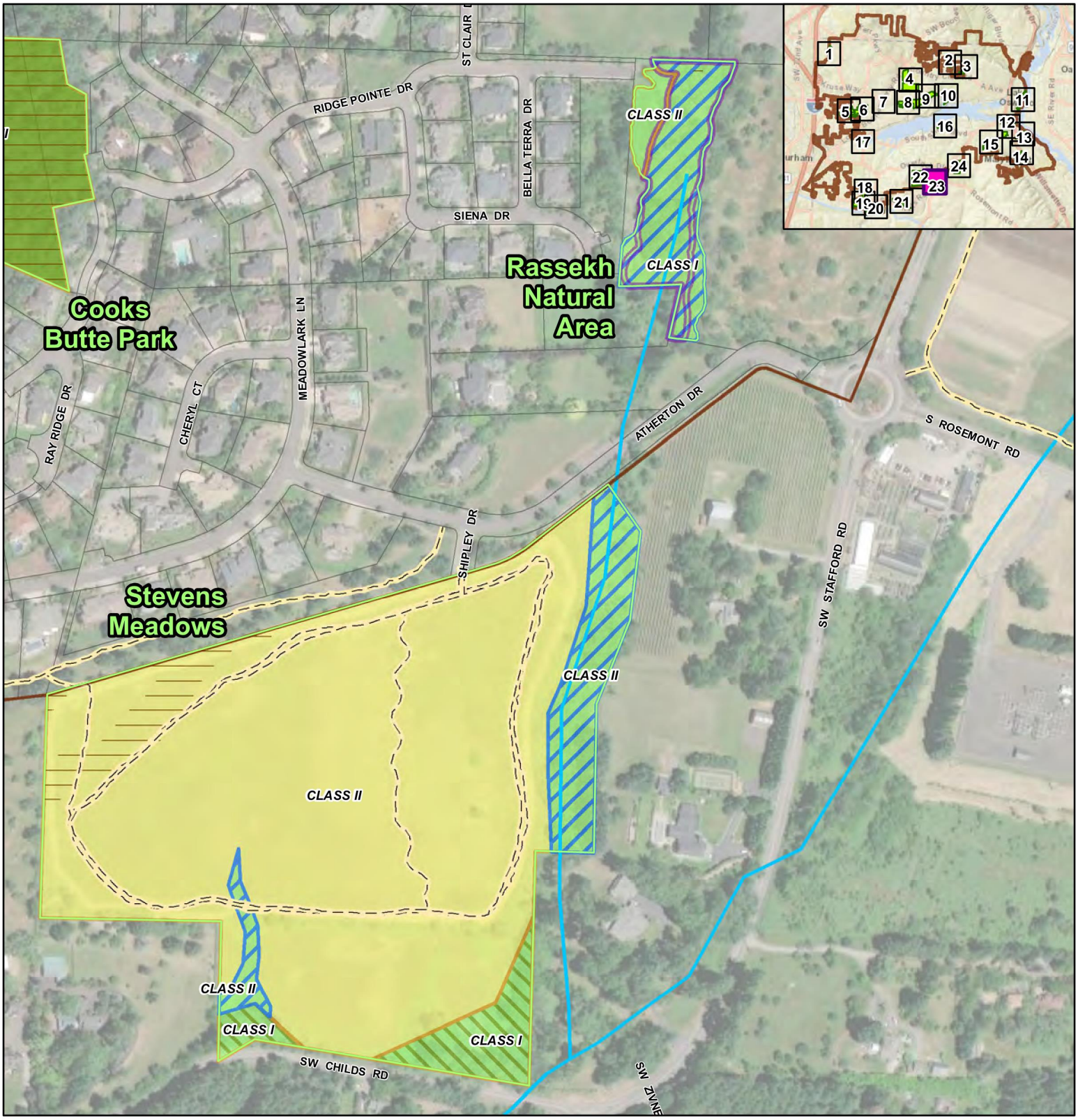

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Steep Slope
- Waterway
- Trail/Pathway
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Conifer Forest
- Deciduous Forest
- Mixed Conifer-Deciduous Forest
- Upland Grassland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 23 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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Feet

December 2022

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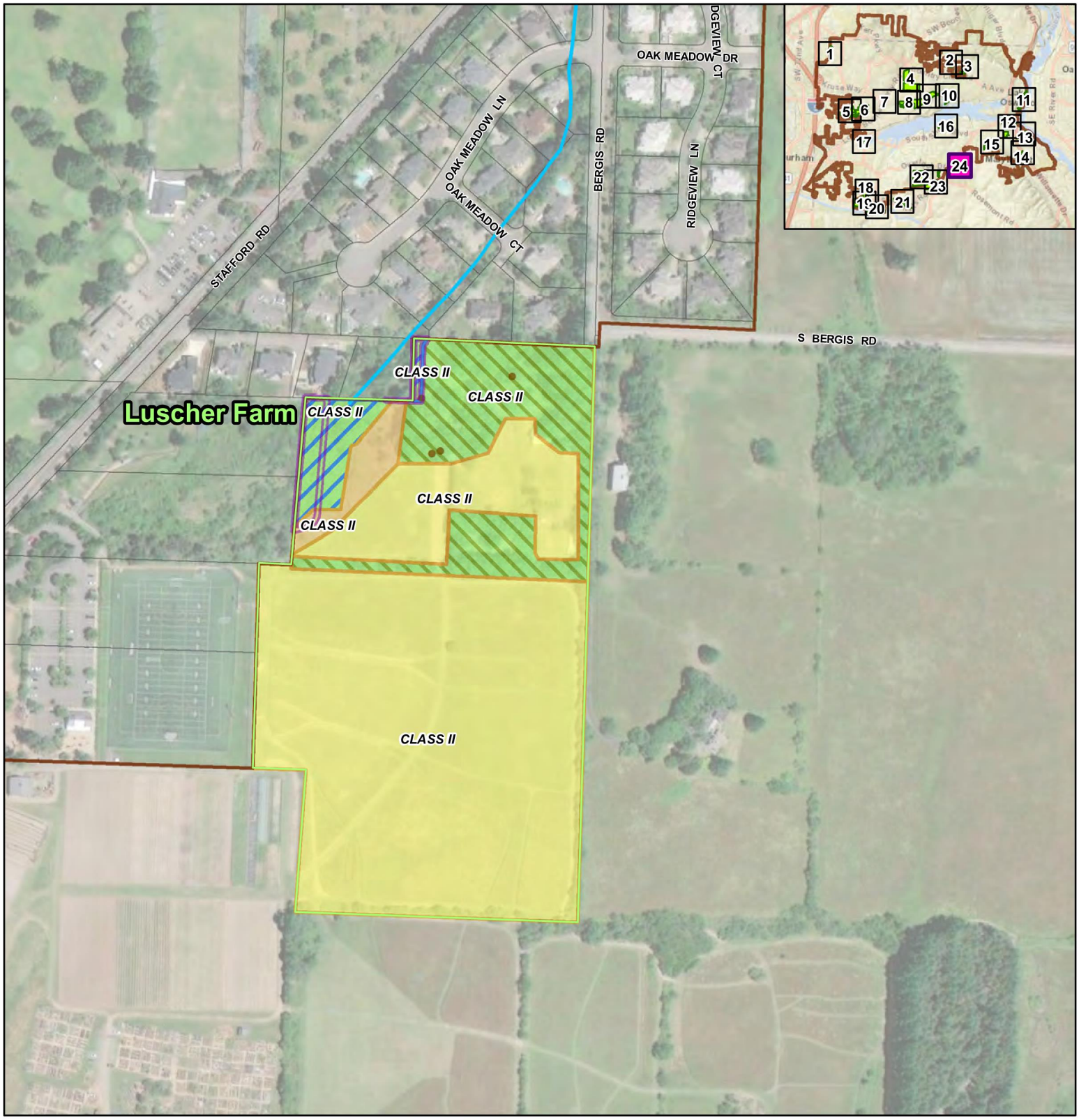

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Legend

- City Boundary
- Natural Area Study Site
- Taxlot
- Waterway
- Oak Tree
- RP District (Riparian/Wetland)

Habitat Type

- Wetland (Estimated)
- Mixed Conifer-Deciduous Forest
- Shrubland
- Upland Grassland

Habitat Classes:,
Class I: Degraded
Class II: Marginal
Class III: Good

Map 24 of 24

LAKE OSWEGO NATURAL AREA HABITAT TYPES

CITY OF LAKE OSWEGO
PARKS AND RECREATION DEPARTMENT
NATURAL AREAS HABITAT MANAGMENT PLAN

N W E S

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Feet

December 2022

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Appendix C

Target Native Plants for Each Habitat Type

Mixed Conifer-Deciduous Forest

Photo from Iron Mountain, K Roeland

This forest community is a common cover type within multiple natural areas that dominates several of the City's larger natural areas. Total area within Lake Oswego's natural areas is 112.4 acres. The dominant species in the canopy include Douglas-fir and bigleaf maple. Additional common canopy species include western red cedar, red alder, and Pacific madrone. Most of the overstory trees are young to mature, with diameters ranging from 8 inches to a maximum of 24 inches diameter at breast height (dbh). Canopy cover typically ranges from 80 to 100 percent, with variable canopy heights. This community is often found within many of the areas mapped as Resource Protection (RP) overlay zones, which include the stream or wetland and a protected riparian area.

Lake Oswego Natural Areas: Bryant Woods, Canal Acres, Cooke Butte, Cornell Natural Area, George Rogers, Glenmorrie Greenway, Hallinan Woods, Iron Mountain, Lamont, Lily Bay, Luscher Farm, Kelly Creek, Pennington, South Shore, Southwood, Stevens Meadows, Sunny Slope, Waluga (East and West), Woodmont

Trees

Scientific name	Common name
Pseudotsuga menziesii	Douglas-fir
Acer macrophyllum	Bigleaf maple
Thuja plicata	Western red cedar
Alnus rubra	Red alder
Arbutus menziesii	Pacific madrone
Populus balsamifera var. *trichocarpa*	Black cottonwood
Fraxinus latifolia	Oregon ash
Crataegus gaylussacia	Suksdorf's hawthorn
Abies grandis	Grand fir
Cornus nuttallii	Western flowering dogwood
Frangula purshiana	Cascara

Shrubs

Scientific name	Common name
Salix scouleriana	Scouler's willow
Acer circinatum	Vine maple
Oemleria cerasiformis	Indian plum
Berberis nervosa	Oregon grape
Gaultheria shallon	Salal
Amelanchier alnifolia	Serviceberry
Sambucus racemosa var. arborescens	Red elderberry
Rubus ursinus	Trailing blackberry
Symphoricarpos alnus	Snowberry

Herbaceous

Scientific name	Common name
Polystichum munitum	Sword fern
Tellima grandiflora	Fringecup
Geum macrophyllum	Large-leaved avens
Oxalis oergana	Oregon oxalis

Threats: Threats for mixed-conifer deciduous forest include invasive species, changes to hydrologic patterns, loss of biodiversity, fragmentation, and climate change.

References: Portland Plants List

Deciduous Forest

Photo from Springbrook Park, K Roeland

In Lake Oswego, deciduous forests are the second most common habitat type totaling 82.2 acres within the City's natural areas. In deciduous forest stands, very few mature conifers are present in the overstory. Bigleaf maple is typically the dominant species, with red alder occasionally abundant, particularly along draws and ravines. Black cottonwood is also seen within this habitat type. Some stands contain conifer saplings (e.g., western red cedar), indicating that they will become mixed conifer-deciduous forest over time. The shrub layer is typically dominated by red-osier dogwood, beaked hazelnut, Indian plum, and Pacific ninebark. This plant association is often found in riparian areas along streams and rivers.

Lake Oswego Natural Areas: Cooks Butte, Freepons, Glenmorrie Greenway, River Run, Roehr, Sierra Vista, Springbrook, Waluga (West)

Trees

Scientific name	Common name
Acer macrophyllum	Bigleaf maple
Alnus rubra	Red alder
Populus balsamifera var. *trichocarpa*	Black cottonwood
Thuja plicata	Western red cedar (sapling)
Fraxinus latifolia	Oregon ash
Crategus gaylussacia	Suksdorf's hawthorn
Frangula purshiana	Cascara

Shrubs

Scientific name	Common name
Cornus sericea	Red-osier dogwood
Corlyus cornuta ssp. *californica*	Beaked hazelnut
Oemleria cerasiformis	Indian plum
Physocarpus capitatus	Pacific ninebark
Salix spp.	Willows

Herbaceous

Scientific name	Common name
Polystichum munitum	Sword fern
Tellima grandiflora	Fringecup
Geum macrophyllum	Large-leaved avens
Oxalis oergana	Oregon oxalis

Threats: Threats for deciduous forest include invasive species, changes to hydrologic patterns, fragmentation, and climate change.

References: Portland Plants List

Conifer Forest

Photo from Iron Mtn, K Roeland

In Lake Oswego's natural areas, conifer forest stands encompass approximately 52.3 acres and contain Douglas-fir as dominate and western hemlock as a subdominant species emerging below the forest canopy. In more mature forests, this habitat may include additional conifer species, including grand fir and western red cedar. Occasional bigleaf maple and/or red alder may be present as minor understory stand components, but these species are typically not included within the forest canopy. The shrub understory varies in diversity, with native areas dominated by sparse-to moderate-density native shrubs (similar to those found in the mixed conifer-deciduous forest habitat).

Lake Oswego Natural Areas: Bryant Woods, Cooks Butte, Freepons, Iron Mountain**,** Lily Bay, Waluga (West)

Trees

Scientific name	Common name
Pseudotsuga menziesii	Douglas fir
Tsuga heterophylla	Western hemlock
Abies grandis	Grand fir
Thuja plicata	Western red cedar
Acer macrohpyllum	Bigleaf maple
Alnus rubra	Red alder

Shrubs

Scientific name	Common name
Salix scouleriana	Scouler's willow
Acer circinatum	Vine maple
Oemleria cerasiformis	Indian plum
Berberis nervosa	Oregon grape
Gaultheria shallon	Salal
Corlyus cornuta ssp. *californica*	Beaked hazelnut
Sambucus racemosa var. *arborescens*	Red elderberry
Rubus ursinus	Trailing blackberry
Symphoricarpos alnus	Common snowberry

Herbaceous

Scientific name	Common name
Polystichum munitum	Sword fern
Tellima grandiflora	Fringecup
Geum macrophyllum	Large-leaved avens
Oxalis oergana	Oregon oxalis

Threats: Threats for upland conifer forest include invasive species and climate change.

References: Portland Plant List

Oregon White Oak Woodland

Photo from Iron Mtn, K Roeland

This habitat is dominated by Oregon white oak and is generally less common than the coniferous forested habitat types in Lake Oswego. According to the Oregon Conservation Strategy, oak woodland habitat is characterized by a tree canopy that obscures 30 to 70 percent of the sky and an understory that is relatively open with shrubs, grasses, and wildflowers. Historically, oak woodlands were most common on flat to moderately rolling terrain, usually in drier landscapes. Although historically a common element of the Willamette Valley, today less than 5 percent of oak woodland habitat remains. In Lake Oswego, this habitat type occurs on approximately 17.5 acres of natural areas; however, many of these oak stands are overcrowded by large conifers and other species and do not currently have an open understory as is characteristic of this habitat type. Because of its uniqueness and regional loss of the habitat type, this habitat type is an important component of the City's biodiversity and would benefit from specific management actions. Oak woodlands are an Oregon Department of Fish and Wildlife (ODFW) Conservation Strategy Habitat and support species that have a high degree of fidelity to oak trees. Historical burning by indigenous communities was a major factor in maintaining oak woodlands in this area, as frequent low-intensity fires exclude conifers such as Douglas-fir. Within the City, it is common for oak woodlands to contain Oregon ash as a subdominant species.

Lake Oswego Natural Areas: Iron Mountain, Freepons, Glenmorrie, Sierra Vista, Waluga (East and West)

Trees

Scientific name	Common name
Quercus garryana	Oregon white oak
Fraxinus latifolia	Oregon ash
Acer macrophyllum	Bigleaf maple
Alnus rubra	Red alder
Arbutus menziesii	Pacific madrone
Frangula purshiana	Cascara
Prunus emarginata	Bitter cherry
Pseudotsuga menziesii	Douglas fir

Shrubs

Scientific name	Common name
Amelanchier alnifolia	Western serviceberry
Berberis aquifolium	Oregon grape
Ceanothus cuneatus	Buckbrush
Symphoricarpos spp.	Snowberry
Ribes spp.	Currant
Oemleria cerasiformis	Indian plum
Sambucus spp.	Elderberry

Herbaceous

Scientific name	Common name
Bromus carinatus	California brome
Elymus spp.	Wildrye
Festuca spp.	Fescue
Carex spp.	Sedge
Polystichum munitum	Sword fern
Clarkia amoena	Farewell to spring

Threats: According to the Oregon Conservation Strategy, the following are threats for Oregon White Oak Woodland:
-Fire suppression and fir encroachment
-Land use conversion and continued habitat loss
-Loss of habitat structure
-Invasive species
-Climate change

References Portland Plants List, Oregon Conservation Strategy

Shrubland

Photo from Woodmont (restored), K Roeland

In Lake Oswego, upland shrubland habitat type occurs primarily in former agricultural land such as old orchards. This habitat type represents a relatively small portion of Lake Oswego's natural areas, with 8.6 acres mapped within the natural areas. Wetland shrubland habitat often occurs within areas that have experienced frequent or recent disturbance (such as regular flooding or recent fire) that would preclude tall overstory tree species. Native shrub species often include willows, red-osier dogwood, hardhack, and/or Pacific ninebark. Shrubland habitat is considered transitional, meaning that over time and without repeated or continued disturbance, it will convert to a tree-dominated habitat type. For this reason, young tree saplings can also be present within this habitat type.

Lake Oswego Natural Areas: Iron Mountain, Luscher Farm, River Run, Woodmont

Trees

Scientific name	Common name
Alnus rubra	Red alder
Crataegus gaylussacia	Suksdorf's hawthorn
Fraxinus latifolia	Oregon ash
Populus trichocarpa	Black cottonwood

Shrubs

Scientific name	Common name
Salix spp.	Willows
Cornus sericea	Redosier dogwood
Spiraea douglasii spp. douglasii	Hardhack
Physocarpus capitatus	Pacific ninebark
Sambucus racemosa var. arborescens	Red elderberry
Rosa spp.	Rose

Herbaceous

Scientific name	Common name
Bromus carinatus	California brome
Elymus spp.	Wildrye
Festuca spp.	Fescue
Carex spp.	Sedge
Polystichum munitum	Sword fern
Clarkia amoena	Farewell to spring

Threats: Threats for shrubland habitat include invasive species, fire, and drought for new saplings (due to lack of shade).

References: Portland Plant List

Upland Grassland

Photo from Stevens Meadows (not restored); Photo by K Roeland

Historically, the Willamette Valley contained upland grassland habitat, also known as prairies, which often occurred near oak woodlands where fire was also used to maintain the open character of that habitat type. Camas is a native tuberous lily that was a staple in the diet of local indigenous communities. As such, it is widely regarded as a culturally important native plant and is often associated with relic or restored wet prairie habitats. Several native plant species became adapted to growing only in (endemic to) these prairie habitats. As prairies have largely been converted to agriculture or development, these endemic species are becoming imperiled, and many have been placed on the Oregon Endangered Species list (e.g., Nelson's checker-mallow [*Sidalcea nelsoniana*], Kincaid's lupine [*Lupinus oreganus*] and Willamette daisy [*Erigeron decumbens*]).
The City's grasslands (approximately 38. acres) have the opportunity to be managed to encourage the development of native prairie habitat.

Lake Oswego Natural Areas: Cooks Butte, Luscher Farm, Stevens Meadows, Woodmont

Trees

Scientific name	Common name
Quercus garryana	Oregon white oak
Arbutus menziesii	Pacific madrone

Shrubs

Scientific name	Common name
Amelanchier alnifolia	Western serviceberry
Berberis aquifolium	Tall oregon grape

Herbaceous

Scientific name	Common name
Achillea millefolium	Yarrow
Acnatherum spp.	Needlegrass
Bromus cerinatus	California brome
Clarkia spp.	Clarkia
Festuca spp.	Fescue grass
Trifolium spp.	Clover
Allium spp.	Onion
Camassia quamash	Camas
Lupinus spp.	Lupine
Elymus galucus ssp. *glaucus*	Blue wildrye
Carex unilateralis	One-sided sedge

Threats: According to the Oregon Conservation Strategy, the following are threats for Upland Grassland:
-Altered fire regimes
-Invasive species
-Land management conflicts
-Reduction of habitat patch size and connectivity
-Loss of habitat complexity in oak savannas
-Recreational impacts

References: Portland Plants List, Oregon Conservation Strategy

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