



Tree Inventory & Maintenance Plan

For Publicly-Managed Trees

City of Covington, WA

March 2025

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PREPARED FOR

City of Covington

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A component of the
2023-2025 Climate Planning Grant

An interagency agreement between the
City of Covington and the Washington State Department of Commerce



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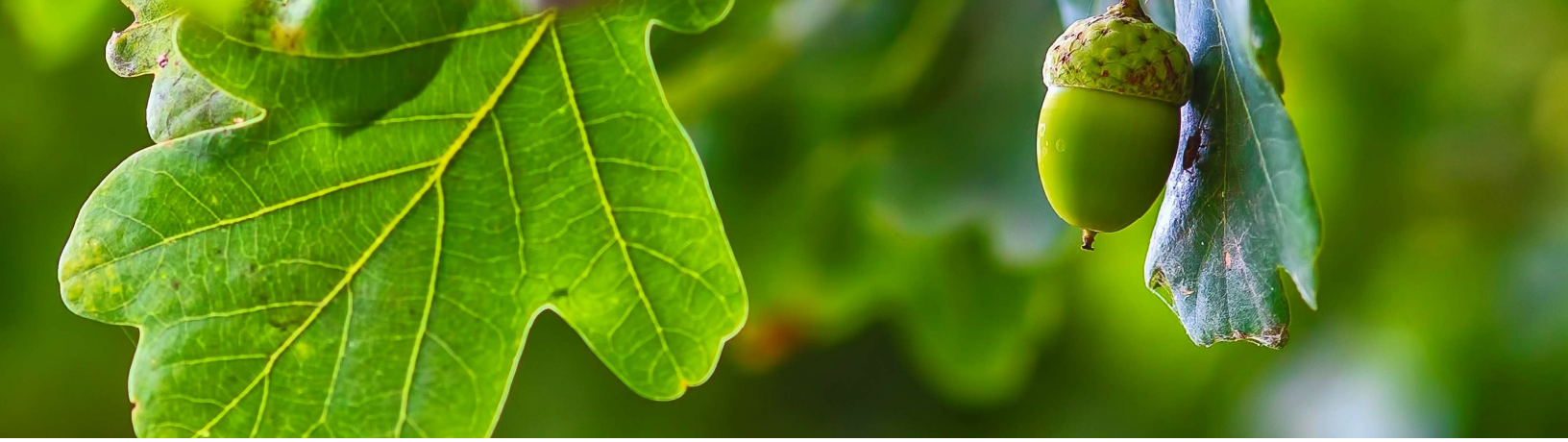
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Executive summary

PURPOSE

The City of Covington, a growing municipality located in southern King County, Washington, is committed to proactively planning for climate resiliency. In response to House Bill 1181, which mandates that jurisdictions plan for climate change, Covington has undertaken several efforts to meet the requirements- one of which is this public tree inventory and maintenance plan. This plan aims to provide guidance for the City of Covington on how to maintain and improve the quality and quantity of tree canopies on city-managed properties, specifically within rights of way (ROWs) and parks.

This project is funded by a Climate Planning Grant from the Washington State Department of Commerce.

KEY FINDINGS

Arborist teams collected data on 5,952 trees within public street ROW and managed park areas. This report summarizes the data collected and provided to Covington in GIS format.

Most of the inventoried trees (83%) were deciduous and the remaining trees (17%) were evergreen.

Tree species reflects an even distribution of large, large/medium, medium, and small-canopied trees at maturity.

There were 101 tree species inventoried, reflecting a diverse canopy. Some taxa were over-represented and should be de-prioritized in future plantings. The most common genus was maple (*Acer*) comprising 21.9% of the

inventoried trees. The top two most common tree species were Callery pear (*Pyrus calleryana*) and Red maple (*Acer rubrum*), comprising 12.4% and 11.8%, respectively, of the tree canopy.

The canopy was healthy with over 86% of the inventoried trees identified in good condition.

Of the trees inventoried, 2% (122 trees) were recommended for removal and replacement. Only 18% (1098 trees) are recommended for pruning.

This report identifies 565 potential planting locations along public ROWs, and 432 potential planting locations in public parks. This reflects a total of 997 potential new trees on public property.

RECOMMENDATIONS

SUMMARY OF TREE MAINTENANCE NEEDS

- Remove and replace 122 trees.
- Complete maintenance actions on 1,495 trees over the next 5 years based on priority levels.
- Establish regular inspections of publicly managed trees.
- Establish a pest monitoring and action program. Prepare and monitor for pests and diseases, especially emerald ash borer, which could impact 9% of the public trees in Covington.
- Establish an accessible internal GIS map for city employees to track maintenance and planting activities.

SUMMARY OF PLANTING OPPORTUNITIES

- Install up to 997 new trees along right of way and in public parks, based on priority levels.
- Plant tree species appropriate for each site which accounts for climate change and pest readiness.
- Prioritize planting trees that support an increased diversity of taxa that are evergreen and large stature where possible.

SUMMARY OF URBAN FOREST PROGRAM NEEDS

- Establish budget and funding source that provides adequate resources to support on-going urban forestry maintenance needs.
- Conduct additional investigations on remaining trees in the ROW not captured in this inventory and in Parks.
- Develop community outreach resources on trees and urban forestry.
- Improve tree planting standards to better support a robust and healthy urban forest.



Introduction

BACKGROUND

RELEVANT DOCUMENTS

Urban tree canopies are vital for managing temperature extremes, reducing heat islands, enhancing environmental quality, and improving public health. Several guiding documents recognize this and have recommended the city create a comprehensive public tree inventory and management plan.

In 2018, a high-level urban forestry assessment analyzed city-wide tree canopy titled *Tree Canopy Assessment Report* (PlanIt Geo, 2018). This report analyzed canopy cover across both public and private space and generated metrics for tree canopy percentage based off 2017 aerial images. These metrics are a baseline from which to compare future canopy cover analysis and are tools for Covington to determine if it is meeting its canopy cover goals.

In 2023, the *Climate Vulnerability Assessment: Policy Audit, Strategies, and Priorities* (BERK, 2023) was completed. It mapped Tree Canopy and Heat Islands, Overall Vulnerability Index, Sensitive Populations and Vulnerability and Overall Vulnerability Index. These maps are referenced in maintenance and planting priorities.

In addition to these maps, the Climate Vulnerability Assessment identified key strategies for investing in green infrastructure in the city's parks and open spaces. Approaches included: recommending **increasing tree canopy** [in public spaces], prioritizing overburdened communities (Central Covington and Downtown) and prioritizing areas subjected to high urban heat island effects.

CURRENT POLICY

The current *Comprehensive Plan* (City of Covington, 2024)² lays out a strategy to retain and enhance tree and vegetation cover, referring to the Urban Forestry Strategic Plan for guidelines regarding planning, management and maintenance of trees on publicly managed properties.

The *Urban Forest Strategic Plan for Publicly-Managed Trees* (Terra Firma Consulting, 2013) worked with key city staff to develop objectives and strategies to improve the urban forest. They identified six major objectives for the city's urban forest strategy, two of which are addressed in this tree inventory and management plan:

1. A comprehensive inventory of the public tree resource to direct its management.
2. A detailed understanding of the condition and risk potential of all publicly-managed trees.

TREE INVENTORY SCOPE

This tree inventory recorded the species, condition, and maintenance needs of trees on publicly managed lands. It also collected basic data for locations where trees could be planted in the future.

Tree data was collected in areas that are actively maintained by Covington's Public Works department, including public rights of way, city-owned parks and public parcels. The right of way inventory had a specific focus on primary arterials and parks with managed landscapes.

The following managed parks were included in this inventory:

- Covington Aquatic Center
- Covington Community Park (portion of park actively managed, and perimeter trees)
- Crystal View Park
- Friendship Park
- Gerry Crick Skate
- City Hall



Methodology

Field teams completed an on-the-ground field assessment of publicly-managed trees throughout the City of Covington on multiple visits in October and November 2024. Tree Solutions deployed ISA-certified arborists to inventory trees and potential planting sites throughout Covington’s public rights of way and parks.

AREAS INVENTORIED

RIGHT OF WAY

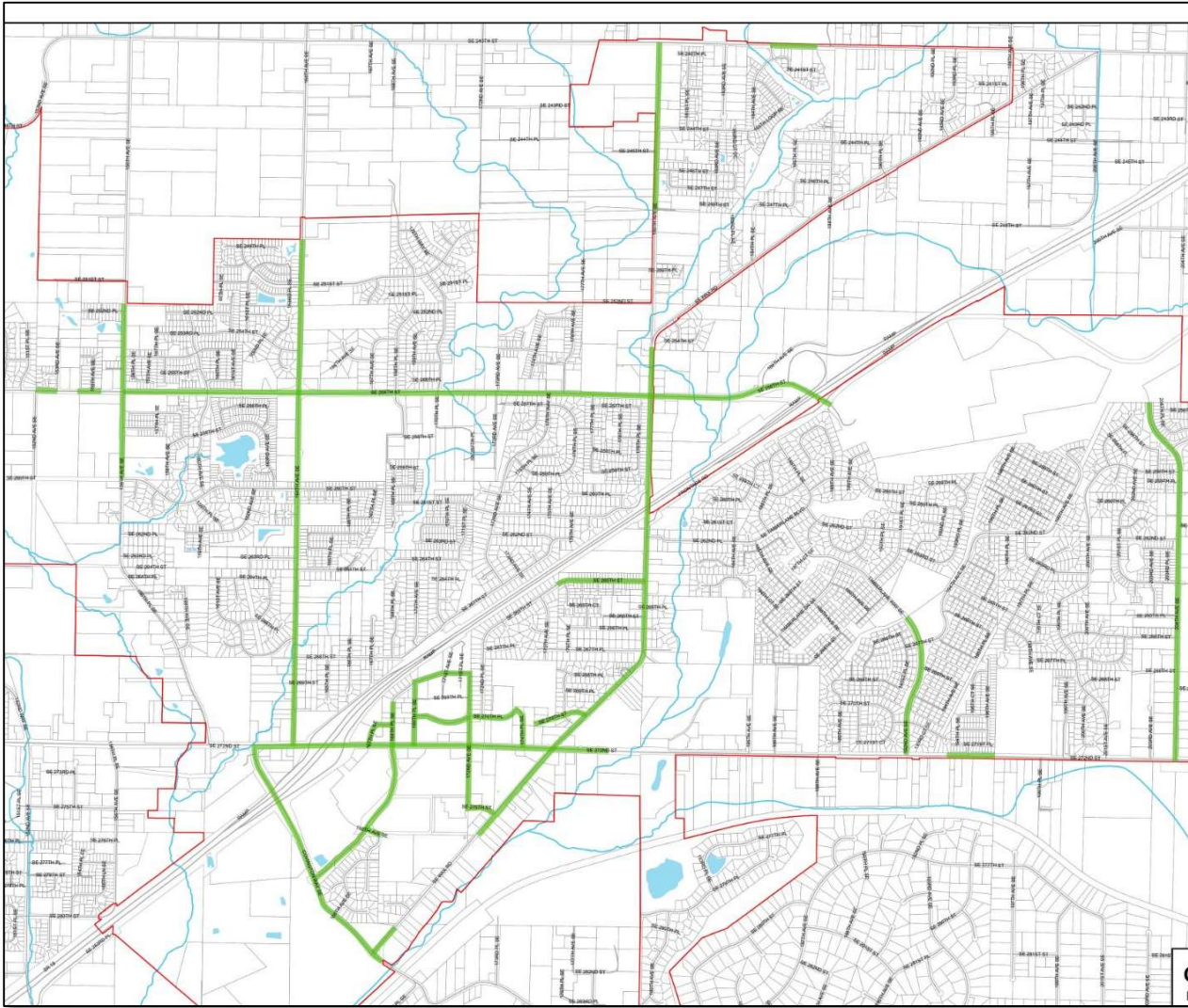
The tree inventory included trees along roads and in medians throughout Covington’s public right of way. Due to a limited budget, not every tree in Covington’s ROW was assessed. Trees were prioritized for the following areas:

- **Priority right of way routes.** This included snow plow routes and arterials identified by city staff as a high priority (Figure 1).
- **Right of way medians, traffic islands, and planting strips** (landscape area between a sidewalk and a road) throughout Covington.

If fences were present, fences were presumed to be the property boundary. If no fence was not present, the edge of the right of way was assumed to be 10 feet from the edge of the road pavement.

If all trees were collected within the right of way, the street was considered a ‘full assessment’. If trees were only collected within medians, islands, and planting strips, the street was considered a ‘partial assessment’.

Areas along Highway 18, such as on-ramps and off-ramps, are managed by Washington State Department of Transportation and were not assessed.

Figure 1. Priority right of way routes (green highlights)

PARKS

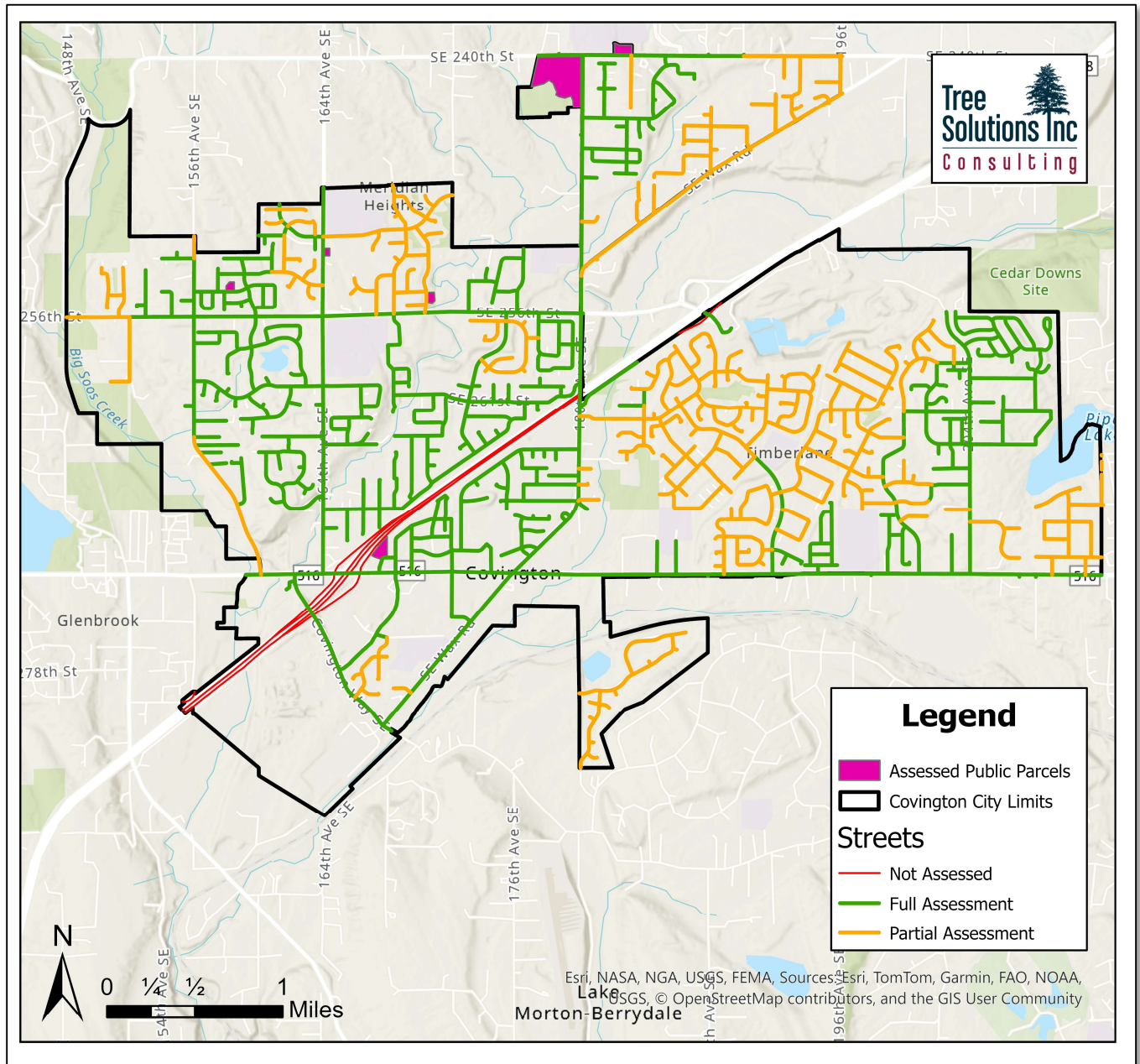
The inventory also included an assessment of trees and planting locations in six public parks. Some of these areas are public parcels managed by the City but are not formal parks (e.g. Covington Aquatic Center and City Hall). For the purpose of this report, all publicly-managed areas in this report will be referred to as ‘Parks’.

Trees in the following areas were inventoried:

- Managed landscape portion of Covington Community Park (excluded natural areas)
- All areas within Crystal View Park, Friendship Park
- All landscape areas around City Hall and the Covington Aquatic Center
- All landscape areas around Gerry Crick Skate Park

Open spaces and natural areas were not included. Other public spaces, including Covington schools, libraries, post office, Chamber of Commerce, Fire Station, and King County Park Parcels were not included.

Figure 2. Tree Inventory Areas



Full Assessment: All trees within the right of way were assessed.

Partial Assessment: Trees within medians, islands, and planting strips were assessed. Did not include trees in front yards, which may have been in the right of way but were managed by private property owners.

EXISTING TREES

Prior to fieldwork, teams referenced high-resolution aerial and street view imagery to reference property lines and create a preliminary map with the potential locations of trees within the rights of way and parks. Arborists used this map in the field as a guide to identify trees on public property and confirm tree locations, ground-truth the locations of trees, and collect attributes using Geographic Information Systems (GIS).

Attributes were collected for each tree, based on Washington State Department of Natural Resources (DNR) standards, including tree location, species, size (trunk diameter), health and structural condition, primary defect (if any), and recommended maintenance (if any).

LOCATION

The physical location of the data point included latitude and longitude coordinates.

- If property lines were not clear in the right of way, data was collected for trees 10-feet beyond the edge of the pavement.
- If a private property fence bordered the right of way, the field arborist assumed fences were representative of property lines and data was only collected for trees outside of the fence. An example of this is the right of way along Timberlane Dr.

SPECIES

Trees were identified by genus, species, and cultivar if apparent.

- Laurel (*Prunus lusitanica* and *Prunus lauroceracus*), rhododendrons (*Rhododendron* spp.), strawberry trees (*Arbutus unedo*), and other shrub species were not collected regardless of size.
- Trees maintained as hedges were not collected.

SIZE / DIAMETER

All trees deliberately planted within the right of way were collected regardless of diameter size.

For natural areas and self-seeded right of way trees, trees 4 inches Diameter at Standard Height (DSH) or greater were collected.

Tree DSH was measured 4.5 feet above the ground with a Spencer Logger's Tape or a Biltmore Stick. DSH was rounded to the nearest tenth of an inch for a single trunk. Protocols for measuring DSH were:

- **Single trunk** – Trees with a single trunk did not have codominant unions or branches at or below 4.5 feet. If there was a union or branch slightly above 4.5 feet, the DSH was measured at the narrowest point below the union.
- **Multi-stemmed** – Trees with codominant unions or branches below 4.5 feet were considered multi-stemmed. Multiple stems emerging from the ground in proximity were considered part of one multi-stem tree if they appeared to be emerging from the same root plate at the field arborist's discretion. In multi-stem trees, arborists measured stems 2- inches DSH and greater and only recorded up to the 5 largest stems.
- **Trees on a slope** – Field arborists measured diameters at 4.5 feet on the uphill side of the slope.

HEALTH AND STRUCTURAL CONDITION

The general condition of each tree was recorded, taking into account tree health, structure and form. Tree Solutions has adapted condition ratings based on the Purdue University Extension formula values for health condition (Purdue University Extension bulletin FNR-473-W - Tree Appraisal, 2019) and the Guide for Plant Appraisal, 10th Ed (International Society of Arboriculture, 2019). Tree points without a condition rating are not living trees. They include tree snags (a standing dead tree), stumps, or a potential planting location. Condition categories included:

Excellent: 91% - 100% condition rating. The tree was nearly perfect in health, structure and form.

Very Good: 81- 90% condition rating. Structural defects were insignificant. Damage from insects or disease was minimal. Health and form were very good.

Good: 61% - 80% condition rating. The tree was in good health. It may have minor structural problems or insignificant mechanical damage. Imperfect canopy density may have been present in few parts of the tree (up to 10% of the canopy). Typical leaf development was normal or growth rate of shoots was at least ¾ typical growth rate. Any deficiency is minor. If pest issues or damage is present, it is minimal and controllable, or tree is reacting appropriately. Normal branch and stem development with healthy growth. Safe useful life expectancy typical for the species.

Fair: 41% - 60% condition rating. The tree may have exhibited some of the following conditions: Crown decline and dieback up to 30% of the canopy. Leaf color somewhat chlorotic/necrotic with smaller leaves and “off” coloration. Stunted shoot extensions indicative of stressed growing conditions. Stress cone crop may have been visible. Obvious signs of pest problems contributing to lesser condition, control might be possible. Some decay areas in main stem and branches. Below average safe useful life expectancy

Poor: 21% - 40% condition rating. The tree may have exhibited some of the following characteristics: Lacking full crown, more than 50% decline and dieback, especially affecting larger branches. Stunting of shoots was obvious with little evidence of growth on smaller stems. Leaf size and color revealed overall stress in the plant. Insect or disease infestation may have been severe and uncontrollable. Extensive decay or hollows in branches and trunk. Short safe useful life expectancy.

Very poor: 1% - 20% condition rating. The tree may have exhibited some of the following characteristics: The tree was dying, had an insect or disease problem that was fatal, had a major structural problem or was unstable.

Dead: 0% condition rating. This category refers to dead trees only.

PRIMARY DEFECTS

Each tree was visually examined from the ground. The field team only recorded if there was a major defect in the tree. This attribute only included the most critical primary defect: the one most affecting the health and structural stability of the tree, over a 5-year timeframe, and which drives maintenance needs. Not all trees had defects to identify. Primary defects include:

Broken Limbs/Hangers
Cankers/Galls/Burls
Cavity/Decay/Nest hole

Crack/Seams
Dieback/Deadwood
Fungal Fruiting Bodies

Girdling Stem/Root	Root Decay Suspected
Included Bark/Weak Union(s)	Basal Decay Suspected
Mechanical Damage - Includes excessively poor pruning	Root Plate Lifting / Soil Heaving
Oozing Through Bark	Suppressed or Phototropic Growth
Previous Failure(s)	Uncorrected Lean
Previously Topped	Other – items not classified above (i.e. expand tree grate, infrastructure conflict, etc...)

RECOMMENDED TREE MAINTENANCE & REMOVAL

The field team noted recommended tree maintenance if they felt it was necessary. Only the most pressing maintenance need was recorded.

- **Prune – High Risk Branches** - Recommend pruning out hazardous deadwood, hangers, diseased limbs, or broken branches greater than four inches in diameter.
- **Prune – Structural** – This young tree requires pruning that will promote sound tree structure by correcting or eliminating weak, interfering, or objectionable branches. Structural pruning will reduce future maintenance. These trees are up to 20 feet in height and can be worked with a pole pruner by a person standing on the ground.
- **Prune -- Clearance** - These trees do not have required clearance over sidewalk – 8’, road 14’, or building 4’ etc. Branches may interfere (now or in the future) with automobile, bike or pedestrian traffic and requires pruning.
- **Removal - Priority 1** – Trees that are high or extreme risk that cannot be cost-effectively or practically managed to reduce that risk. Trees in this category could have a large percentage of dead canopy and be in decline. These trees should be removed in the next six months.
- **Removal - Priority 2** – Trees that are moderate risk that cannot be cost-effectively or practically managed to reduce that risk. This category also includes right of way trees that are dead or dying that are four (4) inches or greater in diameter. These trees should be removed in the next 1-3 years.
- **Removal - Priority 3** Trees that should be removed and replaced, but are not necessarily associated with risk. Trees could be in poor condition, diseased, overplanted, or be the wrong species for that location. This category also includes dead or dying trees that are less than four (4) inches in diameter. Trees should be removed within 1-5 years.
- **Young Tree Maintenance** – Trees smaller than four (4) inches in diameter that require routine inspections and cultural improvements to aid plant establishment. Remove stakes after 1 year, add mulch, prune out girdling roots or girdling irrigation lines, supplement irrigation with water bag or add temporary irrigation. At least one of these is required for this tree.
- **Other** – May include additional inspection, monitoring, testing, cabling or bracing.

TREE PLANTING OPPORTUNITIES

This report identifies 997 locations for potential tree planting.

RIGHT OF WAY

The field team of arborists identified 565 locations for potential new tree plantings along rights of way. Ordinance no. 08-2021¹ dictated street tree spacing guidelines. Referring to these, arborists identified the areas as potential tree planting locations. They included:

- Empty planting pits along sidewalks.
- Landscape areas where evidence of a tree formerly planted was there (e.g. planting stakes or root watering tubes).
- Dead tree or stumps.
- Landscape area that had adequate soil volume, and sunlight, (with minimal competition from nearby vegetation) to support a mature tree.

The field team did not collect data on potential planting locations in rights of way planting strips for the following situations:

- If the planting strip appeared to be actively managed and landscaped by the adjacent landowner.
- If the installation of trees in these areas would require outreach and coordination with adjacent landowners.
- If a tree had potentially been removed or never installed due to belowground utilities or other infrastructure conflict.

PARKS

Arborists identified 432 tree planting locations in the six parks in areas that could support trees that did not have a clearly specified use like a sports field or play area. Planting location points were placed approximately 30 feet apart in a natural pattern. Tree planting locations in parks are only recommendations that show the potential for added tree canopy in public lands and could be adjusted based on species, site conditions, or aesthetic requirements. Potential planting locations were not identified in areas that were clearly managed as natural areas or native ecosystem plantings.

Locations for potential new plantings in parks were also collected in the following situations:

- Empty planting pits.
- Dead tree or stump or evidence of a tree formerly planted there (planting stakes or root watering tubes).
- Landscape area within a parking lot where trees could be planted, such as planting strips along sidewalks, within medians, and in traffic islands.

¹<https://cms2.revize.com/revize/cityofcovington/Ordinance%20No.%2008-2021.pdf>

AREAS FOR PRIORITIZING MAINTENANCE

Heat index maps were overlaid with vulnerability and population density maps (BERK Consulting, 2023) to separate the city into six geographic areas (Figure 3). These areas are intended to guide prioritization of tree removals, maintenance, and tree planting across Covington.

CENTRAL

The central area includes most of the downtown business area, and some residential areas to the north. Most of the neighborhoods in this area appeared to be some of the older neighborhoods in the city and had fewer recent developments. Climate vulnerability for this area is generally higher and it includes some of the higher heat island values in the city.

NORTH

The north area mostly consists of planned developments in residential neighborhoods near Covington Community Park and the Aquatic Center. Climate vulnerability for this area is medium.

NORTHWEST

The northwest section mostly consists of planned developments in residential neighborhoods near Kentwood high school. Climate vulnerability for this area is medium-medium high and it has some of the higher heat island values of the city.

WEST

The west section appeared to be less populated with few recent developments. This area has some of the cooler heat island values in the city; however, climate vulnerability for this area is high and medium-low.

SOUTH

The south section includes some of the downtown area and residential developments to the south that appear to have been built relatively recently. This area also includes the Lake Winterwood neighborhood. This area has high/medium climate vulnerability and appears to have some of the higher heat island values in the city.

EAST

The east section includes all of Covington east of SE Wax Rd. and north of SE 272 St. This includes older and newer residential developments. Climate vulnerability is lower and medium low and this area has both warm and cooler heat island values.



Data & Analysis

EXISTING TREES

A total of 5,952 publicly managed trees were assessed in this inventory. Of these, 5,622 trees were in the right of way and 330 were in parks.

The majority of tree canopy inventoried, or 87%, were deciduous species and drop leaves every winter. Only 13% of the inventoried trees were evergreen species with year-round foliage.

Table 1. Existing Trees: Deciduous v. Evergreen

Foliage Habit	Number	Relative Abundance
Deciduous	5189	87%
Evergreen	763	13%

The quantities and relative abundance of deciduous and evergreen trees inventoried in right of way and parks.

SIZE AT MATURITY

Inventoried tree species were categorized into four size categories, by the height the species can reach at maturity based on Tree Solutions Inc.’s professional knowledge of tree species. Sizes categories included:

- Small: Trees less than 30 feet tall at maturity
- Medium: Trees between 30 and 40 feet tall at maturity
- Medium/Large: Trees between 40 and 50 feet tall at maturity
- Large: Trees greater than 50 feet at maturity

Appendix A shows how each species was categorized.

Table 2 shows the numbers and percentages of tree size category separated by area and total across the city. Both across the city and within each area, tree size categories are evenly distributed, with a slight majority of trees being in the “Large” tree category at 35% of all trees. The East and South neighborhoods have a lower percentage of public trees in the large category than the rest of the city, and a higher percentage in the “Small” category.

Table 2. Tree Species Size at Maturity

Area ID		Large		Medium/Large		Medium		Small	
		Qty of trees	% within area	Qty of trees	% within area	Qty of trees	% within area	Qty of trees	% within area
Area ID	Central	853	43%	400	20%	532	27%	220	11%
	East	310	18%	412	24%	532	32%	432	26%
	North	305	41%	151	20%	181	24%	106	14%
	Northwest	538	42%	195	15%	298	23%	248	19%
	South	13	15%	27	31%	22	25%	26	30%
	West	50	35%	8	6%	63	44%	21	15%
Totals		2069	35%	1193	20%	1628	27%	1053	18%

Tree quantities separated by tree size at maturity. See Appendix A for a list of which size categories apply to tree species. Percentages reflect the percent of all trees in that area. Nine trees with genus ‘unknown’ are omitted from this table.

CANOPY COMPOSITION

The following analysis of canopy diversity represents all 5,952 trees that were inventoried in parks and rights of way. The relative abundance of species, genus, and family are shown in the following sections.

SPECIES DIVERSITY

There were 101 different species inventoried. Callery pear (*Pyrus calleryana*) was the most common species, accounting for 12.4% of the trees. The second most-inventoried species was red maple (*Acer rubrum*) accounting for 11.8% of the trees. Table 3 lists the 22 most common species inventoried.

Table 3. Existing Trees by Species

Species	Common Name	Number	Relative Abundance
<i>Pyrus calleryana</i>	Callery pear	735	12.35%
<i>Acer rubrum</i>	Red maple	701	11.78%
<i>Quercus rubra</i>	Red oak	380	6.38%
<i>Acer platanoides</i>	Norway maple	368	6.18%
<i>Pseudotsuga menziesii</i>	Douglas-fir	364	6.12%
<i>Fraxinus pennsylvanica</i>	Green ash	316	5.31%
<i>Prunus cerasifera</i> 'Thundercloud'	Thundercloud plum	264	4.44%
<i>Tilia cordata</i>	Little leaf linden	226	3.80%
<i>Crataegus douglasii</i>	Black hawthorn	183	3.07%
<i>Carpinus betulus</i>	European hornbeam	179	3.01%
<i>Fraxinus oxycarpa</i> 'Raywood'	Raywood ash	173	2.91%
<i>Cercidiphyllum japonicum</i>	Katsura	160	2.69%
<i>Prunus serrulata</i>	Flowering cherry	149	2.50%
<i>Thuja plicata</i>	Western redcedar	135	2.27%
<i>Liquidambar styraciflua</i>	Sweetgum	112	1.88%
<i>Fagus sylvatica</i>	European beech	110	1.85%
<i>Acer saccharinum</i>	Silver maple	98	1.65%
<i>Chamaecyparis lawsoniana</i>	Lawsons cypress	82	1.38%
<i>Amelanchier alnifolia</i>	Pacific serviceberry	64	1.08%
<i>Prunus x subhirtella</i>	Winter-flowering cherry	62	1.04%
<i>Parrotia persica</i>	Persian ironwood	60	1.01%
<i>Zelkova serrata</i>	Japanese zelkova	60	1.01%

Species with fewer than 50 individuals, each accounting for less than 1% of the total trees inventoried, are not listed.

GENUS DIVERSITY

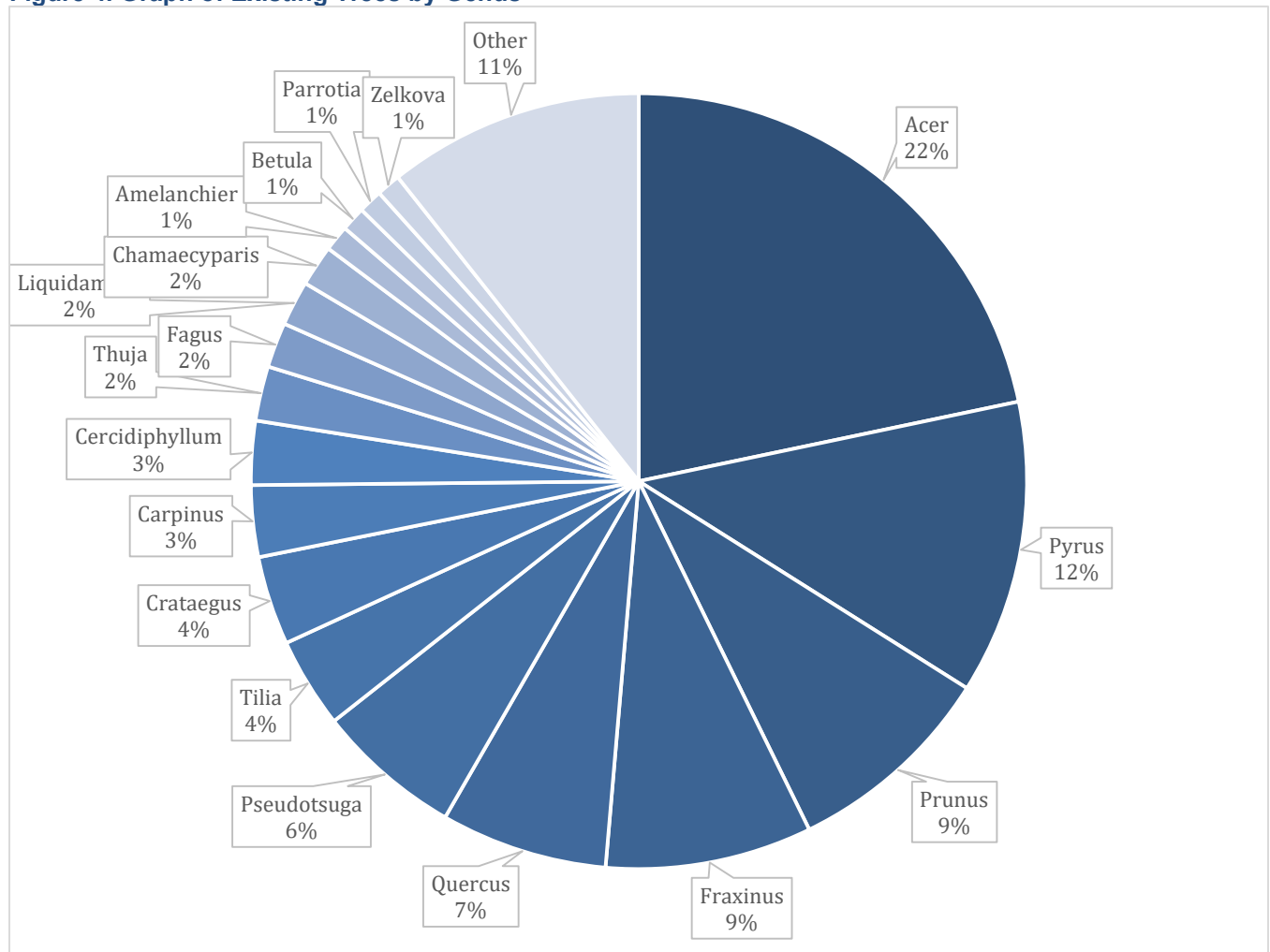
There were a total of 51 genera inventoried. The most common genus inventoried was *Acer*, the maple genus, which accounted for 21.9% of trees. *Pyrus* (pear) was the second most common, at 12.3%, followed by *Prunus* (plum/cherry) at 8.9% and *Fraxinus* (ash) at 8.7% of trees. Table 4 lists the 18 most common genera inventoried, illustrated in Figure 4.

Table 4. Existing Trees by Genus

Genus	Common name	Number	Relative Abundance
<i>Acer</i>	Maple	1302	21.9%
<i>Pyrus</i>	Pear	735	12.3%
<i>Prunus</i>	Plum/Cherry	529	8.9%
<i>Fraxinus</i>	Ash	516	8.7%
<i>Quercus</i>	Oak	416	7.0%
<i>Pseudotsuga</i>	False hemlock	364	6.1%
<i>Tilia</i>	Linden	227	3.8%
<i>Crataegus</i>	Hawthorn	222	3.7%
<i>Carpinus</i>	Hornbeam	179	3.0%
<i>Cercidiphyllum</i>	Katsura	160	2.7%
<i>Thuja</i>	Arborvitae	136	2.3%
<i>Fagus</i>	Beech	113	1.9%
<i>Liquidambar</i>	Sweetgum	112	1.9%
<i>Chamaecyparis</i>	False cypress	103	1.7%
<i>Amelanchier</i>	Serviceberry	64	1.1%
<i>Betula</i>	Birch	61	1.0%
<i>Parrotia</i>	Ironwood	60	1.0%
<i>Zelkova</i>	Zelkova	60	1.0%

Genera with fewer than 50 individuals, each accounting for less than 1% of the total trees inventoried, are not listed.

Figure 4. Graph of Existing Trees by Genus



“Other” category includes 34 different genera.

FAMILY DIVERSITY

Trees inventoried represented a total of 22 tree families. The most common at 27.1% was Rosacea, the rose family which includes apples, pears, plums, cherries, and hawthorns. The second most common family was Sapindaceae at 21.9%, which is the family that includes maple trees. The third most common was Fagaceae, the family that includes oaks and beeches at 8.9%. Table 5 includes the full list of all families inventoried and their numbers and percentages.

Table 5. Existing Trees by Family

Family	Number	Relative Abundance
Rosaceae	1609	27.03%
Sapindaceae	1305	21.93%
Fagaceae	529	8.89%
Oleaceae	524	8.80%
Pinaceae	453	7.61%
Cupressaceae	314	5.28%
Betulaceae	273	4.59%
Malvaceae	227	3.81%
Cercidiphyllaceae	160	2.69%
Altingiaceae	112	1.88%
Ulmaceae	91	1.53%
Magnoliaceae	84	1.41%
Cornaceae	60	1.01%
Hamamelidaceae	60	1.01%
Ginkgoaceae	49	0.82%
Salicaceae	48	0.81%
Platanaceae	17	0.29%
Fabaceae	16	0.27%
Anacardiaceae	5	0.08%
Lythraceae	5	0.08%
Aquifoliaceae	1	0.02%
Moraceae	1	0.02%

This table shows the quantity and relative abundance of tree families inventoried in ROWs and parks. Nine trees with genus 'unknown' are omitted from this table.

HEALTH/CONDITION

Table 6 shows the inventoried public tree numbers and percentages separated by their health/condition rating. The majority of publicly managed trees were in decent condition with over 86% of the inventoried trees being rated as “good” or better.

Table 6. Existing trees condition rating

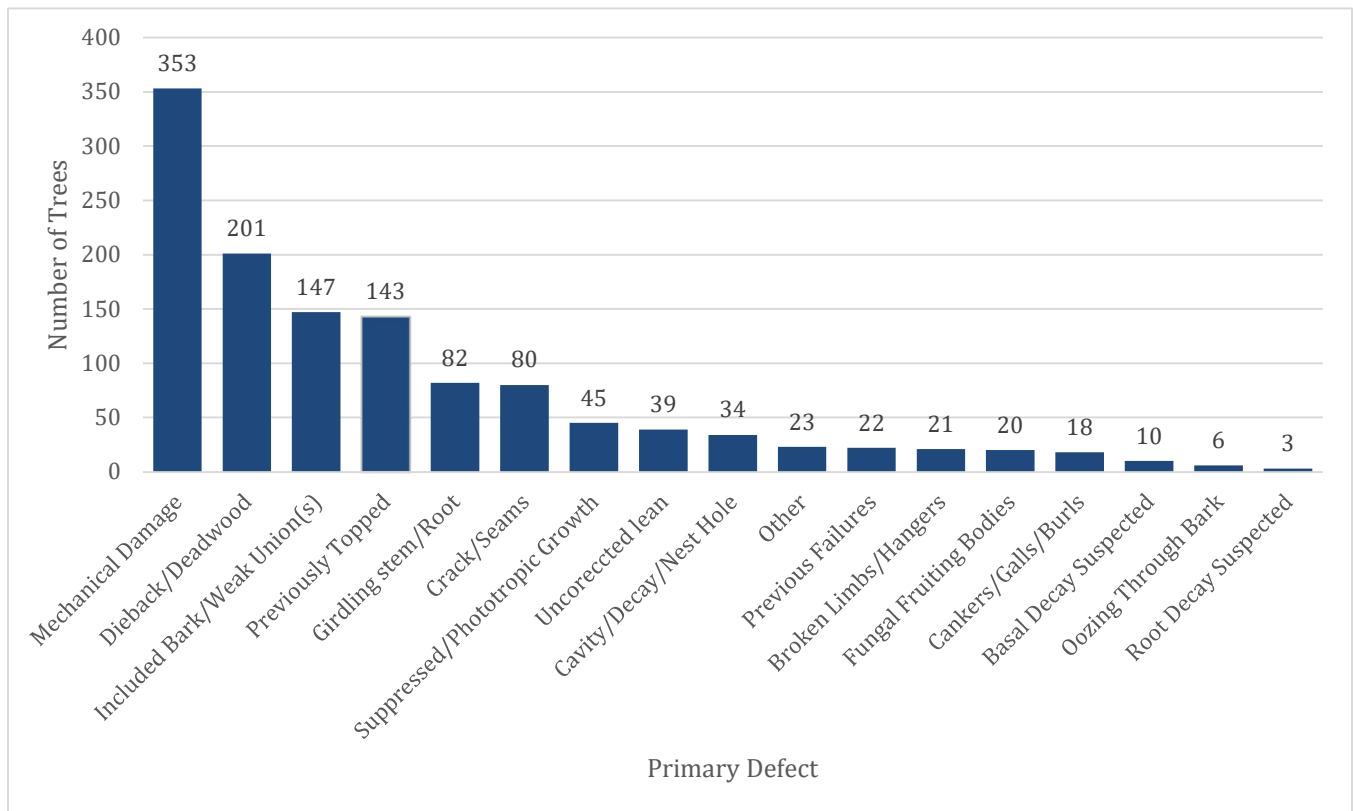
Condition Rating	Number	Percent
Excellent	330	6%
Very Good	2332	39%
Good	2442	41%
Fair	660	11%
Poor	127	2%
Very poor	12	0.2%
Dead	49	0.8%

The quantity and percent of inventoried public trees separated by their health/condition rating.

PRIMARY DEFECTS

Of the 5,952 trees inventoried, a defect was recorded for 21% of the trees (1,247 trees). Some trees may have had multiple defects; however, only the most pressing defect was recorded. Figure 5 shows how many of each primary defect was noted. The most common defect was mechanical damage.

Figure 5. Primary Defects of Inventoried Trees



RECOMMENDED MAINTENANCE AND REMOVALS

Of the trees inventoried, 27% (1,617 trees) have a recommended maintenance action, which includes if a tree is recommended for removal. The most common recommendation (Table 7) is for clearance pruning, making up over 50% of the recommended maintenance activities. Clearance pruning removes branches to make way for street and sidewalk traffic, including trucks, cars, bikes and pedestrians.

Table 7. Recommended Removals and Maintenance

Recommended Maintenance	Notes	Number of Trees
Removal - 1	High or Extreme Risk. Remove within next six months.	4
Removal - 2	Moderate Risk or Dead/Dying Trees 4-inches or greater. Remove within next 1-3 years.	38
Removal - 3	Not necessarily associated with risk. Includes dead or dying trees less than 4 inches. Remove within next 1-5 years.	68
Prune - High Risk Branches		7
Prune - Clearance		1016
Prune - Structural		75
Young Tree Maintenance		397
Total		1617

RECOMMENDED REMOVALS

Summary of recommended tree removals are in Table 8.

Table 8. Removal Recommendations

	Species	Tree Diameter			
		<4"	4-10"	10-14"	14-21"
Removal Priority 1	<i>Abies grandis</i> / Grand fir				1
	<i>Acer rubrum</i> / Red maple				1
	<i>Acer saccharinum</i> / Silver maple				1
	<i>Fraxinus pennsylvanica</i> / Green ash				1
Removal Priority 2	<i>Acer rubrum</i> / Red maple		8	1	
	<i>Alnus rubra</i> / Red alder		1		
	<i>Betula papyrifera</i> / Paper birch		3		
	<i>Fraxinus pennsylvanica</i> / Green ash		5	1	
	<i>Prunus cerasifera</i> / Purple-leaf plum		1		
	<i>Prunus serrulate</i> / Flowering cherry		1	1	
	<i>Robinia pseudoacacia</i> / Black locust			1	
	<i>Tilia cordata</i> / Linden		1		
Unknown species		1			
Removal Priority 3	<i>Abies procera</i> / Noble fir			1	
	<i>Acer rubrum</i> / Red maple	1			
	<i>Betula nigra</i> / River birch	1			
	<i>Betula papyrifera</i> / Paper birch	2	1		
	<i>Fagus sylvatica</i> / Beech	4			
	<i>Fraxinus pennsylvanica</i> / Green ash			1	
	<i>Nyssa sylvatica</i> / Tupelo	1			
	<i>Prunus cerasifera</i> 'Thundercloud' / Purple-leaf plum				1
	<i>Pseudotsuga menziesii</i> / Douglas-fir	4	8	9	8
	<i>Tilia cordata</i> / Linden	1			
	<i>Zelkova serrata</i> / Zelkova		1		
Unknown species	5				

Removal 1 – Trees that are high or extreme risk. Should be removed in the next six (6) months.

Removal 2 – Trees that are moderate risk, or are dead or dying trees > 4inches diameter. Should be removed in the next 1-3 years.

Removal 3 – Trees that should be removed and replaced, but are not necessarily associated with risk. Trees could be in poor condition, diseased, overplanted, or be the wrong species for that location. This category also includes dead or dying trees that are less than four (4) inches in diameter. Trees should be removed within 1-5 years.

PRIORITIZING MAINTENANCE

The 1,617 trees with recommended maintenance or removal actions were separated into different priority levels based on the tree location and the urgency of the action. Table 9 shows the breakdown of maintenance actions and priority levels. Most of the recommended maintenance is not urgent, and includes young tree maintenance and clearance pruning of trees in non-priority streets or snowplow routes outside of the central area.

When establishing priority levels for tree removals and maintenance, priority was given to trees within the Central Area and to trees along snowplow routes and the primary right of way routes identified in Figure 1.

Table 9. Maintenance and Removal Priorities

Maintenance Priority Level	Areas	Action	Tree Qty	Recommended Timeframe
1	All	Remove tree (R1) Prune High Risk Branches,	11	6 months
2	Central; Snow Plow Routes Priority Right of Way Routes	Remove tree (R2, R3) Structural pruning	90	12 months
3	Snow Plow Routes Priority Right of Way Routes	Young tree maintenance Clearance pruning	28	18 months
4	Parks, Northwest North East South West	Remove tree (R2, R3) Structural pruning	69	2 years
5	Central, Parks	Young tree maintenance Clearance pruning	338	3 years
6	North Northwest East South West	Young tree maintenance Clearance pruning	1081	5 years
Total			1617	

This table shows the conditions and locations used for determining maintenance priorities of trees.

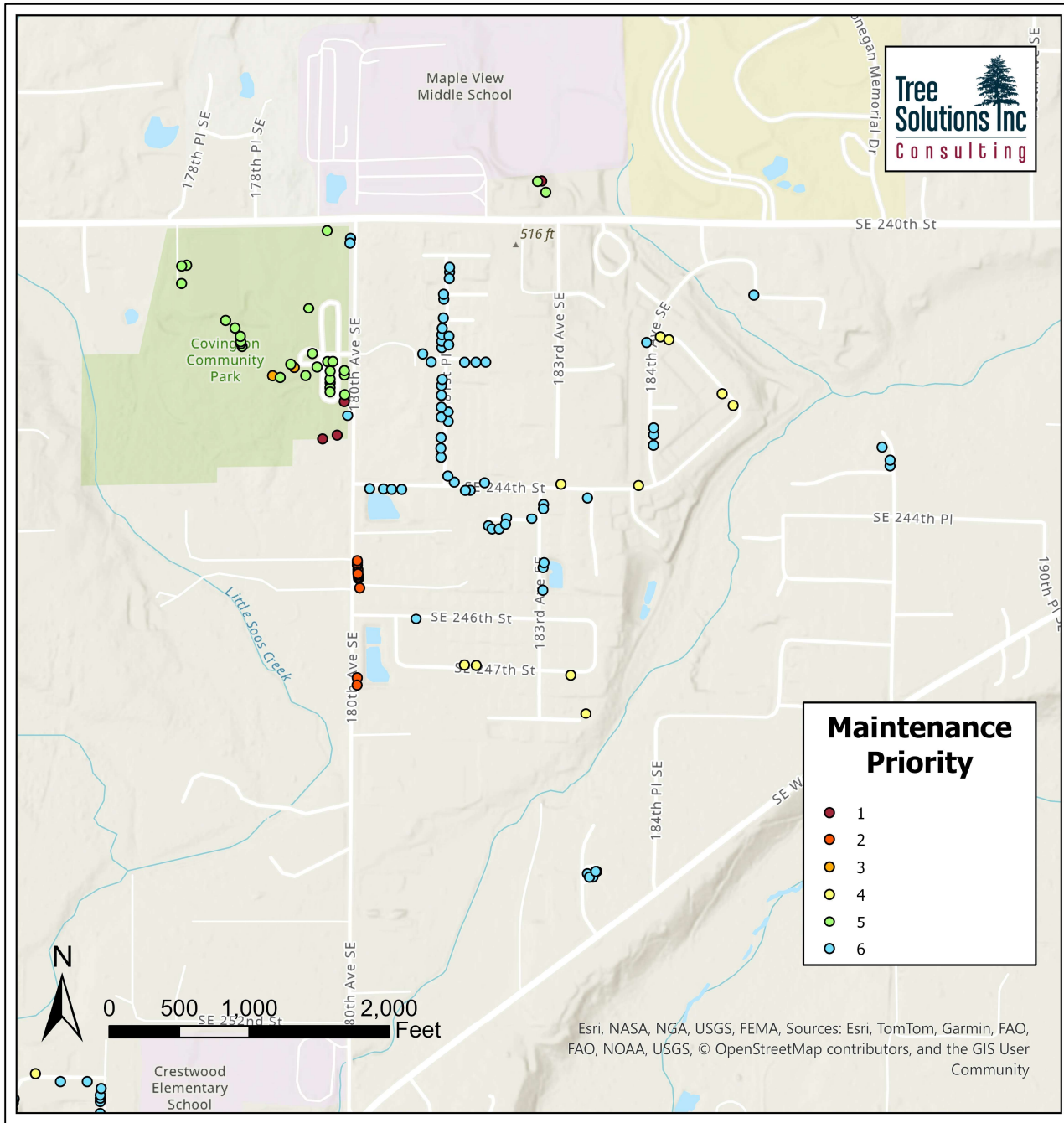
R1: Removal Priority 1,

R2: Removal Priority 2

R3: Removal Priority 3

GIS data was provided with this report. Maps can be created filtering trees by any attribute, including maintenance priority. An example can be found in Figure 6.

Figure 6. Trees with Recommended Maintenance for North Priority Area



Map of North Priority Area showing trees with recommended maintenance actions. This map can be produced for any area in Covington to aid staff in managing and budgeting for tree maintenance.

CANOPY DEVELOPMENT

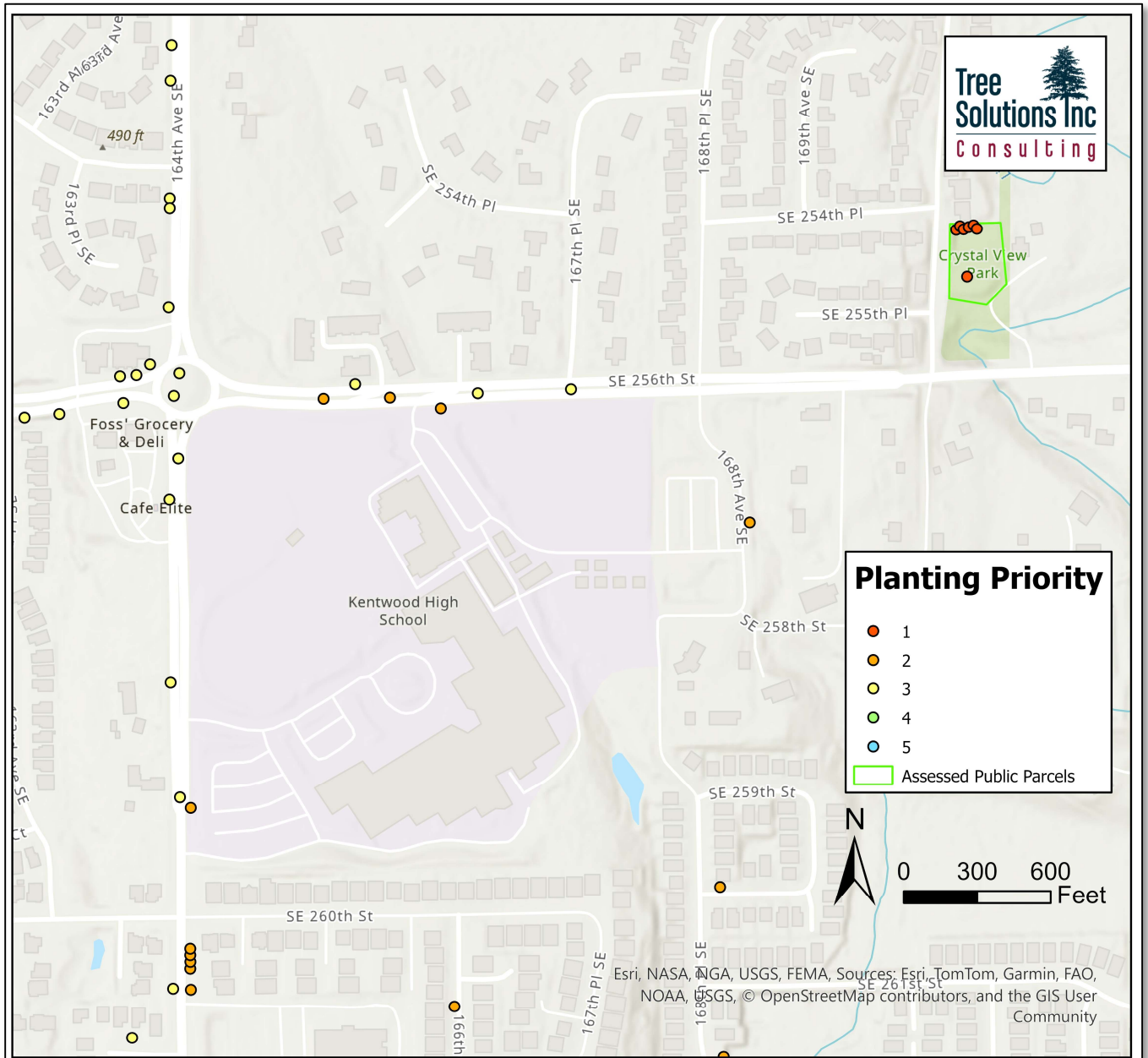
INSTALLATION OF NEW TREES

Arborists identified 997 locations of potential planting locations for trees. Each of the recommended planting locations are separated into five different planting priority categories based on their locations. Table 10 shows the location criteria for each planting priority and the number of planting locations within each planting priority. The greatest planting opportunities are within the 6 parks, followed by in the Central area. Figure 7 shows an example map that can be produced from provided GIS data illustrating different planting locations labeled by recommended planting priority.

Table 10. Potential tree planting by locations and priority

Planting Priority	Location in Covington	Number of Planting Locations
1	Parks	433
2	Central	274
3	Northwest	84
4	Snow Plow / Priority Inventory Routes	122
5	All remaining	85
Total		997

Figure 7. Map Example Showing Priority Locations for New Tree Plantings



THREATS TO TREE CANOPY

RESOURCES

Lack of adequate staff and funding to adequately maintain and train young trees is a real threat to helping newly planted trees reach maturity. Research indicates that only half of trees planted in a typical urban tree planting survive 13 to 18 years (Hilbert et al., 2019) and in some cases mortality of newly planted urban trees can reach 25% within the first few months (Yang & McBride, 2003). Many urban trees, particularly in right of way, have short lifespans due to improper planting techniques, inadequate mulch and irrigation during tree establishment, and lack of structural pruning.

Investing in tree establishment, including monitoring young trees, is the easiest way to ensure planted trees reach maturity and contribute to the urban canopy long-term.

If structural pruning doesn't occur when trees are young and branches are small, there is a higher potential for large branches in the future to be broken and ripped by trucks and cars. This can cause significant damage. In some cases, these can turn into risk situations and require emergency tree work. It can also significantly reduce plant vigor and its ecological benefits.

Tree grates must be maintained and widened before trees are negatively impacted. Stakes and ties can girdle trees if not removed after a year.

CLIMATE CHANGE

Regional temperatures are expected to continue to rise with more extreme temperatures (BERK Consulting, 2023). Stress from extreme heat can cause dieback, leaf scalding, reduced photosynthesis and early leaf drop. These symptoms can reduce shade and a tree's cooling effect during the times when shade is needed most.

Maintaining a continuous urban canopy can help regulate extreme temperatures for nearby trees, reducing overall plant stress from extreme heat. Mature trees tend to not respond as easily to environmental changes. They will rely on nearby trees to reduce heat impacts.

DISEASE AND PESTS

Plant diseases and pests that affect urban tree canopy in the Puget Sound region continue to evolve. Planning for these pathogens and potential outbreaks that can cause immediate severe impacts to the urban forest is critical to maintaining a resilient urban tree canopy. Using three sources published by public organizations (Washington State Department of Agriculture, and the Washington State Invasive Species Council, and City of Seattle) a list of pests and diseases was compiled that have the potential to cause widespread impacts to trees in Covington. Table 11 includes information on their hosts, if they are currently present in Washington state, and types of impact. The only disease or pathogen on this list observed during data collection was pear trellis rust which was on nearly every Callery pear (*Pyrus calleryana*) tree. Callery pears made up over 12% of the total trees inventoried.

This is not a comprehensive list of diseases that impact trees in western Washington but those that public agencies have identified as having the potential for sudden outbreaks and widespread impacts to urban trees.

Table 11. Current and Potential Pest and Diseases

Pathogen	Type	Presence in WA	Hosts	Notes
Asian and Citrus Longhorn Beetles ^{a,b,c}	Insect	no	<i>Fraxinus, Koelreuteria, Cercidiphyllum, Aesculus, Ulnus, Platanus, Acer, Katsura, Sorbus, Betula, Populus, Salix</i>	Can cause tree mortality.
Emerald Ash Borer ^{a,b,c}	Insect	no	<i>Fraxinus spp.</i>	Kills 99% of trees. Present in Oregon, forecasted to be present in WA soon.
Gypsy Moth ^b	Insect	no	Generalist: feeds on many species	Defoliates trees, can cause mortality.
Sirex Woodwasp ^{a,b,c}	Insect	no	<i>Pinus</i>	Beetles infect trees with fungus that causes mortality.
Bronze Birch Borer ^a	Insect	yes	some <i>Betula spp.</i>	Kills trees over the course of 3-5 years.
Winter moth ^a	Insect	yes	<i>Quercus, Acer, and fruit trees</i>	Defoliates trees, several years of an infection can cause dieback or mortality.
Dutch Elm Disease ^a	Fungus	yes	Some <i>Ulnus spp.</i>	Fungus spread by beetles causes mortality.
Sooty Bark Disease ^a	Fungus	yes	<i>Acer, Aesculus, Cornus, Prunus</i>	Not much known about this disease
Pear Trellis Rust ^a	Fungus	yes	<i>Pyrus, Juniperus</i>	Damage is mostly to fruit and aesthetics, rarely causes mortality.
Spotted Lanternfly ^{b,c}	Insect	no	<i>Ailanthus altissima</i> is preference but impacts many other hardwoods	Rarely causes mortality but cause stress and other issues
Spongy moth ^c	Insect	yes	Generalist	Defoliates trees causing stress and sometimes death

Pathogens listed alphabetically.

Source for information:

a – City of Seattle <https://seattle.gov/trees/tree-pests>

b – WSDA https://cms.agr.wa.gov/WSDAKentico/Documents/PP/PestProgram/802-InvasiveInsectDetectionPamphlet-WEB_1

c – Washington State Invasive Species Council <https://invasivespecies.wa.gov/find-a-priority-species>



Recommendations

The urban tree canopy across public parks and right of way in the City of Covington is a crucial component of the city's green infrastructure. By implementing these recommended strategies, Covington can enhance and increase its tree canopy, reducing climate impacts for its residents.

TREE MAINTENANCE

Maintaining and improving the health and structure of established trees is the most resource and cost-effective way to improve the urban forest canopy and improve its resilience to climate change.

Recognizing that the City of Covington has limited resources to work on tree management and removal, the 1,602 trees recommended for removal and maintenance are separated into six priority categories. Priority categories are based on the maintenance action required and the location of the tree (see Table 9). Trees along snow plow routes and specific right of way routes were prioritized, as well as trees in the central area.

MANAGE FOR RISK

REMOVE AND REPLACE HIGH RISK TREES

Only four (4) trees were identified as high risk trees that require removal and replacement. These should be removed within the next six (6) months.

PRUNE BRANCHES THAT ARE HIGH RISK

Seven (7) trees were identified as high risk that can be mitigated through pruning. These should be completed within the next six (6) months.

CARE FOR YOUNG TREES

CONDUCT CLEARANCE PRUNING AND YOUNG TREE MAINTENANCE

Removals and structural pruning had a higher priority than young tree maintenance and clearance pruning. Structural pruning and young tree maintenance accounted for 29% of all recommended maintenance actions.

REPLACE DEAD TREES

REMOVE AND REPLACE DEAD AND DYING TREES

Trees that are recommended for removal are not included in potential planting location totals. It is assumed that any tree removed will be replaced, unless there is a conflict with utilities or infrastructure and that location will not support a tree.

ESTABLISH REGULAR INSPECTIONS

This inventory and report identified trees that required maintenance at the time of the inventory. The city should establish regular inspections for publicly managed trees at a minimum of a 5-year interval per tree. These inspections can flag trees with minor problems before they become more serious. Maintenance crews should use the GIS platform to identify when the next inspection should be. Some tree species may require more frequent inspections depending on species profile, and historic failures.

PREPARE AND MONITOR FOR PESTS AND DISEASES

The table above (Table 11) summarizes current and future threats from pests and pathogens. Maintenance staff should be familiar with pest identification so they can identify them in the field. An integrated pest management plan should be established and in place, so the city can respond to any signs of these pests or diseases.

EMERALD ASH BORER

Emerald Ash Borer (EAB) is a nonnative beetle to North America that has devastated mature ash (*Fraxinus spp.*) populations in urban forests. This insect causes mortality in 99% of untreated ash trees in North America. It has recently arrived in northern Oregon and it is anticipated to move northward to the Puget Sound region in the near future. Once it arrives, this beetle has the potential to cause complete mortality to the city's ash population within 3-5 years.

EAB could have a significant negative impact on the city's publicly managed trees. Arborists identified 516 ash trees in Covington, making it the fourth most inventoried genus (8.7% of total trees inventoried).

Ash trees can be treated with insecticides to prevent EAB establishment in individual trees. This treatment must be applied regularly and can have ecological consequences, as well as being costly. The City of Covington should make a plan for the arrival of this pest including weighing the options of treating public trees versus removing and replacing them with a different species. Inaction may result in the city's sudden responsibility of removing and replacing over 500 dead trees.

Washington State Department of Natural Resources offers recommendations² for steps communities can take to prepare for the arrival of EAB. Recommendations include training staff, updating ordinances, raising awareness, and reviewing the State of Washington Urban Forest Pest Readiness Playbook.³ The City of Covington should review these recommendations and establish an action plan for an inevitable future EAB outbreak.

PEAR RUST

Pear rust was the only disease observed, which was found on nearly every *Pyrus* tree that was inventoried. This is a common disease that is generally considered an aesthetic issue for otherwise healthy ornamental trees. Pear rust can cause fruit and some foliage loss, which is an economic issue for agriculture. The only *Pyrus* species in this inventory were ornamental and impacts from rust would mostly be aesthetic.

Treatment for trees with pear rust is not recommended since this disease rarely causes death, but the city should not plant additional pear trees. *Pyrus calleryana* is the most common species in Covington and *Pyrus* is the second most common genus making up over 12% of all trees inventoried. The field team observed that many recent plantings in new developments appeared to be pears.

ESTABLISH AN ACCESSIBLE INTERNAL GIS MAP

Tree Solutions Inc has provided the City of Covington with a GIS shapefile with all data collected.

Opportunities for GIS include making it an interactive online map for public to track trees near them.

The City should also make all tree data easily accessible to maintenance crews in the field. The map should be online, intuitive, and not require specific software to access, allowing users to filter specific attributes of established trees. It should also be easily editable so that pruning and maintenance can be recorded in real time. This map will be a useful tool for maintenance staff to plan for and record maintenance and planting activities.

TREE PLANTING

There is an opportunity to improve the publicly managed urban tree canopy of Covington through the installation of additional trees. Being intentional about the species of trees installed can influence how robust and resilient to climate change the future of Covington's canopy will be.

² https://www.dnr.wa.gov/publications/rp_urban_eab_prep_recommendations.pdf

³ <https://invasivespecies.wa.gov/wp-content/uploads/2020/01/UrbanForestPestReadinessPlaybook.pdf>

Arborists identified 997 locations where trees could be installed. These included areas where there is a dead or former tree and open locations that could fit a new tree. Some of these locations may need to be verified that there are no barriers to a tree being planted such as underground utilities that were not evident to the arborists conducting the inventory.

All the trees should be installed within the next five years. To help prioritize tree installations, each planting location has a priority ranking based on its location. Table 10 shows the numbers of trees within each priority. First priority was given to parks/public parcels since this is the easiest opportunity to increase canopy. Several of the parks had large areas of field or lawn that were not associated with sports fields that could host a number of trees. Parks also have much more room to plant larger species than in areas along the right of way. The next priorities were given to right of way locations in the central and the northwest areas since they had a higher urban heat index than the other areas. The next priority was given to the primary right of way routes/snowplow routes as these are generally along larger arterials. The lowest priority was given to all the other areas.

PRE-PLANTING AND PLANNING

Pre-planting should include community engagement, species selection and site design.

All parks should have a site-specific planting plan that outlines objectives for the ultimate tree canopy of the park and what trees should be planted to meet these goals.

PRIORITIZE PLANTING EVERGREEN SPECIES

One benefit of a robust canopy cover is its ability to intercept precipitation during storm events and reduce the load on stormwater infrastructure and slowing flooding⁴. Having a robust evergreen urban canopy will provide the most benefits for managing and slowing stormwater runoff. Most precipitation events in the Puget Sound region happen in the winter when deciduous trees do not have foliage and their canopy cannot intercept water. Only 13% of public trees were evergreen (see Table 1). Evergreen trees should be prioritized if the City of Covington desires an urban canopy that can help reduce the amount of stormwater during winter precipitation events.

PRIORITIZE PLANTING CLIMATE-RESILIENT SPECIES

Climate models indicate that due to climate change, King County will experience hotter and drier summer days in the next 25 years (“Climate Vulnerability Assessment: Policy Audit, Strategies, and Priorities”, BERK Consulting, 2023). The city should prioritize tree species that are drought-resistant, heat tolerant, and able to withstand these changes.

PLANT SPECIES APPROPRIATE FOR THE SITE

Choose a tree species that will not impact future infrastructure, utilities or overhead power lines. Other site factors should include soil type, available soil volume (planting space), and microclimates.

⁴ <https://www.epa.gov/soakuptherain/soak-rain-trees-help-reduce-runoff>

PLANT LARGE STATURE TREES WHERE POSSIBLE

Larger stature trees increase the size of the urban canopy cover and decrease the impacts of the urban heat island effect. Table 2, which shows the relative abundance of four size categories across the city and within areas, shows that most of the trees inventoried were in the “large” size category at 35%. Large stature trees were especially prominent in the central and northwest areas, at 43% and 42% respectively. Both areas had some of the higher heat island measurements and these trees continue to grow and expand their canopy, and the benefits from a larger canopy should follow. As the city chooses plant pallets, the city should continue to prioritize larger stature trees, especially in the east and south areas where there was a lower percentage of high stature trees.

Larger stature trees are not appropriate for every location given proximity to buildings or infrastructure. Larger stature trees also require larger rooting areas and may cause pavement conflicts as they age. Large stature trees should be installed in locations where they have enough room to grow above and below ground. Tree planting areas should be designed so that they are conducive to the installation of larger trees.

PLANT A MORE DIVERSE PALETTE OF SPECIES

Having a diverse urban forest can make the urban canopy more resilient to climate change and pathogens and pests. The relative abundance of taxa within an urban forest can be a good measure of the diversity of a forest⁵. One commonly used diversity benchmark used in urban forestry is the 10-20-30 rule of thumb developed by Dr. Frank Santamour in which he recommends that within an urban forest, the relative abundance of any one species should not be greater than 10%, the relative abundance of a genus should not be greater than 20%, and the relative abundance of plant family should not be greater than 30%. While there have been criticisms regarding this approach, the merits of planting tree diversity are not disputed. Covington has a relatively temperate climate where a large variety of species can grow. It should strive for plant diversity meeting these benchmarks.

Applying the 10-20-30 rule, Covington is slightly higher than what it allows: Callery pears and red maple trees are both above the 10% species threshold, *Acer* is above the 20% genus threshold. There are no tree families that exceed the 30% threshold (although *Rosacea* comes close at 27%.) As the city chooses a plant palette to install new trees, the relative abundances of species, genera, and families (Table 3, Table 4, Table 5) should be reviewed and the city should avoid installing tree species, genera, and families that are already abundant within the publicly managed urban forest.

The City of Covington should avoid planting any additional Callery pear trees, which are overly abundant and are susceptible to diseases like the pear trellis rust. They also have brittle wood and can be prone to branch failure as they grow.

The city should avoid planting any trees in the ash (*Fraxinus*) genus, which are susceptible to Emerald Ash Borer as well as birch (*Betula*) species susceptible to bronze birch borer, and elm (*Ulmus*) species susceptible to Dutch elm disease.

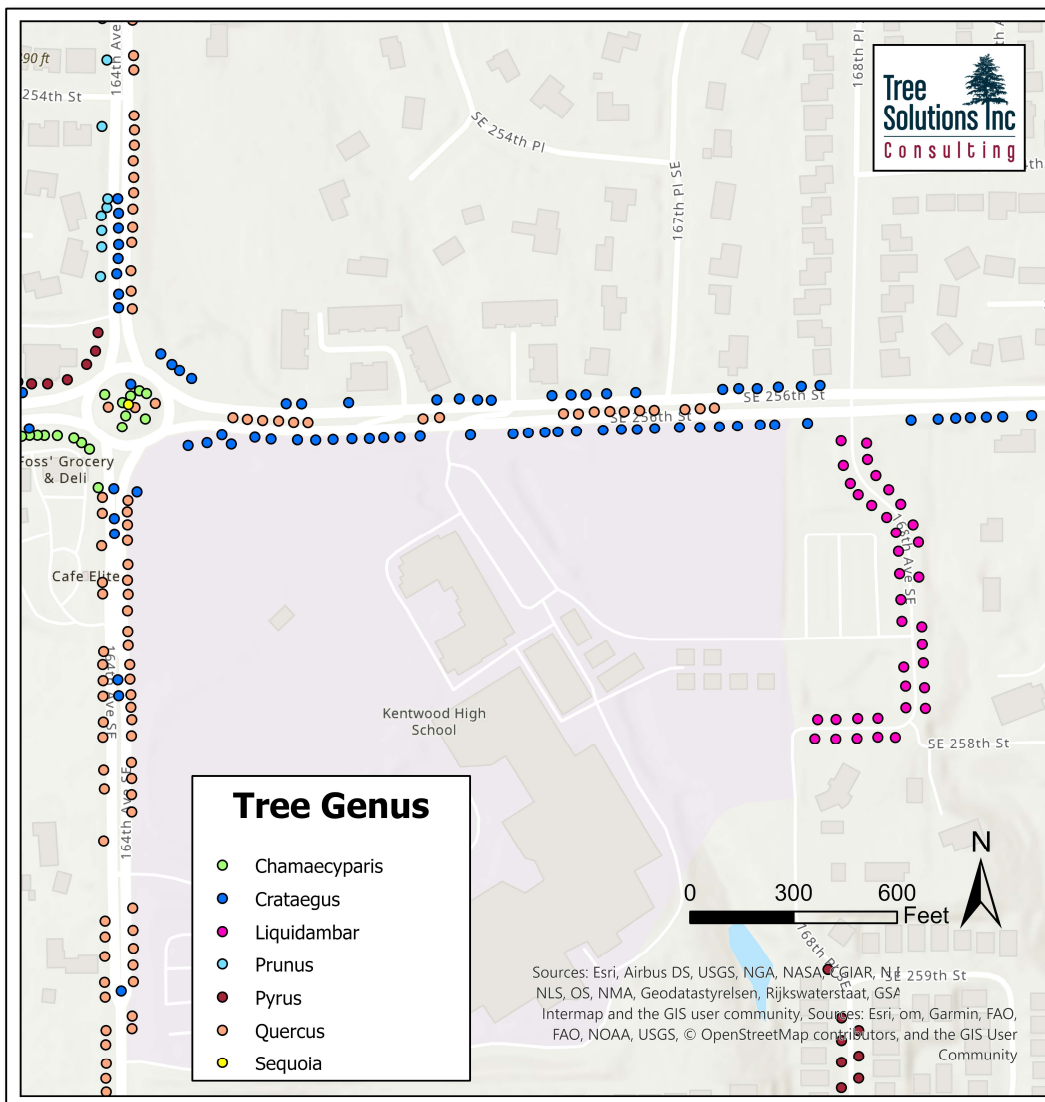
⁵ Dave Kendal, Cynnamon Dobbs, Virginia I. Lohr, Global patterns of diversity in the urban forest: Is there evidence to support the 10/20/30 rule?, Urban Forestry & Urban Greening, Volume 13, Issue 3, 2014, Pages 411-41

DIVERSIFY WITHIN NEIGHBORHOODS

Avoid monocultures and consider planting a more diverse tree palette within a neighborhood. During the inventory, the field team noticed that often it was just one or two species of trees that had been installed along a right of way or in a housing development (Figure 8). Having a more diverse planting within a neighborhood or development can create a more resilient urban forest at a local level. For example, if there is a disease or pest that specifically impacts one genus, a neighborhood or street could lose all of its tree canopy quickly.

If similar tree species are planted along a block, they should be planted further apart to slow the spread of pathogens.

Figure 8. Tree Genus Diversity in Focused Area



Trees of the same genus were often planted in rows along the same street. For example, if a pathogen were to arrive that used Quercus as a host, all of the trees along 164th Ave SE would be impacted and possibly lost.

INSTALLATION

SOURCE LOCALLY

Work with local nurseries to increase quality production of underused species. Using local nurseries can reduce costs and reduce carbon emissions from transportation of plant material.

PLANT FOLLOWING ARBORICULTURAL BEST PRACTICES

Use professional staff who are trained to install trees correctly. They should follow ANSI standards for tree planting including site preparation, planting depth, and watering.

POST PLANTING

Allocate about one-third of funding for equipment and staff for regular maintenance of trees up to 5 years after planting (Eisenman et al., 2024). This is a critical component of increasing an urban tree canopy. This includes weeding, reapplying mulch, adjusting stakes and ties, and structural pruning. It also includes monitoring and repairing irrigation during plant establishment, and monitoring for pests and diseases.

ADDITIONAL RECOMMENDATIONS

The following are recommendations that could promote a more dynamic and resilient urban canopy:

- Increase the required planting strip in the city’s standard detail to allow for the installation of larger species within right of way.
- Reassess the standard detail 526 for tree planting and irrigation.
- Develop a list of prohibited species within right of way and parks, deterring installation of tree genera that are overrepresented (*Acer*) and tree genera that are susceptible to high-impact pathogens or pests (*Pyrus*, *Fraxinus*).

NEXT STEPS AND BEYOND

There are additional opportunities that are beyond the scope of this tree inventory, which can serve the goals and policies outlined in Chapter 6: the Natural Environment Element of the 2024 Comprehensive Plan.

Primarily the city should secure on-going funding for managing Covington’s publicly managed urban forest. Our recommendations for a 5-year maintenance plan are based off a singular moment in time, but as Covington’s public trees grow, they will continue to require regular maintenance and monitoring. The city should not solely rely on grants to fund on-going forest management. Our recommendations will require labor and resources. The City should establish a recurring budget for adequate staff to manage public trees in Covington.

ADDITIONAL STUDIES

Additional studies recommended include:

- Pricing for proposed maintenance and tree installation work.
- Tree inventory of residential right of way not completed in this inventory, this could include crowd-sourced data which will require homeowners input.
- Tree inventory for parks and public parcels not included in this study.
- Developing park-specific tree management plan and natural area plans, including risk assessments, incorporating long-term planning and programming goals, and a plan for resources to plant and maintain canopy.

OUTREACH OPPORTUNITIES

Future outreach and community engagement can include:

- Street tree benefits and why Covington residents should plant and maintain street trees.
- Resources on tree planting including where to get a tree, how to plant a tree, and how to maintain a tree.
- Approved or recommended street tree species list that are native and/or climate resistant.
- Community involvement:
 - Volunteering in a local park
 - Planting a tree for a neighbor
 - Monitoring trees on your walking routes and in your neighborhood
 - Awareness and monitoring for signs and symptoms of potentially damaging insects and disease
- Community input and buy-in on right of way and parks



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Definitions

canker: localized diseased area on stems, roots, and branches. Often shrunken and discolored. (Lily 2010)

canopy: the layer of foliage, branches, and stems of trees that cover the ground or the area of a city is shaded by trees.

cavity: open or closed hollow within a tree stem, usually associated with decay. (Lily 2010)

chlorotic: foliage with whitish or yellowish discoloration caused by lack of chlorophyll.

codominant stems: stems or branches of nearly equal diameter, often weakly attached (Matheny *et al.* 1998)

cracks: separation in wood fibers; narrow breaks or fissures in stems or branches. If severe may result in tree or branch failure. (Dunster 2017)

crown: the aboveground portions of a tree

decay: an area of wood that is undergoing decomposition (Lily 2010)

deciduous: tree or other plant that sheds all of its leaves according to a genetically scheduled cycle as impacted by climate factors (usually during the cold season in temperate zones) (Lilly 2010)

dieback: condition by which the branches in the tree crown from the tips toward the center. (Lilly 2010)

DSH: diameter at standard height; the diameter of the trunk measured 54 inches (4.5 feet) above grade (Matheny *et al.* 1998)

evergreen: tree or plant that keeps its needles or leaves year round; this means for more than one growing season (Lilly 2010)

failure (of a tree part): breakage of stem, branch, or roots, or loss of mechanical support in the root system. (Dunster 2017)

fruiting body: reproductive structure of a fungus. The presence of certain species may indicate decay in a tree. (Lilly 2010)

gall: abnormal swelling of plant tissue caused by gall wasps, mites, nematodes, and various insects and less commonly by fungi or bacteria.

girdling root: root that encircles all or part of the trunk of a tree or other roots and constricts the vascular tissue and inhibits secondary growth and the movement of water and photosynthates.

GIS: Geographic Information System

ISA: International Society of Arboriculture

hanger: a broken branch that is still attached to the tree, assumed to fall at any moment.

heat island: places with greater impervious surfaces in roads, parking lots, and building roofs and less tree canopy where heat is absorbed and hotter than other locations in a city. (BERK Consulting, 2023)

included bark: bark that becomes embedded in a crotch (union) between branch and trunk or between codominant stems and causes a weak structure (Lilly 2010)

lean: predominant angle of the trunk from the vertical (Dunster 2017)

mechanical damage: any damage to tree roots, trunks, or branches from something striking a tree part.

monitoring: keeping a close watch; performing regular checks or inspections (Lilly 2010)

pathogen: causal agent of disease. Usually refers to micro-organisms (Dunster 2017)

phototropic growth: growth toward light source or stimulant

planting pit: A designated area within pavement or a sidewalk for a tree or other vegetation.

planting strip: Area between a road and a sidewalk meant for vegetation.

risk: the combination of the likelihood of an event and the severity of the potential consequences. In the context of trees, risk is the likelihood of a conflict or tree failure occurring and affecting a target, and the severity of the associated consequences. (Dunster 2017)

ROW: public right of way

snag: a tree left partially standing for the primary purpose of providing habitat for wildlife

structural defects: feature, condition, or deformity of a tree that indicates a weak structure or instability that could contribute to tree failure (Dunster 2017)

topping: inappropriate pruning technique to reduce tree size. Cutting back a tree to a predetermined crown limit, often at internodes. (Lilly 2010)

vigor: overall health. Capacity to grow and resist stress. (Lilly 2010)

urban forest: the naturally occurring and planted trees and associated plants in an urban area

Appendix A:



Mature Tree Size by Species

A. Mature Tree Size by Species

RELATIVE TREE SIZE AT MATURITY

Mature canopy size varies by species and individual plant. To get a general sense of the quality and depth of urban tree canopy over time, we have categorized tree species into Small, Medium, Medium/Large and Large canopy categories. These categories are based on City of Seattle publications combined with our professional judgement and experience with tree species in the Puget Sound Region.

Large

Canopy > 50 feet at maturity

Abies grandis
Abies procera
Acer macrophyllum
Acer saccharinum
Acer saccharum
Alnus rubra
Calocedrus decurrens
Cedrus deodara
Cedrus libani ssp. atlantica
Cercidiphyllum japonicum
Chamaecyparis pisifera
Fagus sylvatica
Fraxinus pennsylvanica
Liquidambar styraciflua
Liriodendron tulipifera
Metasequoia glyptostroboides
Picea abies
Pinus nigra
Pinus ponderosa
Platanus x acerifolia
Populus trichocarpa
Pseudotsuga menziesii
Quercus alba
Quercus garryana
Quercus palustris
Quercus robur
Quercus rubra
Sequoia sempervirens
Sequoiadendron giganteum
Thuja plicata
Tsuga heterophylla

Ulmus americana

Ulmus laevis

X Cuprocyparis leylandii

Zelkova serrata

Medium/Large

Canopy 40-50 feet at maturity

Acer platanoides
Fraxinus americana
Ginkgo biloba
Picea pungens
Pinus sylvestris
Tilia americana

Medium

Canopy 30-40 feet at maturity

Acer sp.
Acer truncatum x Acer platanoides
Betula nigra
Betula papyrifera
Betula pendula
Callitropsis nootkatensis
Carpinus betulus
Chamaecyparis lawsoniana
Chamaecyparis obtusa
Crataegus phaenopyrum
Fagus pendula
Fraxinus oxycarpa 'Raywood'
Magnolia grandiflora
Morus alba
Nyssa sylvatica
Ostrya virginiana

Picea glauca

Populus tremula

Populus tremuloides

Prunus avium

Prunus cerasifera

Pyrus calleryana

Salix scouleriana

Salix sp.

Thujaopsis dolabrata

Tilia cordata

Small

Canopy <30 feet at maturity

Acer ginnala
Acer griseum
Acer palmatum
Amelanchier alnifolia
Cercis canadensis
Cornus florida
Crataegus douglasii
Crataegus monogyna
Ilex aquifolium
Laburnum anagyroides
Lagerstroemia indica
Magnolia x soulangiana
Malus domestica
Malus sp.
Parrotia persica
Pinus contorta var. contorta
Prunus serrulata
Rhus typhina
Sorbus aucuparia
Thuja occidentalis